

Food Insecurity, Poverty and Agriculture: A Concept Paper

Sumiter S. Broca

ESA Working Paper No. 02-15

September 2002

Agricultural and Development Economics Division

The Food and Agriculture Organization
of the United Nations

www.fao.org/es/esa

ESA Working Paper No. 02-15

www.fao.org/es/esa

Food Insecurity, Poverty and Agriculture: A Concept Paper

September 2002

Sumiter S. Broca

Agricultural and Development
Economics Division
Economic and Social Department
Food and Agriculture Organization
Italy
e-mail: sumiter.broca@fao.org

Abstract

This paper argues for a twin-track approach to hunger and poverty reduction that combines measures to promote rural development through growth in agriculture and rural off-farm activities with measures to provide direct and immediate access to food for the most needy.

The paper begins with an exposition of the concepts of food insecurity and poverty and shows that the majority of the hungry and poor in developing countries still live in rural areas. It then documents the substantial economic costs of hunger to show that direct action against hunger can itself contribute to poverty reduction.

It goes on to argue that if the income from agricultural growth is spent locally and promotes growth in rural off-farm activities, this can have a strong impact on the incomes of the poor. Evidence is presented to substantiate this argument. The paper concludes by discussing the implications of the twin-track approach for anti poverty strategies.

Key Words: Rural Poverty, Food Insecurity, Hunger, Twin-track Approach, Food Security Strategy, Rural Off-farm.

JEL: I32, I38, O13, O17, O20.

This paper is the outcome of the efforts of a team from the Agricultural Sector in the Economic Development Service (ESAE), within the Agricultural and Development Economics Division (ESA). The principal author was Sumiter S. BROCA. Important contributions were made by Kostas STAMOULIS, Benjamin DAVIS, Leslie LIPPER, and Aysen TANYERIABUR, all of ESAE and by staff from other services, especially AGSM. Four outside reviewers, Dr. John MELLOR, Dr. Harold ALDERMAN, Prof. Alain de JANVRY, and Prof. Alexander SARRIS provided extremely valuable comments and advice. Valuable comments were also received from FAO staff at headquarters and in the field offices. The team gratefully acknowledges these comments, which have substantially improved this paper.

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever of the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Table of contents

1. Introduction	3
2. Food insecurity and poverty: Concepts and magnitudes	6
Food insecurity: concepts	6
Poverty: concepts	10
The magnitude and distribution of food insecurity in developing countries	12
The magnitude and distribution of poverty in developing countries	15
Rural poverty	17
Other dimensions of poverty	22
Conclusions	24
3. Direct public action against hunger: An economic justification	25
The costs of hunger	25
Income growth alone will not remove hunger	35
4. Agriculture and rural off-farm activities and poverty reduction	43
Economic growth does not always reduce poverty quickly	43
Growth in agriculture and rural off-farm activities can reduce poverty quickly	44
The importance of rural-off farm activities and non-tradables	47
Agricultural growth and poverty alleviation: Evidence	50
When does agricultural growth not reduce poverty?	52
5. Implications for poverty and food insecurity reduction strategies	55
Policies to combat hunger	55
Policies on rural infrastructure investment	59
Agricultural research and poverty alleviation	61
Saving and credit policies to promote farm investment	62
Policies on access to assets	63
Policies towards the rural off-farm sector	65
Safety nets	66
Human development	69
6. Conclusions	71
7. References	75

List of tables

Table 1: Dimensions of food insecurity	8
Table 3: Poverty proportions and severity.....	17
Table 4: Percentage of rural and urban population in poverty by country	19
Table 4 continued.....	20
Table 5: Trends in rural poverty levels, developing countries.....	21
Table 6: Distribution of total population and population in poverty for 72 countries by agro-ecological zone (aggregate for all thermal zones and geographical regions)	22
Table 7: Summary of studies on the productivity impact of poor nutrition	28
Table 8: Estimates of excess mortality attributable to malnutrition	32
Table 9: Estimates of productivity costs of malnutrition, selected Asian countries, as percent of GDP	34
Table 10: Shares of non-farm income and employment in total rural income and employment - regional averages of country cases	48
Table 11: Income sources in rural India by income quintile (percent), 1994.....	49
Table 12: Sources of income in the Mexican ejido sector by farm size, 1997	49
Table 13: Effects on poverty and growth of additional government expenditures, by type of investment and region in China 1985-89, 1991 and 1996	61

List of figures

Figure 1: Under nourished (FAO definition) by world region in millions.....	12
Figure 2: Percentage of population undernourished by world region	13
Figure 3: Wages, education and height of males in Brazil and the United States	29
Figure 4: Wages and BMI in Brazil and the United States, Males	30
Figure 5: Height, BMI and percentage of male working age population not working, Brazil.....	31
Figure 6: Human development and economic growth.....	44
Figure 7a: Shares of average and incremental income spent on non-tradable and tradable goods by rural household	46
Figure 7b: Additional household income from an initial US\$ increase in income from tradables	46
Figure 8: Squared poverty gap and average farm yields in rural India, 1959-64.....	51
Figure 9: Progress in reducing underweight in children under 5, Thailand.....	56

1. Introduction

“No society can surely be flourishing and happy, of which the far greater part of the members are poor and miserable”, as Adam Smith so eloquently put it.¹ In recognition of this truth the international community has repeatedly affirmed its commitment to fighting poverty and hunger through a series of statements issued at international summits of heads of state culminating in The Millennium Declaration issued at the 24th special session of the United Nations General Assembly in June 2000. The Millennium Declaration consolidates the earlier commitments and contains a commitment to halve the proportion of the world’s population living in extreme poverty by 2015. At the 1996 World Food Summit in Rome, 186 heads of state pledged to halve the number of undernourished people in the world by 2015.

Though there are disputes over definitions and the exact numbers involved, it is safe to say that several hundred million people in developing countries live in extreme poverty and hunger. The challenge is to create conditions that allow those who are poor today to escape poverty. This concept paper is an attempt to lay out the elements of a possible approach to fighting mass poverty and hunger that is based on the fact that about 75 percent of the poor and hungry live in rural areas and depend, directly or indirectly, on agriculture for their livelihoods. Therefore, a twin-track approach to hunger reduction is advocated in which measures to promote rural development through growth in agriculture and rural off-farm activities are complemented by measures to broaden direct access to food for the most needy.

At the risk of belabouring the obvious, an emphasis on rural and agricultural development must be an essential element of a successful strategy for alleviating mass poverty not only because agriculture is a source of food, but because agriculture and rural off-farm activities are a major source of income for the rural poor. Hence their development helps to reduce poverty - provided there are no marked inequalities of wealth in rural society. Furthermore, reductions in rural hunger and poverty slow down the drift to the towns and thus have an impact on hunger and poverty in urban areas as well.

Rural development would involve among other things, improving rural roads and access to communication systems; publicly funded agricultural research; rural savings and credit Programmes to assist the poor in creating assets and engaging in rural off-farm activities; irrigation and soil conservation and other measures to improve agricultural productivity and competitiveness. The aim would not simply be to grow more food but to increase employment opportunities for the poor and their incomes. Direct action to fight hunger would involve the use of targeted public interventions in sanitation, health and micronutrient supplementation in the context of community based nutrition Programmes.

¹ Smith, Adam (1776), Book 1, Chapter 8.

Direct public action to fight hunger requires no instrumental justification. Hunger is one of the direst manifestations of poverty and is a violation of a basic human right recognized in legally binding international instruments. That should be enough. However, it should be pointed out that there is mounting evidence that fighting hunger also helps reduce poverty since hunger and under nourishment reduce labour productivity, increase susceptibility to illness, worsen school performance in children, reduce the willingness to undertake risky but more profitable investments and transmit themselves from one generation to the next.

It should be stressed that the two tracks are interdependent and that the key to swift poverty reduction lies in making use of this interdependence by taking simultaneous action on both fronts. For example, direct action to improve nutrition can stimulate personal productivity by increasing physical work capacity. However, if action is not taken simultaneously to promote rural development and labour demand, this additional productivity may not have much impact on income because little additional work is available.² Conversely, the provision of better seeds through agricultural research may not have much impact on farmers' incomes if the farmers to whom they are supplied can only work sporadically because they are under nourished or ill.

The twin-track approach can be thought of as a means of creating opportunities for the poor. However, the poor cannot necessarily take full advantage of these opportunities unless they have the capability to do so. Hence action is also required to expand the capabilities of the poor so that they can exercise more control over their lives and escape poverty by determining for themselves the best strategies for escaping poverty. This can be done by providing opportunities for education, by measures to improve health and by measures to increase their holdings of physical and financial assets.³

The plan of the rest of the paper is as follows. Before proceeding with an exposition of the twin-track approach, it is necessary to be clear about the concepts of food insecurity and poverty, the number of people who are poor or food insecure or both in the developing world and to document the widely ignored fact that the majority of them still live in rural areas. This is done in the next section. The third section presents an economic justification for direct public action to fight hunger by documenting its economic costs. The fourth section presents a framework for conceptualizing the relationship between growth in agricultural and rural off-farm activities and poverty reduction and reviews the available evidence on this point. The fifth section discusses the implications of the twin-track

² Also, it should not be forgotten that higher incomes can help finance programmes to fight hunger.

³ It is surely unnecessary to remind the reader that expanding the capabilities of the poor requires no justification, since this is an end in itself. In other words, even if it could be shown that these actions had no impact on productivity and income, they would still be justified. Hence evidence on their impact on economic variables is not presented in order to justify action to improve capabilities. It is simply stated as a fact.

approach for anti poverty strategies without attempting to provide detailed policy prescriptions. The sixth section presents the main conclusions of this paper.

2. Food insecurity and poverty: Concepts and magnitudes

Food insecurity: concepts

The following definition of food security is widely used:⁴ Year-round access to the amount and variety of safe foods required by all household members in order to lead active and healthy lives, without undue risk of losing such access. No country anywhere in the world is food secure on this definition. It represents therefore an ideal.⁵

To make the definition operational, four dimensions have to be considered:

1. *Food availability*: The availability of sufficient quantities of food of appropriate qualities, supplied through domestic production or imports (including food aid). This is often confused with food security but should properly be seen as only a part, albeit an important part of food security. The question is not only whether food is available in a country but whether it is available in the right place at the right time and there must be a mechanism for ensuring that food of the right quality is made available.

2. *Food access*: Access by individuals to adequate resources (entitlements) to acquire appropriate foods for a nutritious diet. These resources need not be exclusively monetary but may also include traditional rights e.g. to a share of common resources. Entitlements are defined as the set of all those commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which he or she lives.

3. *Food utilization*: Utilization of food through adequate diet, clean water, sanitation, and health care. This brings out the importance of non-food inputs in food security. It is not enough that someone is getting what appears to be an adequate quantity of food if that person is unable to make use of the food because he or she is always falling sick.

4. *Stability of access*:⁶ Are individuals at high risk of losing their access to food? An example of this situation would be a landless agricultural labourer who was almost wholly dependent on agricultural

⁴ Consultative Committee on Programme and Operational Questions (2000). Toward System-Wide Guidance on Household Food Security and Nutrition. Final version from IFAD/FAO/WFP. Revised July 2000.

⁵ This definition is surely too blunt since according to it a country is either food secure or not food secure, with nothing in between. This makes it useless for measuring progress towards food insecurity. Thus if 60% of a country's population is food secure and the proportion rises to 90%, all that can be said according to the definition is that the country was food insecure and continues to be food insecure. That is all.

⁶ FAO/TCAS (1996): Implications of Economic Policy for Food Security – A Training Manual, p. 2.

wages in a region of erratic rainfall. Such a person is at high risk of not being able to find work in a situation of general crop failure and thus going hungry, i.e. is vulnerable.

The first point to note is that all four dimensions have to be present before it can truly be said that an individual is food secure. The second critical point is that food security is defined at the level of the individual even though it is brought about by a combination of individual, household, community and national and even international factors.⁷ The third point is that the mere presence of food does not entitle a person to consume it. The quantity of food required must lie within that person's entitlement set. It has to be kept in mind that we are all members simultaneously of different groups, ranging from the immediate family to wider associations, bound to them by ties of varying strength. This implies that food security status also depends on the extent to which a person can draw upon resources from the different groups to which he or she belongs and this is part of an entitlement set.

There was a tendency to underplay the importance of the fourth dimension, stability of access, in the past. It is, however, crucial, because it is required for understanding the concept of vulnerability. A person can be vulnerable to hunger even if he or she is not actually hungry at a given point in time. In general, the ability to call upon resources in emergencies reduces vulnerability. Being able to call upon relations or friends when needed or having a line of credit or possessing sufficient assets which can be sold in emergencies, are all examples of resources. This insight can be used to construct profiles of demographic groups which are vulnerable to the risk of food insecurity by inquiring about the variety of assets controlled by households in that group, the mediating factors that affect households, such as group memberships, laws, local customs etc., the external environment, such as demographic trends and the probability of shocks to income or health. *The State of Food Insecurity 2000* gives the example of Benin for which such an exercise has been carried out. According to that, close to half the population is vulnerable to hunger whereas only one seventh of the population is *under nourished*, using the FAO estimate of under nourishment.

The opposite of food security is food insecurity. The following table on the dimensions of food insecurity should be self-explanatory.

⁷ This may explain why national self-sufficiency is so often confused with food security despite the fact that national self-sufficiency is neither necessary nor sufficient to guarantee food security at the individual level (Hong Kong and Singapore are not self-sufficient but their populations are food secure while India is self-sufficient but a large part of its population is not food secure). The principal reason for the confusion is that food production as a source of income and entitlements is confused with food production as a source of supply of the commodity food (Drèze and Sen (1989)). What often happens is that a collapse in food production, which necessitates imports, may also lead to an entitlements collapse which causes hunger. Under these circumstances it is easy to see why food imports may appear to cause the latter.

Table 1: Dimensions of food insecurity

	Transitory	Chronic
Household level	Income and savings shortfall Entitlement failure Health shocks	Insufficient assets (including education and human capital) Intra-household resource sharing
Market Level	Change in food prices Food availability decline	Long-run relative prices and wages

Since food insecurity is a complex concept, several measures of food insecurity are available, each capturing a different aspect of the problem.

One of the most widely used is the FAO measure of under nourishment. The term “under nourishment” is used to refer to the status of persons whose food intake is insufficient to meet their basic energy requirements defined on the basis of physiological needs on a continuing basis. The basic energy requirement is currently stated as 1.55 times the Basal Metabolic Rate (about 1800 kilocalories per day for an average adult). To estimate the extent of under nourishment, data on the distribution of food intakes over a specified period are needed as well as assumptions about energy requirements.

The FAO measure involves the construction of a synthetic distribution of energy intakes under the assumption of log-normality. The mean is given by the Daily Energy Supply (DES) per caput for a country calculated from its Food Balance Sheet. The variance is derived from the coefficient of variation (CV) of energy intakes stratified by income level calculated from household income and expenditure surveys (HIES). The proportion of undernourished in the population is defined as that part of the distribution lying under a minimum energy level defined by taking into account the sex and age distribution of the country’s population and assuming light activity levels.⁸

⁸ Critics (see e.g. Svedberg (2000) and Smith (1998)) object to this procedure on the grounds that it is based on unreliable data—especially on subsistence agriculture—and on questionable assumptions about dietary needs. That improvements in these areas are necessary is recognized by FAO, which sponsored an expert consultation on energy requirements in October 2001 and an International Scientific Symposium on the measurement of undernutrition and food deprivation in June 2002. At the same time it should be recognized that other methods also suffer from serious problems, which are often poorly understood by their users. The much criticised FAO approach, based as it is on food balance sheets, does have the merit of being internally consistent.

It should be clear from the foregoing that the FAO measure focuses on food availability and access. The third pillar of food security is food *utilization*. This is used as the basis for anthropometric measures of food insecurity. The term “under nutrition” is used to refer to the status of persons whose anthropometric measurements lie outside the ranges for healthy people. These measurements are the outcome not only of inadequate food intake but also of poor health and sanitation conditions that may prevent them from deriving full nutritional benefit from what they eat (FAO, *“The State of Food Insecurity in the World”, 2000*). A commonly used measure in adults is the body mass index, BMI, usually defined as the ratio of weight in kgs. to the square of height in cm. Since this is independent of height it is a good measure of adult nutritional status and more generally of health. An adult with a BMI value of 30 or above would be considered obese and a person with a BMI of 15 or under would be in a state of chronic energy deficiency while 12 is considered the lower limit for survival. “Indeed below 17 a person should be regarded as frankly undernourished” (Dasgupta (1997), p. 13).

Another widely used approach is to measure the weights and heights of children under five years of age and then determine whether these weights are appropriate to their age and height and whether they are too short for their age. Children with low weight relative to their age are said to be underweight, while if they are underweight relative to their height, they are said to be wasted. Children who are too short for their age are said to be stunted. Underweight reflects either inadequate food intake, past under nutrition or poor health conditions. Wasting is generally regarded as a marker for severe short-term deprivation while stunting is regarded as a marker for long-term deprivation. Generally, the proportion of children who are wasted is well below the proportion who are stunted.

The major problem with treating child heights and weights as indicators of poor nutrition is that it is not clear how the appropriate ranges for weight and height are to be determined. In practice these are taken to be the median weights and heights of a reference population consisting of white, middle-class children from the Eastern seaboard of the United States, not the children of the country being studied. While this does facilitate international comparisons, it also means that these measures of stunting and wasting are not necessarily appropriate to the country, particularly if it is underdeveloped.

The main distinction between under nourishment and under nutrition is that the latter refers to an outcome, i.e. the body weight and height achieved by a person as a result not only of their food intake but also of any sickness spells they have undergone, e.g. from diarrhoea or malaria or other diseases. The point is that one can have two people of the same age and sex, doing similar work consuming the same number of calories. Yet this consumption level may be adequate for one person but not for the other simply because he or she is sick more frequently. Thus nutritional status incorporates information about health inputs as well as food consumption.

A natural question at this point is whether it is worthwhile to collect information on both concepts. The answer is yes because both types of information are required to guide public policy. It is not usually clear whether a country’s under nutrition record is due to inadequate food intakes or to frequent

sickness spells despite calorie intake levels that would otherwise be sufficient. The implications for public policy are quite different. In the former case the aim should be to increase food intakes, while in the latter, the emphasis should be on public health, sanitation, the provision of clean drinking water etc.

Poverty: concepts

This sub-section provides a review of poverty concepts and measures and shows how they are related to the food security measures just discussed. A recent authoritative definition of poverty is to be found in the OECD Development Action Committee's (DAC) Guidelines on Poverty Reduction (OECD (2001)), which state that:

"Poverty encompasses different dimensions of deprivation that relate to human capabilities including consumption and food security, health, education, rights, voice, security, dignity and decent work." (OECD (2001), p. 8)

This approach to conceptualizing poverty is widely accepted. It is also widely accepted that these dimensions of deprivation interact with and reinforce each other. However, it is much less clear how to create a measure of poverty that allows poverty to be compared between countries and tracked over time for the purpose of monitoring progress while taking account of the multiple dimensions of poverty since a many sided approach may lead to fuzziness about fundamental objectives.

Furthermore, some dimensions of poverty are difficult to measure and quantify. Thus the World Bank's *World Development Report 2000/2001: Attacking Poverty*, after a detailed discussion of the multiple dimensions of poverty, then goes on to list some of the problems involved in constructing a measure that takes account of the multiple dimensions of poverty (Box 1.6, p. 22).⁹ For this reason, the practice in the field is to base poverty measures on lack of economic resources, supplementing them with information on other forms of deprivation.

This is true of almost all measures of poverty at the global level including the widely cited World Bank poverty line of one dollar a day. This was originally defined as expenditure (both actual and imputed) in a country equivalent to one dollar a day in the United States at 1985 US prices converted at purchasing power parity exchange rates (see Ravallion *et al* (1991) for details). This line was originally chosen because it was representative of a number of poverty lines in poor countries in 1985 and has been updated to 1993 by using the median of the lowest ten poverty lines within the same set of countries used as in the original study. The equivalent line in 1993 PPP is about \$1.08 a day in

⁹ Please note that it is not claimed that it is impossible to devise a poverty measure that takes account of the multiple dimensions of poverty, only that for the specific purpose of poverty monitoring and comparisons it is difficult to find such a measure.

1993 prices (Ravallion and Chen (2000)). Its continuing popularity derives from its “familiarity to the relatively wealthy people who are the primary users of the measures, and who are the primary target for rhetoric based on them” (Deaton (2000)).

An obvious question at this point is, how were these national poverty lines constructed? The most widely used practice is to base them on food intakes in relation to dietary needs by calculating the cost of consuming the calories required for a healthy existence and adding an allowance for non-food expenditures. A household is regarded as poor if its consumption expenditure is below this level. Thus it is important to note that ultimately the dollar a day and almost all national poverty lines are derived from the cost of consuming a certain number of calories¹⁰ and are closely linked to measures of food security.

