

THE DEVELOPMENT OF  
GLOBAL DIETS SINCE  
ICN 1992: INFLUENCES  
OF AGRI-FOOD SECTOR  
TRENDS AND POLICIES


*by*

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# CONTENTS

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EXECUTIVE SUMMARY/MESSAGES	1
<i>Background</i>	
<i>Key trends and their influences on diets</i>	1
<i>Food prices</i>	1
<i>Income and Income distribution</i>	1
<i>Food systems</i>	2
<i>Other factors influencing food availability</i>	2
<i>Socio-demographic trends</i>	3
AGRICULTURAL, TRADE AND FOOD POLICIES	3
<i>Agricultural policies</i>	3
<i>Trade policies</i>	4
<i>Food policies targeted at consumers</i>	4
<i>Conclusions</i>	5
1. INTRODUCTION	6
2. KEY TRENDS AND DRIVERS OF FOOD CONSUMPTION AND DIETS	10
2.1 Food prices	10
2.1.1 Trends in food prices	10
2.1.2 Food price elasticities	12
2.1.3 Food prices and overnutrition	12
2.1.4 Food prices and undernutrition: Effects of the food price crisis	14
2.1.5 Summary	15
2.2 Income & income distribution	15
2.2.1 Trends and heterogeneity in income growth	15
2.2.2 Income distribution	15
2.2.3 Income elasticities	16
2.2.4 Nutrition outcomes	16
2.2.5 Financial crises and nutrition	17
2.2.6 Summary	17
2.3 Changes in Food Systems	17
2.3.1 Globalization and concentration	18
2.3.2 Implications for diets: changes in preferences	20
2.3.3 Implications for diets: changes in prices	20
2.3.4 Implications for diets: changes in availability	20
2.3.5 Implications for diets: changes in food safety	21
2.3.6 Summary	21

2.4	Changing food availability	21
2.4.1	<i>Import surges</i>	21
2.4.2	<i>Biofuels</i>	22
2.4.3	<i>Growth in Agriculture and Agricultural Productivity</i>	23
2.4.4	<i>Summary</i>	23
2.5	Other main socio-demographic trends	24
2.5.1	<i>Population growth and ageing</i>	24
2.5.2	<i>Urbanization</i>	24
2.5.3	<i>Migration</i>	24
2.5.4	<i>Lifestyles</i>	24
2.5.5	<i>Female employment</i>	25
2.5.6	<i>Education and knowledge</i>	25
2.5.7	<i>Summary</i>	25
3.	THE ROLE OF AGRICULTURAL, TRADE AND FOOD POLICIES	26
3.1	Agricultural Policy	26
3.1.1	<i>Producer support in OECD countries: Trends</i>	26
3.1.2	<i>Producer support in OECD countries: Influence on Diets</i>	27
3.1.3	<i>Producer support in non-OECD countries: Trends</i>	28
3.1.4	<i>Producer support in non-OECD countries: Impacts on diets</i>	29
3.1.5	<i>Summary</i>	29
3.2	Trade Policies	30
3.2.1	<i>Modelling the impact of trade liberalization</i>	31
3.2.2	<i>Regional trade agreements (RTAs)</i>	32
3.2.3	<i>Tariff Escalation</i>	32
3.2.4	<i>SPS, TBT and Private Standards</i>	32
3.2.5	<i>Investment Liberalization</i>	33
3.2.6	<i>Summary</i>	33
3.3	Food policies targeted at consumers	34
3.3.1	<i>Evolution of Food Aid and other International Food Assistance Programs</i>	34
3.3.2	<i>Domestic food assistance programmes and price subsidies</i>	36
3.3.3	<i>Taxation of unhealthy foods</i>	37
3.3.4	<i>Summary</i>	37
	CONCLUSIONS	38
	REFERENCES	40

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## EXECUTIVE SUMMARY/MESSAGES

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### *Background*

The scope of this report is to discuss dietary and nutritional changes and their causes since the International Conference on Nutrition (ICN) 1992, with particular reference to developments on international food markets and policies.

While the proportion of chronically hungry has been falling over the last two decades, the absolute number has remained stable at about 800m, and has been overtaken by the increasing numbers of overweight and obese individuals. Many developing and middle income countries are experiencing a nutrition transition characterized by a movement from diets associated with undernutrition to diets associated with overnutrition. Overweight and obesity are prevalent among low socio-economic groups in middle-income and developed countries and among the better off in poorer countries.

Based on FAOSTAT food supply data, between 1992 and 2007 there has been an increase in calorie availability ranging between 150 and 250 Kcal per person per day in developing countries on average, although availability remains stagnant in many countries, particularly in Africa. Developing countries have experienced a general increase in calories from all food groups, but especially from sugar and meat, while calorie availability in the EU and North America has been relatively stable.

The healthiness of diets measured as (aggregate) compliance with the basic World Health Organization recommendations has improved everywhere, but to a very minor extent in Least Developed Countries. It has actually worsened in central and southern Africa.

### *Key trends and their influences on diets*

#### *Food prices*

International food prices were stable or declining in real terms until 2003, when food price inflation emerged, growing into a food crisis in 2008.

Energy-dense diets provide requisite energy at lowest cost and are also more palatable. Long-run decline in food prices, coupled with the increasing opportunity (time) cost of food preparation and the consequent attractiveness of ready-to-eat foods are consistent with the shift towards energy-dense diets observed in the developed world. Most of the evidence of the link between price patterns and diet adjustments from the developed world is likely to carry over to countries facing nutrition transition, especially in urban areas.

Initial evidence available following the food price crisis suggests the crisis had the effect of reducing diet quality as households tried to maintain energy intake in many developing countries, but it is too early to draw conclusions on long-run effects.

#### *Income and income distribution*

In general, real incomes have grown by around 2 percent per year since 1992, with large disparities across the world and a major slowdown after the onset of the financial crisis. The highest growth rates have been observed in middle income countries, the lowest in heavily indebted poor countries and high-income countries.

The limited evidence on the evolution of income distributions suggests a reduction in inequalities in most world areas, with exceptions among Eastern Europe transition economies, and importantly, African and Latin American countries where inequality is strongly associated with high chronic hunger rates.

Income elasticities for food are much higher in low and middle-income countries (more or less twice as large as in high-income countries), and are higher for livestock products compared to cereals, fruit and vegetables at all income levels.

The relationship between income and diets and the evolution of aggregate incomes and their distribution are consistent with the observed nutrition transitions and the trends in undernutrition and overnutrition in different countries. They are a major factor in explaining the evolution of diets, including the observed shift towards animal products and the uneven dynamics in hunger and obesity across world areas.

Evidence from the past Asian crisis suggest that the current world financial crisis may have a long-term impact on nutrition and health outcomes.

### *Food systems*

Rapid globalization has occurred in the food industry over the last 20 years, and diets have changed significantly over the same period, with processed foods now accounting for 80 percent of global food sales. The share of food markets accounted for by supermarkets has risen in developing countries, first in Asia and over the last decade also in Africa. Technological progress (especially in transport and handling) has sparked a major increase in the share of processed products in food and agricultural exports, approaching 70 percent in high-income and Asian countries.

Global inflows of foreign direct investments in the food sector have increased fourfold to over USD 40 billion between 1992 and 2007 and there is evidence that they are concentrated on convenience and highly processed foods. Fast food restaurants have also multiplied dramatically and at a faster pace outside the US, including Asia/Pacific countries and Latin America. It has been argued that globalization of markets induces domestic competitors to adopt the competitive practices introduced by global corporations.

Globalization trends, including globalization of media and marketing strategies, have accelerated the adoption of non-traditional diets. There is some (limited) evidence to indicate that the globalization of supermarkets and food manufacturers and the consequent economies of scale have reduced the price of packaged foods relative to fresh produce, and made available a larger variety of products, particularly semi-processed and processed products.

While it is difficult to show causation between globalization trends and changes in diet, there is convincing circumstantial evidence that companies create these changes rather than simply responding to latent demand. The impact on nutrient intakes is not well-established, even in developed countries, though processed foods, fast foods and soft drinks have been linked to the nutrition transition and the obesity epidemic, and they are also likely to influence nutrition outcomes in poorer countries.

### *Other factors influencing food availability*

Import surges (rapid, unusual and substantial increases in quantities imported of a good) have been frequent occurrences in the developing world in the last 20 years. These surges can be harmful for domestic industry, but beneficial to consumers by reducing prices. However, currently there is little evidence to indicate any influence on diets.

Biofuel production has surged since the early 2000, reducing the food use of some crops, especially maize and sugarcane from the US and Brazil, and thereby putting pressure on prices and generating a shift from maize into rice and wheat consumption, whose prices have also increased. Biofuel expansion affects diets through its influence on international commodity prices (with an effect on increasing grain prices estimated between 15 and 40 percent).

The poor in grain importing countries with grain staple-dependent diets are most likely to experience worse nutritional outcomes as a consequence of food inflation influenced by biofuel expansion. Some African countries with very low calorie intakes import more than 40 percent of the grain in their diets, and are likely to have been affected by biofuel developments. However, there is no specific evidence isolating the effect on household diets.

Agricultural productivity has risen steadily over the last two decades, with the fastest growth observed in the OECD, MENA and East Asian countries, while being variable in Sub-Saharan Africa and Latin America and relatively poor in South Asia.

Agricultural growth has an important influence on stunting, and a strong effect on calorie supply especially at low existing levels of supply (with the major exception of India), although there is no clear robust relationship with diet diversity. Since agricultural productivity is strongly influenced by public investment in agriculture, declining investment in global agriculture over the last two decades may have been a missed opportunity to improve nutrition outcomes.

### *Socio-demographic trends*

Over the last 20 years the world population has increased by 1.6 billion, 78 percent of this population growth was in low-income food deficit countries, and 34 percent in China and India, increasing aggregate food demand and affecting diets through higher prices, especially in countries where agricultural growth is limited by resource constraints. Some poorer countries (particularly in Sub-Saharan Africa) have experienced an increase in dependency ratios due to a reduction in infant mortality without an increase in working age population.

Because of these population trends, despite the falling proportion of population at risk of hunger, the absolute number of people facing undernutrition has been stable or even increasing.

Parallel to population growth, a rapid urbanization process has occurred, again faster in developing countries, and has been associated with increased intakes of energy-dense foods and lower intakes of fresh foods, also because of price differentials relative to rural areas and increased exposure to globalization trends.

While the increase in female labour force in high-income countries (+20 percent between 1992 and 2009) has been sometime blamed for rising obesity rates, convincing recent evidence suggests that the effects on children's diet are negligible or positive, and in developing countries (where women entering the work-force has increased by more than 50 percent) a positive net effect on children's nutritional status has been found.

There is suggestive evidence that parental education has a larger impact than wealth on children's health and nutrition in developing countries.

On balance there seem to be more negative than positive effects on diets arising from socio-demographic trends in high-income countries. The evidence is less complete for developing countries but the same dynamics are observed, and are likely to have net negative implications on nutrition.

### *Agricultural, trade and food policies*

#### *Agricultural policies*

The reforms of domestic agricultural policies between 1992 and 2010 have worked towards liberalization and removal of distortions, especially in OECD countries with a decline of the producer support estimate, PSE from 35 percent in 1991 to about 23 percent in 2009. Decoupling of support from production has gone a long way to restore the link between production and international price signals.

While there is a body of research linking agricultural policies in the EU and US to deterioration of diets because of subsidized production, convincing recent evidence shows that this the effect is actually the opposite, as domestic support increased internal prices acting like an implicit food tax, which has been heavier for energy-dense commodities relative to fruit and vegetables. The link between agricultural policies affecting commodity prices and food prices paid by the

consumer is however weak. Thus ongoing reduction in producer support in the West may actually contribute to worsening diets, although the effects are likely to be modest.

Support levels in non-OECD countries have historically been much lower, and declining in most cases during the period under investigation, although there has been a resurgence of interests in input subsidies, especially after the food price crisis. There is very little evidence on the implications for diets in non-OECD countries. However, given the low existing support levels any impact on diets through prices is likely to be small.

### *Trade policies*

The most relevant event for international agricultural trade over the last 20 years has been the signing of the Uruguay Round Agreement on Agriculture in 1994, which generated a subsequent reduction in tariffs, export subsidies, and domestic support. Non-tariff barriers were also addressed by the Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) agreements in 1995, while the Doha round has so far failed to further capitalize on progress.

While the effects of multilateral trade agreements have favored globalization trends in food systems, and may have induced changes in diets by altering relative prices, the most relevant impacts are likely to be the indirect ones driven by the expansion of non-agricultural trade and global economic growth. Traditional trade liberalization models indicate relatively minor price changes for agricultural commodities, while generating more substantial effects on diets through income growth, changes in food systems and increased availability of processed foods.

Rising imports of oilseeds and vegetable oils have been identified as characterizing the start of the nutrition transition in low-middle income countries.

### *Food policies targeted at consumers*

Over the last 20 years, food aid has decreased by more than 50 percent, it has been untied from commercial exports, and has focussed on emergency provision (from 18 percent in 1990 to 72 percent in 2010). While there is evidence of effectiveness in crisis relief and in buffering short-run shocks (especially food-for-work measures), food aid has been criticized for poor targeting which inhibits longer run benefits. The focus on the nutritional content of food aid (fortified foods) is recent, and to date there is little evidence of a change in the composition of food aid towards a more nutritious mix. On balance, the evidence suggests that food aid has had little or no impact on long-term diet and nutrition outcomes, a few isolated examples apart.

Generic domestic food assistance programs like food stamps have a relatively long history in the US and have been closely scrutinized showing that they are effective in reducing food insecurity, but they also have been criticized as they may lead to increased intakes of unhealthy nutrients; the link to increasing obesity rates is very weak, if it exists at all. Targeted food assistance programmes like the US Women, Infants and Children (WIC) program have been shown to be cost-effective in improving diets without increasing calorie intakes.

In developing countries, domestic food assistance programs working through public distribution systems or price subsidies have had a positive but small effect on calorie intakes and food security, and they have become more cost-effective over the last two decades.

Taxes on foods with high density of unhealthy nutrients have been implemented in the US and recently in Europe, but their small extent combined with relatively low price elasticities generated tax revenues rather than diet changes.



## Conclusions

On aggregate, diets and nutritional outcomes have improved in most parts of the world over the last 20 years, but there is substantial heterogeneity, with little change in Africa (particularly Sub-Saharan Africa) and India compared to progress in Asia, and especially China and Vietnam.

Evidence points at globalization as the dominant force for dietary change, prompted by international investment liberalization and trade reform.

Beyond its major influence on prices and incomes, globalization has a critical impact on preferences and lifestyles, with a growing range of available food to meet new demands. These changes have been complemented and facilitated by growing urbanization and demographic change (most notably increased workforce participation of women).

Income growth has also exerted an important influence on dietary change since 1992, both by reducing hunger and by improving diet quality, though with negative effects in those countries experiencing a nutrition transition, where undernutrition tips over into overnutrition prevalence. The size of these adverse effects depends on the evolution of income distributions in both developing and developed countries.

Agricultural growth has been more effective than non-agricultural growth in alleviating stunting in this period, and it has also exerted a strong effect on calorie intakes. However, its influence on diet diversity appears weak.

Trade and agricultural policy reforms in themselves have not had a major impact on diets (other than through influences on globalization and income growth), although agricultural investments have an important influence on productivity growth in agriculture and undernutrition outcomes. Thus, declining public investment in agriculture over this period implies a missed opportunity.

Consumer policy vehicles like food aid, food assistance programs, local procurement programs and public distribution systems do not seem to have had major diet quality effects, but they have been effective in their basic goal of assuring minimum calorie requirements are met, particularly in emergencies.

From 1992 until around 2007 food price trends were relatively flat or slightly downwards, and they may have promoted some switch to animal-source products which are more responsive to a price fall, bolstering the encouragement to livestock product consumption induced by income growth. The food price crisis in the late 2000s had a significant short-term impact on diets and nutrition, generally reducing diet diversity and quality, particularly among the poorest. Longer-run effects will be an important area for research in coming years.

Future research will especially need to explain and address the issue of stagnating diets and nutritional outcomes in the poorest regions, especially Sub-Saharan Africa and South Asia.

Given the extent of heterogeneity in nutritional outcomes and the co-existence of under and overnutrition problems in many parts of the world, future research focus may well need to be on nutrition inequalities rather than on overall trends.

# 1. INTRODUCTION

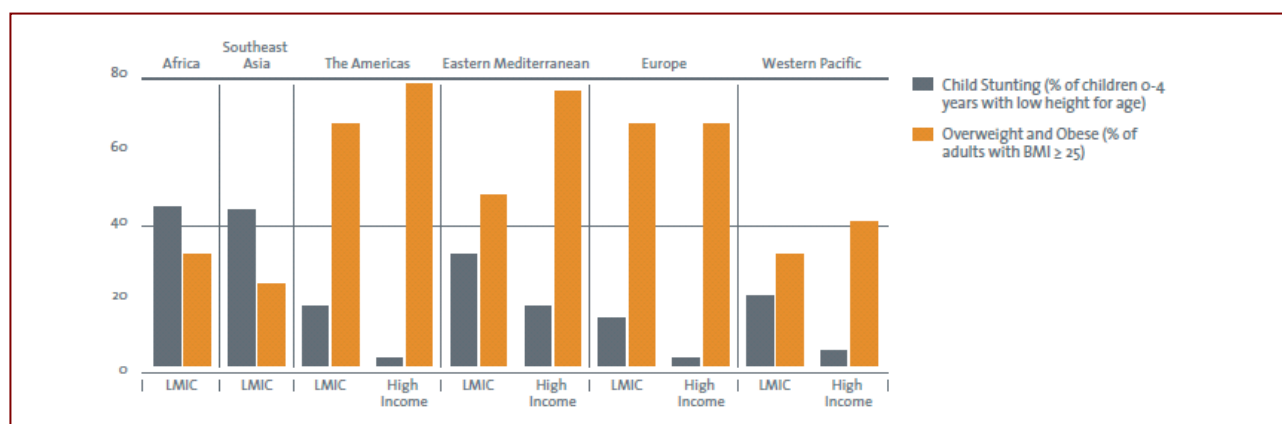
The objective of this report is to review and discuss the evidence on dietary changes and their causes/drivers since the ICN in 1992, with particular reference to the role of public policies relative to other drivers for change. Dietary outcomes (composition of food consumption baskets) are determinants of nutrient intakes (macro and micronutrient intake levels), which in turn are determinants of nutritional status (anthropometrics). Although these are distinct outcomes and there is an implicit hierarchy, sometimes the distinctions get blurred in practice, and often the available evidence or data relates only to one or the other of these aspects. Our primary focus is on diets, although we sometimes use evidence relating to nutrient intakes or anthropometric outcomes depending on availability.

In the 20 years since ICN-1992 there have been significant changes in global nutrition; in what has become known as the nutritional transition, the most notable outcome of this transformation saw the number of overweight people in the world overtake the number of chronically hungry in 2006. While the number of chronically hungry people has remained stubbornly around 800m<sup>2</sup> (despite the Millennium Development Goal and 1996 World Food Summit target to halve this number by 2015) (FAO, 2011b), overweight prevalence has leapt to over 1b from levels so low even most developed countries did not consider them worth counting in 1992 (see OECD, 2011).

Popkin has been the most prolific cataloguer of the nutrition transition and has listed its 5 stages, the final 3 of which are relevant to most countries in the past 20 years (e.g. Popkin, 2006). Although a number of countries, notably in sub-Saharan Africa, remain subject to periodic famine (Stage 2), many developing and middle income countries have passed into Stage 3 (receding famine) and Stage 4 (degenerative disease). Developed countries are beginning the process of behavioural change (Stage 5) which sees obesity prevalence begin to decline.

In Stage 3 nutritional deficiencies diminish as diets progress from reliance on starchy staples to include more fruit and vegetables, animal products, vegetable oils and general diet diversity. In Stage 4 non-communicable diseases linked to overweight become prominent as diets become more energy-dense and less constrained by incomes. Although it is hard

Figure 1.1 Overweight and stunting by world regions (various dates)



Source: Chicago Council (2011)

<sup>2</sup> Though falling as a proportion of world population.

to detect in any country the falling levels of overweight suggested by Stage 5 (associated with higher quality fats, more refined grains, reduced energy density), a number of developed countries seem to have reached an obesity plateau and there are signs of improvement among higher socio-economic groups, particularly for females. Indeed in a cross-country study, Ezzati et al. (2005) found average BMI peaked at yearly GDP/capita of USD12,500 for women, USD17,000 for men<sup>3</sup>. In poorer countries, undernutrition is most common among poorer parts of society, overweight more prevalent among the better off; but in middle income countries (e.g. Brazil, Mexico, South Africa) and in developed countries, overweight and obesity are most prevalent among the lower socio-economic groups. Moore et al. (2010) put the transition from overweight and obesity being most common among those with high incomes to those with low incomes at a national income per head of USD8,700.

As the Chicago Council (2011) acknowledges, the shift from early death due to communicable diseases to later death from chronic non-communicable diseases (NCDs) is primarily a story of technological, social, and economic success. However, an incomplete success for those many countries that have not yet seen advances in sanitation and water quality, where particularly rural and child hunger remain common and where advances in health care systems are yet to diminish the adverse health effects of over-nutrition<sup>4</sup>. Such countries suffer what has become known as the double-burden of malnutrition (Chicago Council, 2011). Indeed, it has become apparent that diet-related NCDs are emerging increasingly among lower- and middle-income groups in less affluent countries (Kearney, 2010) and death rates from NCDs are much higher, for example, in Burkina Faso and Bangladesh than in the UK (Chicago Council, 2011). The burden both of NCDs on health care systems and of both NCDs and under-nutrition on economic production is substantial (Chicago Council, 2011).

Writing 10 years ago in a WHO Report, Chopra (2002) claimed “undernutrition remains by far the most important single cause of morbidity and mortality globally, accounting for 12 percent of all deaths and 16 percent of disability-adjusted life years lost. Taking micronutrient deficiencies into account the figures are especially alarming: 2 billion women and children are anaemic (James, 2001), 250 million school age children suffer from vitamin A deficiency and 2 billion people are at risk from iodine deficiencies” (Chopra, 2002).

Discussing the relative importance and harm associated with under and over-nutrition is beyond the scope of this paper in which the main focus is a the evidence relating to the development of diets.

Table 1.1 Calorie availability 1992 and 2007

Countries	1992	2007
Least Developed Countries	1957	2162
World	2634	2798
Africa	2300	2462
Americas	3005	3216
Asia	2477	2668
Europe	3253	3406
Oceania	3079	3182

Source: FAOSTAT

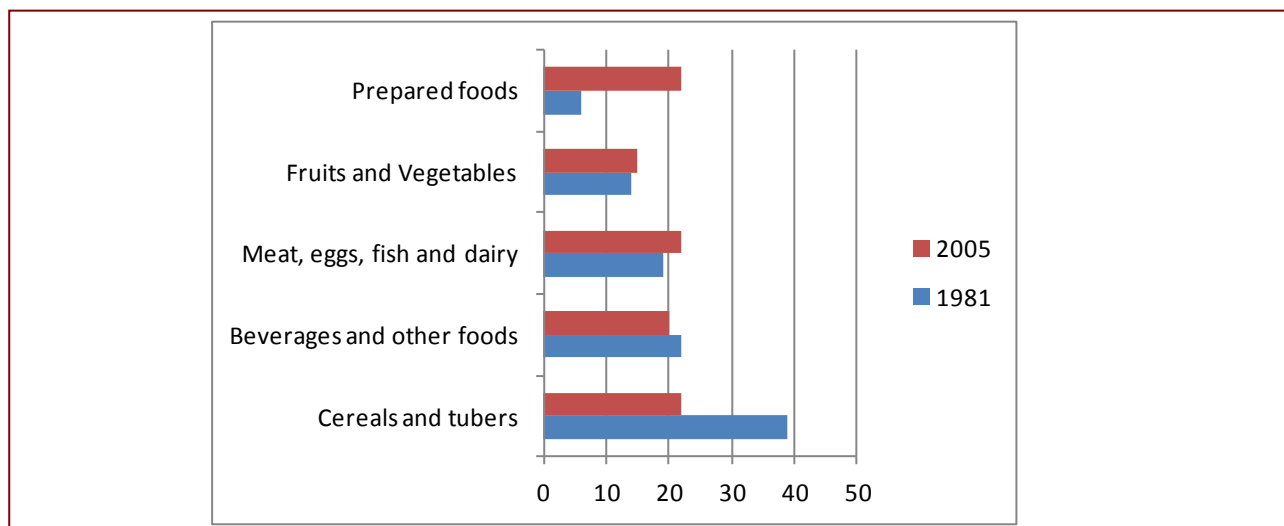
<sup>3</sup> Income data was generally based on International USD at 2000 prices, although data gaps led to many substitutions with previous years, which might suggest some downward bias.