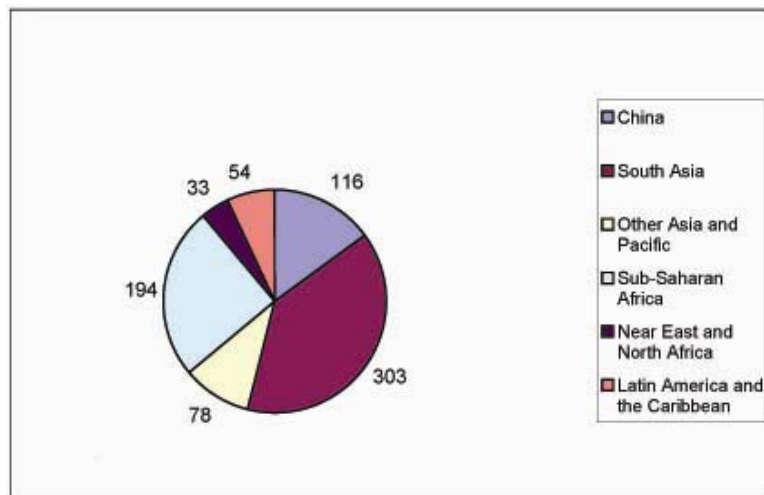
The dollar a day poverty measure and the national measures it is derived from are, of course, far from perfect even if the underlying concept of poverty is considered acceptable. It is very difficult to attach a monetary value to food grown at home or received as wages, which are often primary sources of food for many poor households in developing countries. Neither is it easy to determine the proportion of the population whose consumption expenditure is below a certain level unless nationally representative household surveys are carried out regularly. Since many developing countries lack the resources to do this, the construction of poverty estimates often requires a heroic leap of faith. This point should be kept in mind in the discussion of poverty numbers below.

¹⁰ Strictly speaking there is no such thing as “the” cost of consuming a certain number of calories since there are usually many combinations of foods, more or less expensive, that can provide the same number of calories. Hence it is necessary to construct a “representative” diet that provides the calorie requirement for a country. This itself has to be constructed on the basis of the age and sex composition of a country and the activity levels of its population. The cost of consuming that diet can then be used as the starting point for the poverty line.

The magnitude and distribution of food insecurity in developing countries

In this sub-section, an attempt is made to measure the magnitude of the problem of food insecurity in developing countries and its distribution. The figures in FAO (2001) Table 1 show that in 1997-99 there were about 777 million undernourished people in the *developing* world. Their distribution is shown in the chart below (Figure 1):

Figure 1: Under nourished (FAO definition) by world region in millions

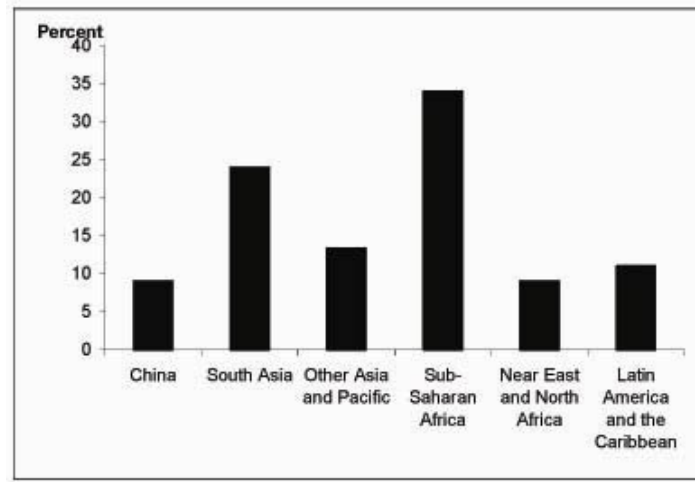


Source: *The State of Food Insecurity in the World 2001, Table 1*

From Figure 1, it appears that two regions and one country, sub-Saharan Africa, South Asia and China account for four out of every five under nourished people in the developing world. The number of undernourished people in the developing world has declined between 1990-92 and 1997-97 from about 816 million to about 777 million. This was also true of all the regions except sub-Saharan Africa and (marginally) the Near East and North Africa.

An important piece of information is the proportion of the population that is under nourished. Without this information it is not clear whether the number of under nourished people is high because there is a high incidence of under nourishment or because a low incidence is combined with a large population. Figure 2 below provides information on the proportion of the population undernourished by world region.

Figure 2: Percentage of population undernourished by world region



Source: *The State of Food Insecurity in the World 2001, Table 1*

The two regions with the highest proportions of under nourished people are sub-Saharan Africa and South Asia. These rates are either lower or unchanged since 1990/92. As discussed above, evidence on nutritional outcomes is also an essential part of the picture.

This evidence can be summarized as follows:

Stunting: FAO figures,¹¹ based on surveys conducted between 1987 and 1998, show that 40 percent of children under five in the developing world are stunted. With the highest incidence of stunting (50 percent) and a very large number of children, South Asia accounts for about 40 percent of the world's stunted children, with East and Southeast Asia and sub-Saharan Africa accounting for another 50 percent.

Wasting: 10 percent of children under five are wasted in the developing world, but with wide variations, from almost nothing in Latin America and the Caribbean to 50 percent in South Asia. South Asia accounts for half the world's wasted children with another 40 percent accounted for by East and Southeast Asia and sub-Saharan Africa.

Underweight: About a third of children under five are underweight, with less variation around this figure. Once again, 50 percent of these children are in South Asia, with East and Southeast Asia and sub-Saharan Africa accounting for another 40 percent.

The general conclusion is that whichever measure of deprivation one uses, South Asia comes off worst, followed by East and Southeast Asia and then sub-Saharan Africa. Together these three

¹¹ FAO (1999). *The State of Food Insecurity*.

regions account for 90 percent of the world's children who suffer from under nutrition. Information on changes in the proportion of children underweight between 1970 and 1995 for the major regions of the world is available from Smith and Haddad (1999). It appears that over the long-term there has been encouraging progress on child malnutrition. It is clear that underweight prevalences have declined in every region, and have shown a particularly steep decline in South Asia, the region with the very worst record on malnutrition. As noted above, approximately 50 percent of children in South Asia were underweight in 1995, but in 1970 the proportion was far higher, over 70 percent. Similarly, where numbers of underweight children are concerned, the table shows that they also declined in every region over the 25 year period, with one exception, sub-Saharan Africa.

Unfortunately a rural/urban breakdown is not available. The only study so far that attempts to provide one is by Haddad, Ruel and Garrett (1999), which covers 14 developing countries. The main finding of this study is that the proportion of children who were underweight was higher in rural areas for all 13 countries studied. As the rural areas also generally contained a larger number of children under five, the absolute number of children underweight was also larger in the rural areas. This is probably the only available evidence on rural-urban breakdowns of under nutrition.

The magnitude and distribution of poverty in developing countries

Turning now to the available evidence on poverty, we begin with Table 2 below, taken from Chen and Ravallion (2000) which gives the latest figures on poverty in major world regions, based on data “from 265 national surveys from 83 countries representing 88 percent of the total population of the developing world” (Chen and Ravallion (2000)).

Table 2: Population living on less than US\$1 per day at 1993 PPP

Region	Percentage living in households that consume less than the poverty line					Number of poor (millions)				
	1987	1990	1993	1996	1998	1987	1990	1993	1996	1998
East Asia	26.7	27.6	25.2	15.0	15.3	417	452	432	265	267
(excluding China)	24.0	18.5	15.9	10.0	11.3	114	92	84	55	54
Latin America & Caribbean	15.3	16.8	15.3	15.6	15.6	64	74	71	76	61
Middle East & North Africa	4.3	2.4	1.9	1.8	1.9	9.3	5.7	5.0	5.0	6
South Asia	45.0	44.0	42.4	42.3	40	474	496	505	532	522
Sub-Saharan Africa	46.6	47.7	50.0	48.5	46.3	217	242	273	289	302
Total	28.3	29.0	28.1	24.5	24	1183	1276	1304	1191	1175
(excluding China)	28.5	28.1	27.7	27.0	26.2	880	916	956	981	961

Source: Ravallion and Chen (2000). Figures for 1998 from World Bank (2000b)

The principal findings of this report are that significant declines in the proportion of the population in poverty between 1987 and 1998 occurred only in East Asia and in the Middle East and North Africa (MENA) region. In the other regions, the proportion was either unchanged or declined so little that the change can be attributed to statistical “noise”. Once again, as with the figures on under- and malnutrition, the worst affected regions in terms of poverty prevalence and depth are South Asia and sub-Saharan Africa. In both regions, about two out of five people are below the poverty line.

The Latin America region and China both report reasonably low proportions of their populations in poverty. The only regions where this proportion is 10 percent or less are East Asia excluding China

and MENA. However, the poverty percentages reported for MENA are too low to be credible¹² and there is good reason to doubt the figures for China.

It appears that in South Asia, sub-Saharan Africa and Latin America, there were more people in poverty in 1998 than there were in 1987, over 500 million in South Asia in 1998, close to 300 million in sub-Saharan Africa and about 60 million in Latin America. In East Asia there was a decline in the number of people in poverty over this period, but there were still about 270 million people under the poverty line in 1998. From the table it appears that South Asia, East Asia and sub-Saharan Africa accounted for about 80 percent of the world's poor in 1998. This general conclusion can be accepted even if there are doubts about the exact numbers involved.

Unfortunately Table 2 does not provide information on the severity of poverty, i.e. how far below a household is from the poverty line expenditure. Thus there can be two households below the poverty line, but one of them spends an amount, which puts it just below the line whereas the other spends an amount which is considerably less than the poverty line expenditure. Then it is reasonable to suppose that though both are in poverty, the second household suffers more. This information, only available up to 1993, is provided in Table 3 below, taken from De Haan and Lipton (1999). The table provides information on the depth of poverty as measured by the poverty gap index (explained in the notes to the table), drawn from national surveys. The evidence on the depth of poverty shows that, as one would expect, the regions with the highest poverty prevalence (South Asia and sub-Saharan Africa) are also the regions with the highest values of the PGI. In both regions, the PGI changed only slightly between 1987 and 1993 remaining between 10 percent and 15 percent in both regions. Regions with low poverty prevalence such as East Asia also tend to have low PGIs in line with expectations. Once again, it is necessary to register disbelief at the very low figures for the MENA region.

¹² However, according to Datt, Joliffe and Sharma (1997), 27 percent of the Egyptian population was in poverty in 1997 with a poverty gap index of 7. Both figures are an order of magnitude higher than those given above. Since Egypt has the largest population of any country in this region, the figures for the region should reflect these. Hence the figures given above should be treated with caution.

Table 3: Poverty proportions and severity

World Region	Poverty Gap Index		
	1987	1990	1993
East Asia	8.3	8.0	7.8
(excluding China)	3.8	3.1	3.1
South Asia	14.1	12.3	12.6
Latin America	8.2	9.0	9.1
Middle East & North Africa	0.9	0.7	0.6
Sub-Saharan Africa	14.4	14.5	15.3
Developing countries	10.8	10.3	10.5

Source: De Haan and Lipton (1999)

Original source: World Bank (1996b) and Ravallion and Chen (1996)

Note: The poverty gap index (PGI) is defined as the average percentage income shortfall of those below the poverty line multiplied by the proportion of the population in poverty. The larger the value of the PGI, the greater the depth of poverty; the larger the proportion of the population in poverty, the larger the value of the PGI.

Data are from nation-wide household surveys (sometimes extrapolated/interpolated) covering 93 percent of Asia's population (96 percent in South Asia and China, 57 percent in other East Asian countries; 79 percent in Southeast Asia; transitional or Pacific island economies). For the seven percent of people in countries lacking surveys, poverty data are estimated by cross-country regressions of HCI and PGI on real (PPP) per -person GDP and other variables (Chen, Datt and Ravallion 1993).

Rural poverty

The single most important fact about poverty in the developing world is its rural nature. Detailed breakdowns are available from the IFAD Rural Poverty Report 2001, and from the IFPRI report referred to above (Haddad, Ruel and Garrett (1999)). Both come to the same conclusion: in almost every country of every region, the proportion of the rural population in poverty was higher, in some cases much higher, than the proportion of the urban population.

Table 4 below presents evidence from the IFAD Rural Poverty Report on the prevalence of poverty in rural and urban areas of various countries. Note that national definitions of (a) poverty and (b) the distinction between rural and urban areas have been used. The main point is that in almost every country, using national definitions, a higher percentage of the rural population is in poverty than of the

urban population. Furthermore, since the rural population is also a larger percentage of the total, this translates into a larger number of poor people in rural areas than in urban, very much larger in some cases. For example, in India according to the IFAD report, there were about 240 million people in poverty in rural areas in 1993 versus only about 20 million in urban areas. The most important difference between these figures and the ones reported in Tables 2 and 3 is that these are derived from nationally defined poverty lines in local currencies. This partly explains the striking differences in poverty percentages for the Middle East and North Africa region and for China. This time it is the figure for China that is too low to be credible.

Table 4: Percentage of rural and urban population in poverty by country

Region/country	Survey year	Rural	Urban
West & Central Africa			
Burkina Faso	1998	51	16
Cameroon	1984	32	44
Chad	1985-1986	67	63
Ghana	1991-1992	34	27
Guinea-Bissau	1991	61	24
Mauritania	1996	59	19
Niger	1989-1993	66	52
Senegal	1991	40	16
Sierra Leone	1989	76	53
East & Southern Africa			
Ethiopia	1994-1997	46	39
Kenya	1994	47	29
Lesotho	1993	54	28
Madagascar	1993-1994	77	47
Uganda	1997	48	16
Zambia	1996	75	34
Zimbabwe	1996	63	15
Middle East & North Africa			
Algeria	1995	30	15
Egypt	1995-1996	23	23
Morocco	1998-1999	27	12
Tunisia	1990	22	9
Yemen	1992	19	19

Table 4 continued

Region/country	Survey year	Rural	Urban
Asia			
Bangladesh	1995-1996	40	14
Cambodia	1997	43	25
People's Republic of China	1998	5	2
India	1997	34	28
Indonesia	1998	22	18
Lao PDR	1993	53	24
Malaysia	1989	19	14
Mongolia	1995	33	39
Nepal	1995-1996	44	23
Pakistan	1990-1991	37	28
Philippines	1997	51	23
Papua New Guinea	1996	39	14
Sri Lanka	1990-1991	24	18
Thailand	1992	16	10
Vietnam	1993	57	26
Latin America			
Bolivia	1996	82	34
Brazil	1995	42	13
Chile	1995	15	6
Colombia	1992	31	8
Dominican Republic	1992	31	8
Ecuador	1994	47	25
Guatemala	1989	72	34
Honduras	1993	51	57
Nicaragua	1993	76	32
Panama	1997	65	15
Paraguay	1995	45	8
Peru	1997	65	40
El Salvador	1992	56	43
Trinidad and Tobago	1992	20	24
Venezuela	1995	73	46

Source: IFAD Rural Poverty Report 2001 and Okidegbe (2001)

Table 5: Trends in rural poverty levels, developing countries

	Period	# countries showing decline in rural headcount index	# countries showing increase in rural headcount index	# countries which data not available
East Asia	1961-1997	5	0	5
South Asia	1970-1991	4	0	1
Latin America & The Caribbean	1980-1997	5	3	6

Source: IFAD (2001)

Other dimensions of poverty

Given that rural areas account for the bulk of the poor, an obvious question is whether the poor live in areas of low agro-ecological potential. The conclusions of the pioneering study in this field, Broca and Oram (1991), are summarized in Table 6 below:

Table 6: Distribution of total population and population in poverty for 72 countries by agro-ecological zone (aggregate for all thermal zones and geographical regions)

Total length of growing period (days per year)	Total	330-365	270-329	210-269	150-229	90-149	0-89
Agro-ecological zone	Wet	Humid	Seasonally dry	S-Arid 1	S-Arid 2	Arid	
Total # people (millions)	1804.	190.6	298.8	319.5	457.3	334.0	203.8
Total # poor people (millions)	0	47.9	100.7	123.8	145.1	109.1	67.0
% of poor in total population	32.9	10.6	16.6	17.7	25.3	18.5	11.3
% of total population	100.0	8.1	17.0	20.9	24.4	18.4	11.3
% of total poor	100.0	0.76	1.02	1.18	0.96	0.99	1.00
Ratio of poor % to population%	1.0						

Source: Broca and Oram (1991)

Note: Agro-ecological zones are based on the FAO system of characterization of the number of growing season days.

Figures for total population are taken from UN or FAO sources.

Data on numbers of poor and distribution by AEZ are derived from IFPRI work.

According to this table, the majority of the poor in the 1980s (380 million) were located in zones with Length of Growing Period (LGP) ranging from 90 to 330 days a year. Among these zones, the poor were over represented in the populations of the Seasonally Dry zone with an LGP between 210 and 269 days a year and the Humid zone with an LGP of 270 to 329 days a year. Several caveats are in order: this uses the old FAO classification that did not take account of irrigation and so large parts of South Asia were classified as Semi-Arid 1 or Seasonally Dry; secondly a number of countries were not included for lack of data, notably China, but also Mozambique, Angola, South Africa and the entire Near East and North Africa region. In particular comparing these results with the results of more recent FAO studies on farming systems in order to determine the evolution of poverty by agro-ecological zone is difficult because the zones are defined differently.

All that can be said at this stage is that significant numbers of the poor were located in the 1980s in areas where plants could grow for at least half the year, i.e. areas with reasonable agro-ecological potential. Furthermore since many of these areas are irrigated, concluding that poverty is concentrated in areas of poor agro-ecological potential does not seem warranted.

Neither is there any strong evidence that poverty is concentrated among women. Three studies, by de Haan and Lipton (1999) for Asia, by Quisumbing, Haddad and Peña (1995) for 10 developing countries from sub-Saharan Africa, Asia and Central America and by Blackden and Bhanu (1999) for sub-Saharan Africa broadly come to similar conclusions:

“Though the household surveys do not, on the whole, show that women in Asia are more vulnerable than men to consumption poverty, in many areas women are substantially worse off than men. In most Asian countries women or female-headed households are only slightly likelier to be poor than men. However, women are more vulnerable than men.” (de Haan and Lipton, 1999).

And

“Similar to previous studies on gender and poverty, our results show weak evidence that female-headed households are over represented among the poor. While individuals in female-headed households are worse-off in terms of a number of poverty measures, these differences are statistically significant in about a third-to-half of the data sets, depending on the poverty measure used.” (Quisumbing, Haddad and Peña, 1995).

And

“These results (for sub-Saharan Africa) show that there is no consistent evidence to support the hypothesis that poverty incidence is necessarily higher among female-headed households” (Blackden and Bhanu, 1999).

There is also little consistent evidence of pro-male bias in food consumption. To quote SOFI (2000), “a 1996 review of literature by the International Food Policy Research Institute concluded that, despite extensive study, ‘evidence of pro-male biases in food consumption is scarce’. Indeed, once adjusted for activity patterns and body weight, the pro-male bias seen in many of these studies turned out to be slight”.

However, Blackden and Bhanu (1999) do make an important point. Women face a much heavier workload than men since they typically look after children and do housework and farm work. Therefore if one were to include consumption of leisure in overall consumption, it may well turn out that women are worse off, i.e. men are consuming more leisure¹³. Secondly, it is important to bear in mind that women are more vulnerable to hunger and poverty since they tend to control fewer assets,

¹³ Blackden and Bhanu (1999) p. 3 give an example from Tanzania where it was found that women enjoyed about 2 hours of leisure every day compared with 4.5 hours per day for men.

while at the same time their ability to engage in remunerative activities that would permit them to acquire assets is limited because of time pressures. Also there does seem to be clear evidence of regional patterns of discrimination against female children as shown by differences in anthropometric status, by survival probabilities and the likelihood of attending school. These patterns are heavily dependent on other indicators of social status. For example, in South Asia, home to about half the world's poor, it is in the interactions between caste and gender that severe patterns of discriminations arise.

Conclusions

The two main conclusions of this section are as follows. First, though poverty is widely agreed to be a multi-dimensional concept, it has proved difficult to define a simple, internationally comparable measure of poverty that takes account of these multiple dimensions. Hence income based poverty measures tend to be used, such as the dollar-a-day poverty line used by the World Bank. Poverty estimates based on this line show that poverty is heavily concentrated in South Asia and sub-Saharan Africa in terms of both incidence and numbers involved, that the number of people in poverty probably increased between 1987 and 1993, without much change in incidence.

The available evidence does not lend support to the propositions that the poor are concentrated in areas of low agro-ecological potential or that women are disproportionately represented among the poor. The overwhelming fact about poverty in developing countries is that it is rural in character.

Secondly, the FAO measure of under nourishment shows that in terms of incidence and numbers, under nourishment is concentrated in South Asia and sub-Saharan Africa, a conclusion reinforced by the available evidence on underweight and stunting among children. The available evidence indicates a fall over the past 20 years. There is some evidence that these two problems are also more widespread in rural areas.