<sup>4</sup> In developed countries, deaths from diet-related NCDs has fallen steadily (OECD, 2011) and life expectancy is little, if at all, diminished by being obese (Finkelstein et al., 2009).

Table 1.1 shows how calorie availability has progressed between 1992 and 2007 (latest available data). Quite uniformly, for regional aggregates, availability has increased by between 100 and 200 calories per capita per year—surprisingly little given some of the seemingly dramatic global changes described in subsequent sections of this paper.

As we consider the shifts in calorie availability arising from different food groups between 1992 and 2007 in developing countries, using FAOSTAT food supply data, an increase is observed for most items, but especially sugar (+45 percent) and animal products (+25 percent, and +31 percent for meat) in least developed countries. Calories from vegetables (+25 percent) and from vegetable oil (+20 percent) have also increased in the same countries. Considering the European Union and North America, the picture is relatively stable, with the exception of increases in vegetables (+4 percent and +15 percent, respectively) and vegetable oils (+11 percent and +18 percent). China stands out in terms of increased calorie availability for all food groups, but compared to the previous trends towards animal product calories, the largest increase has been observed for fruit (+216 percent), although the absolute calorie availability per capita is still slightly more than half the availability of fruit in Europe or North America. Over the same period major increases in calories

Figure 1.2 Share of food categories in per-capita food expenditure (percent)



Source: World Development Report 2008-09

Table 1.2 Growth rates of sales for selected food categories

	Average annual growth rate (1998-2003)				
	Oils and Fats	Breakfast Cereals	Ready Meals	Dried Food	Dairy Products
Lower Income Countries	11.6%	56.3%	11.0%	14.4%	11.4%
Lower Middle Income Countries	8.1%	12.3%	10.1%	10.9%	9.7%
Upper Middle Income Countries	7.4%	9.7%	7.9%	8.3%	6.7%
Higher Income Countries	0.2%	3.3%	4.7%	1.8%	2.9%

Source: Gehihar and Regmi (2005), based on the Euromonitor, 2003

from animal products have taken place in China (+75 percent) and India (+24 percent), but again absolute (estimated) intakes are very far from those observed in industrialized countries. In contrast to the general picture of increasing calorie availability, landlocked developing countries have experienced a reduction from most food groups, most notably for meat (-20 percent) and animal fats (-33 percent).

The marked rise in available food energy observed globally has been accompanied by changes in the composition of the diet. The process involved in such dietary change appears to follow a pattern involving two main stages. In the first stage, known as the ‘expansion’ effect, the main change is in terms of increased energy supplies, with these extra calories coming from cheaper foodstuffs of vegetable origin (Smil, 2001). This development has been ubiquitous, occurring in both developed and developing countries. The second stage, called the ‘substitution’ effect, results in a shift in the consumption of foodstuffs with no major change in the overall energy supply. This shift is primarily from carbohydrate-rich staples (cereals, roots, tubers) to vegetable oils, animal products (meat and dairy foods) and sugar. In contrast to the first stage, this one is country-specific and is influenced by culture, beliefs and religious traditions. In particular, such traditions can influence the extent to which animal products substitute vegetable products and the specific types of meat and animal products consumed (Kearney, 2010).

The second stage could be associated either with a worsening of diet quality (e.g. if too much sugar or saturated fat is consumed) or an improvement (if more fruit and vegetables are added to the diet in place of sugars and saturated fats. Measured in terms of proximity of average nutrient intakes to WHO dietary recommendations (Mazzocchi et al., 2008), Table 1.3 shows improvement in all major regions of the world, most dramatically in Asia. Of concern is that Africa as a region and the least developed countries as a group have shown little improvement in their diet quality—indeed, in mid and southern Africa diet quality has actually worsened. As well as tending to under-nourishment, diets in these regions remain concentrated on a small range of staple foods; these countries still await the nutrition transition.

The framework for this report is represented in Figure 1.3. Food consumption, our main focus, is influenced by incomes, prices, availability and preferences. Over the past 20 years these have been influenced by important global changes in incomes, technology, globalization, population and other socio-demographic changes like urbanization and the increased work-force participation of women. Of course, many of these changes are inter-related, but we discuss their separate influence on prices, availability and preferences in Section 2 of the report. The impact of income (and income distribution) change is also discussed in this section.

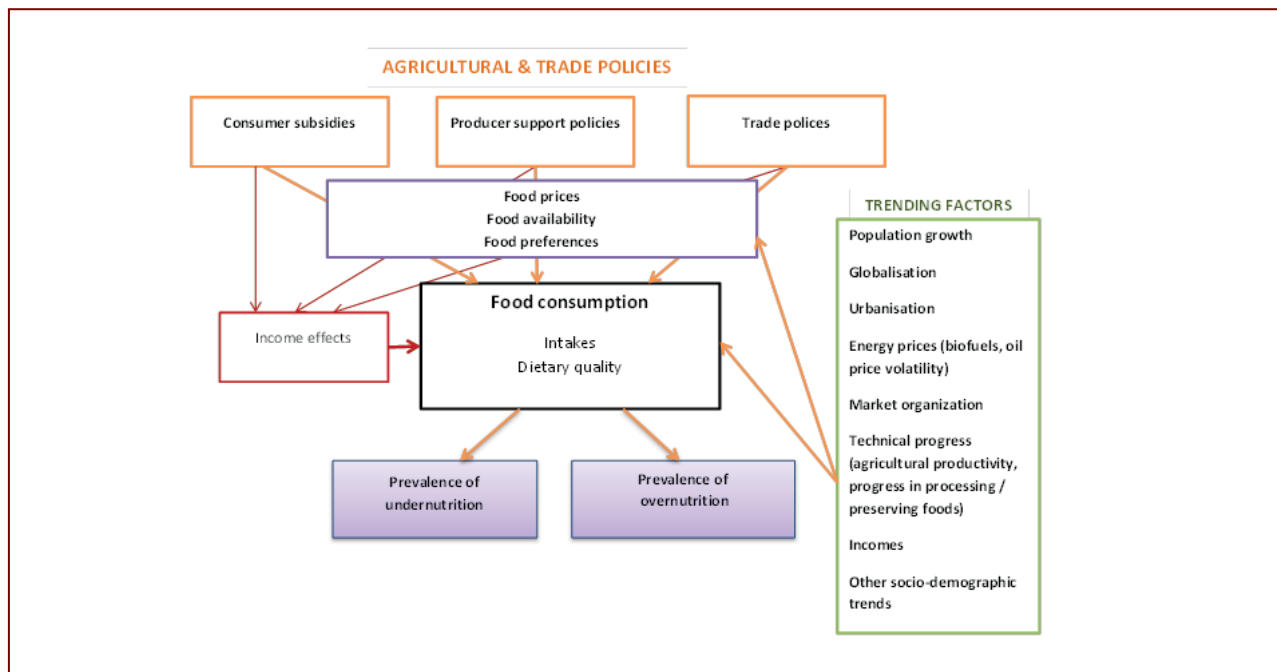
There have been important policy developments over the past 20 years. The Uruguay Round Agriculture Agreement and (sometimes linked) foreign investment liberalization and agricultural policy reform have influenced world and

Table 1.3 Adherence to WHP recommendations based on FAOSTAT food availability data (0=maximum distance, 1=all recommendations met)

Country group	1992	2007
Least Developed Countries	0.71	0.73
World	0.84	0.95
Africa	0.79	0.81
Americas	0.91	0.93
Asia	0.81	0.97
Europe	0.92	0.96
Oceania	0.85	0.90

Source: our processing based on FAOSTAT data (for details see Mazzocchi et al., 2008)

Figure 1.3 Influences on food consumption



domestic prices and availability of different foods. There have also been changes in the use of consumer taxes and subsidies within countries specifically aimed at changing food consumption patterns (nutrition assistance programmes, for example, ). Such policy developments have also impacted on incomes and on trending factors such as globalization and urbanization. These are discussed in Section 3.

Finally, the discussion in Section 4 attempts to draw conclusions on the most important driving forces and policy influences on global diet change in the past 20 years.

## 2. KEY TRENDS AND DRIVERS OF FOOD CONSUMPTION AND DIETS

As trade liberalization, the rate of urbanization and global income growth have accelerated in the last twenty years, fundamental changes have come about in the world food system, marked by increased foreign, particularly western influence. The latter half of the period was also marked by food price volatility following a lengthy period of stable decline in food prices. Patterns of food aid, import surges, agricultural productivity and biofuel developments have influenced food availability. This section discusses the influence of these trend factors on global diets and nutrition.

### 2.1 Food Prices

#### 2.1.1 Trends in food prices

Food prices measured at the international level were largely stable (with a gentle decline) from 1991 until 2003, having declined for a considerable length of time before this period. The food price inflation that set in during 2003 turned into a full-blown inflationary crisis in 2008, which continued into 2010 after a brief respite (and has declined somewhat

again since). Figure 2.1 charts the overall food price index, along with the indices of international prices of individual commodities. Figure 2.2 shows the evolution of relative commodity prices for meat, dairy and cereals across two sub-periods. Considering the inflationary crisis, both volatility and price levels show some heterogeneity across the main commodity groups. More specifically, dairy prices have been more volatile, and meat prices have risen less than cereals and dairy products.

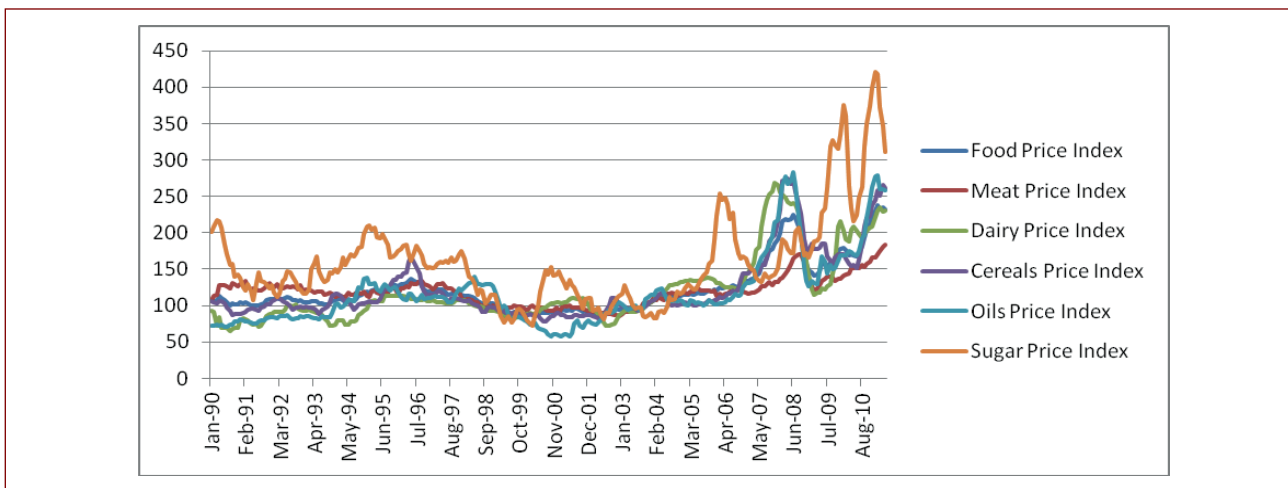
### 2.1.2 Food price elasticities

The effects of changing food prices on consumption is encapsulated in price elasticities. Figure 2.3 shows own-price elasticities for food groups and how they differ by the country's income level. Fruit and vegetables and meat and dairy consumption are generally seen to be more responsive to price changes than cereals and fats and oils. At lower country income levels, sensitivity to price changes is seen to generally increase across food categories, but particularly so for livestock products and fruit and vegetables. The decline in the price of meat relative to cereals and other foods since the early 2000s, combined with a higher elasticity may partially explain the shift towards including more meat in diets, observed in several developing countries. This underscores the role of food prices in LMIC countries undergoing nutrition transition. Even if temporal decline in prices of livestock products is not dramatic, consumers respond relatively strongly to price changes. What of processed foods and beverages? a systematic review by Green (2011, unpublished) of more than 3700 demand studies worldwide demonstrates that soft drinks and confectionery as a category have the highest elasticity value of all food groups, including livestock products. Figure 2.4 shows the trends in real consumer price indices for the food aggregates and for relevant food groups in the EU and US, which provide clear evidence on the lower relative prices of soft drinks and energy dense foods compared to other foods, especially fresh foods, again a trend which is consistent with increased relevance of these foods in the diet.