3. Direct public action against hunger: An economic justification

This section presents arguments in favour of an independent focus on fighting hunger. Since hunger imposes significant economic costs on society, besides being a violation of a basic human right, its reduction and ultimate eradication is one of the most urgent tasks facing national governments, civil society and the international community. Targeted direct public interventions are required to eradicate hunger in a reasonable amount of time because household income growth by itself, which reduces income poverty, does not seem to lead to a swift reduction in hunger.

The plan of this section is as follows. The next sub-section documents the serious economic costs of widespread hunger. This is followed by a discussion of the relationship between household income growth and nutrition, the main point of which is that income growth at the rates observed in the recent past cannot be expected to remove hunger by itself in a reasonably short period. It follows that direct public interventions are also required and examples of such interventions are provided, together with a discussion of their benefits and costs. However, measures can and should be taken to promote rapid income growth among poor households because, for one thing, higher incomes make it possible to finance public action against hunger. In Section 4 it is argued that agricultural development coupled with the development of rural non-farm activities is one of the most effective means of promoting income growth.

The costs of hunger

What are the economic costs of under nourishment and under nutrition? At the most basic level it cannot be denied that “if, over an extended period of time, a person is to convert potential labour power into actual labour power of any specified, physiologically admissible amount, he requires, among other things, nutrition of a corresponding quality and magnitude over that period” (Dasgupta (1997)). If this is not forthcoming, or if the person lives in an unhealthy environment the result is poor nutritional status and this person suffers an impairment of his ability to do sustained work. Furthermore, if as a result of past nutritional deprivation the person is shorter or has a smaller body frame, he or she lacks in general, the strength to perform certain tasks that are physically demanding but also better rewarded, i.e. one would expect to find poor nutritional status, as measured by height, associated with lower wages and earnings.

Secondly, there is evidence that poorer nutritional status leaves people more susceptible to illness. Thus a vicious cycle may exist, whereby inadequate food intakes combined with frequent sickness spells result in poor nutritional status, which in turn creates an increased susceptibility to illness. Evidence on this point is presented below.

Thirdly, there is a risk of intergenerational transmission of poor nutritional status. For example, women who suffer from poor nutrition are more likely to give birth to underweight babies. These babies thus start out with a nutritional handicap.

Fourthly, there is evidence that poor nutrition is associated with poor school performance in children of school going age. At its simplest, this is expressed in the slogan a hungry child cannot learn. This would not imply any impairment in the child's cognitive ability, but merely that because of hunger the child is listless or tired and inattentive and cannot participate in learning activities. Unfortunately, it may also be the case that cognitive ability itself is impaired as a result of prolonged and severe malnutrition. In either case, the upshot is that children do poorly at school thereby damaging their future economic prospects.

Fifthly, people who live on the edge of starvation can be expected to follow a policy of safety first with respect to investments, i.e. will avoid taking risks since the consequences for shortterm survival of a downward fluctuation in income will be catastrophic. But less risky investments also tend to have lower rewards. Once again, the tendency is for poor nutrition to be associated with lower earnings.

Finally, there is some evidence that the macroeconomic performance of an economy may suffer as a result of the cumulative impact of these effects. It has been shown recently that the overall effect may be to reduce a country's rate of economic growth. Nutrition and productivity: Several studies are now available of the impact of poor nutrition in individuals on productivity and wages and the evidence contained in them is fairly convincing. Table 7 below summarises the main features of these studies which cover groups of people from 10 developing countries in Asia, Africa and Latin America.

A detailed discussion of these studies is not possible within the confines of this section, but some discussion of magnitudes and causal mechanisms would be worthwhile. As discussed above, it is useful to distinguish between the effect of current under nutrition—as expressed in the BMI—from the crystallised effect of past under nutrition—as expressed in adult height. Many of these studies do consider the impact of current nutrition on productivity and earnings. For example, Croppenstedt and Muller (2000) found that in rural Ethiopia an increase of 1 percent in weight-for-height and BMI increased farm output and wages by about 2.3 percent and 2.7percent respectively. Deolalikar (1988) found that a 1 percent increase in weight-for-height in his rural South Indian sample increased farm output by about 2 percent and wages by about 0.3 to 0.7 percent, “the lower value reflecting the effect in peakseasons, the higher value in slack seasons, when the tasks are different” (Dasgupta (1997, p. 18). Thomas and Strauss (1997) found that a 1 percent increase in BMI in their sample from urban Brazil was associated with a 2.2 percent increase in wages.

Another measure of current under nutrition is calorie intakes. The impact of increased calorie intakes was measured by Strauss (1986) as well as Thomas and Strauss (1997); the main finding of the former study - on Sierra Leone - is that a one percent increase in calorie consumption per adult

equivalent would increase farm output by about 0.3 percent. It is significant that this percentage rises to 0.5 at a daily calorie intake level of 1500 calories per adult equivalent. Strauss and Thomas (1997) found that an increase of one percent in calorie intakes increased wages by about 1.6 percent at calorie intake levels of around 1700 calories per day, but that this effect ceased to operate at calorie consumption levels of around 1950 calories per day. The role of micronutrient deficiencies in reducing work capacity has also received increased attention lately. "Studies suggest that iron deficiency anaemia is associated with a 17 percent loss of productivity in heavy manual labour, and five percent in light blue-collar work (studies cited in Ross and Horton (1998))" (Horton (1999)).

Table 7: Summary of studies on the productivity impact of poor nutrition

Study authors	Country	Group studied	Main finding
Croppenstedt & Muller (2000)	Ethiopia	Rural households, mainly agricultural	Output & wages rise with BMI & WfH - adult height has +ve impact on wages
Bhargava* (1997)	Rwanda	Rural households, mainly agricultural	BMI, energy intake - +ve impact on time spent on heavy activities (men, but not women)
Strauss (1986)	Sierra Leone	Rural households, mainly agricultural	Calorie intake has +ve impact on productivity
Satyanarayana <i>et al</i> (1977)	India	Indian factory workers	WfH is significant determinant of productivity
Deolalikar (1988)	India	Southern Indian agricultural workers	Significant effect of WfH on farm output & wages
Alderman <i>et al</i> (1996)	Pakistan	Rural households, mainly agricultural	Adult height is significant determinant of rural wages
Haddad and Bouis (1991)	Philippines	Sugarcane growers	Adult height is significant determinant of rural wages
Thomas and Strauss (1996)	Brazil	Urban population sample	BMI, adult height, have strong, +ve impacts on market wages
Spurr (1990)	Colombia	Sugarcane cutters and loaders	Weight, height are significant determinants of productivity
Immink <i>et al</i> (1984)	Guatemala	Coffee & sugarcane growers	Adult height has +ve impact on productivity

Notes: BMI refers to Body Mass Index, i.e. weight (kgs.) / (square of height (cms))

WfH refers to weight for height.

*This study is not directly relevant since it focuses on time allocation decisions. However, it could be argued that *ceteris paribus* the ability to spend more time on heavy activities enhances one's productivity and earning capacity in agriculture.

Adult height is influenced by nutrition in childhood (Steckel (1995)) as well as birth weight. Since underweight mothers tend to have small babies, this can be a potent mechanism for transmitting under nutrition across generations. The evidence on the impact of lower heights is a little more mixed in these studies. Thus Croppenstedt and Muller (2000) did find a positive association between height and wages but this was not statistically significant, perhaps because of the small size of the sample. They found that a one percent increase in height was associated with a 2.2 percent increase in wages while Haddad and Bouis (1991) and Alderman *et al* (1996) found the corresponding percentages to be 1.4 and 0.3 respectively.

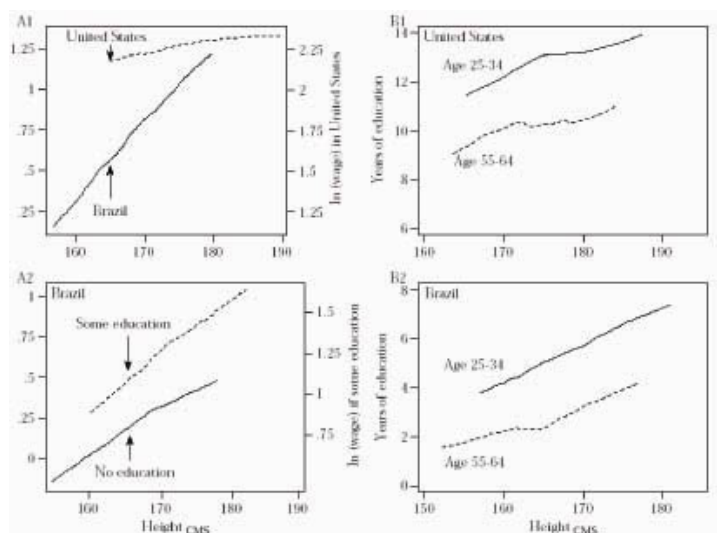
What is the mechanism by which poor nutrition affects productivity? Dasgupta ((1997), p. 15) explains that a person's physical work capacity can be measured by his or her maximal oxygen uptake. This is the highest rate of oxygen uptake a person is capable of attaining while engaged in physical work at

sea level. It has been shown that maximal oxygen uptake measures cardio-respiratory fitness: the higher its value, the greater the capacity of the body to convert energy in the tissues into work. Here is the crux of the matter: clinical tests suggest that the maximal oxygen uptake *per unit of muscle cell mass* is pretty much constant in well-nourished and mildly undernourished people. Since lean body mass is related to muscle cell mass, it follows that a higher body mass index is related to a higher maximal oxygen uptake and hence greater work capacity. Also, if two people have the same BMI, the taller of the two has more lean body mass and hence higher maximal oxygen uptake and work capacity.

Studies also suggest that maximal oxygen uptake depends on the concentration of haemoglobin in the blood. Since that depends on iron intakes, the connection between iron deficiency anaemia and low productivity is also explained.

Strauss and Thomas (1998) present a succinct and illuminating review of these issues through a set of graphs that present data from the United States and Brazil. The US data are drawn from National Health and Nutrition Examination Survey (NHANES) (1976-80) and the 1992 wave of the National Longitudinal Survey of Youth. The Brazilian data are taken from the *Estudo Nacional da Despesa Familiar* (ENDEF) conducted in Brazil in 1974-75.

Figure 3: Wages, education and height of males in Brazil and the United States



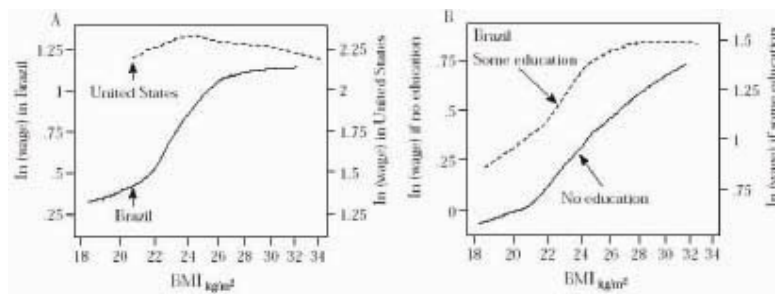
Source: Strauss and Thomas (1998)

The main inferences from these graphs can be summarized as follows:

- Adult stature is positively correlated with wages in both the United States and Brazil, but the effect is strong in Brazil and weak in the United States, from graph A1 in the Northwest quadrant.

- However stature is clearly also positively correlated with education as can be seen from the two sub-graphs on the right. The gap between the two cohorts arises from the fact that there was a secular expansion in educational opportunities in both nations over time.
- Therefore the suspicion naturally arises whether the seeming effect of stature on wages is simply a reflection of the fact that taller people are also better educated. Since it is widely accepted that better education does lead to higher wages, perhaps that is the underlying cause of the dependence of wages on stature.
- However, a glance at sub-graph A2 disproves this point because it shows that in Brazil, the impact of stature on wages was strong even in those adults who had no education.
- A similar relationship holds between BMI and wages as shown in Figure 4 below.

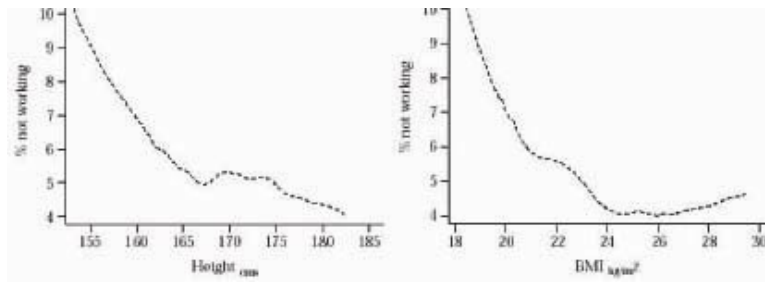
Figure 4: Wages and BMI in Brazil and the United States, Males



Source: Strauss and Thomas (1998)

- The most striking feature of this graph is that in general higher values of BMI are strongly correlated with higher wages in Brazil, but that this effect disappears among educated people whose BMI is above 26, i.e. those who are definitely well-nourished and on the point of obesity. The other striking finding is that there is little or no effect in the United States, on the contrary people who are obese are likely to be paid slightly less.
- Finally as shown in Figure 5 below, low stature as well as low BMI are also associated with lower labour force participation, i.e. not only do people with lower stature or BMIs earn less, but they are less likely to be given an opportunity to earn wages at all. The probable reason for this is, as will be shown below, that people with low BMIs and low stature are also more likely to fall sick.

Figure 5: Height, BMI and percentage of male working age population not working, Brazil



This evidence is consistent with the hypothesis that higher stature and BMI are associated with higher wages because of their impact on maximal oxygen carrying capacity and not because they are proxies for otherwise unobserved qualities that are attractive to employers.

Even if one were to argue that stature captures other unobserved investments in human capital in childhood, it is difficult to explain the finding that people with no education are likely to earn higher wages if they are taller. Since the jobs done by uneducated people typically involve heavy manual labour and do not require a great deal of initiative, but more a willingness to carry out simple instructions, it is difficult to see what else employers could be looking for in a tall person who is being hired to perform manual labour, other than ability to perform physical labour.

More evidence for this hypothesis is provided by the finding that the impact of higher stature on wages is weaker in the United States, where mechanisation is more prevalent, than in Brazil where mechanisation is less prevalent and thus physical strength matters more. Also note that even in Brazil, the better educated, who presumably do more sedentary work, cannot expect to get higher wages if their BMI is 26 or higher, while in the United States, obesity actually lowers one's chances of getting a higher wage.

Finally, in discussing the issue of causation it is worth remembering that adult stature does not vary over a person's lifetime. Hence when a correlation between stature and wages is found, it can safely be assumed that a change in wages cannot cause stature to vary, while variation in stature can cause wages to vary. Therefore it is not unreasonable to suppose that the arrow of causation points from stature to wages and not the other way round.

The implications of these findings are profound. The loss of income to those suffering from under nutrition is very large if the evidence provided by these graphs is any guide. Thus it seems that in Brazil a 1 percent increase in BMI among men is associated with a more than 2 percent increase in wages for BMIs in the range 22 to 26. To put this in perspective, it should be noted that almost all the variation in male wages takes place between BMIs of 21 and 27. Furthermore people with BMIs of 26

are far more likely to find work than people with BMIs of 22. The consequences for people with BMIs lower than these can be imagined.

Nutrition and health: Inadequate consumption of protein and energy as well as deficiencies in key micronutrients such as iodine, vitamin A and iron are key factors in the morbidity and mortality of children and adults. It is estimated that 55 percent of the nearly 12 million deaths each year among under five-year-old children in the developing world are associated with malnutrition.¹⁴ Similarly it has been estimated that 45 percent of all deaths in developing economies in 1985 can be attributed to infectious and parasitic diseases such as diarrhoea and malaria, while these diseases account for about 4.5 percent of all deaths in industrial market economies (Strauss and Thomas (1998), p. 767). Fogel (1994), based on research on the European past, finds that improvements in stature and body mass index explained “over 80 percent of the decline in mortality rates in England, France and Sweden between the last quarter of the 18th century and the third quarter of the 19th”. Modern evidence from a number of Asian countries is summarized below in Table 8 below, from Horton (1999).

Table 8: Estimates of excess mortality attributable to malnutrition

Country	# child deaths per year (thousands)	# due to severe or moderate malnutrition (thousands)	# maternal deaths per year (thousands)	# due to anaemia (thousands)
Bangladesh	327	215	24.3	5.6
Cambodia	63	39	33.0	7.6
PR China	970	287	19.6	4.5
India	2,810	1,730	139.3	32.0
Laos	30	17	1.5	0.3
Nepal	95	51	12.5	2.9
Pakistan	687	367	17.1	3.9
Sri Lanka	6	3	4.0	0.9
Vietnam	92	53	33.0	7.6
Total	5,080	2,762	286.2	65.3

Source: Horton (1999), p. 249

These figures are staggering. As many as 2.8 million children and close to 300 000 women die needless deaths every year because of malnutrition in these countries. Also noteworthy is the fact that

¹⁴ UNICEF, The State of the World's Children 1998, Focus on Nutrition, Oxford, Oxford University Press

anaemia is responsible for 20 to 25 percent of maternal deaths in most of these countries. This last observation points up the importance of micronutrient deficiencies in malnutrition. Iron deficiency is associated with malaria, intestinal parasitic infestations and chronic infections. Chronic iodine deficiency causes goitre in adults and children, besides having an impact on mental health. The importance of subclinical vitamin A deficiency in child mortality has only recently been recognized through meta-analysis of clinical studies (Horton (1999), p. 249). The relative risk of mortality for a child with subclinical vitamin A deficiency is 1.75 times that for a child who does not suffer from this deficiency. Thus in the Asian region, if about 10 percent of children suffer from sub-clinical deficiency - a conservative estimate - then 300 000 child deaths can be prevented through a successful vitamin A supplementation programme.

Nutrition and school performance: Considering the importance of nutrition in human development, there is a relative dearth of studies focusing on the role of the different aspects of malnutrition on cognitive achievement among children in developing countries. Nevertheless, there is sufficient empirical evidence, which indicates that early childhood nutrition plays a key role in cognitive achievement, learning capacity, and ultimately household welfare. Specifically, available studies have shown that low birth weight, protein energy malnutrition in childhood, childhood iron deficiency anaemia, and iodine deficiency (e.g. being born to a mother with goitre) are all linked to cognitive deficiencies and the effects are more or less irreversible by the time a child is ready to go to school (Horton (1999), p. 249). Childhood anaemia is associated with a decrease in score of one standard deviation on cognitive tests. Children are most vulnerable to malnutrition in utero and before they are three years of age as growth rates are fastest and they are most dependent on others for care.

The table below from Horton (1999) provides a rough measure of the overall economic costs of malnutrition as a percentage of GDP for selected Asian countries.

Table 9: Estimates of productivity costs of malnutrition, selected Asian countries, as percent of GDP

Loss of adult productivity			
Country	Stunting	Iodine deficiency	Iron deficiency
India	1.4	0.3	1.25
Pakistan	0.15	3.3	0.6
Vietnam	0.3	1.0	1.1

Losses including childhood cognitive impairment associated with iron deficiency		
Country	Cognitive only	Cognitive plus manual work
Bangladesh	1.1	1.9
India	0.8	0.9
Pakistan	1.1	1.3

Source: IFAD (2001)

It should be noted that these estimates are lower bounds for the productivity losses since they have been produced under conservative assumptions about losses. These calculations are based only on market economic activity and exclude non-market losses. They also assume the maximum degree of overlap between different conditions. An example would be the overlap between those adults who are currently anaemic and hence less productive in manual labour, and adults who are stunted and therefore less productive in manual labour. Similarly there is undoubtedly an overlap between children who are currently deficient in iron and those who are stunted. It is much harder to estimate the overlap between those adults who are currently anaemic, and adults who suffered either protein-energy malnutrition or iron-deficiency anaemia as children that affected their cognitive development and hence adult productivity.

The conclusion is that the economic costs of malnutrition can be very large indeed, especially when one considers how they accumulate over time. From Table 9 it seems that adult productivity losses arising from the combined effect of stunting, iodine deficiency and iron deficiency, are equivalent to about 3 percent of GDP every year in these countries. Since their GDP growth rates have been in the range of 5 to 7 percent per annum in the nineties, it follows that they have lost very large sums indeed. This point leads us to the next sub-section.

Nutrition and macroeconomic performance: As we have just seen, there are considerable losses at the national level from malnutrition and over time these can accumulate. When a significant proportion of the population is undernourished - and indeed, in 28 countries totalling nearly half a billion people,

from one to two thirds of the population is food insecure - it is possible that potential rates of GDP growth can be curtailed. The Nobel Laureate Robert Fogel has pointed out that in England and France around 1790, the bottom 20 percent of the population was effectively excluded from the labour force because they were too hungry to work. Since many developing countries today have living standards similar to those of Britain and France in the late 18th century, it seems likely that similar proportions of their populations are excluded from their labour force.

Fogel has shown in work based on historical longitudinal studies of single countries that improvements in nutrition and health explain half of British and French economic growth in the 18th and 19th centuries (Fogel (1994)). Using an accounting approach with concepts from demography, nutrition, and health sciences, he stresses the physiological contribution to economic growth over the long term. Reductions in the incidence of infectious diseases along with changes in the composition of diet and clothing and shelter increased the efficiency with which food energy was converted into work output and translated into higher economic growth.

Income growth alone will not remove hunger

Sufficient evidence has been presented to show that nutritional deficiencies impose a heavy economic burden on nations. This does not, of course, in any way imply that under nutrition should not be considered an unacceptable violation of human rights even if it could be shown that these economic effects were negligible.

Given that the reduction of under nutrition is vital, can income growth among poor households take care of the problem on its own, or does it need a helping hand in the form of direct public interventions? Some evidence on this point is available from the comprehensive study by Smith and Haddad (1999) who used data from 63 countries in five regions covering 88 percent of the developing world's population over the period from 1970-95 to analyse the determinants of child malnutrition, as measured by the percentage of underweight children under five. One of their principal findings is that growth in per-capita national income contributed to half the reduction in child malnutrition over this period. It is reasonable to say that while income growth has a substantial impact on under nutrition it alone will not take care of the problem.

Income growth is essential if under nutrition is to be reduced, but taken alone it cannot solve the problem completely. Statistical analysis of recent household surveys tends to show that the poor use extra income to diversify their diets away from cereals, roots and tubers towards foods that taste better and provide micronutrients or both. Hence calorie consumption may not increase in step with growth in private incomes, but the quality of the diet does improve and thus nutrition. However, growth in private incomes cannot provide education for girls or safe drinking water, or improved health services and sanitation or nutrition education, all of which are just as important as a better diet in improving nutrition

in most developing nations. Thus the problem of under nutrition is unlikely to be solved through income growth alone.

Neither is it likely to be solved without strong income growth. What is needed is a combination of income growth and direct nutrition interventions.

"[the WFS goals] are unlikely to be met through income growth. On the basis of the evidence in this paper we argue that these goals are also unlikely to be met without robust income growth. Thus a combination of growth and specific nutrition programmes will be needed"
(Alderman et al (2001)).

Nutritional status is the outcome of both food intakes as well as health inputs. So it is perfectly possible for an adult to be consuming e.g. 2700 calories a day and still be underweight because they have gastro-intestinal infections or have been getting malaria regularly, or suffer from deficient intakes of vitamin A or iodine or iron deficiency. Therefore the solution to under nutrition is increased intakes of calories and micronutrients or better health and sanitation, safe drinking water etc. Evidence will be presented below to show i) that private income growth is not even guaranteed to raise calorie intakes and ii) it certainly cannot improve health if better health requires public investments e.g. DDT spraying to kill mosquitoes. Rich people can certainly buy medical treatment for malaria once they have it, but they cannot protect themselves from getting malaria in the first place if they live in an area where malaria is endemic:

"There are strong reasons why governments should invest in nutrition, rather than leaving it solely to households and parents. First, nutrition, like education, is a very long-term investment. Capital markets are imperfect and do not finance this type of investment, particularly since there is no collateral. Hence investments by the poor in nutrition are likely to be too low, even if the households know that the returns are high. Second, parents are likely to under invest in nutrition of girls, particularly in those countries in Asia where sons and daughters-in-law (but not daughters) take responsibility for their parents in old age. Lack of investment in girls' nutrition helps to transmit poverty inter-generationally, since stunted women have smaller babies. Finally, there are information gaps. The academic community only recently became fully aware of the importance of several micronutrients, and parents in developing countries may not have this information. Although the last problem can be overcome with public education policies, the first two represent market failures requiring government intervention" Horton (1999).

We begin by presenting evidence that income growth does not necessarily lead to growth in calorie consumption.

The point of departure for this whole literature is Engel's Law, one of the very few well established empirical laws in Economics. This states that the proportion of current expenditure spent on food declines with rising incomes. It follows that at low income levels, the share of food is very high. This can easily be verified. In India for example, according to figures from the National Sample Survey (Bansil (1999), p.33) the share of per-capita food expenditure in per-capita current expenditure dropped from 73 percent to 63 percent over the period from 1972 to 1994. These shares were substantially higher for those below the poverty line. By contrast, food budget shares in developed countries are rarely over 25 percent.

It would seem to follow from the fact that food has a high budget share that as incomes increase, the problem of malnutrition will be solved since people will spend more on food, indeed from the evidence above for India, out of every additional rupee of income, they would have spent anywhere from Rs 0.63 to Rs. 0.73 on food during the twenty year period referred to. However, matters are not as simple as that. The fact that a person or a household spends more on food implies nothing about whether they spend more on calories, since they could indulge their taste for variety by spending on more expensive foods. That this is not an idle speculation will be demonstrated below. Hence even if the income elasticity of demand for *food* is close to one, the income elasticity of demand for calories may be much lower than that.

A simple arithmetic example serves to demonstrate the importance of this elasticity for the fight against under nourishment. Suppose the income elasticity of demand for calories is 0.5 and suppose per-capita income is increasing at 5 percent per annum, which is a fairly high growth rate. Then per-capita income will double in approximately 14 years, accompanied by a 50 percent increase in calorie consumption at the mean. If all percentiles of the distribution of calorie consumption share in this growth, then a 50 percent increase in calorie consumption for the undernourished will bring them close to the minimum calorie requirement. For example, in India's rural areas, the lowest 5 percent of the population ranked by per-capita expenditure had a mean calorie consumption in 1993-94 of 1300 calories/person/day.¹⁵ The calorie requirement for India (rural) has been established at 2400 calories/person/day.¹⁶ It follows that the mean calorie consumption of this group needs to almost double (i.e. increase by 86 percent) for it to get the minimum calorie requirement. At a 5 percent growth rate of per-capita income with an income elasticity of 0.5 for calorie consumption, it will take 25 years for this group to attain its calorie requirement level. And if the income elasticity of calorie consumption should be much lower, e.g. 0.25, it will take 50 years for this group to reach the requirement level.

Two questions arise naturally at this stage. First, does the calorie "requirement" of 2400 calories/person/day for rural India make sense? If so, it is hard to see how 25 - 35 million people could

¹⁵ There is good reason to believe that this figure is an underestimate (Suryanarayana (2000)).

¹⁶ FAO uses a figure of 1810 kcal/person/day as the requirement for India (FAO 2000, Table 2).

have survived for years on calorie intakes far below this “requirement”. The second question, of course, is what is the income elasticity of demand for calories? The rest of this subsection deals with these two questions.

Turning first to the available estimates of the income elasticity of demand for calories, it is useful to understand how these estimates are made. There are essentially two ways of measuring food and calorie intakes. One is through data on **food acquisition** and the other through **direct observation** of food intakes. In the food acquisition method one begins by finding out how much food was acquired by the household in a given period through purchase, home production or gifts and then subtracts from it any food sold, or otherwise given out. The net amount of food acquired by the household is then converted into calories using standard tables on the calorie content of different foods. The final step is to divide the total number of calories by the number of household members to arrive at a measure of calorie consumption per head.

The basic assumption is that all food acquired is consumed by someone in the household over that time period. Another problem is created by the degree of aggregation of food items. In order to keep costs down and to cope with problems of recall, it is necessary to confine survey questions to reasonably broad aggregates of food items. But this necessarily means that the calorie content of those foods cannot be measured to a high degree of accuracy. What is to be done about food given to servants, guests, pets etc.? If this food is included in total household food acquisition but farmhands are excluded when computing the number of family members, one can end up with gross overestimates of per-capita calorie consumption.

For example, the Indian National Sample Surveys for 1971-72, recorded the calorie consumption of the top four percent of the Indian population (in terms of monthly consumption expenditure per head) as 6000 calories per day per capita while the corresponding figure for the bottom four percent was 1500 calories per day per capita. These figures arose from the fact that the consumption of servants was included in the household food accounts of the top four percent whereas in accounting for the food acquired by the bottom four percent (who presumably were servants) no allowance was made for the fact that they had already received food from their employers (Srinivasan (2000a) and Suryanarayana (2000)).

An alternative is to collect information on food intakes, rather than food acquisition. This can be done either by having the investigator weigh the ingredients of each meal as well as any wastage and then converting into calories or by asking respondents to recall these ingredients for the past 24 hours. These methods do have the advantage of focusing on food consumption by permanent household members but they cannot account for meals eaten away from home.

However, the former is very expensive - though probably the most accurate - while the latter suffers from the obvious drawback that one day's consumption is not representative. Moreover, it is plausible

to argue that the act of observing people itself changes their behaviour. Households that know they are being observed will presumably attempt to present a better picture of their lifestyle. For example, they may cook “better” foods or they may not discriminate against family members they usually discriminate against. It can also be assumed that wealthy households find it easier to make such behavioural changes than poorer households do. Strauss and Thomas (1998), p. 794, give the example of the Brazilian ENDEF survey where poor households initially tried to impress the enumerators by eating more, but lacked the financial stamina to keep it up beyond two days. Be that as it may, some change is to be expected.¹⁷

Having estimated calorie consumption, the next step is to compute total current expenditure, i.e. the sum of food and non-food expenditure. Total current expenditure per-capita is very commonly used as a proxy for income in estimating the income elasticity of demand for calories. The final step is to estimate the income elasticity of demand for calories. One widely used procedure for this is to regress the log of per-capita calorie consumption on the log of per-capita expenditure and to treat the coefficient of log per-capita calorie consumption as an estimate of the income elasticity of demand for calories. A large number of studies using either this procedure or modifications of this procedure have been carried out. The use of this procedure necessarily implies that this elasticity is constant over the whole range of incomes in the sample. A moment’s reflection will show that this is not a reasonable assumption since the elasticity is ultimately limited by the capacity of one’s stomach. Hence Reutlinger and Selowsky (1976), one of the earliest and most comprehensive studies on this topic, used a semi-logarithmic functional form for estimation purposes, implying a declining elasticity of demand for calories as income increases.

What were Reutlinger and Selowsky (1976) findings? Even for households at the calorie requirement level, their elasticity estimates ranged from 0.15 to 0.30. A large number of studies were conducted after that (see Bouis (1994) and Strauss and Thomas (1995) for details) which can be divided broadly into two groups, those that produced elasticity estimates ranging from 0.3 to as much as 1.2, i.e. above Reutlinger and Selowsky’s estimates, and those that produced estimates below theirs, ranging from about 0.18 to as low as 0.01. There are at least three reasons why this range is so large.

- The degree of aggregation: Some degree of aggregation is unavoidable in any household survey since otherwise the questionnaire would be extremely unwieldy and in any case the respondent would be hard pressed to recall in detail what foods were acquired or what was eaten by each family member. However, the degree of aggregation varies from survey to survey. To take a very simple example, one can either have a food group called cereals, or one can break it down into coarse cereals (e.g. sorghum and millet) and superior cereals (e.g. rice and wheat). The

¹⁷ A good name for this would be the Heisenberg effect, by analogy with the Heisenberg uncertainty principle in physics, one interpretation of which is that the act of observing a sub-atomic particle is not independent of its behaviour.

calculation of calories consumed and the cost of those calories will differ depending on whether this is done for cereals or separately for coarse cereals and superior cereals. Suppose that income elasticities of demand for calories are to be calculated for the cereals group. This is done under the implicit assumption that there is no substitution within the cereals food group. However, as is known from experience there often is: as incomes go up, people switch their consumption from coarse to superior cereals. Since these tend to be more expensive there is a slower increase in calorie consumption than there would be if the cost of calories had not gone up. But the implicit assumption is that the cost of calories has not gone up. Hence the percentage increase in calorie consumption tends to be overstated for the same percentage increase in income, i.e. the elasticity is overstated.

- The use of calories calculated from food acquisition data: The use of the former causes elasticity estimates to be biased upward provided total expenditure is used as a proxy for total income. If calories are computed by multiplying quantities consumed by calorie conversion factors and adding, and if total expenditure is obtained by multiplying those same quantities by other positive factors (prices) and adding, measurement error in the quantities consumed will be transmitted to both expenditures and calories, leading to a spurious positive correlation between total expenditure and calories. As a result, all of the variation in total calories will be attributed to the variation in total expenditure, when in fact some of it is due to the error, i.e. the coefficient estimates will be biased upward. The solution to this problem should be obvious: use instrumental variables. Of course that begs the question whether satisfactory instruments can be found. But in most cases, some sort of crude instrument can be found, e.g. most household surveys do collect information on household assets even if only to ask how many pots and pans there are in the house. Even this sort of information can be useful.
- The use of expenditure as a proxy for income is often necessitated by the fact that income figures are not collected in household surveys. But what if they are collected and can be used as the explanatory variable in a regression. What happens to the calorie elasticity estimates then? Assuming that there are random errors in measuring both calories and income and that these errors are not correlated. In that case, one ends up with an errors-in-variables model and hence the elasticity estimates will be biased downward. Once again the obvious solution is to use instrumental variables.
- The use of different functional forms and econometric estimation methods: It is obvious that some differences in estimates will arise simply because of differences in functional forms and estimation methods and so this point will not be belaboured.

What general conclusions can be drawn from this admittedly impressionistic survey of this vast literature? What is a reasonable range for calorie elasticities? It seems reasonably clear that some of the early calorie elasticity estimates - before these problems were well understood - tended to be on

the high side, higher than Reutlinger and Selowsky's results. Elasticities of 0.5 were not uncommon. In general it can be said that recognition of these problems and with improvements in survey techniques and econometric estimation techniques, calorie elasticity estimates have generally decreased in size. Also, as expected, whenever food intake data have been regressed on total expenditure or income, the elasticity estimates obtained thereby have been smaller. In recent years, with the exception of Subramanian and Deaton (1996) who obtained an estimate of about 0.45, researchers have generally obtained low to very low elasticities, i.e. in the range 0.01 to 0.15, tending to provide confirmation for the hypothesis that these elasticities are actually quite low.

There are also strong a priori arguments for the belief that calorie elasticities should be low. First of all high calorie elasticities would imply absurdly large weight gains for individuals. The argument is as follows. Weight gain goes hand in hand with increased calorie intakes, at least up to a point. For example, Bouis (1994) shows that a 22 percent increase in calories in going from the lowest quintile to the highest, is associated with a 17 percent increase in average weight. This is a slight overstatement since people in the highest quintile tend to be older so that one would expect their weight to be higher anyway. Now suppose that an individual's income doubles. If one assumes a calorie elasticity of 0.5, this means that calorie consumption will increase by 50 percent. This increase should then be associated with a weight gain of $[17/22 \times 50]$ i.e. 38 percent, which is highly improbable. Bouis also points out that another IFPRI data set for Pakistan which had information on body weights for women, showed that while incomes went up by 85 percent, body weights only increased by 15 percent. These figures are incompatible with a high income elasticity of demand for calories if calorie consumption is strongly correlated with body weight.

The second argument against a high-income elasticity of demand for calories comes from Behrman and Deolalikar (1989). They hypothesise that there is a strong demand for more variety in foodstuffs and that this demand manifests itself even at low-income levels. This hypothesis was tested on the data set used for the University of Pennsylvania project on International Comparisons of Prices (ICP), which had data on prices, quantities and purchasing power parity incomes from 34 countries for 1975 and 60 countries for 1980. Nine food groups were covered, i.e. the degree of aggregation was quite high. In the authors' own words, "as food budgets increase from very low levels, there is a very pronounced increase in the demand for food variety, with the food indifference curves changing from being flatter than the Cobb-Douglas to being almost L-shaped (the fixed proportions case)". (Behrman and Deolalikar (1989, p. 671). An important implication of this finding is that since the elasticity of substitution is higher among poor households, any increase in food prices will cause the poor to curtail their food consumption more sharply than the rich. Hence food consumption by the poor will respond strongly to sharply targeted food subsidies.

These results, if valid, have some profound implications. First, if the choices made by individuals are informed choices, then it follows that even in poor societies people do not seem to take nutritionists' standards for calorie consumption very seriously. There is some evidence that people are making an

informed choice; as Deaton (1997) shows, the cost of calories rises steeply with income. He uses the Maharashtra (India) data set from Subramanian and Deaton (1996) to show that whereas it only cost households in the bottom expenditure decile Rs 0.88 to obtain 1000 calories, the cost for households in the top decile was Rs 1.50, an increase of 67 percent. Calorie consumption in the bottom decile was 1429/person/day against a calorie requirement of 2400 calories/person/day. Hence the bottom decile could have wiped out its calorie deficit by spending an extra Rs. 0.88 per day to obtain an extra 1000 calories. Of course, it would have had to largely consume coarse cereals to do so, since that was the relatively cheap source of calories. Since the wage rate for unskilled labour in Maharashtra in 1983 (the time of the survey) was Rs. 15 per day, it is difficult to understand what kept the poor from simply buying more calories, except the possibility that they did not want to spend their money on coarse cereals.

It is also necessary to consider the possibility that the poor make an uninformed choice, i.e. that they are hungry but do not know it. Now this argument does make sense if one thinks about micronutrients and vitamins, since much of this knowledge is new even for nutritionists and is often not understood by lay people. In that case there may be high returns to making this knowledge available to the poor. Another, more likely possibility is that a shortage of calories manifests itself as lethargy or a propensity to fall sick. In that case, the nutrition shortfall may not be perceived for what it is and once again a case could be made out for a role for public policy to make more food available perhaps through a food for work programme or through a targeted public distribution scheme.

4. Agriculture and rural off-farm activities and poverty reduction

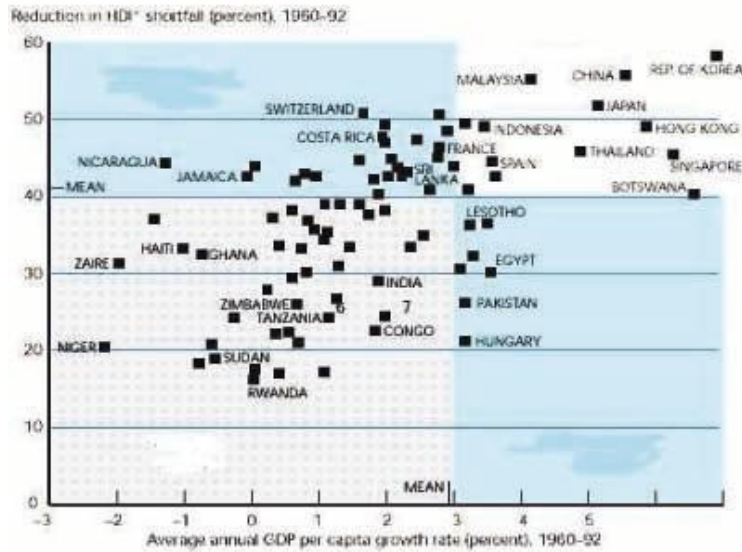
The major premise of this section can be stated briefly. For hunger reduction there is an interdependent relationship between income growth and direct public measures. Without direct public measures, income growth will only partially solve the problem of hunger but income growth is needed to finance direct public measures. Hence pro-poor income growth needs to be encouraged. The question then becomes, under what circumstances is income growth pro-poor? The rest of this section attempts to provide an answer to this question.

Economic growth does not always reduce poverty quickly

A consensus seems to have emerged that the structure of economic growth matters for its impact on poverty and on human development generally. The graph below from the UNDP Human Development Report 1996 makes the point quite clearly: economic growth, as measured by growth in per capita GDP is associated with better human development. The relationship is quite strong: countries that achieved higher per-capita GDP growth rates over the period from 1960 to 1992 generally achieved a sharper reduction in the UNDP Human Development Index (HDI) shortfall.¹⁸

¹⁸ Note, however, that this is not the full HDI, but a subset, restricted to those components that do not rise automatically with income.

Figure 6: Human development and economic growth



At the same time it is quite clear that for the same growth rate, some countries managed to reduce the HDI shortfall much more than did others. For example, why did Egypt not succeed in reducing its HDI index deficit much despite enjoying fast growth in per-capita GDP? Thus, with the same per-capita GDP growth rate countries like Lesotho, Indonesia and Malaysia did much better at improving their Human Development performance.

The answer to this question lies in the fact that economic growth and poverty and inequality reduction are all simultaneously determined outcomes of deeper processes.¹⁹ If these are such as to increase the returns to the assets possessed by the poor then economic growth and poverty reduction will be seen to go together. On the other hand if the process favours assets possessed by the wealthy then the opposite will be true. Hence it matters greatly for poverty and hunger alleviation whether overall economic growth originates in a particular sector, i.e. the sectoral composition of growth is important.