### 2.1.3 Food prices and overnutrition

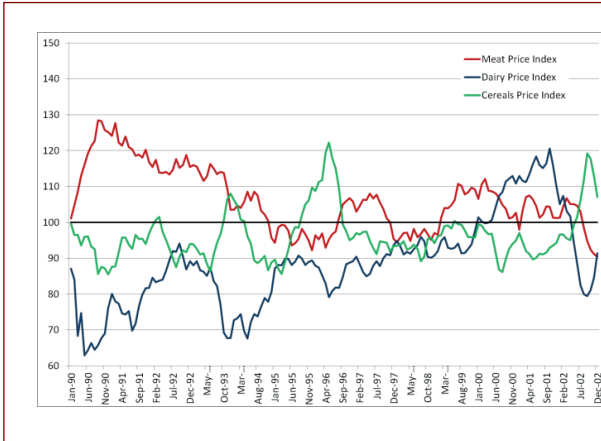
Long-run trends in food prices have been implicated as being central to observed patterns of overnutrition around the world. Lakdawalla and Philipson (2009) emphasize the importance of reductions in the overall price of food relative to other goods as a result of agricultural innovation in stimulating overnutrition. Other authors (eg. Brownell and Horgen, 2004; Drewnowski and Darmon, 2005) characterize the problem as being caused by energy-dense foods with added sugars and fats being relatively inexpensive compared to healthier diets composed of lean meats, whole grains and fruit and vegetables. There is an inverse relationship between energy density (calories/gram) and energy cost (price/calorie) in the modern food economy, and thus an energy-dense diet provides requisite energy at lowest cost (Drewnowski and Darmon, 2005).

Figure 2.1 FAO International Food Price Indices for commodity groups (2002-04=100)

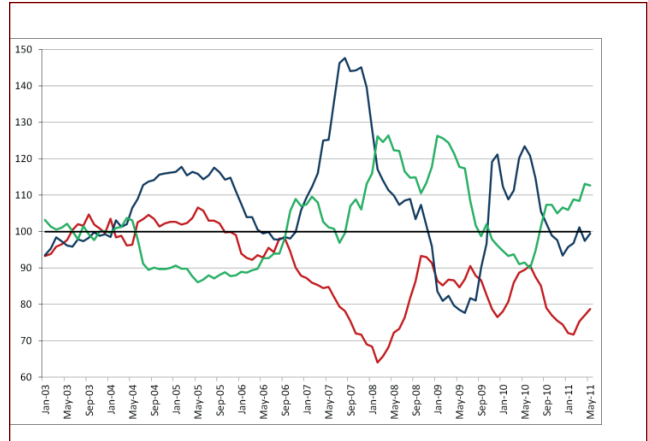


Source: FAO Monthly Food Price Index, <http://www.fao.org/worldfoodsituation/wfs-home/foodpricesindex/en/>

Figure 2.2 Price indices for meat, dairy and cereals relative to the Food Price Index



1990-2002



2003-2011

Source: our processing on FAO monthly price indices

Figure 2.3 Own-price elasticities for aggregate food group (Source: Regmi, et al.)

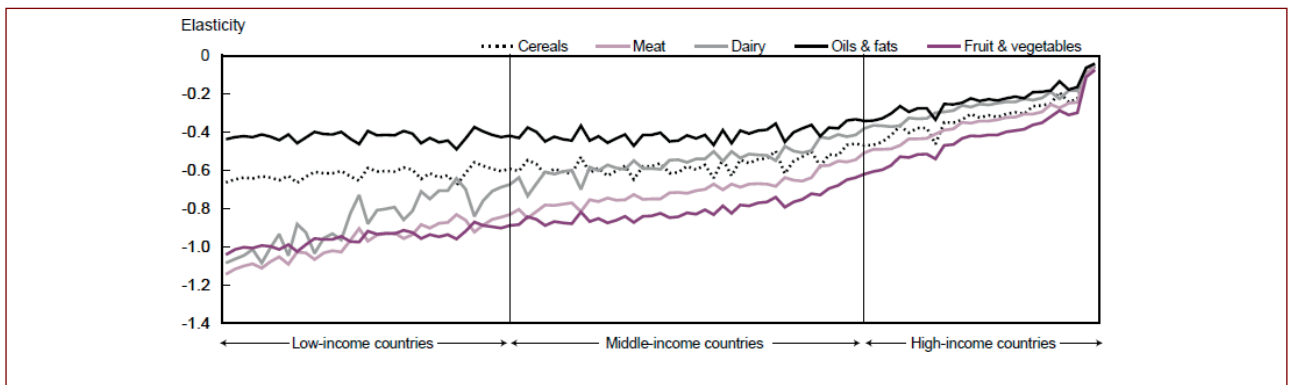
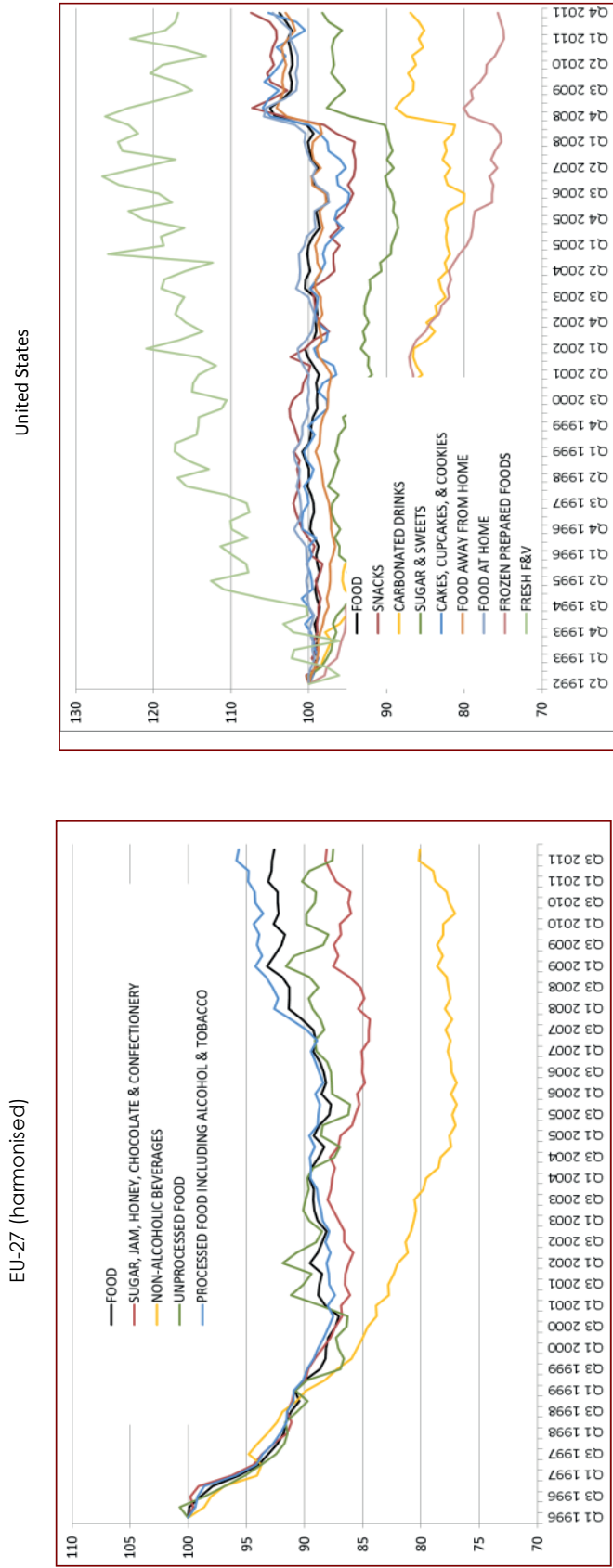




Figure 2.4 Real consumer prices for food and selected food groups in the EU-27 and the US



Source: our processing on Datastream data

However, although this may help explain the shift towards energy-dense diets in many populations, it is inadequate to explain *excess* energy intake in such populations. An additional non-economic element in the form of superior palatability of energy-dense foods helps complete this explanation. As Drewnowski (1998) notes, sensory research finds more energy-dense foods to be more palatable than less energy-dense food, and thus energy-dense foods *increase* appetite and encourage energy intake beyond body requirements for normal functioning. Also, increasing opportunity (time) cost of food preparation fuelled by economic growth is an important element in explaining overnutrition trends (Cutler et al., 2003). Comparing the changes in real prices in the US of less-healthy processed foods (cookies, cola, ice-cream and chips) with those of *unprocessed* fruit and vegetables, Kuchler (2008) find that the real prices of the two sets have declined by about the same magnitude. Thus it may be too simplistic to state that healthier foods have become more expensive relative to unhealthy foods. However, when the opportunity cost of cooking time is factored into the comparison, the increasing relative attractiveness of ready-to-eat foods as a source of energy becomes apparent. In the last two decades, an increasing proportion of fruit and vegetables has been undergoing value addition in the form of processing (washing, peeling, cutting, microwavable packaging, etc.). When the price trends for such value-added produce is compared to those for processed snacks, thereby holding the level of convenience constant across the two sets, the relatively expensive nature of healthier foods is confirmed.

Although the arguments with regard to the role of food prices in overnutrition patterns have largely been framed in the context of the developed world, particularly the US, they carry over to LMICs undergoing nutrition transition, particularly in urban areas. In addition to the range of processed foods that are increasingly available in developing countries, street foods (often high in fats, salt and sugar) may provide inexpensive energy sources with low time cost of preparation.

#### 2.1.4 Food prices and undernutrition: Effects of the food price crisis

The evolution of outcomes following the rapid surge in food prices since 2008 enables a good appreciation of the importance of food prices in the diets of populations characterised by undernutrition. A relevant question to ask at the outset is whether the observed short-term volatility in food prices has relevance for long-run nutritional outcomes. Two factors suggest that they do: (i) nutritional shocks suffered during early life have been shown to have significant long-term health and economic repercussions (Alderman, 2006; Victora et al., 2008), and (ii) it has been argued that the recent surges are part of a structural upward shift in food prices (OECD/FAO 2008).

The food price crisis has been felt across key commodities as observed in Figure 1. The translation of these international price changes into local price changes has been marked by substantial heterogeneity, depending on the size of the food import bill, exchange rate movements, foreign exchange reserves and trade and marketing policies pursued by the government (Headey and Fan, 2008). The impact of local food price changes on household diets and nutrition has depended on whether households have diverse diets or are largely dependent on tradeable food commodities affected by the price hike, on whether households are net buyers or net producers/sellers of food, and on whether social protection mechanisms such as cash transfers have been put in place. The groups identified as being hit hardest are the poor, the landless, the net food buyers and the vulnerable female-headed households, with the urban poor, who best match these characteristics, being identified as particularly impacted (Ruel et al., 2010).

Past experience with significant food price shocks suggests that vulnerable households may follow one or more of several coping strategies with regard to their diets (Darnton-Hill and Cogill, 2010; Ruel et al., 2010). Since calorie adequacy (hunger alleviation) is a primal need, the first move is usually to maintain calories by switching out of more expensive sources of calories. This is accomplished by switching from preferred staples to lower quality staples, or by cutting down on relatively expensive non-staple sources of calories such as meat, fruit and vegetables. Reliance on cheap and energy-dense convenience foods or street foods may increase in urban areas. Dietary diversity and micronutrient intakes are casualties in this process. Size and frequency of meals may also be reduced, particularly if the crisis is prolonged, resulting in lowered energy intakes in addition to reduced micronutrient intake. Intra-household reallocation of food may also be pursued, typically by reducing adult intakes to maintain child intakes, and this can be particularly harmful to the long term prospects of newborns if practiced by pregnant women.

Although the crisis is recent, a substantial body of evidence from across the world is beginning to accumulate confirming some of these patterns. The World Food Programme's (WFP) application of rapid assessment tools to gauge food security impacts of the crisis shows reduced dietary diversity in Haiti, Nepal and Niger (Brinkman et al., 2010). In Liberia, the WFP finds substitution of cassava for rice following the crisis, and an overall reduction in protein sources and vegetable consumption. In Palestine, households are found to have reduced milk and meat consumption due to the crisis. D'Souza and Jolliffe (2010) find that the food price crisis in Afghanistan resulted in substantial reduction in real per capita food consumption, calorie intake and dietary diversity. Price elasticities with respect to calories are found to be lower than for food consumption, suggesting a reduction in diet quality to maintain energy. Jensen and Miller (2008) report the interesting case of China, where they estimate a muted effect of the crisis on nutritional intake (little or no effect on calories) partly due to government policy actions in releasing grain from stocks and limiting exports.

### **2.1.5 Summary**

In the case of the role of food price changes on overnutrition trends, the evidence points towards an important role in combination with other aspects of the modern food economy, although many of these changes took place prior to the period under investigation. The triumvirate of relative food prices, palatability of energy-dense foods and increasing opportunity costs of food preparation together offer a more complete picture than food price changes in isolation. The importance of food price evolution on undernutrition is firmly established with evidence that has emerged following the crisis. However, this emerging evidence is necessarily short-term in nature at this time. Longer-run estimates from a prolonged crisis could be larger or smaller in magnitude. On the one hand, if households are drawing down on savings to buffer the impact in the short-run, longer-run impacts may be larger. On the other hand, in the longer run, households may find additional coping strategies that may lessen the impact (Jensen and Miller, 2008).

## **2.2. Income & income distribution**

Income is a well-recognised determinant of calorie intake and dietary quality and economic growth is the obvious pathway towards reducing malnutrition (Smith and Haddad, 2002). However, straightforward evidence ends here. Once the objective becomes to assess the effects of income changes on dietary quality and nutritional outcomes (including excess weight), the evidence base is marked by substantial complexity and heterogeneity, especially at the aggregate level.

### **2.2.1 Trends and heterogeneity in income growth**

According to World Bank data (World Bank, 2012), the World average real per capita income has risen by 2.1 per cent per year between 1992 and 2010, a growth which is all but steady and even across world areas and over time. The rise between 2000 and 2007 has been around 2.8 percent, before falling below 1 percent under the current financial crisis. The largest growth rates have been observed in middle income countries (above 3 percent between 1990 and 2009), the lowest in heavily indebted poor countries (just above 1 percent over the same period) and wealthiest countries (between 1.4 and 1.5 percent). After considering purchasing power parities, in 2010 per-capita income of high income countries is still 30 times the per-capita income of low income countries, roughly the same gap which could be observed in 1992. Instead, the income gap between high income and middle income countries has reduced from 8 in 1992 to 5.5 in 2010.

### **2.2.2 Income distribution**

Data on the evolution of income distribution are incomplete and fragmented. For those developing countries for which the World Bank provides a Gini Index, a rough comparison between data in the early 1990s and in the late 2000s suggest that the evolution has been towards a more even distribution, with a few exceptions, which include Burkina Faso, Mali, Ghana, Ethiopia, Cote d'Ivoire, Lesotho and Kenya, plus most of Eastern Europe transition economies. In these countries, the increase in disparities has been combined by a real income growth, although a relatively slow one (around 2 percent per year in most African land-locked countries). This might explain why the proportion of chronically hungry has not grown, while obesity rates have become noticeable. Considering the most recent data, strong

Table 2.1 GDP per capita, PPP (constant 2005 international USD)

Country grouping	1992	2010	yearly growth (%)
Low income	738	1127	2.4
Middle income	3048	5998	3.8
High income	24866	33119	1.6
Heavily indebted poor countries (HIPC)	899	1197	1.6
Latin America & Caribbean	7376	10117	1.8
Least developed countries: UN classification	807	1334	2.8
East Asia & Pacific	4095	8725	4.3
Middle East & North Africa	6629	9132	1.8
North America	31431	41908	1.6
European Union	20664	27555	1.6
OECD members	22931	30112	1.5
South Asia	1266	2914	4.7
Sub-Saharan Africa	1535	2041	1.6
World	6797	9889	2.1

Source: World Development Indicators (World Bank, 2011)

inequalities (i.e. a Gini index above 40) are associated with undernourishment rates well above 10 percent in African and South American countries,

### 2.2.3 Income elasticities

The non-linear relationship between income and demand for food and calories suggests that the evolution in income levels and disparities is a likely explanation for changes in nutritional status. Income elasticities for food are much higher in low-income countries than in middle-income or high-income countries, with average values estimated at 0.73, 0.60 and 0.34, respectively (Seale et al., 2003). Thus, consumption response to a 1 percent growth in per-capita incomes is more than twice as large in low-income countries compared to high-incomes. Furthermore, income elasticities for animal products are much higher than those for fruit and vegetables or cereals at all income levels. Thus, income growth generates a shift towards animal products, and also a larger demand for processed products and food away from home (Grigg, 1999), especially in the transition between low and middle income levels, while at higher income levels demand for luxury goods (including health) becomes more prominent and consumption of meat and fats is reduced (Cirera and Masset, 2010). These transition patterns are not only consistent with both the cross-country distribution of undernutrition and obesity, but they might also explain why obesity is concentrated in the wealthier part of the population in low- and middle-income countries in contrast to high obesity rates in low-income groups of affluent economies (see Introduction).

### 2.2.4 Nutrition outcomes

A major growth in the proportion of the population characterized by undernutrition<sup>5</sup> has been estimated in countries like Botswana (+36 percent), Burundi (+43 percent), Gambia (+41 percent), Madagascar (+24 percent), Swaziland (+63 percent), Tanzania (+15 percent), Zambia (+23 percent) and these countries have suffered from extremely low economic growth compared to other developing countries and in some cases (e.g. Burundi, Madagascar, Niger) even a real

<sup>5</sup> Reported statistics follow the current FAO approach to measuring hunger prevalence, which is currently under revision. This is the population below minimum level of dietary energy consumption (sometime also referred to as prevalence of undernourishment).

reduction of per-capita income when comparing current levels to 1990. The choice of indicators to measure economic growth, human development and health or nutritional outcomes has been challenged in the literature (Heltberg, 2009; Ranis et al., 2000) but regardless of the measure chosen the income effect is recognised as the most relevant to fight malnutrition, also with an emphasis on the significant endogenous role of nutrition (health) in driving economic growth (Weil, 2007). The rise in obesity comes as a side effect. According to Ezzati et al. (2005) estimates, the peak BMI is reached for a per capita income of € 12,500 for women and € 17,000 for men and the low income levels reported in Table 2.1 suggest that major increases in overweight and obesity are a real threat for all countries, and low income countries with larger income inequalities experience the double burden of malnutrition to a larger extent.

### 2.2.5 Financial crises and nutrition

The world economy is currently in the midst of a major financial crisis, and while it is still too early to predict whether there will be long-term consequences for diet quality and nutrition status, some indication can be obtained by looking at the impact of the 1997-1998 Asian crisis. Most outcomes simply reflect the pathways of changes in income levels and distribution already explored in this section. However, it has been shown that the Asian crisis, albeit short-lived, had an impact on health status and mortality rates of the affected countries, especially those without well-targeted safety nets (Hopkins, 2006). The pathways towards health outcomes are not only the direct ones, though, as short-lived crises may still impact severely cohorts conceived and born during hardship periods, through malnutrition of mothers (Block et al., 2004).

### 2.2.6 Summary

The evolution of income and income distributions, combined with the much higher income elasticity for caloric and food demand, are a major factor in explaining trends over the last 20 years. Real income has grown in all world areas, but at a faster pace in middle-income countries (where income elasticities for food are higher than in high-income countries) which has led to a higher consumption of animal products and processed products in general. In transition countries, this has allowed a reduction in hunger, but also created the conditions for rising overweight and obesity rates. On the other hand, some of the least developed countries (also with high income elasticities) have experienced lower growth rates and in some cases also a widening of income inequalities, which also leads to adverse nutritional outcomes in both directions. Diet quality is also very responsive to income changes, with a differentiated outcome depending on the stage of transition. Income growth in low and middle-income countries is associated with a much higher consumption of animal products.

## 2.3 Changes in Food Systems

Driven by the process known loosely as globalization, food systems in middle income and developing countries have changed dramatically in the past 20 years. Multinational retailers have followed multinational food manufacturers, soft drink companies and fast food chains into food and drink sectors in virtually all countries and they have introduced the types of supply chain controls previously seen only in the developed world, based around tight vertical co-ordination, centralised purchasing and distribution, private standards, product differentiation and sophisticated marketing. Domestic firms, driven by competition and learning from new market entrants have followed suit. Simultaneously diets have changed dramatically. From an analytical perspective the difficulty is showing causation. Have the observed changes in supply chains *caused* dietary change or were they a response to a growing consumer demand for soft drinks, fast food and packaged groceries linked to general economic development? There is certainly plenty of circumstantial evidence that multinational firms have created the demand as well as satisfied it. Christian and Gereffi (2010) go further and argue there is a theoretical basis - Global Value Chain (GVC) analysis, which focuses on the role of lead firms in global supply chains, their power over chain governance and their interaction with local companies. According to this 'theory', powerful lead firms accelerate the rate at which local firms (manufacturers, retailers and their suppliers) adopt multinational business strategies and tailor them to local needs. What are the dietary implications? Processed foods, fast foods and soft drinks are known to be more energy dense than the foods they replace in diets - so on the one hand

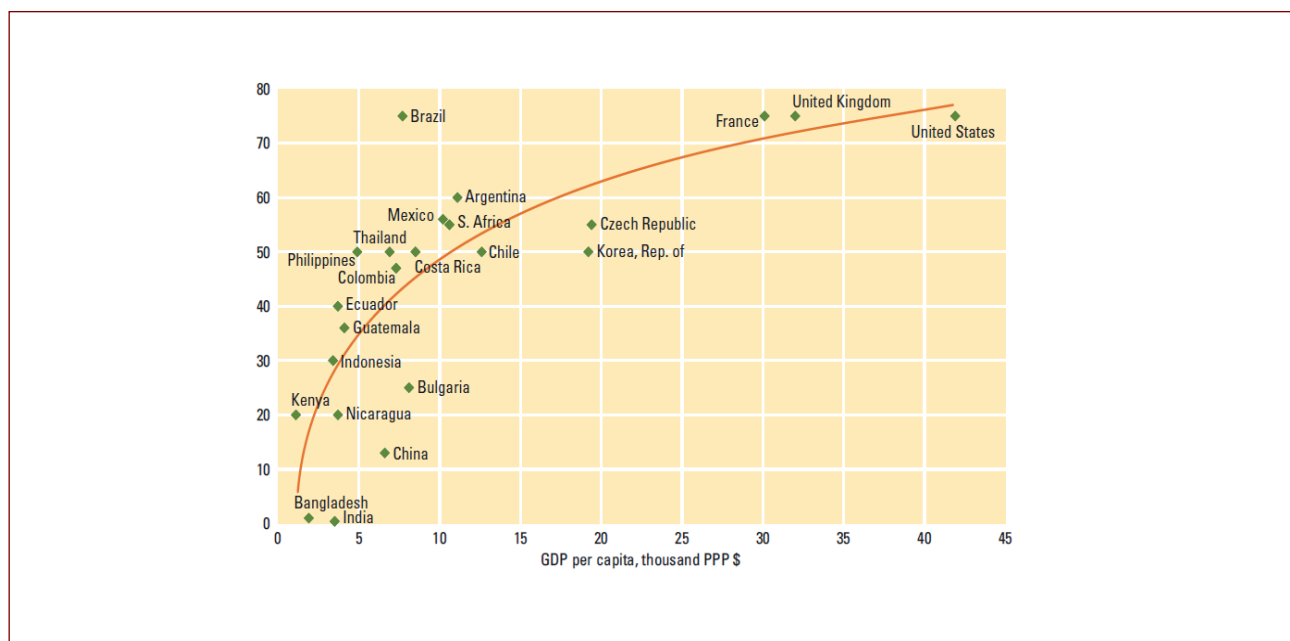
they may worsen obesity-related problems; while on the other hand, they may provide energy that was not previously available or affordable to the poor. They also provide employment and generate income which multiplies through the economy and brings its own nutritional changes (as indicated in Section 2.2).