Growth in agriculture and rural off-farm activities can reduce poverty quickly

Which sector is that? Evidence is presented in this sub-section to show that economic growth originating in agriculture, when coupled with growth in rural off-farm (ROF) incomes is likely to be strongly poverty reducing provided that it does not occur against a backdrop of extreme inequality in asset ownership, especially of land. For example, Timmer (1997) found that while the elasticity of average per capita income of the lowest income quintile to changes in agricultural productivity is higher than the counterpart measure for non-agricultural sectors, the result depends crucially on the

¹⁹ Srinivasan (2000b) makes this point forcefully.

distribution of income. Namely, in countries with highly skewed income distribution (measured as the difference between the average per capita incomes of the top and the bottom quintiles of income distribution) growth reaches the poor with difficulty, whether it originates from increases in agricultural productivity or the non-agricultural one. Thus according to some estimates, high-inequality countries would need twice as much growth as low-inequality countries to achieve the same reduction in poverty levels (ODI, 2000).

The bare bones of the story mentioned above are as follows. It begins with the obvious fact that the majority of the world's poor still live in rural areas and depend crucially on agriculture for their livelihoods. Hence an increase in agricultural productivity should raise incomes in agriculture. This alone will not necessarily help the poor. But that is not the end of the story. The next step is to ask where the extra income is spent. There is some evidence that in many countries this income increment is largely spent on bulky or perishable goods, such as livestock products, the services of merchants, artisans, mechanics etc. and simple agricultural and household goods. The defining characteristic of these goods and services is that they can only be traded within a small area, either because they are perishable or because of high transport costs. Furthermore, these commodities generally require low inputs of capital and skills to supply and are ideally suited to the capabilities of the rural poor. But because they are effectively non-tradable, their growth is constrained by the growth of demand in the local, rural, market which may be stagnant. Hence if this barrier could be removed, they could grow and help the poor escape poverty. That is precisely what the extra income from agricultural growth does: it creates demand for these locally non-tradable goods, *provided this extra income is not hoarded or spent outside but is spent locally* - which is more likely in a society of smallholders than in one of large landlords. If all goes well, a virtuous cycle is created, with agricultural and rural off-farm income growing and helping each other to grow. Four important pieces of evidence are needed to validate this hypothesis.

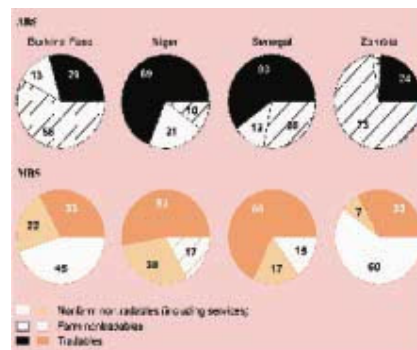
First, incremental budget shares of non-tradables out of agricultural income have to be large; secondly, income from non-tradables should be important for the poor; thirdly, poverty reduction should follow agricultural growth with a lag and finally, high initial inequality will short-circuit this process.

The argument above is now presented in greater detail. First of all, it can hardly be disputed that the majority of the world's poor still live in rural areas and depend crucially on agriculture for their livelihoods (IFAD, 2001). It seems reasonable then that raising the profitability of agriculture will be helpful to the poor. This involves taking steps either to increase agricultural productivity per acre or encouraging a switch to higher valued crops. For the time being, we set aside the question of how agricultural productivity is to be raised in the first place as well as the question whether this increase is sustainable.

The initial impact of increased profitability in farming is to raise the incomes of those who own land. This in itself may help reduce poverty if the poor also own some land and participate in the productivity

increase, but obviously not if the very poor do not generally own land. But there may also be an increase in demand for labour because agriculture itself, and the construction of the infrastructure needed to support agricultural development are both very labour intensive. Those who were earlier unemployed may thereby find work while those already employed may find themselves working more hours. Either way their incomes go up. However, for poverty reduction, it is not the initial rise in incomes that matters. What does matter is what they are spent on.

Figure 7a: Shares of average and incremental income spent on non-tradable and tradable goods by rural household



Farm non-tradables account for the lion's share of consumption in Burkina Faso and Zambia, but are less important in Niger and Senegal, where more basic foods are tradables.

Figure 7b: Additional household income from an initial US\$ increase in income from tradables



The net spin-off effects from growth in agriculture are at least as high as the immediate returns.

It is well-known that as incomes rise, the proportion spent on staples declines while the proportion spent on superior foods such as superior grains, vegetables, fruit, milk, meat, etc. increases (this is another statement of Engel's Law). These commodities are effectively nontradable because they are bulky or perishable. At the same time the proportion of income spent on the services of merchants, artisans, mechanics etc. is likely to go up, partly because agricultural growth also creates a demand for agricultural implements but partly because rural consumers begin to demand goods like bicycles, which need repairs or begin to eat outside the home so creating a demand for food stalls. Services are, of course, by definition also non tradable. Finally, there is a third category of effectively non-tradable goods comprising simple agricultural inputs, e.g. hoes, rakes, spades and so forth which may be bought and sold locally, but which do not have much of a market outside the rural areas.

The combined effect can be large. For example, Delgado *et al* (1998) use household consumption data from surveys conducted in the 1980s in Burkina Faso, Niger, Senegal, and Zambia (with additional insights gained from field work in Zimbabwe) to study this question. They show (see Figure 7A above) that the share of additional income (MBS or Marginal Budget Share in the graph) spent on non-tradables ranges from 67 percent in Burkina Faso and Zambia to 32 percent in Senegal. Now this spending had multiplier effects on household income and these effects were also calculated. The overall impact on household incomes from non-tradable activities was thus given by the combination of these two effects. This impact turns out to be surprisingly large as Figure 7B shows. For example in Burkina Faso, according to this graph, that a US\$1 increase in income from farm tradables led to an increase of US\$1.88 in income from non-tradables, while in Zambia, the same US\$1 increase led to an increase of US\$1.57 in income from non-tradables.

The importance of rural-off farm activities and non-tradables

The next step is to show that income from non-farm activities looms large in the incomes of the poor.²⁰ Such services as running a food stall or setting up a simple repair shop do not require much in the way of either skills or capital. Neither does the manufacture of simple agricultural implements. Hence it is precisely in the provision of these goods and services that the poor can find gainful employment and thus raise their incomes. Furthermore the expansion of this sector does not initially require that any other sector should shrink, since there is often a great deal of unemployment, disguised or open in the rural areas of developing countries and so the labour required to supply these goods and services does not have to be withdrawn from some other activity. Table 10 to Table 12 below provide evidence of the importance of rural off-farm income to the poor.

²⁰ A distinction is made between off-farm income and non-farm income. The former includes income from working on farms other than one's own while the latter is confined to activities other than farming.

Table 10: Shares of non-farm income and employment in total rural income and employment - regional averages of country cases

Region and sub-region	Non-farm income share		Non-farm employment share		Average per capita ² GNP 1995 (US\$)
	Mean ¹ %	Coefficient of variant	Mean %	Coefficient of variant	
Sub-Saharan Africa	42	0.45	726
Eastern/Southern Africa	45	0.47	932
West Africa	36	0.36	313
Asia	32	0.33	44	0.32	1,847
East Asia	35	0.19	44	0.29	2,889
South Asia	29	0.52	43	0.40	388
Latin America	40	0.20	25	0.33	2,499

1/ The mean refers to the mean over the case studies considered for each region and sub-region.

2/ Average per capita GNP is calculated as the simple average over the countries covered by the case studies and is based on estimates from the World Bank, World Development Report 1997.

Note: The income shares represent the share of non-farm income in total income of households that are mainly farm households (and the rural landless). The employment shares represent the share of households in the rural population (both in rural areas and small rural towns) with non-farm activity as primary occupation.

Source: *Special chapter on rural off-farm activities in SOFA 1998*

Table 11: Income sources in rural India by income quintile (percent), 1994

Per capita consumption expenditure quintile	All households	Bottom quintile	2nd	3rd	4th	Highest quintile
Income from cultivation	55	38	38	45	50	65
Total off-farm income	43	60	60	51	47	33
Agricultural wages	8	28	21	13	8	2
Non-agricultural wages	6	16	15	10	6	2
Self employment	12	11	17	16	15	8
Regular employment	17	4	7	12	19	21
Other income	3	2	2	3	3	3

Source: Lanjouw and Shariff (2001).

Note: Quintiles of real per-capita income defined at the All-India level

Totals do not necessarily add up to sub-totals because of rounding.

Table 12: Sources of income in the Mexican ejido sector by farm size, 1997

Farm size in rain-fed equivalent hectares	All	<2	2-5	5-10	10-18	>=18
Number of households	928	131	244	239	179	135
Shares in total income (percent)						
Total farm income	45.1	22.9	28.1	41.8	50.3	62.0
Total off-farm income	54.9	77.1	71.9	58.2	49.7	38.0
Wages	24.6	40.3	36.9	30.4	18.2	11.1
Agricultural wages	4.8	10.0	7.5	4.2	5.7	1.2
Non-agricultural wages	19.9	30.3	29.4	26.2	12.5	9.9
Self employment	9.4	17.1	14.2	4.6	12.1	6.8
Remittances	6.5	2.6	5.4	8.9	6.0	6.0
Other income	14.4	17.1	15.3	14.3	13.3	14.1

Source: de Janvry and Sadoulet (2000)

From Table 10 it is clear that the mean share of non-farm income in household income is nowhere less than about 30 percent and is as high as 45 percent in Eastern/Southern Africa. Shares in employment are equally high, ranging from 25 percent in Latin America to almost 45 percent in parts of Asia. Table 11 provides evidence that in one large, poor country – India - at least, the share of income from off-farm sources is highest for households in the bottom expenditure quintile and declines with increases in income. A broadly similar trend holds in Mexico, as Table 12 shows, although households are classified by the amount of land farmed, rather than expenditure as in the case of India. To sum up, off-farm income is important to all rural households, but is particularly important to poor rural households.

Hence, for the poor, the rural off-farm sector offers a relatively easy escape route from poverty. But anyone who thinks of supplying these goods and services runs into a demand bottleneck because they are effectively non-tradable in most circumstances, implying that they can only be sold locally. But there is not much local demand for these goods and services in a stagnant rural economy, and until this is created, there is no point in expanding output. But if agricultural productivity and hence the incomes of those who own land can be increased, and if they spend this extra income on goods and services provided by the rural off-farm (ROF) sector then the bottleneck to the ROF sector's expansion can be cleared and it can grow and provide important benefits to the poor. Even landless agricultural labourers and others not directly employed in this sector benefit since their power to bargain for higher wages and thus share in the fruits of agricultural productivity growth, goes up if alternative sources of employment are available.

A critical implication is that the impact on poverty occurs with a lag. Growth in agricultural income will not initially reduce poverty and may not have any impact even on the wages of unskilled agricultural labour. It is only later, after incomes have been generated in the rural non farm sector that poverty should begin to decline. Once it does, however, it should decline very quickly. Empirical evidence on these points is now presented.

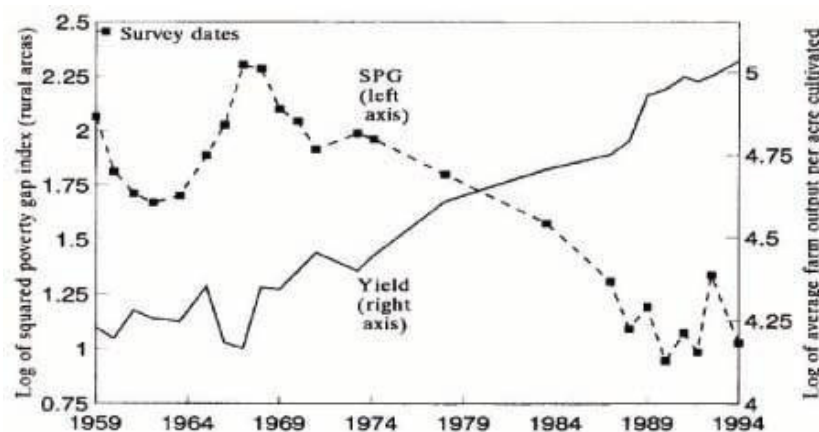
Agricultural growth and poverty alleviation: Evidence

Econometric evidence of a positive relationship between agricultural growth and poverty alleviation can be traced back to the late 1970s (Ahluwalia (1985)) mainly for India. Ahluwalia (1985) showed that in years of good harvests poverty declined while in years of bad harvests poverty increased. The problem was that during the time period covered, there was not much agricultural growth. Therefore any attempt to estimate the impact of agricultural growth on poverty was bound to produce imprecise results, and was criticised on precisely these grounds. However, now that India has had a long period of sustained agricultural growth, starting from the early seventies, better estimates can be found. The most detailed of these studies is Datt and Ravallion (1998) and we will focus closely on this for the following reasons. The authors relate differences in poverty reduction to differences in agricultural growth rates for different Indian states. The main advantage of doing that is that in effect an

experiment is performed in which macroeconomic, trade, sectoral and social policies are all held fixed (since these apply to the whole of India) and the “pure” effect of agricultural growth on poverty reduction isolated.

Before discussing the main findings of this paper, some background information on agricultural growth in India is needed. Broadly speaking, there was essentially no sustained agricultural yield growth from 1947, when India gained independence, till about 1966 and almost all the growth in agricultural output in this period came from area expansion. Starting from about 1966, agricultural yields began to grow. Initially this growth was confined to the (geographically small) states of Punjab and Haryana in the north-western region, spread to the central and parts of the southern region in the seventies and to the eastern region, especially West Bengal, in the eighties. Growth rates converged to levels above three percent per annum. There is widespread concern that yield growth has slowed down in India since the early nineties though no clear evidence on this is available. Anyhow, over the period from 1962 to 1995 as a whole, yields grew at a compound annual rate of 2.3 percent.

Figure 8: Squared poverty gap and average farm yields in rural India, 1959-64



Source: Datt and Ravallion (1988)

Turning now to Datt and Ravallion (1998), Figure 8 above brings out the main point of the paper quite effectively. There was not much growth in agricultural yields in India between 1959 and the early seventies. After that, when growth in agricultural yields became strong, poverty as measured by the squared poverty gap index began to decline. The squared poverty gap index does not merely count the number of people whose incomes are below the poverty line, it also measures how far below the poverty line their incomes are, and gives progressively higher weights to incomes the farther they are below the poverty line. It is important to be clear about the meaning of this graph. Not only did the number of people in poverty, as measured by the headcount index, decline but poverty also became less severe, i.e. the consumption of the poorest of the poor also increased. The claim that agricultural yield growth bypassed the poorest cannot be supported on the basis of this graph.

What were the channels through which agricultural growth helped the poor? The first important finding is that rural wages increased, but with a lag: “higher average farm-yields benefited poor people both directly and via higher real wages. The long-run elasticity of the headcount index of poverty to farm yield was over two, and 40 percent of this was through wages. The short-run elasticity was far smaller, and little of the impact was via wages. The benefits to the poor from agricultural growth were not confined to those near the poverty line.

Inflation had adverse short-run effects on the poor, via real wages” (Datt and Ravallion (1998)). The fact that wages do respond to agricultural growth but with a lag is a critical piece of evidence for the framework above. It is an important implication of the framework that wages rise with a lag since time is required for the rural non farm sector to grow in response to the initial impetus from growth in agriculture. When that happens, the demand for labour goes up, agricultural workers find that their bargaining power has gone up and they can start demanding higher wages. Therefore agricultural growth should cause wages to go up, but with a lag. These lags also explain another finding of this paper: that the impact of growth is slower than in Ahluwalia (1985), but the eventual impact is much greater.

The next important finding is that an increase in consumption expenditure in rural areas made possible by growth in the primary and tertiary (mainly informal) sectors reduced poverty in both urban and rural areas but secondary sector growth did not reduce poverty in either. Thus, the poverty reduction potential of growth in the agricultural and rural non farm (informal) sectors goes beyond the immediate impact on rural poverty and “spills over” to urban poverty.

Thus far the discussion has concentrated on how the process works if everything goes well. Under what conditions would the process not benefit the poor? The punch line should be obvious: the poor will not benefit if the extra income provided by the initial increase in agricultural profitability is not spent locally on the goods and services provided by the rural off-farm (ROF) sector. One possible scenario is that there are marked inequalities in land ownership so that the initial increase in agricultural income is concentrated in a few hands. Though there may be gains to the poor arising out of extra agricultural employment and possibly lower food prices, the add-on effect on local employment and industry arising out of expenditure by farmers on locally made products will not be there since wealthy landowners will have metropolitan tastes and the wealth to indulge them. Therefore they will be unlikely to patronize local suppliers.

When does agricultural growth not reduce poverty?

Bautista (1995) sheds some light on these issues with a case study of the Philippines. He points out that over the period 1965-80, crop production in the Philippines grew at a rate of 5.2 percent per annum and livestock at a rate of 6.4 percent, among the highest growth rates in Asia. The growth of crop production was evenly shared between rice and non-traditional export crops. These high growth

rates were at least partly due to a sevenfold increase in real government expenditure on agriculture, the bulk of which was devoted to irrigation investment, which took half of all agricultural investment by 1980. But this was at the cost of investments in rural roads whose share had dropped to barely two percent of agricultural expenditure. At the same time, human development was exceptionally good in the Philippines, with rates of literacy, infant mortality and life expectancy all either better or comparable with its neighbours in Southeast Asia. Despite all this, there was no significant reduction in poverty.

The primary reason for this was that the income gains from agricultural growth were highly concentrated. First, where rice farmers were concerned, only those who had access to irrigation could benefit - despite all the investment in irrigation only 18 percent of arable land was irrigated by 1980. Second, subsidies on credit and fertilizers were pocketed by large farmers who also enjoyed better access to infrastructure. Large farmers also enjoyed implicit subsidies - through low tariffs, an overvalued exchange rate and a low interest rate - on imported farm machinery that displaced landless agricultural labourers. The consequences were clear:

"Income gains were concentrated in the already more affluent segment of the rural population. As a result, rural consumption favored capital-intensive products and imported goods rather than labor-intensive, locally produced goods ... Accordingly the rate of labor absorption in both agriculture and industry was very low, and given the rapid expansion of the labor force, it prevented real wage rates from moving upward. As a result ... the incidence of poverty increased over the period" (Bautista (1995) p. 144).

A similar situation can arise in countries where government policies specifically discriminate against small holders. For example, small holders might be forbidden to grow cash crops, which are reserved for large commercial farms. The owners of these farms tend to spend any increments in their income on imported goods but spend little on goods produced in the local economy. If small farmers are allowed to share in the profits from cash crop cultivation, there can be little doubt that they are more likely to spend their money locally, creating income-earning opportunities for others. Hence in situations like this, though the agricultural sector registers growth, this growth has little or no impact on poverty.

Before summing up the arguments of this sub-section, one key point needs to be made. This has to do with whether the poor can seize the opportunities provided by agricultural growth. Agricultural growth puts money initially into the hands of those who own land. Its impact on poverty depends on whether this income is spent on goods and services that are supplied locally or on imports. If there are strong inequalities in land ownership then this income is unlikely to be spent locally. If it is spent locally it creates an opportunity for the poor to raise their incomes. But how well they seize this opportunity depends on their education and health, on access to credit and savings services, and on whether they are not excluded by social custom or government fiat from income earning activities (e.g.

women being shut out from credit markets). Measures to increase the capital available to the poor - human, financial, physical, natural and social - are therefore likely to pay big dividends in terms of their ability to lift themselves out of poverty.

In conclusion, the key point is that growth in agricultural incomes, by creating demand for the output of the rural off-farm non-tradable sector, makes it possible for that sector to grow. Since the capital and skill requirements of that sector are well suited to the capabilities of the poor, its rapid growth can help eliminate poverty. Thus agricultural growth ultimately reduces poverty and does so with a lag. Growth originating in other sectors cannot do this. But this benign process cannot work if there are marked initial inequalities in the agricultural sector since these act to prevent agricultural incomes from being spent locally and therefore do not create the multipliers needed to make the process work. Evidence was presented on these points that showed that this is not merely a theoretical possibility.

5. Implications for poverty and food insecurity reduction strategies

There appears to be an emerging consensus that the fundamental principle of public policy should be to “expand the social opportunities open to people” (Drèze and Sen (1999), p. 203). In this framework, state policies can be classified as market complementary and market excluding. Policies towards the agricultural sector have been for a long time of the second type thus reducing opportunities for the rural population to develop and expand their capabilities. At the same time, states have often failed to “go beyond the market” and provide the essential supportive services that could prevent rural stagnation, decline and poverty - rural infrastructure, education, health care and sanitation, child nutrition Programmes, agricultural research and extension. In South Asia and a number of sub-Saharan African countries generally, these activities were largely left to private initiative, with indifferent results, whereas in the East Asian countries there was strong public action with a payoff in higher economic growth and poverty reduction.