### 2.3.1 Globalization and concentration

Most interest has focussed around supermarkets and their role in redefining the organization of supply chains and, ultimately, consumption. The rapid expansion of supermarkets in developing countries has been widely written about by Reardon and colleagues in a series of articles (for example, Reardon and Berdegue, 2002; Reardon and Swinnen, 2004; Weatherspoon and Reardon, 2003; Reardon et al., 2004). The line of argument is that supermarkets are no longer places where only rich people shop: they have spread from the wealthy suburbs of major cities to poorer areas and smaller towns. This has happened in response to a number of forces, many of them interconnected: rising incomes (also associated with higher ownership of consumer durables such as refrigerators and cars, which facilitate supermarket shopping); urbanization; greater female participation in the labour force (increased opportunity cost of time); and the desire to emulate Western culture, spurred on by the globalization of media and advertising (Traill, 2006). The process began in Latin America in the early 1990s, and by 2000 supermarkets were delivering 50 to 60 percent of retail food sales in countries in the region (Reardon et al., 2004). The take-off in Southeast Asia began between five and seven years later and a third wave has taken place in Eastern and Central Europe. Africa is rapidly following, led by South Africa, which has seen a “spectacular” rise since 1994 (Reardon et al., 2004: 171). However, even an open economy will not quickly bring high levels of market share to the low-income and highly rural economies of Southern Asia and sub-Saharan Africa.

The continuing spread of multinational food and soft drink manufacturers and fast food franchises has also been well charted (see, for example, Bruinsma, 2003; World Bank, 2008; UNCTAD, 2009). Global inflows of FDI in the food sector have increased from under USD10b in 1992 to over USD40b in 2007 (UNCTAD, 2009). Wilkinson, (2008) claims that United States investments in Mexico have concentrated on convenience and highly processed foods, especially snacks, beverages, instant coffee, mayonnaise and breakfast cereals. However, as pointed out in Regmi and Gehlhar (2005), such products are amenable to foreign investment because they are not location specific. Technology and capital are mobile in

Figure 2.5 Share of Supermarkets in Retail Food Sales



Source: Reardon and Berdegue, 2006.



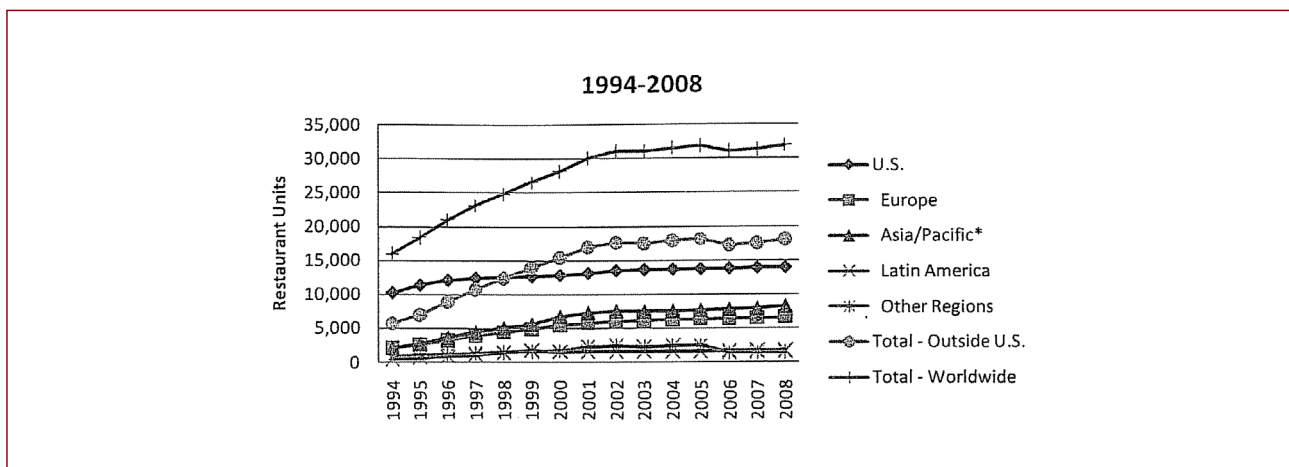
the world food economy whereas primary processed products, such as fresh or frozen meat, frozen and canned fruit and vegetables and dry milk powder, are more closely associated with their production location. Thus it would be a surprise if FDI was not concentrated in highly processed products. This pattern of FDI may also be linked to *tariff escalation* (see Section 3.2).

Fast food chains and soft drink companies have also been blamed for unhealthy eating in developing countries. Pingali and Khwaja (2004) charts the growth of McDonald’s from 951 stores in Asia and the Pacific in 1987 to 7 135 in 2002, and as the diagram below shows, numbers have continued to rise, though more slowly. In Latin America numbers rose from 99 to 887 over the same period. In 2007, of its 30,000 restaurants world-wide, fewer than half were in the US. Pepsico, another global player (main brands Pepsi and Frito-Lay) trebled its sales outside North America and Mexico between 2000 and 2007 (Christian and Gereffi, 2010).

However, of potentially far greater importance for diets are the domestic manufacturers, fast food and soft drink firms that have sprung up to imitate global brands at much lower price, and therefore with much higher sales (Vepa, 2004). Wilkinson supports the view that the entry of foreign firms has provoked domestic competitors who have copied the new competitive practices introduced by global corporations: “Global players from Europe in dairy and drinks ceded ground to the leading regional players in the Chinese market—President from Taiwan, Charoen Pokphand from Thailand, Sinar Mas from Indonesia, and Kerry from Malaysia” (Wilkinson, 2009).

International trade continues to be important - it increases the availability of foods and provides a further competitive impetus for the modernisation of domestic competitors. Global trade in goods and services as a share of global GDP increased from 19 percent in the late 1970s to 26 percent in the early 2000s. Between 1992 and 2009, the share of food exports (imports) in total merchandise exports (imports) fell from 10 percent (7.7 percent) to 8.4 percent (5.1 percent), (World Development Indicators). However, during this time total trade in food and agricultural products more than doubled from USD40b pa to USD80b pa (UN COMTRADE). Of which, the share of processed food in food and agricultural exports grew from 54 percent to 69 percent for high-income countries and from 49 percent to 67 percent for Asia between the 1970s and 2000s (Sandri et al., 2007). The main impetus was the falling cost of moving products around the world due to technological developments in transport, handling and IT (Anderson, 2010).

Figure 2.6 McDonalds Restaurant Penetration



Source: Christian and Gereffi (2010) derived from McDonalds company reports

### 2.3.2 Implications for diets: changes in preferences

Preferences for western foods are said to have been encouraged by imports displacing traditional staples, beginning in the era of colonisation (see, for example, Thow and Snowdon, 2010). More recently, sophisticated marketing activities of global manufacturers, soft drink and fast food chains have been highlighted as changing preferences towards western foods: “marketing aims to develop in consumers the habit of drinking or eating the product regularly” (Hawkes, 2002: p7). To this end children and young adults have been particular targets, the intention being to change consumption habits over the long term (Hawkes, 2002). Methods include targeted TV and web advertising, sports and event sponsorship, products targeted at local tastes and special offers/price promotion for market growth (Hawkes, 2007).

As Pingali says, diet transformation in India has involved two stages, the first as income growth led to diversification of diets, but with traditional features; the second, influenced by globalization, involved the adoption of non-traditional diets including highly processed foods, soft drinks and fast foods (Pingali and Khwaja, 2004). The process is assisted and accelerated by globalization of the media (Pingali and Khwaja, 2004; Hawkes, 2002).

### 2.3.3 Implications for diets: changes in prices

Supermarkets and food manufacturers might also have a substantial impact on diets through their effect on relative food prices, availability and safety (Reardon et al., 2010). Limited evidence suggests that supermarkets (and convenience stores) have reduced the prices of packaged foods relative to fresh produce, particularly in the early stages of supermarket penetration in a country. A study in Brazil found supermarket prices for packaged foods are as much as 40 percent lower than prices in traditional outlets; Drewnowski et al. (2010) support the view that FDI reduces highly processed food prices and increases their consumption, but the evidence is a simple correlation. By contrast, fresh fruit and vegetables were more expensive in supermarkets (Farina, 2002). Schipmann and Qaim (2011) find supermarkets in Thailand sell higher priced fresh produce than traditional wet markets, but of higher quality - they target higher income consumers.

Supermarkets and large manufacturers are said to work ‘symbiotically’; the latter are able to supply the large volumes (at high standards) demanded by the supermarkets, which in turn are able to deliver a market for the manufacturers’ products (Farina et al., 2005). The economies of scale on both sides enable the delivery of reduced prices for processed products.

### 2.3.4 Implications for diets: changes in availability

Price differences are not the only route by which supermarkets influence diets. Particularly as supermarket penetration levels and market sophistication increase, they offer a huge variety of previously unavailable products (Hawkes, 2008; Reardon et al., 2010). This is especially the case for refrigerated products, notably dairy lines. Tillotson (2004) notes that as well as their natural advantage over small shops in selling more cheaply processed, packaged and bulk foods such as edible oil, grains, noodles and condiments, supermarkets in China have moved very quickly into processed semi-fresh foods such as tofu, dairy products and processed meats. They support the argument that supermarkets have largely driven the rapid expansion in the Chinese dairy products market.

In developed countries snacking has been associated with increases in energy intake (Cutler et al., 2003). There is not a great deal of empirical evidence from developing countries, but the tendency towards consumption of snack foods, largely associated with increased availability, is reported for urban India (Vepa, 2004), where there have also been rapid increases in consumption of biscuits, salted refreshments and prepared sweets (between 1987/1988 and 1999/2000 intakes of these products rose from close to zero to 68, 45 and 13 g per capita per day, respectively). Vepa suggests that processed foods, mainly driven by such snack products, may represent as much as 1,000 kcal in the daily diet of high-income consumers<sup>6</sup>.

<sup>6</sup> However, for the average consumer these products are not very significant in terms of expenditure. The National Sample Survey (2001) includes a category for “beverages, refreshments etc. (including processed food)”, which includes all beverages (tea, coffee, cold drinks, commercially produced beverages), biscuits, confectionery, salted refreshments, sweets, pickles, sauce, jams and jellies and cooked meals obtained on payment. This group represents 7 percent of food expenditure in rural and 13.2 percent in urban India.



Availability has also been an important factor behind the increase in consumption of fast foods, in competition with traditional street foods.