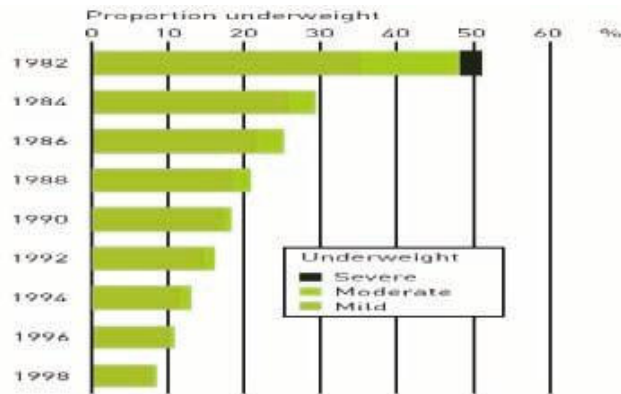
It is not the intention here to add to the already long list of development strategies. The aim is much more modest: in the light of the above, what considerations should guide the design of economic and other policies to implement the twin-track approach? In other words, what considerations should guide policies to combat hunger and to promote growth in agricultural productivity and off-farm rural activities given that the ultimate aim is to expand the capabilities of the poor? Examples of successful Programmes are provided without attempting to delineate a detailed strategy.

Policies to combat hunger

Examples of policies to combat hunger include nutrition surveillance Programmes; supplementary feeding of deeply under- and malnourished groups, in particular pregnant women and young children; nutrition education; better primary health care; and measures to increase the supply of more nutritious foods combined with micronutrient supplementation. Basing such initiatives in communities is critical to their success.

The experience of Thailand, described in detail in FAO (2000) (The State of Food Insecurity in the World, 2000), is instructive and is described in detail here. The Thai government launched a community based programme to alleviate under nutrition in 1982 which concentrated initially on alleviating the most serious nutrition problems found among the rural poor: protein-energy malnutrition, vitamin A deficiency and iodine deficiency through nutrition surveillance, supplementary feeding of young children, nutrition education, better primary health care and production of nutritious foods. The most important feature of this programme was that it was community based, with volunteers from every 10 households within each community and supported the principle of people’s participation in decision making and problem solving, and community responsibility for outcomes.

Figure 9: Progress in reducing underweight in children under 5, Thailand



Source: Bureau of Health Promotion, Ministry of Public Health, 1998

The approach has brought about significant progress in reducing the percentage of underweight pre-school children (see Figure 9 above). In fact, within ten years, the more severe forms of malnutrition were virtually eliminated among these children. Having brought protein-energy malnutrition under control, the government was able to give attention to a wider range of food and nutrition issues and to make other improvements to the quality of life. The expanded programme has seven elements: a) production of diversified foods for home consumption; b) skills development and credit schemes for commercially viable food processing and marketing activities; c) fortification of Thai instant noodle seasoning with vitamin A, iron and iodine; d) mandatory nutrition labelling of food products; e) dissemination and promotion of nine healthy diets, with special advice for age-specific vulnerable groups such as infants and young children, adolescent girls and pregnant women; f) free or highly subsidized health care; g) a monitoring, surveillance and special feeding programme for children under five years, and children in primary school.

The Thai experience is unique in its systematic implementation in every community in the country. It provides a model for a food safety net programme that not only meets the immediate needs of the food-insecure but also lays the foundation for their permanent escape from the hunger trap.

Policies to promote growth in agriculture and rural off-farm activities

Sectoral relationships, trade and macroeconomic policies

By the middle of the 1980s a consensus began to emerge that past policies had discriminated against the agricultural sector and this had harmed the development of the agricultural sector. For example, in a display of what Lipton (1977) calls urban bias, many countries have maintained overvalued exchange rates. This “reduced the cost of capital imports and biased agriculture towards capital-

intensive technologies that used little labour”.²¹ The experience of Pakistan in the 1960s is a case in point. The import of tractors was subsidized because the government artificially lowered the price of tractors and other farm machinery by maintaining an overvalued exchange rate and providing subsidies and duty exemptions of various kinds. As a result, landlords found it profitable to evict tenants and farm their land themselves. Between 1960 and 1980 the number of pure tenants halved, from about 2 million to about 1 million.²² McInerney and Donaldson (1975) in a survey of 202 Pakistani farms found that the average size of these farms increased from 18 hectares to 44 hectares between 1960 and 1975. Of the additional land, 33 percent came from a reduction in land rented out, another 30 percent from additional land rented, about 13 percent from purchases and finally 25 percent from reclamation and improvements. Their general finding was that one tractor replaced an average of 4.5 tenants.

Furthermore, currency overvaluation directly discriminated against exporters and favoured importers. Since the exporters were often agricultural producers, they could not get remunerative prices for their produce in local currency and were often forced to either smuggle out their output or reduce production. By contrast, relatively wealthy citizens - generally urban - who wanted to import luxury consumer goods could do so at low local currency prices. Overvalued exchange rates were often coupled with marketing boards and compulsory levies which forced farmers to sell their produce to the boards at below market prices. These policies were justified in the name of protecting farmers from international price fluctuations.

Another common policy was to impose quotas and tariffs on industrial imports and export restrictions on farm imports on the grounds that the poor had to have access to food. India, for example, had the highest implicit and explicit tariffs on industrial imports outside the noncommunist world until the mid 80s. This implied that every time a farmer bought inputs from the industrial sector he or she paid a premium on the world price for goods of inferior quality. Models of the Indian economy generally conclude that the main source of taxation of agriculture was implicit, through the protection granted to industry and that this amounted to about one third of agricultural GDP in the sixties, seventies and eighties, but has since come down, though there is disagreement on the current burden of the tax.

The main recommendations for macroeconomic, sectoral and trade policies are now fairly uncontroversial. It is important to avoid high inflation because food price increases invariably hurt the poor, at least in the short-run. It is equally important not to distort international prices through trade and other restrictions. The Human Development Report (1997) puts it well:

“The solution is not to subsidise agriculture, since the subsidies would be pocketed by richer farmers. Better to free markets and remove their biases against the poor”.

²¹ UNDP (1997), Human Development Report, p.75

²² However the number of owner-tenants probably increased. These are farmers who own a small quantity of land themselves but also rent in land from others.

It is important to point out, however, that the available evidence indicates that most of these distortions were in fact removed in the nineties. Budget deficits are now a smaller proportion of GDP than at the beginning of the eighties, real interest rates are now positive in all regions, and inflation rates have fallen - dramatically in the case of Latin America - everywhere except in Africa. Governments now rely much less on trade taxes than they used to and have more or less eliminated currency overvaluation. Marketing boards and compulsory levies have all but disappeared. In consequence most developing economies are more open to foreign trade than they were twenty years ago and foreign direct investment flows have become very large indeed, though the greater part by far goes to just two areas, East Asia and Latin America and the Caribbean.

Unfortunately there is little evidence so far that, on a worldwide scale these policies have done much to increase the rate of growth of GDP and agricultural GDP. In particular, they seem to have done little to raise the ratio of gross domestic investment to GDP. The experience of the Latin America and Caribbean region is particularly hard to understand. The ratio of gross domestic investment to GDP has been constant over twenty years, foreign direct investment has increased almost six fold in dollar terms and GDP growth per-caput has duly increased, but is still painfully slow. Neither is there any clear evidence that crop production or food production growth - particularly in sub-Saharan Africa - have picked up significantly now that the bias against agriculture has been significantly reduced. The conclusion would appear inescapable that something more than the reduction of distortions is required for economic growth and agricultural development in particular.

There have also been widespread expressions of concern that trade liberalisation will end up harming the poor. We begin with the central question: how does the opening up of trade affect people with no assets other than their labour power? In principle, the answer is that specialization according to comparative advantage in a labour surplus economy should raise demand for the only asset possessed by the poor - labour power - and this should make them better off, eventually. In other words, trade can create productivity gains. But how are these gains distributed, and how long does the process take? Unfortunately, trade theory does not provide firm answers to these questions. The focus has usually been on the aggregate gains from trade, or their distribution by functional categories, e.g. labour and capital, or how the gainers can potentially compensate the losers (through lump-sum taxes or specific taxes and subsidies) and so on.

Since clear answers are not available, concerns have been raised that even if the poor do receive some of the benefits of the increase in allocative efficiency in the long-run, during the transition period they may be disproportionately affected if food prices rise since they spend a large proportion of their income on food. For the very poor the consequences could even be catastrophic, particularly if the transition period is long and there is a sharp rise in food prices. Another possibility is that trade liberalisation may have serious consequences for some regions but not for others, e.g. if a region specialises in a crop whose domestic price is above the world price. The challenge for public policy is

to devise a mix of policies that allows the initial losers from trade liberalisation to gain some of the benefits, while protecting their food security and livelihoods during the transition period.²³

Some of the fears expressed about international trade harming food security seem overblown. To take one example, Timmer (1997a) states that all the governments of South-East Asia have pursued self-reliance in rice production over the past twenty-five years on the grounds that the international market for rice was thin (i.e. the amount traded was small in relation to the amount produced and consumed) resulting in wild swings in rice prices and that the market was in any case unreliable as the experience of 1974 showed when there was no rice to be had on the international market at any price.

Now the government of any country where large numbers of people live on the edge of starvation will generally wish to prevent wild swings in food prices. The simplest way to do this is through a public agency, which would be charged with creating a buffer stock of essential foodgrains to be released on the market if prices start rising. This could be combined with a system of targeted food subsidies and possibly rural public works to maintain purchasing power in times of crisis. The Indian system, under which the Food Corporation of India holds buffer stocks combined with a public distribution system to distribute food to the poor at low prices is one such example. None of this implies, however, that this agency should be compelled to build up its buffer stock from domestic sources alone, as a policy of self-sufficiency requires? Therefore engaging in some trade in foodgrains may offer the advantage of ensuring food security at lower cost. Another argument is sometimes heard in East Asia, that opening up to trade will result in rice production being wiped out, along with the infrastructure required for growing rice. It is argued that this infrastructure cannot easily be rebuilt in an emergency. Then, if there is a war, or a worldwide shortage of rice, the country will face starvation because the infrastructure will not be there. The obvious rejoinder is that buffer stocks should be built up and maintained by a public agency to guard against just such a possibility. Besides, if one is worried about a war then it must be a very tender hearted enemy indeed who makes no attempt to destroy the infrastructure for growing rice.

Policies on rural infrastructure investment

In the framework of this paper, agricultural and rural off-farm growth are vital for poverty reduction. But how is this growth to be brought about? The most important stimuli are public investment in agricultural research and development and public investment in infrastructure. Since good statistics

²³ Managing trade liberalisation, not shying away from it is the rational response. The scenario described above is essentially the same as the following scenario. Suppose a campaign against smoking result in tobacco farmers being left with unsold stocks of tobacco. Sensible policy makers would accept the fact of change and focus on finding ways to manage it, by encouraging farmers to switch to other crops or non-farm activities and using safety net mechanisms to shield the poor during the transition (see WHO (1999) Chapter 5 “Combating the Tobacco Epidemic” for more on this).

are readily available for China and India and both have had reasonable agricultural growth, this sub-section focuses on infrastructure investment in these countries leaving agricultural research to the next sub-section.

Irrigation was expanded dramatically. In China the greatest expansion in irrigation facilities took place between 1949 and 1977, when the irrigated area increased from 16 million to 45 million hectares. About 70 percent of grains as well as most of the cotton and other cash crops are produced on irrigated land. In India, most of the expansion in the area under irrigation seems to have taken place in the period up to 1980-83, with private irrigation from tubewells playing an extremely important part. In 1992-95 about a third of the total arable land area was irrigated, amounting to about 50 million hectares, almost the same as in China.

Rural electrification was another priority area for the Chinese government and as a result, over 95 percent of households had access to electricity by 1996, as compared to about 33 percent for India in 1991, a figure that is unlikely to have increased to Chinese levels by 1996. Similarly the telecommunications sector has also seen explosive growth in China: between 1989 and 1996, public investment alone increased more than ten fold. However, investment in rural roads appears to have been a low priority area for the government. India, by contrast, invested more in rural roads and less in telephones. What was the payoff in terms of agricultural and other growth? For evidence on this we turn to Fan, Zhang and Zhang (1999). Table 13 below from Fan, Zhang and Zhang (1999) is instructive. It seems clear that confining ourselves to infrastructure investments alone, expenditures on the provision of rural telephones, roads and electricity had the highest ranks as far as impacts on both agricultural production and poverty were concerned, while expenditure on irrigation had relatively little impact on either agricultural production or poverty reduction. It is possible that this result arises from the fact that irrigation is already relatively well developed in China. It is interesting to note the very large impacts of the two education related components, education itself and R&D spending on both agricultural production and poverty reduction.

Table 13: Effects on poverty and growth of additional government expenditures, by type of investment and region in China 1985-89, 1991 and 1996

	Coastal region	Central region	Central region	China
Returns to agricultural production				
(Yuan/Yuan investment)				
R&D	7.33	8.53	9.23	7.97
Irrigation	1.40	0.98	0.93	1.15
Roads	3.69	6.90	6.71	4.91
Education	6.06	8.45	6.20	6.68
Electricity	3.67	4.89	3.33	3.90
Rural telephones	4.14	8.05	6.57	5.29
Returns to poverty reduction (# poor reduced per ¥10,000)				
R&D	0.97	2.42	14.03	3.36
Irrigation	0.15	0.23	1.14	0.39
Roads	0.70	2.80	14.60	2.96
Education	1.79	5.35	21.09	6.30
Electricity	0.92	2.64	9.62	2.92
Rural telephones	0.98	4.11	17.99	4.02

Source: Fan, Zhang and Zhang (1999).

Agricultural research and poverty alleviation

China and India also have by far the largest agricultural research establishments in the developing world. In 1997, the Chinese agricultural research system spent about US\$330 million in current prices at the market exchange rate. India spent even more: in 1994 its expenditure was close to US\$500 million in 1980 prices. Almost all of it was publicly funded in both countries. However, establishing that this investment produced returns commensurate with the scale of the investment is difficult, particularly in view of the fact that China and India are poor countries. Fan and Pardey (1997) attributed about 20 percent of China's agricultural output growth from 1965 to 1993 to increased public investment in agricultural R&D, with estimated rates of returns to R&D investment ranging from 36 percent to 90 percent (Fan, Zhang and Zhang (2000)). Similarly, Evenson, Pray and Rosegrant (1999) estimate the marginal internal rate of return on public research at over 50 percent, showing that this was well worth doing.

But does agricultural research benefit the poor? Hazell (1999) argues that agricultural research benefits the poor directly through an increase in own farm production, greater employment opportunities at higher wages, lower food prices, better migration opportunities, and growth in the rural off-farm economy.

Saving and credit policies to promote farm investment

A system of credit is present in most underdeveloped economies. The traditional credit system is locally based, operates on a small scale, lending mainly for consumption purposes, and supplies the needs of a static economy. Most borrowers are poor farmers who either need to borrow at seeding time and intend to repay at harvest time, or need money for social ceremonies. Since these sorts of loans are not used to increase output without lowering consumption, they should be classified as consumption credit.

The market structure of village money lending is more akin to monopolistic competition than outright monopoly. The main reason for these high interest rates is that the moneylender is not integrated into the regional or national money market. The traditional lender lends his own money, not other people's savings, and therefore cannot operate on a large scale or over long periods. Such a market will also be very risky, requiring close supervision on the part of the lender, which might degenerate into outright oppression, and requires detailed personal knowledge about the borrowers, which means that the market must be highly localised. The final problem is that such markets cannot cope effectively with such natural disasters as a drought since they cannot draw on outside resources. Since their clients are usually confined to a small area, growing similar crops, moneylenders cannot spread their risks. If bad weather affects one client, it will not be offset by good weather elsewhere. For this reason, the risk component of the interest rate (in addition to the cost of time) is pronounced in this kind of business.

However, as the economy develops and agriculture is commercialised, credit needs change and the nature of rural credit markets must also change. Since rural modernisation requires financing for rapid growth in production, both agricultural and non-agricultural, the credit system has to be able to mobilise savings or bring in substantial flows of funds from outside the local region and thus fill the financial requirements of a rapidly growing rural sector. To sum up this discussion: though informal lenders in rural areas may not be unjustified in charging high interest rates, the development of agriculture requires that interest rates be brought down. This requires the integration of local markets for borrowing with national and even international markets by extending institutional lending to rural areas.

In recent years, financial services have been provided to increasing numbers of the poor and micro-entrepreneurs through what is known as "micro-finance". Micro-finance refers to that part of the

financial sector that responds to the financial demand of low-income households who were traditionally shut out of the credit market because they could not provide collateral. Until now, micro-finance institutions have operated mainly in urban areas, providing small and short-term loans mainly for trading, services and micro-enterprise activities. Useful lessons from the failures of the earlier directed agricultural credit projects and the principles of the new financial systems development approach have been applied in the areas of institutional and organisational set-up and operational strategies and new lending technologies have been designed for low-income clients.

What lessons have been learned from micro-credit practices, in particular those relating to cost and risk reduction? Can these practices be transferred also to agricultural lending? Costs have been reduced by using standardized procedures to lend standardised products, increasing the productivity of lending officers. Many micro-credit programmes lend to groups instead of individuals. This has the added advantage of reducing risks. The idea is that the loan is made to the group, which decides which of its members will receive it, thus performing a screening function on behalf of the lender. Should that individual default, the group will be held collectively responsible. The peer pressure thus generated serves as a substitute for collateral. When lending to individuals, risks can be reduced by lending to clients who are known to the lending officer and who have a good track record and sometimes also by requiring that they maintain a savings account with the micro lender.

The foregoing experience suggests some pointers for successful credit Programmes. First, financial services should be offered, not just credit. Secondly, close attention to costs is essential. Thirdly, it is better to lend for expanding the use of an improved technology, rather than as a lubricant for the adoption of inputs, which are unproven for a given borrower. Fourthly, the inputs financed by a credit programme should offer enough extra returns to outweigh the additional risk and cost involved. Returns are not merely physical but also the profitability of the crop. Therefore some stability in input and output prices is crucial (e.g. through a government agricultural price support scheme). Fifthly, credit for production purposes, especially if it is to be used to purchase inputs, must be disbursed on time. Finally, the use of group lending offers advantages as a cost and risk containment device.

Policies on access to assets

Marked inequalities in wealth are problematic for two reasons. First because it prevents agricultural growth from producing the beneficial effects it is capable of if its fruits flow to a wealthy class, which then spends them on goods produced outside the rural off-farm sector. In addition to this, there is a second problem. Imperfections are pervasive in credit and insurance markets and these lead to otherwise creditworthy borrowers being denied credit because they lack sufficient collateral of the right type. The upshot is that the poor are unable to enlarge their scale of production, to buy or lease land and equipment, to take up more highreturn high-risk projects or occupational choices and to invest in productivity-raising human and physical capital formation and are left trapped in poverty.

It follows that a relaxation of the wealth constraint would benefit the poor directly as well as through the second round effects produced by the productivity enhancing investments made possible by the extra wealth. This is because the extra wealth can be invested directly but also increases the creditworthiness of the poor. The question is, how can the wealth constraint be relaxed.

The most important single asset is land. Studies of formal credit in rural societies invariably find that lack of land shuts out whole classes of borrowers. But redistributing land is also fraught with problems. There is some evidence that the small family farm is often the most efficient unit of production.²⁴ The obvious question then is, why do the large landlords not voluntarily lease out or sell their land to small family farmers and gain much of the surplus arising from this efficient reallocation? There clearly has been some leasing out of land, but problems of monitoring, insecurity of tenure and the landlord's fear that the tenant will acquire occupancy rights on the land has limited the efficiency gains from and the extent of tenancy. The land sales market remains particularly thin.

An important point that is often overlooked in the usual calculations of the surplus generated by a given institutional change is that both sides are really interested in relative, rather than absolute, gain or loss. Landlords resist land reforms because the levelling effects reduce their social and political power and their ability to control and dominate even non-land transactions. Large land holdings may give their owner special social status or political power in a lumpy way (so that the status or political effect from owning 100 hectares is larger than the combined status or political effect accruing to 50 new buyers owning two hectares each).

Under the circumstances the former will not sell, and inefficient (in a productivity sense, not in terms of the Pareto criterion) land concentration persists. Of course, much depends on the nature of political competition and the context-specific and path-dependent formations of political coalitions; an interesting example of this is provided by Nugent and Robinson (1998). Holding constant both colonial background and crop technology, they compare the divergent institutional (particularly in terms of small holder property rights) and growth trajectories of two pairs of former Spanish colonies in the same region (Costa Rica and Colombia, on the one hand, and El Salvador and Guatemala, on the other) producing the same principal crop (coffee).

Some aspects of land reform (e.g. extension of tenurial security) may be less difficult to implement than others (e.g. land ceilings). Besides, in the dynamics of political processes and shifting coalitions, the range of feasibility often changes; and options kept open contribute to the political debate and may influence the political process. Some policy advisors (in international lending agencies) who rule out land reform as politically infeasible are at the same time enthusiastic supporters of other policies that

²⁴ But see Lanjouw and Stern (1999) for a different view: over the typical range of farm sizes encountered in Northern India today, "the relationship between gross agricultural output and land cultivated was not far from proportional" (pp. 293-294).

may be no less politically difficult; an example is the strict targeting of food subsidies and thus cutting the substantial present subsidies to the vocal urban middle classes.

Of course, some methods of land reform can be counter-productive particularly in situations of land scarcity and weak organisation of the land-poor. Well-intentioned measures like abolition of tenancy often end up driving tenancy underground or leading to large-scale eviction of tenants, and take away a part of the agricultural ladder which the landless could formerly aspire to use to climb out of poverty. Redistributing land without adequate provision of credit and marketing facilities and extension services may make the land recipient worse off as they are obliged to burn their bridges with the erstwhile landlord/creditor patron. In recent years there is increasing support for “market-assisted land reforms” (as opposed to confiscatory land reforms), whereby the government assists voluntary transactions in the land market through credit and subsidies to the small buyers

Policies towards the rural off-farm sector

The heterogeneous character of the rural off-farm activities within a region and across regions or settings the makes it difficult to propose specific policy actions that would also maximize the impact of that sector’s activities on poverty. Given the rural off-farm sector’s dependence on agricultural growth the latter may be a necessary condition for the development of the former. Thus, policies that promote agricultural growth (or remove antiagricultural bias) at the same time promote off-farm rural activities and employment. But agricultural growth is not sufficient. Namely, growth in agricultural production activities may be such that the rural off-farm sector is by-passed if (a) is based on capital-intensive techniques (b) upstream or downstream activities to farming are undertaken outside the rural area (c) expenditure linkages by-pass the local rural sector i.e. the expenditure patterns of those who gain from agricultural growth are directed towards goods and services “imported” into the area. In such cases, employment and income generation resulting from agricultural growth “leak” to the cities/urban areas.

In terms of policy towards the small-scale labour-intensive rural sector (especially when it comes to services) one major problem is that the sector falls into an institutional vacuum i.e. it falls neither under the institutional mandate of the ministry of agriculture nor that of industry. This institutional constraint has to be resolved before any meaningful policies are taken towards the rural off-farm sector (including specific knowledge and data on its composition and characteristics, factor intensity etc).

Policies towards rural poverty alleviation aiming at the rural off-farm sector should facilitate the participation of the poor in such activities, i.e. reduce barriers to participation. Increasing the asset base of poor households (liquid assets, education, access to credit) will allow them to participate in the more remunerative rural off-farm employment (self-employment or skilled labour employment) and “break” the duality of access to non-farm employment and concentration of wealth.

Policies of market opening and market integration through improved communications, transportation infrastructure etc. may look as a threat to the viability of low technology, small-size rural off-farm activities. For instance, in liberalising and opening markets, largescale firms even when at a competitive disadvantage in production activities compared to small-scale labour-intensive firms, may have developed distribution networks, which the small firms lack. And yet, this may not be necessarily be the case: several types of arrangements (sub-contracting being one of them) have been developed in several parts of the world which allow an effective co-operation between larger firms and smaller labourintensive firms in the rural space. Thus, while market integration, market expansion and liberalisation do diminish the strength of local employment and income multipliers from increases in agricultural activity, at the same time they provide opportunities for growth in the rural off-farm sector through increased rural-urban linkages. Institutional frameworks (contract enforcement mechanisms, flexible labour laws that allow part time employment to name a few) may be crucial in allowing various forms of partnerships and labour arrangements among firms and people. That said, attracting through tax breaks and capital subsidies large agro-industrial firms in the rural areas may damage small-scale firms and aggravate poverty. It is extremely important for rural firms to identify and develop profitable market niches in urban areas and export markets. Market information systems are important in that they are designed to inform farmers of prices; however, it is crucial to make price information provision only the first step, followed by the creation of the information, skills, and institutions to develop realistic and bold business strategies.

Consideration of the rural off-farm sector may have implications for agricultural research policy. Such policy should aim at the development of agricultural technologies that are scaleneutral and thus benefit small farmers, combined with agro-processing technologies that can be handled by small/medium agro-industrial firms in order to maximise the rural employment impact of agricultural development. The relatively small scale means a higher employment/output ratio. It is also probable that smaller farms and agro-processing firms will have a greater tendency to use local repair shops for farm tools, local transport and commercial firms, and invest profits locally, all leading to further ripple effects in the local economy.

Safety nets

Households, especially in developing countries, are continually buffeted by shocks to their income generating capacity. These shocks either affect individual households e.g. sickness, or deaths of livestock, or affect entire groups of households e.g. an economic reform programmeme, a drought or an epidemic. In developing countries institutions usually evolve to help the poor cope with household level shocks. However, no society has been able to find a fully satisfactory solution to the problem of helping the poor cope with large-scale shocks. Yet such shocks can have catastrophic impacts on the livelihoods and even the lives of the poor in developing countries.

One way to avoid these impacts is for governments to set up social safety nets to protect the livelihoods and asset bases of the poor during natural calamities or periods of economic reform. Safety nets include income transfers for those chronically unable to work-because of age or handicaps- and for those temporarily affected by natural disasters or economic recession. Such safety nets include targeted food subsidies, public works projects with cash transfers or food-for-work, nutrition programmes, credit programmes and the provision of family benefits and pensions.

However, safety nets cannot substitute for coherent macroeconomic management or the effective provision of basic services. But in order to deliver these, the state often needs to eliminate distortions in order to promote economic growth and to reform basic state services. Since these take time and neither capital nor labour is as flexible as it is theoretically presumed to be, safety net measures may be necessary to compensate for this lack of flexibility during the transition period.

Where safety nets take the form of subsidies, one general lesson is that targeted subsidies are far more cost-effective than general subsidies. A case in point is Sri Lanka, which operated a general food price subsidy scheme before 1979, under which a whole host of food items were subsidized and anyone could buy essentially unlimited quantities at the subsidized price. But this proved fiscally unsustainable and was replaced in the early 1980s with a food stamp programme. The food subsidy, which accounted for fully 5 percent of GDP in the mid-1970s accounted for barely 1.3 percent of GDP in 1984. The Bangladesh Public Food Distribution system is another example of lack of targeting imposing heavy costs. It is estimated that transferring one Taka of income to an eligible household costs the programme six Taka.

There are also indirect costs imposed by such programmes on, for example, incentives. These can be quite large: according to one estimate the food stamp programme in Sri Lanka may have reduced labour market participation by as much as 3.5 days a month for men and 4.7 days a month for women. The overall costs can therefore be quite heavy, and what has to be remembered is that any programme that imposes a heavy fiscal drain has little chance of being sustained.

For these reasons, current thinking on safety net policies is moving from universal price supports and subsidies to targeted cash transfers linked to improving access and quality of education and health services. Latin America has been at the forefront of these efforts. These include the PROGRESA programme in Mexico, PRAF-II in Honduras, and the Red Social in Nicaragua. Other Latin American countries, as well as from both Africa and Asia, are observing this experience, and this type of programme is being promoted by multilateral lending agencies. PROGRESA began disbursement in 1997, while the other programmes begin in 2000. In general these programmes combine short and long term poverty alleviation components.

Households receive a cash transfer, which serves a safety net function. In return, children must attend school, the whole family receive medical examinations, and adults attend public health talks. These

obligations focus on building human capital, serving a long-term poverty alleviation function. All these programmes have a gender focus; transfers are targeted to female caregivers, and in some cases girls are provided with greater incentives to stay in school. Finally, all are targeted. In Mexico statistical routines select individual households, while in Central America for the moment geographical targeting is used.

One important departure in this new generation of programmes is their emphasis on rigorous impact evaluations, particularly in terms of quantifying the impact on school assistance and attainment, health indicators, and the efficiency of targeting mechanisms. In most cases this has entailed the collection of experimental panel household data, as well as case study qualitative data.

The preliminary results of the impact analysis for Mexico show that in two years PROGRESA has had a significant impact in terms of increasing school enrolment, health outcomes, household expenditures on food. While the quantitative analysis has shown positive results, qualitative studies have questioned the efficacy of targeting mechanisms.

Both beneficiaries and non beneficiaries alike share the perception that many poor households were left out of the programme, and in some cases targeting has fostered or rekindled social tension within a community. Household targeting is also anathema to predominately indigenous households. A more structural problem that has emerged is the duration of these programmes. PROGRESA beneficiaries are subject to "recertification" every three years based on (consumption defined) poverty status. Such a criteria would be at odds with the long term human capital building elements, which would require a greater number of years in order to shepherd the current generation of students through school. The programmes in Central America are currently ambiguous on this issue.

Another concern is that the focus on health and education ignores the development of more short and medium term household productive capacity. While increased human capital may eventually benefit household agriculture production, off farm entrepreneurial efforts, or wage labour activities, in the meantime household productive activity may go unaided. In Nicaragua this is being addressed formally by a controlled experiment comparing the Red Social to a Bono Productivo (Productive Voucher), which would be directed towards investment in productive activities.

Finally, when economic reforms produce short-term unemployment, or when a region is drought-prone so that there are seasonal shortages of jobs, labour-intensive public works programmes can be effective in reducing the magnitude of the problem. However, public works will only be effective in targeting benefits to the poor if low wages are offered to ensure selftargeting. Zambia provides an example. Wages were kept lower than the market wage, and were often paid in kind, thus making it attractive to women and improving household food security. In India, the Maharashtra Employment Guarantee Scheme (EGS) also seems to have worked well, for essentially the same reasons as in Zambia. Evidence from household data suggests that the poor had very high participation rates and

self-targeting worked even better than in a means-tested credit programme. Well-designed and well run public works projects can also strengthen existing infrastructure, thus promoting long-term growth. The Maharashtra EGS has been criticised on these grounds: that the infrastructure that has been built is of poor quality, not surprisingly because the people working on these projects were not trained properly.

Human development

An important implication of the capabilities approach is that human development—making people literate or improving their health and nutrition—should be considered ends in themselves and not as means to the end of economic growth. Thus even if the return to literacy on conventional measures is zero, it would still be worthwhile to invest, according to this criterion.

However, this still leaves open the question of how to promote human development most effectively, i.e. how to get the biggest “bang for the buck”. Does human development occur with the rising incomes that accompany economic growth or does public action have a bigger impact? This does not, of course, rule out the possibility of a “virtuous cycle” in which growth promotes human development and human development then promotes further growth²⁵ but the capabilities perspective would regard any impact on economic growth as a side benefit. Anand and Ravallion (1993) put it as follows:

“... if social expenditures and the reduction in income poverty are the main forces driving human development, rather than economic growth per se, then policy intervention can play a role in promoting human development independently of the promotion of aggregate affluence ...”

Some countries that have been singled out by Drèze and Sen (1989) and Anand and Ravallion (1993) because they took the policy intervention route are Sri Lanka, Chile, Costa Rica, Jamaica, China and the Indian state of Kerala. Anand and Ravallion (1993) make a striking point about Sri Lanka: according to their calculations, “an increase of one Sri Lanka rupee in public health spending per capita would reduce infant mortality by 1.1 deaths per thousand; this is 22 times more than the impact on infant mortality from the same increase in average income (p. 146)”.

Drèze and Sen (1989) make a similar point about Chile under the generals. Under this government, infant mortality was, surprisingly enough, reduced from 66 per thousand to 20 per thousand over the period from 1973 to 1985. During these years, there was no essentially no growth in per-capita GDP

²⁵ UNDP Human Development Report (1997) p. 74 points to three possible ways by which poverty reduction can raise growth: i) it allows people to take on more productive activities that are also more risky; ii) it makes them more mobile; iii) it allows them to educate their children and take care of their health.

or private consumption and health, housing and education expenditures were drastically curtailed. However, the military government did maintain and even sometimes expand spending on nutrition Programmes, with a reorientation towards the most vulnerable groups and expanded emergency employment Programmes in years of high unemployment, with the results noted above.

The Indian state of Kerala is also commended by Drèze and Sen (1989) for reducing discrimination against women, and in achieving high literacy rates and life expectancy. They start by pointing out that in general India has done much worse than China in literacy and life expectancy. However, one Indian state, Kerala, has done much better than the national average. Not only are its adult literacy rates far higher than in the rest of India, but they are much higher than China's as well. The same is true of life expectancy at birth. Moreover, these rates show much less evidence of gender bias, e.g. life expectancy at birth was 67 years for females versus 63 for males in 1981.²⁶ They make the point that literacy expansion through public action had a long history in Kerala, going back to the early 19th century. The expansion of literacy in turn seems to have led to people seeking modern remedies for treatable ailments and may also have played a role in facilitating public participation in social change. To sum up the preceding discussion, it seems reasonably clear that even low-income countries can, through effective public action, improve nutrition, education and health. This is desirable on its own merits, but may also offer the added advantage of contributing to the overall growth rate.²⁷

²⁶ Drèze and Sen (1999), p 223.

²⁷ There is one troubling feature of the societies selected by Drèze and Sen: with the exception of China and Chile, all have experienced economic stagnation for the past fifteen years. This topic calls for further examination.

6. Conclusions

At the dawn of the new millennium, it is clear that the international community considers the continued existence of poverty and hunger unacceptable and it has set itself explicit goals for human development.

The challenge is a formidable one since hundreds of millions of people live in conditions of poverty and hunger and it is not clear how to create conditions that will allow them to escape these conditions. According to the World Bank, there are about 1.2 billion people in poverty in the developing world—about 24 percent of the developing world's population—the majority of whom live in South Asia and sub-Saharan Africa. FAO estimates that about 777 million people in the developing world are undernourished—about 17 percent of the developing world's population. Once again, the majority lives in South Asia and sub-Saharan Africa.

A critical, but widely ignored, point is that on the available evidence, the majority of the world's poor and undernourished live in rural areas. Taking this fact as its point of departure, this paper describes a two pronged approach that is likely to lead to swift reductions in hunger and poverty: fight hunger through direct public action and fight poverty by focusing on rural areas since this is where most of the poor live and depend on agriculture and rural off-farm activities for a living. Hence if the development of these activities raises the incomes of the rural poor, this should reduce poverty and, to some extent, hunger.

Direct public action against hunger does not really require a justification since the existence of hunger is a violation of a human right. However, evidence is accumulating to show that hunger reduces productivity, increases susceptibility to illness, reduces cognitive ability in children, reduces the willingness to undertake risky investments and transmits itself from one generation to the next, thus affecting the rate of economic growth. Thus hunger is likely to impose significant economic costs on society and it follows that fighting hunger is one of the most effective ways of promoting pro-poor economic growth.

But how is hunger to be fought? To some extent household income growth does lead to improvements in nutrition. However, something more is required. Arguments are presented to show that public action is essential for reducing hunger. First, it is shown that household income growth does not necessarily lead to increased calorie intakes, though the quality of the diet may improve. Secondly, some inputs into nutrition are public goods, e.g. the eradication of infectious diseases, which will not necessarily be supplied by private initiative since that would be unprofitable. Thirdly, since private investments in nutrition have a longterm payoff, private capital markets are unlikely to finance this investment if collateral cannot be provided. Fourthly, parents are likely to under invest in nutrition of girls, particularly in those societies where sons and daughters-in-law (but not daughters) take responsibility

for their parents in old age. The conclusion is that public action towards hunger reduction is required on both existential as well as instrumental grounds.

None of this, however, provides grounds for ignoring the importance of pro-poor economic growth. Economic growth and poverty and inequality reduction are all simultaneously determined outcomes of deeper processes. If these are such as to increase the returns to the assets possessed by the poor then economic growth and poverty reduction will be seen to go together. If the process favours assets possessed by the wealthy then the opposite will be true.

Hence it matters greatly for poverty and hunger alleviation where economic growth originates. Evidence is presented to show that economic growth originating in agriculture, when coupled with growth in rural off-farm (ROF) incomes is likely to be strongly poverty reducing provided that it does not occur against a backdrop of extreme inequality in asset ownership, especially of land. The underlying reason for this is that poverty is still disproportionately concentrated among the rural population who still rely heavily on agriculture (broadly considered) and on rural off-farm activities for their livelihood strategies. Hence an increase in agricultural productivity should raise incomes in agriculture. There is evidence that in many countries this income increment is largely spent on bulky or perishable goods, such as livestock products, the services of merchants, artisans, mechanics etc. and simple agricultural and household goods, with the defining characteristic of being effectively non-tradable.

Furthermore, these commodities generally require low inputs of capital and skills to supply and are ideally suited to the capabilities of the rural poor. But because they are effectively non-tradable, their growth is constrained by the growth of demand in the local, rural, market that is stagnant. Hence if this barrier could be removed, they could grow and help the poor escape poverty. That is precisely what the extra income from agricultural growth does: it creates demand for these locally non-tradable goods, provided this extra income is not hoarded or spent outside but is spent locally—which is more likely in a society of smallholders than in one of large landlords. If all goes well, a virtuous cycle is created, with agricultural and rural off-farm income growing and helping each other to grow. Four important pieces of evidence are presented in support of this argument. It is shown that incremental budget shares of non-tradables out of agricultural income are large; that income from non-tradables is important for the poor; that poverty reduction follows agricultural growth with a lag and finally, that high initial inequality shortcircuits this process.

What are the implications of this framework for public policies. The first track of the framework involves public action against hunger. The example of the Thai government's nutrition programme started in 1982 was given to show that dramatic successes are possible in reducing under nutrition in a short time. The essential elements of this programme were that it was community based, and these communities were selected from among the poorest in the country. In other words the aim was to

target poor communities and let them decide who should benefit from these Programmes, rather than the government's attempting to find undernourished people with a view to helping them.

The second track involves the development of agriculture and rural off-farm activities. In promoting agricultural development macroeconomic policies form the backdrop against which other policies operate. Macroeconomic policies in the first half of the post-war period, protection to industry and heavy direct and indirect taxation of agriculture came under increasing attack in the late seventies. They were replaced by a new set of policies that relied on internal and external liberalisation of prices and markets. High hopes were raised that by following "sound" macroeconomic policies and getting prices right, the bias against agriculture would be ended and agricultural and economic growth would follow. The available evidence shows that while the new policies have been widely adopted they have not had the desired impact on growth. It seems clear that ending the bias against agriculture is not sufficient to promote agricultural growth. In addition, policies are needed that target the agricultural sector directly, e.g. improving rural roads and access to communication systems; irrigation and soil conservation publicly funded agricultural research; rural savings and credit Programmes to assist the poor in creating assets and engaging in rural off-farm activities; and other measures to improve agricultural productivity and competitiveness.

On rural infrastructure, evidence was presented from China to show that the returns to expenditure on rural telephones, roads and electricity had the highest payoffs in terms of both agricultural production and poverty reduction, while expenditure on irrigation had relatively little impact on either agricultural production or poverty reduction. It is possible that this result arises from the fact that irrigation is already relatively well developed in China. The highest payoffs, however, are to agricultural research and development, both in agricultural production and poverty reduction.

The development of rural financial markets is also essential to the success of such a programme. While such efforts focused in the past on the provision of credit, it is now widely accepted that it is more important to develop a rural financial system that facilitates saving on the part of the rural population, provides credit and is integrated with national and even international financial markets. Various innovative schemes now exist for allowing even very poor people to save small amounts and to borrow without collateral. The promotion of rural financial markets is particularly important for removing constraints to the growth of the rural off-farm sector, for which it is otherwise difficult to provide policy recommendations given its heterogeneous nature. The only general policy is to remove obstacles to its growth and the biggest obstacle, after lack of demand, is lack of financing for starting new enterprises, both from one's own savings and from credit.

Policies to ameliorate inequality in access to assets, especially land, are important because the beneficial effects of agricultural growth require the absence of marked inequalities in wealth and also because access to credit often depends on possessing the right collateral, of which the best is land. Some aspects of land reform, e.g. extension of tenurial security, may be less difficult to implement

than others, such as land ceilings. There is also evidence that some methods of land reform, e.g. the abolition of tenancy, can be counter-productive particularly where land is scarce and the poor are not organised. Redistributing land without adequate provision of credit and marketing facilities and extension services may make the land recipient worse off as they are obliged to burn their bridges with the erstwhile landlord/creditor patron. Hence there is increasing support for market-assisted land reforms (as opposed to confiscatory land reforms), whereby the government assists voluntary transactions in land.

Policies to protect the livelihoods of the rural poor against shocks are essential because such shocks can have catastrophic impacts on the livelihoods and even the lives of the poor in developing countries targeted food subsidies, public works projects with cash transfers or food-for-work, nutrition programmes, credit programmes and the provision of family benefits and pensions. One general lesson is that targeted subsidies are far more cost-effective than general subsidies and any programme that imposes a heavy fiscal drain has little chance of being sustained. Current thinking on safety net policies is moving from universal price supports and subsidies to targeted cash transfers linked to improving access and quality of education and health services. These combine short and long term poverty alleviation components.