### **2.3.5 Implications for diets: Changes in food safety**

Reardon et al. (2010) point out that supermarkets, together with large manufacturers, tend to impose private food safety standards at a higher level than small manufacturers and stores. To the extent that relative safety levels are an argument in consumer demand functions, this too would influence purchases towards previously less safe products such as dairy and other chilled products.

### **2.3.6 Summary**

Processed foods now account for 80 percent of global food sales, and, although spending is still low in developing countries (USD143 per capita per year in lower-middle income countries and USD63 per capita in low-income countries), it is growing at 28 percent and 13 percent a year respectively in those country groups. In addition, spending on food service accounts for 22 percent of food budgets in Brazil and Indonesia and 15 percent of urban food spending in China (WDR 2008-09).

Overall, there have been dramatic changes in food consumption behavior over the past 20 years. These have been associated with the spread of supermarkets and the globalization and concentration of food manufacturing, fast foods and soft drinks and the manner in which they have organized supply chains. The outcome is higher consumption of these foods and displacement of more traditional foods. Causation is hard to prove, but the circumstantial evidence that companies create these changes rather than simply responding to latent demand is convincing. The impact on nutrient intakes is not confirmed, even in developed countries, though processed foods, fast foods and soft drinks have all been linked to the nutrition transition and the increased incidence of obesity. They are likely to be equally involved in increasing obesity among the expanding middle classes in poorer countries. Whether they have helped to make cheap, safe and palatable energy available to the chronically hungry has not been researched.

## **2.4. Changing food availability**

The quantity and range of foods available in local markets and to households has changed substantially in the last two decades, driven both by changes in demand as well as by supply side factors. Some of these aspects (for example, spread of multinational food companies) are explicitly covered in other sections, and the section on food prices implicitly captures effects flowing from key changes to availability of foods. However, given the interest in specific underlying drivers, this section will focus on a set of remaining key determinants of food availability and their putative effects on diets.

### **2.4.1 Import Surges<sup>7</sup>**

An import surge refers to a rapid, unusual and substantial increase in quantities imported of a good, usually occurring over a short period of time. Import surges are considered to have become more common and widespread over the last two decades as countries have initiated reforms and fulfilled trade commitments by liberalizing domestic markets and reducing tariffs. However, although market reforms are often blamed, a variety of other factors, including domestic production shortfalls, exchange rate fluctuations, demand shocks, export subsidies and food aid can trigger import surges. Import surges have been taken seriously particularly because of the harm that can come to domestic import-competing industry when confronted with a dramatic influx of imports within a short period of time. Domestic consumers on the other hand may benefit when import surges are followed by price reductions. The aspect of importance here is whether import surges have influenced dietary change. Import surges are often short-lived and the question is whether these short but sharp episodes are adequate to change consumption preferences within a population.

<sup>7</sup> This section draws heavily on FAO (2011a).

Isolating the impact of import surges on diets is not straightforward. Establishing causality can be tricky, given that in some countries dietary change may precipitate import surges rather than the other way around. For example, both Senegal and Tanzania experienced import surges for poultry meat in the last ten years. However, in both cases, available evidence indicates that demand shocks caused by ongoing dietary change (in the case of Tanzania, spurred by supermarket expansion), coupled with the inability of local industry to meet increased demand, was a causal factor in the surges. Establishing proper counterfactuals and controlling for trends as well as other influences would also require careful analysis. However, while the methods are available, there is an absolute dearth of evidence on the surge-diet relationship. Is there at least compelling circumstantial evidence, as in the case of the relationship between food systems changes and diets described in section 2.4? The answer is no. Since the literature is very limited, we performed a basic FASOSTAT query on consumption outcomes relating to two of the import surge case studies described in FAO (2011a). One case study related to the sudden surge in poultry imports into Mozambique over 2002-05 and the other related to the sugar surges in Kenya over 2001 to 2004. Given that any dietary change in these cases would hinge on expanded consumption of the surging commodity, we queried consumption (available supply) outcomes for the period before, during and after the surges (until 2007, the year to which FAOSTAT Food Balance Sheet data are available). Somewhat surprisingly, the Mozambique data suggest a mild decline in poultry consumption per capita over the period, declining steadily but mildly from 2.1 kg/capita/year in 1998 to 1.5 kg/capita/year in 2007. In the Kenyan case, there has been an expansion in total sugar available for consumption over 1998 to 2007, but the per capita consumption availability has been largely stagnant. This is a very crude check of outcomes, and is only for two out of many cases, but helps reinforce the notion that there is no compelling evidence on links from import surges to dietary change. This is consistent with FAO (2011a) where it is noted that a change in dietary patterns at the continent level in Africa is hard to prove, although food imports have grown rapidly in the last two decades and several instances of import surges have occurred in the continent.

#### 2.4.2 Biofuels

As noted in section 2.1, increased biofuel production is one of several key developments over the last two decades that have impacted diets and nutrition via increased food prices. Biofuels are paid brief separate attention here since (i) they first emerged as an issue *within* the two decades under investigation here, in contrast to some other longstanding drivers of international food prices, (ii) they represent a development internal to the agri-food sector, and (iii) they look set to continue as an important driver of food prices in the future.

Having been kickstarted in the shadow of the oil crisis of the 1970s, global biofuel production, comprising ethanol and biodiesel production, stood at a relatively modest 16 billion litres in 1991, and stayed largely stagnant until 2000. Rapid expansion took place in the early and mid-2000s, with production doubling by 2006 and continuing to surge to reach almost 83 billion litres in 2010 (Brown, 2011). In the short run this has inevitably meant a substantial diversion from food uses of biofuel crops. Maize and sugarcane, predominant sources of biofuel production in the two largest producers, the USA and Brazil respectively, have been particularly affected (Timilsina and Shrestha, 2010). Given that the US alone is responsible for a third of global maize production and two-thirds of global exports, the implications for food availability of maize have been substantial. The resultant shift of consumers out of maize and into rice and wheat consumption has exerted upward pressure on the prices of these commodities (Rosegrant, 2008), and biofuel diversion has been strongly implicated in the food price crisis discussed in section 2.1.

Biofuel expansion affects diets through its influence on international commodity prices. Biofuels being only one of several causal factors in the food price crisis, there is no evidence isolating the specific effect of biofuel expansion on household diets. However, Rosegrant (2008) conducts a simulation exercise and finds that the biofuels factor was responsible for approximately 30 percent of the weighted average grain price increases experienced over 2000-07. When maize alone is considered, biofuel diversion explains 39 percent of price increase in the period. Baier et al. (2009) estimate that the biofuel effect accounted for 17 percent of maize price increases and 14 percent of soybean price increases over 2007-08. Biofuel expansion has thus been at least a moderately important factor in grain price inflation in the 2000s, and we have already seen from section 2.1 that the food price crisis has had important short-run dietary effects.

Although the specific effects of biofuels expansion on diets during the food price crisis are difficult to isolate due to the conflation of various causal factors in food price determination, it is possible to consider the profile of countries likely to have been particularly affected. Net grain importers are vulnerable to biofuel shocks, and within these countries, the poorest are most vulnerable since they have a high proportion of food to total expenditure. All the main developing regions of the world are grain importers, and about half of world grain trade is between north and south (Hazell and Evans, 2011). Rosen and Shapouri (2008) report on a USDA exercise to identify countries most susceptible to increased international grain prices. 70 low-income countries were ranked on the basis of their dependence on grain imports and their calorie intakes. Six countries were identified out of these where grain imports comprised more than 40 percent of diets and calorie intakes were less than 2200 kcal/day: Eritrea, Liberia, Haiti, Georgia, Burundi and Zimbabwe. International biofuel developments are especially likely to have worsened nutritional outcomes in these countries.

### 2.4.3 Growth in Agriculture and Agricultural Productivity

In a policy environment characterised by stimulation via lowering of price distortion on the one hand, but discouragement due to lowered public investment in agriculture on the other, the agriculture sector has steadily, if unspectacularly, grown in most parts of the world over the last two decades. Sectoral annual growth rates over 1993-2005 averaged just under 4 percent for agriculture-based countries (largely in Sub-Saharan Africa), just under 3 percent for transforming countries (mostly in East and South Asia, Middle-East and North Africa (MENA)) and 2.5 percent in urbanised countries (mostly in Europe and Latin America) (World Bank, 2008). This has happened despite a global trend of falling public investment in agriculture. Total Factor Productivity (TFP) in global agriculture, having stagnated in the 1970s, has risen steadily since the 1980s, with fastest growth observed in the OECD, MENA and East Asia. TFP growth has been variable in Sub-Saharan Africa and Latin America and relatively poor in South Asia (Headey and Fan, 2008). Headey and colleagues also show that public agricultural spending has a large and significant effect on global agricultural TFP growth, while price reforms have boosted accelerations in TFP growth though not long-run TFP growth itself.

What does agricultural growth imply for diets and nutrition? Economic growth might be expected to improve nutrition via an income effect, but also possibly by inducing investments in health, sanitation, education, *etc.* It could be argued that agricultural growth, comparatively to non-agricultural growth, is especially likely to improve diets and nutrition since agricultural growth has been shown to be particularly effective at reducing poverty (for example, Christiaensen et al., 2011; Thirtle et al., 2003) and because it is likely to exert downward pressure on food prices. Testing this hypothesis in a global context, Headey (2011) finds that agricultural growth does indeed have a large and significant effect on stunting, while the results for non-agricultural growth are not robust. From a dietary perspective, he finds that agricultural growth has a very strong effect on dietary energy supply, especially at low existing levels of supply. At low levels of supply, the elasticity of energy supply with respect to agricultural growth is 0.5 to 0.8. However, agricultural growth does not appear to have a robust relationship with diet diversity (measured by proportion of energy deriving from cereals and roots).

The strong links found between public agricultural investment and growth in the agricultural sector, and between agricultural growth and calorie supply and nutrition suggests a lost opportunity over the last two decades to improve nutrition by investing in agriculture. It is also worth noting that India, containing a third of the world's malnourished children, is an exception in terms of the results discussed above. Economic growth, and particularly agricultural growth seems to have failed to reduce child malnutrition in India, and the apparent disconnect between agriculture and nutrition in India is currently a very active research area (see, for example, Deaton and Drēze, 2008).

### 2.4.4 Summary

Of the disparate set of topics examined in this section, growth in agriculture and agricultural productivity and biofuel developments are seen to be important determinants of diets in the period under investigation. Both are significantly amenable to policy influence. Public spending on agriculture is a particularly important determinant of agricultural growth, which in turn is important for diet quantity though less so for diet diversity (quality). Thus sustaining and boosting public spending on agriculture would appear to be important for nutrition, although attention needs to be

paid towards optimising investments to improve diet quality in addition to quantity. Although there may be occasional examples of import surges influencing dietary change, there is no evidence that these are systematic and widespread influences.

## 2.5. Other main socio-demographic trends

### 2.5.1 Population growth and ageing

Between 1990 and 2010 the world has grown by 1.6 billion people and 78 percent of this growth was in low-income food deficit countries (FAOSTAT). China and India together account for 34 percent of the world population growth over the two decades. Improved nutrition and health is one of the drivers of this growth, but the demographic transition also places pressure on nutrition, especially in agriculture-dependent countries (Bloom and Canning, 2000). The long-standing issue of the existence of a Malthusian trap is whether increasing demand for food can be met by a sufficient increase in agricultural productivity. Heterogeneity in outcomes across the world over the last two decades suggests that the answer is not always positive. Furthermore, population growth is associated with major shifts in the population age structures, with striking differences depending on the level of economic development (Schmidhuber and Shetty, 2005). China and India are benefitting from a stage of demographic transition which increases the work force and improves the dependency ratio, and the absolute number of food insecure people is falling in China, but not in India (FAO, 2011b). The situation of African landlocked (especially Sub-Saharan) countries is much more problematic, because in the early stages of the transition the reduction in infant mortality which precedes the reduction in fertility increases the dependency ratio. The number of chronically hungry in Africa has increased by 50 million between 1990 and 2008, an increase almost entirely located in the Sub-Saharan region. Other factors associated with the inability of these economies to cope with population growth are the strong dependency on agriculture and its failure to trigger development, but also agricultural resource constraints which limit productivity growth (Alexandratos, 2005). The effects of these major population changes on diets are not easily identified. The increase in calories for those countries that accompany the demographic transition with an economic transition led to a reduction in the prevalence of undernutrition, but also to and an increased risk of obesity for the wealthier social classes, as explored in Section 2.2. Finally, population growth acts indirectly on diets through increased demand and higher prices for agricultural commodities, which lead to dietary changes through the mechanisms discussed in Section 2.1.