Finally, it is important to close with a reminder of the importance of policies to promote human development generally, as a means of expanding the capabilities of the poor. The available evidence indicates that even low-income countries can, through effective public action, improve nutrition, education and health. This is desirable on its own merits, but offers the added advantage of contributing to the overall growth rate

7. References

- Adams, R. and J. He, 1995, "Sources of income inequality and poverty in rural Pakistan. Research Report No. 102. Washington D.C. International Food Policy Research Institute.
- ADB, 2000, "Fighting Poverty in Asia and the Pacific: The Poverty Reduction Strategy", Asian Development Bank, Manila.
- Ahluwalia, M. S., 1985, "Rural poverty and agricultural performance in India." *Journal of Development Studies* 14: 298-323.
- Alderman, H., *et al*, 2001, "Reducing Child Malnutrition: How Far Does Income Growth Take Us?", World Bank, Processed.
- Alderman, H., J. Behrman, D. Ross and R. Sabot, 1996, "The Returns to Endogenous Human Capital in Pakistan's Rural Wage Labour Market," *Oxford Bulletin of Economics and Statistics* 58(1): 30-55.
- Anand S. and M. Ravallion, 1993, "Human development in poor countries: On the role of private incomes and public services". *J. Econ. Perspectives* 7, 1. 133-150.
- Arcand, J., 2001, "Under nourishment and Economic Growth: The Efficiency Cost of Hunger," FAO Economic and Social Department Paper No. 147. FAO, Rome.
- Bansil, P.C., 1999, (Ed.) "Demand for Foodgrains by 2020 A.D: A Monograph", New Delhi, Observer Research Foundation.
- Bautista, R., 1995, "Rapid agricultural growth is not enough: The Philipines, 1965-1980". In *Agriculture on the Road to Industrialization*, Eds. John W. Mellor. Baltimore and London. The Johns Hopkins Press.
- Behrman, J. and A. Deolalikar, 1989, "Is Variety the Spice of Life? Implications for Calorie Intake", *Review of Economics and Statistics*, 71(4): 666-672.
- Bhagwati, J. and A. Krueger (Eds.) 1978, *Foreign Trade Regimes and Economic Development*. (11 vols.) Cambridge, MA. Ballinger Publishing.
- Bhalla, G.S. and G. Singh, 2001, *Indian Agriculture: Four Decades of Development*. New Delhi. Sage Publications.

Bhargava, A., 1997, "Nutritional Status and the Allocation of Time in Rwandese Households". *J. of Econometrics* 77, 277-295.

Binswanger, H. and J. von Braun, 1991, "Technological Change and Commercialization in Agriculture: The Effect on the Poor". *World Bank Research Observer*, 6 (1) January. 57-80

Bouis, H., 1994, "The effect of income on demand for food in poor countries: Are our databases giving us reliable estimates?", *Journal of Development Economics* 44 (1): 199-226.

Bouis, H., and L. Haddad, 1992, "Are estimates of calorie income elasticities too high? A recalibration of the plausible range", *Journal of Development Economics* 39 (2): 333- 364.

Boyce, J. and M. Ravallion, 1991, "A Dynamic Econometric Model of Agricultural Wage Determination in Bangladesh". *Oxford Bulletin of Economics and Statistics* 53, 4, 361-366.

Broca, S. and P. Oram, 1991, "Study on the Location of the Poor". Prepared for the Technical Advisory Committee to the CGIAR. Feb 1991. IFPRI, Washington D.C.

Bruno, M., M. Ravallion and L. Squire, 1998, "Equity and Growth in Developing Countries: Old and New Perspectives on the Policy Issues." In *Income Distribution and High- Quality Growth*. Eds. Vito Tanzi and Keyoung Chu. Cambridge, MA, MIT Press.

Chen, S., and M. Ravallion, 2000, "How Have the World's Poorest Fared in the 1990s?" *Policy Research Working Paper 2409*, World Bank, Washington, D.C.

Chenery, H. B., 1958, "The Role of Industrialization in Development Programs," in A. N. Agarwala and S. P. Singh, eds., *The Economics of Underdevelopment*. Bombay: Oxford University Press, 1958, pp. 450-71.

Collier, P. and D. Lal, 1984, "Why Poor People Get Rich: Kenya 1960-79". *World Development*, Vol. 12, pp. 1007-1018.

Corbo, V. and S. Fischer, 1995, "Structural Adjustment, Stabilization and Policy Reform: Domestic and International Finance. In *Handbook of development economics*, Vol. 2 (44), Eds. Chenery, H., T.N. Srinivasan and J. Behrman, J. Amsterdam, North-Holland, 1988-1995.

Croppenstedt, A. and C. Muller, 2000, "The Impact of Farmers' Health and Nutritional Status on Their Productivity and Efficiency: Evidence from Ethiopia," *Economic Development and Cultural Change*, 48 (3): 475-502.

DAC, Development Assistance Committee, 1996, Shaping the 21st Century: The Contribution of Development Co-operation, OECD, Paris.

Dandekar, V. M., 1994, The Indian Economy: 1947-92. Volume 1, Agriculture. New Delhi, Sage Publications.

Dasgupta, P., 1997, "Nutritional Status, the Capacity for Work, and Poverty Traps," J. of Econometrics 77, 5-37.

Datt, G. and M. Ravallion, 1998a, "Why Have Some Indian States Done Better than Others at Reducing Rural Poverty?" *Economica* 65: 17-38.

Datt, G. and M. Ravallion, 1998b, "Farm Productivity and Rural Poverty in India". *Journal of Development Studies* 34: 62-85.

Datt, G., D. Joliffe and M. Sharma, 1997, "A Profile Of Poverty In Egypt". FCND Discussion Paper No. 49. IFPRI, Washington D.C. 1997.

De Haan, A. and M. Lipton, 1999, "Poverty in Emerging Asia: Progress, Setbacks and Logjams". *Asian Development Review*, Vol. 16, 135-178

de Janvry, A. and E. Sadoulet, 2000, "Income Strategies Among Rural Households in Mexico: The Role of Off-farm Activities". University of California at Berkeley and the World Bank. Processed.

Deaton, A., 1997, *The Analysis of Household Surveys*, Baltimore, The Johns Hopkins University Press for The World Bank.

Deaton, A., 2000, "Counting the World's Poor: Problems and Possible Solutions". Research Programme in Development Studies, Princeton University. August 2000, Revised December 2000. Processed.

Delgado, C. *et al* 1998, *Agricultural Growth Linkages in Sub-Saharan Africa*. Research Report No. 107, IFPRI, Washington D.C.

Demery, L. and M. Walton, 1999, "Are Poverty and Social Goals for the 21st Century Attainable?", *IDS Bulletin*, Vol. 30, No 2.

Deolalikar, A., 1988, "Nutrition and Labour Productivity in Agriculture: Estimates for Rural South India," *Review of Economics and Statistics* 3: 406-413.

DFID, 2000, *Eliminating World Poverty: Making Globalisation Work for the Poor*. White Paper on International Development, Department for International Development, London, and <http://www.globalisation.gov.uk>

Dorward, A. and J. Morrison, 2000, "The Agricultural Development Experience of the Past 30 Years: Lessons for LDC's". Prepared for FAO, September 2000.

Drèze, J. and A. K. Sen, 1999, *The Amartya Sen and Jean Drèze Omnibus*. Delhi, Oxford University Press.

Edwards, S., 1993, "Openness, Trade Liberalization, and Growth in Developing Countries", *Journal of Economic Literature*, September.

Evenson, Robert E., Carl E. Pray and Mark W. Rosegrant, 1999, "Agricultural Research and Productivity Growth in India". Research Report, No. 109. IFPRI, Washington D.C.

Fan, S., L. Zhang and X. Zhang, 2000, "Growth And Poverty In Rural China: The Role Of Public Investments". EPTD Discussion Paper No. 66. IFPRI, Washington D.C.

FAO 2000, "Inter-agency experiences and Lessons: From the forum on operationalizing sustainable livelihoods approaches", Pontignano (Siena) 7-11 March 2000. FAO, Rome.

FAO 1999, *The State of Food Insecurity in the World 1999*. FAO, Rome.

FAO 2000, *The State of Food Insecurity in the World 2000*, FAO, Rome.

FAO 2001, *The State of Food Insecurity in the World 2001*, FAO, Rome.

Fogel R. W., 1994, "Economic growth, population theory, and physiology: The bearing of long-term processes on the making of economic policy". *American Economic Review*. 369-395.

Gaiha, R. (1993, "Design of poverty alleviation strategy in rural areas". FAO Economic and Social Development Paper No. 115. FAO, Rome.

Gaiha, R., 2001, "Are DAC Targets of Poverty Reduction Useful?", Faculty of Management Studies, Delhi, mimeo.

Galassi, F., 2000, "Measuring Social Capital: Culture as an Explanation of Italy's Economic Dualism". The Warwick Economics Research Paper Series, No. 553. University of Warwick.

Gugerty K. and C. P. Timmer, 1999, "Growth, Inequality, and Poverty Alleviation: Implications for Development Assistance". CAER II Discussion Paper, No. 50. Cambridge MA, Harvard Institute for International Development.

Haddad, L. and H. Bouis, 1991, "The Impact of Nutritional Status on Agricultural Productivity: Wage Evidence from the Philippines," Oxford Bulletin of Economics and Statistics 53(1): 45-68.

Haddad, L., M. Ruel, and J. Garrett, 1999, "Are Urban Poverty and Under nutrition Growing? Some Newly Assembled Evidence". FCND Discussion Paper No. 63. IFPRI, Washington D.C.

Hazell, P., 1999, "Impact of Agricultural Research on the Poor: A review of the state of knowledge", Paper presented at the CIAT International workshop: Assessing the impact of agricultural research on the poor, San Jose, Costa Rica.

Horton, S., 1999, "Opportunities for Investments in Nutrition in Low-Income Asia," Asian Development Review, 17(1,2): 246-273.

IFAD 2001, Rural Poverty Report 2001: The Challenge of Ending Rural Poverty. IFAD, Rome. Published for IFAD by Oxford University Press, Oxford

IMF, OECD, UN, WB, 2000, "A Better World for All. Progress towards the international development goals". http://www.paris21.org/betterworld/pdf/bwa_e.pdf.

Immink, M. *et al*, 1984, "Microeconomic Consequences of Energy Deficiency in Rural Populations in Developing Countries. In E. Pollit and P. Amante, eds., Energy Intake and Activity. Alan R. Liss, New York, NY.

Joshi, V. and I. Little, 1994, Macroeconomics and Political Economy, 1964-1991. New Delhi. Oxford University Press.

Kanbur, R. and L. Squire, 1999, "The Evolution of Thinking About Poverty: Exploring the Interactions", Department of Agricultural, Resource, and Managerial Economics Paper 99-24, Cornell University, Ithaca, NY.

Krueger, A., 1997, "Trade Policy and Economic Development: How We Learn", American Economic Review Vol. 87 No. 1, 1-22.

Krueger, A., M. Schiff and A. Valdés, 1992, The Political Economy of Agricultural Pricing Policy. Baltimore, MD. Johns Hopkins University Press.

- Krugman, P., 1995, "Dutch Tulips and Emerging Markets". *Foreign Affairs* 74(4) 28-44.
- Lal, D., 1997, "Culture, Democracy and Development". Lecture in NCAER's Golden Jubilee Seminar Series, New Delhi, 24 April 1998. Processed.
- Lal, D., 2000, "The Poverty of 'Development Economics'". New Delhi. Oxford University Press.
- Lanjouw, P., 1999, "Policy Options for Employment in the Rural Non-Farm Sector". Rural Development Note No. 4. Washington D.C. The World Bank.
- Lanjouw, P. and A. Shariff, 1999, "Rural poverty and non-farm employment in India: evidence from survey data". Department of Development Economics. Amsterdam. Processed.
- Lanjouw, P. and A. Shariff, 2001, "Rural Nonfarm Employment in India: Access, Incomes and Poverty", Prepared for the Programme of Research on Human Development of the National Council of Applied Economic Research, sponsored by the UNDP, New Delhi.
- Lanjouw, P. and N. Stern, 1998, *Five Decades of Economic Development in Palanpur*. Oxford, Clarendon Press.
- Lipton, M., 1977, *Why Poor People Stay Poor; A Study of Urban Bias in World Development*. London, Temple Smith.
- Little, I., T. Scitovsky and M. Scott, 1970, *Industry and Trade in some Developing Countries: A Comparative Study*. London, Oxford University Press.
- McInerney, J. and Donaldson, G., 1975, "The Consequences of Farm Tractors in Pakistan". Washington DC: World Bank Staff Working Paper 210.
- Malik, S., 1994, "Poverty in Pakistan: 1984-85, 1987-88 and 1990-91". Processed. IFPRI, Washington D.C.
- Maxwell, S., 1999, "International Targets for Poverty Reduction and Food Security: A (Mildly) Sceptical but Resolutely Pragmatic View, with a Call for Greater Subsidiarity", *IDS Bulletin*, Vol. 30, No 2.
- Mellor, J., 2000, "Agricultural Development: So Many Successes, Such Excellent Results". FAO. Processed.
- Mellor, J., 1995, *Agriculture on the Road to Industrialization*. Baltimore. The Johns Hopkins University Press.

Milanovic, D., 1998, "Income, Inequality, and Poverty during the Transition from Planned to Market Economy", World Bank Regional and Sectoral Studies, World Bank, Washington, DC.

Mundlak, Y. and R. Domenech, 1995, "Agricultural growth in Argentina". In *Agriculture on the Road to Industrialization*, Eds. John W. Mellor. Baltimore and London. The Johns Hopkins Press.

Nugent, J. and J. A. Robinson, 1998, "Are Endowments Fate? On the Political Economy of Coffee Exporting Economies". Unpublished.

ODI, 2000, "Will Growth Halve Global Poverty by 2015?", by Lucia Hammer, John Healey and Felix Naschold, 8 July 2000, ODI Poverty Briefing. <http://www.odi.org.uk/briefing/pov8.html>

OECD 2001, DAC Guidelines on Poverty Reduction.

Okidegbe, N., 2001, "Rural Poverty: Trends and Measurement". Rural Development Strategy Background Paper #3. Washington D.C. The World Bank.

Quisumbing, A., L. Haddad and C. Peña, 1995, "Gender And Poverty: New Evidence From 10 Developing Countries". FCND Discussion Paper No. 9. IFPRI, Washington D.C.

Ravallion, M, G. Datt and D. van de Walle, 1991, "Quantifying Absolute Poverty in the Developing World". *Review of Income and Wealth* 37, 345-361.

Ravallion, M. and S. Chen, 1997, "What Can New Survey Data Tell Us about Recent Changes in Distribution and Poverty?" *World Bank Economic Review*, Volume 11, Number 2

Ravallion, M. and S. Chen, 2000, "How did the world's poorest fare in the 1990s?" <http://www.worldbank.org/research/povmonitor/publications.htm>

Reutlinger, S., and M. Selowsky, 1976, "Malnutrition and poverty: Magnitude and policy options", World Bank Occasional Paper 23. Baltimore, Md., U.S.A.: Johns Hopkins University Press for the World Bank.

Ross, J., and S. Horton, 1998, "Economic Consequences of Iron Deficiency", Ottawa: Micronutrient Initiative.

Satyanarayana, K. *et al*, 1977, "Body Size and Work Output," *American J. of Clinical Nutrition* 30, 322-325.

Shane, M., L. Teygen, M. Gehlhar, T. Roe, 2000, "Economic Growth and World Food Insecurity: A Parametric Approach", *Food Policy*, 25, 297-315.

Singh, I.J., 1991, *The Great Ascent*. Oxford University Press for World Bank.

Smith, Adam (1776, (originally 1776)). *The Wealth of Nations*. Eds. Andrew Skinner. London, Penguin Books.

Smith, L. C., 1998, "Can FAO's Measure Of Chronic Under nourishment Be Strengthened?" FCND Discussion Paper, No. 44. IFPRI, Washington D.C.

Smith, L. C. and L. Haddad (1999). *Explaining Child Malnutrition in Developing Countries: A Cross-Country Analysis*. FCND Discussion Paper No. 60. . IFPRI, Washington D.C.

Spurr, G., 1990, "The Impact of Chronic Under nourishment on Physical Work Capacity and Daily Energy Expenditure," In G. A. Harrison and J. C. Waterlow, eds, *Diet and Disease in Traditional and Developing Countries*, Cambridge U. Press, Cambridge.

Srinivasan, T. N. and J. Bhagwati, 2001,"Outward-Orientation and Development: Are Revisionists Right?" In Lal, D. and R. H. Snape (Eds.) *Trade, Development and Political Economy: Essays in Honour of Anne O. Krueger*, New York, Palgrave.

Srinivasan, T.N., 2000a, "Poverty and Under nutrition in South Asia". *Food Policy*, 25, 269- 282.

Srinivasan, T.N., 2000b, "Growth, Poverty Reduction and Inequality", Department of Economics, Yale University, mimeo.

Strauss, J., 1986, "Does Better Nutrition Raise Farm Productivity?" *J. of Political Economy* 94 (2), 297-320.

Steckel, R., 1995, "Stature and the standard of living", *J. of Economic Literature* 33 (4): 1903-1940

Strauss, J. and D. Thomas, 1995, "Human Resources: Empirical Modeling of Household and Family Decisions". In J. Behrman and T.N. Srinivasan, eds, *Handbook of Development Economics*, Volume 3A, Amsterdam, Elsevier.

Strauss, J. and D. Thomas, 1998, "Health, Nutrition, and Economic Development," *J. of Economic Literature* 36 (2): 766-817.

Subramanian, S., and A. Deaton, 1996, "The Demand for Food and Calories", *J. of Political Economy*, 104, 133-162.

Suryanarayana, M., 2000, "How Real Is the Secular Decline in Rural Poverty?" *Econ. And Polit. Weekly*, June, 2129-2140.

Svedberg P., 2001, *Poverty and under nutrition: Theory, Measurement, and Policy*. Oxford, Oxford University Press.

Thomas, D. and J. Strauss, 1997, "Health and Wages: Evidence on Men and Women in Urban Brazil," *J. of Econometrics* 77: 159-185.

Timmer, C.P., 1997a, "Food Security Strategies: The Asian Experience". *FAO Agricultural Policy and Economic Development Series*, No. 3. FAO, Rome.

Timmer, C.P., 1997b, "How Well do the Poor Connect to the Growth Process?" *Discussion Paper No. 178*. Harvard Institute for International Development (HIID), Cambridge, MA.

United Nations, 1995, *Report of the World Summit for Social Development*, available at <http://www.un.org/esa/socdev/docs/summit.pdf>

United Nations, 1999, *Common Country Assessment Guidelines*, April.

United Nations, 2000, *World Economic and Social Survey 2000. Trends and Policies in the World Economy. Escaping the Poverty Trap*, Department of Economic and Social Affairs, United Nations, New York.

UNDP, 2000, *Poverty Report 2000: Overcoming Human Poverty*, UNDP, NY.

UNICEF, 1998, *The State of the World's Children 1998: Focus on Nutrition*, Oxford: Oxford University Press.

von Braun, J. and E. Kennedy, 1994, (Editors). *Agricultural Commercialization, Economic Development and Nutrition*. Baltimore, The Johns Hopkins University Press

Walker, T. S. and J. G. Ryan, 1990, *Village and Household Economies in India's Semi-Arid Tropics*. Baltimore, Johns Hopkins University Press

Williamson, J., 1994, *The Political Economy of Reform* Washington D.C., Institute for International Economics.

World Bank, 1990, *World Development Report 1990: Poverty*, Published for the World Bank by Oxford University Press, NY.

World Bank, 2000a, World Development Report 2000/1. Attacking Poverty, Published for the World Bank by Oxford University Press, NY.

World Bank, 2000b, Global Economic Prospects and the Developing Countries 2001, Washington D.C., World Bank.

World Bank, 2001a, "The International Development Goals: Strengthening Commitments and Measuring Progress", Background note for the Westminster Conference on Child Poverty, 26 February, mimeo, Washington D.C., World Bank.

World Health Organization, 1999, World Health Report. WHO, Geneva.

ESA Working Papers

WORKING PAPERS

The ESA Working Papers are produced by the Agricultural and Development Economics Division (ESA) of the Economic and Social Department of the United Nations Food and Agriculture Organization (FAO). The series presents ESA's ongoing research. Working papers are circulated to stimulate discussion and comments. They are made available to the public through the Division's website. The analysis and conclusions are those of the authors and do not indicate concurrence by FAO.

ESA

The Agricultural and Development Economics Division (ESA) is FAO's focal point for economic research and policy analysis on issues relating to world food security and sustainable development. ESA contributes to the generation of knowledge and evolution of scientific thought on hunger and poverty alleviation through its economic studies publications which include this working paper series as well as periodic and occasional publications.

Agricultural and Development Economics Division (ESA)

The Food and Agriculture Organization
Viale delle Terme di Caracalla
00100 Rome
Italy

Contact:

Office of the Director
Telephone: +39 06 57054358
Facsimile: + 39 06 57055522
Website: www.fao.org/es/esa