### 2.5.2. Urbanization

More than 75 percent of the total population growth is located in urban areas, and between 1990 and 2010 the world urban population has topped rural population, rising from 42 percent to 51 percent. Urbanization growth is occurring faster in developing countries. The urban population has doubled in low-income food deficit countries, in Africa and China, compared to a 20 percent increase in Europe and a 30 percent increase in North America (FAOSTAT). Urbanization and urban agglomeration have seen a shift of poverty from rural to urban areas, often concentrated in squatter and slum areas (Popkin et al., 2008). In China, the process of urbanization through the 1990s has been associated with an increased intake of edible oils, animal foods and caloric sweeteners, together with a reduction in fresh food intakes (especially vegetables) and an increased consumption of processed foods (Mendez and Popkin, 2004). Among the causes of dietary shift in the urbanisation process is the existence of price differentials compared to rural areas (Drewnowski et al., 2010). We have already seen in 2.3 the importance of urbanization in the development of modern food systems and the impact of this on diets.

### 2.5.3 Migration

According to World Bank Data<sup>8</sup> the number of migrants in the world has risen from 142 million in 1990 to 216 million in 2010, which is more than 3 percent of the total world population. The nominal value of (officially recorded) remittances

<sup>8</sup> <http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/0,,contentMDK:22759429~pagePK:64165401~piPK:64165026~theSitePK:476883,00.html> .

was about USD67 billion in 1990 and rose to almost USD450 billion in 2010. The (scarce) empirical evidence shows that families with migrants have higher calorie intakes, but also that the exposure to different dietary habits coupled with a reduction in available time can lead to a worse diet for migrants, with higher level of fats and sugar and/or lower intakes of fruit and vegetables (Zezza et al., 2011). Migration may have interesting and non-trivial relationships with globalization of diets and trade, according to recent research (Atkin, 2010). Given the evidence that food preferences developed in early years persist over a life time and that prior to liberalization these preferences were oriented towards cheap local foods, trade globalization and migration have imposed pressure on prices of preferred foods throughout the world, possibly generating caloric losses for people in developing countries.

#### **2.5.4 Lifestyles**

Linked to economic growth, technological progress, demographic change and urbanization, lifestyles have changed throughout the world. In relation to nutritional status, lifestyles have become more sedentary hence favouring the rise in overweight and obesity rates. Evidence for developed countries also points to the increase in consumption of prepared and out-of-home meals, which are on average more energy-dense (see Section 2.4). Although little data currently exist, there is increasing evidence that similar trends are emerging in developing countries. Recent surveys have shown a rise in physical inactivity rates and – especially – a significantly lower level of physical activity in the younger generations (Misra and Khurana, 2008).

#### **2.5.5 Female employment**

Between 1992 and 2009, the female labour force rose by 20 percent in OECD countries, an increase of about 48 million women. On the other hand, low-income and lower-middle income countries have experienced a 58 percent and 46 percent growth, respectively, about 156 million women entering the work-force (World Bank, 2012). These dynamics in female work have potentially conflicting effects on nutritional status. Some authors have suggested a causal relationship between maternal employment and rising childhood obesity rates, mainly based on US data (Anderson et al., 2003) but recent studies have either found that the effect of maternal working hours on children's diets is very limited (Rosin, 2008) or even positive (Powell, 2009). It is indeed likely that the positive income effect outweighs the negative effects associated with time pressure, including the additional reliance on processed and fast foods (see Section 2.4). The evidence for developing countries is scarce, but suggestive that increased female participation in the labour force has positive effects on children's nutritional status (Engle, 2000), and several studies on intra-household allocation point out that the importance of the income share of mothers (Alderman et al., 1995)

#### **2.5.6 Education and knowledge**

The positive association between education (especially female education), nutritional knowledge and nutritional status is well known and valid in both developing and developed countries. Although it is not straightforward to disentangle the effect of education from the collinear role of income, there is suggestive evidence that maternal education has a larger impact than wealth on children health's and nutrition in developing countries (Fuchs et al., 2010). World Bank figures (World Development Indicators, 2011) indicate that progress in this area is slow. Between 1999 and 2008 female enrolment in secondary school has slightly increased from 22 percent to 29 percent in low income countries, a very low level compared to 90 percent in 2008 for high income countries.

#### **2.5.7 Summary**

A variety of socio-demographic trends have impacted on diets over the last two decades, with conflicting directions. Population growth in transition economies is associated with an increase in labour force, and ultimately in a positive effect. Improvements in education and employment (especially for women) are also a driver of improved diets. On balance, however, there are more negative than positive trends. Especially but not exclusively in high-income countries, ageing, migration, female employment and sedentary life-styles have been found to be a cause of a worsening of diets and nutritional statuses.



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## 3. THE ROLE OF AGRICULTURAL, TRADE AND FOOD POLICIES

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This Section analyses 3 major policy categories by (a) illustrating the major policy events over the last 20 years; (b) drawing on what has been written in Section 2 to single out the relevance of these policy changes on observed nutrition trends; (c) summing up the aggregate effects of those policies on nutrition.

### 3.1 Agricultural Policy

Agricultural policies, including farm output price support and input subsidy policies impact diets and nutrition by changing the price of food relative to other goods and by changing the prices of various categories of food relative to each other. The policy trend in the last twenty years has been towards liberalization and removal of distortions, partly driven by multilateral trade commitments and partly by budgetary concerns, although significant pockets of support remain. In this section, we restrict ourselves to evidence focusing largely on the effects of domestic agricultural policy change. As we note in section 3.3, trade policy change often directs agricultural policy change and these are often considered jointly in research. Where researchers have focused on them jointly, as in the case of many modeling exercises, the discussion appears in section 3.2 on trade policy.

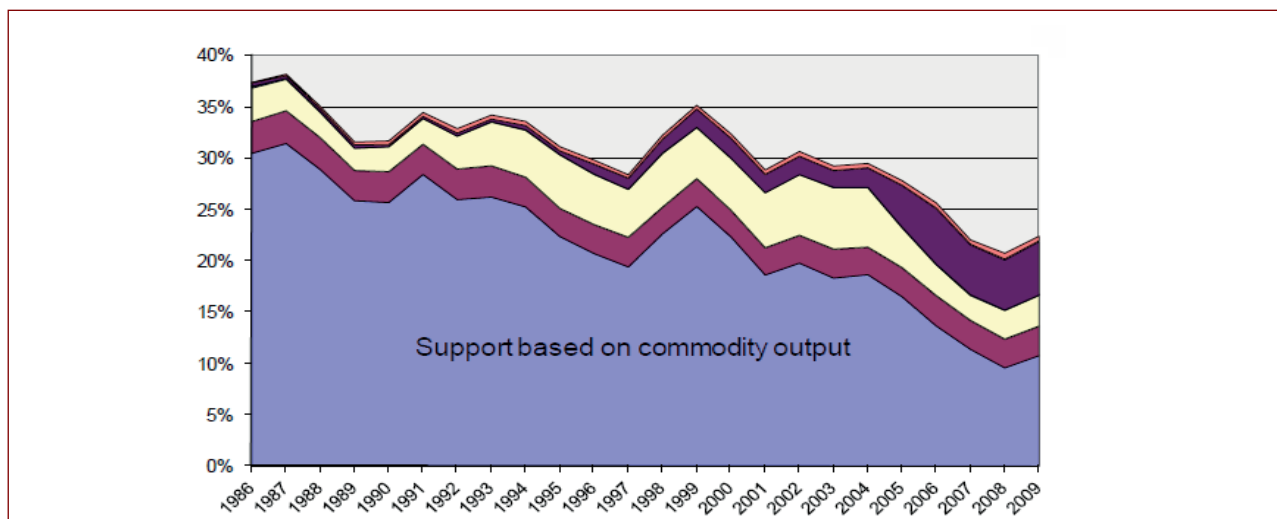
#### 3.1.1 *Producer support in OECD countries: Trends*

In the OECD set of developed countries, the period has been marked not only by a reduction in overall levels of support, but also by significant movement from a reliance on market price support (MPS) for producers to forms of support that have progressively been delinked from production levels. MPS, by setting a floor for prices received by producers for certain commodities and thereby driving a wedge between domestic and international prices, has long been implicated in overproduction of protected commodities. A movement towards alternative forms of support that cut the direct link to production levels of specific crops, such as area-based payments, has gone a long way to restore the link between production and international price signals.

Policy support to producers is commonly measured by the Producer Support Estimate (PSE), defined by the OECD as ‘the annual monetary value of gross transfers from consumers and taxpayers to support agricultural producers, measured at farm gate level, arising from policy measures, regardless of their nature, objectives or impacts on farm production or income’. A normalised version of PSE, the % PSE, measures the share of PSE in total receipts (value of farm production at border prices plus total support) and enables easier comparison of trends across time and countries. The evolution of % PSE for all OECD countries aggregated together is shown in Figure 3.2 below, along with a breakdown into ‘support based on commodity output’ (i.e. most distortionary support shown in blue shading) and other forms (non-blue shading).

It can be seen from Figure 3.1 that overall support for producers has gone down in OECD countries in the last two decades, with %PSE declining from about 35 percent in 1991 to about 23 percent in 2009. Support based on commodity output has also declined relative to support based on less distorting instruments. However, this masks variation across OECD countries. Martini (2010) combines PSE estimates with their production impact (distortion to production) and estimates an index of ‘production impact’ of support relative to the baseline of 1991-93. He reports that the EU has made steady progress with the production impact of support in 2008 only at 38 percent of 1991-93 levels. However, Japan and Korea at 57 percent and 98 percent respectively, have made less progress, while in the US the impact index shows great variability due to the counter-cyclical nature of support to their farm sector (generally speaking, the US has also made significant progress in lowering distortionary support, although support in the US was much less distortionary (MPS-based) than in the EU to start with).

Figure 3.1 % PSE and composition in OECD countries



Source: (Martini, 2011)

### 3.1.2 Producer support in OECD countries: Influence on Diets

Several researchers and commentators, particularly those from the public health community, have implicated agricultural policy in the EU and the US in the deterioration of diets in these regions. Highlighting EU support for the dairy industry, and in particular for the production of butter fat, Lloyd-Williams et al. (2008) hypothesise that without CAP subsidies, per-capita saturated fat consumption in the EU would be 1 percent lower, and compute that this would result in 12800 fewer deaths from heart disease and stroke per year (it is worth noting that the 1 percent reduction is an ad-hoc assumption, although it is considered a conservative estimate by the authors). Health Impact Assessments conducted by the Swedish Institute for Public Health Elinder et al. (2003) and Dahlgren et al. (1996) similarly blame fruit and vegetable withdrawals and butter at withdrawals and resale to processors arising from CAP support for diet deterioration in the EU. Similarly in the US, several authors including Tillotson (2004) and Ludwig and Pollack (2009) connect overnutrition outcomes to patterns of agricultural support, and advocate redesigning support on the basis of dietary health.

However, a closer look taken by economists at the impacts of EU and US agricultural policies on prices faced by consumers in these countries paints a different picture. Schmidhuber (2007) notes that the traditional instrument for producer support in the CAP, price support, raised the price of foods produced in the EU above international prices, and thus amounted to a tax on EU consumers. Using OECD data on consumer support estimates (CSE) that computes gross transfers from consumers in the EU measured at the farm gate (first consumer) level, he finds that in 2001/03, the net effect of food and agricultural policies on the (first) EU consumer was a equivalent to a tax of 48 billion Euros. This amount is net of some consumer subsidies, such as those for school milk and butter fat, but these amounted to only about 4 billion in 2001/03. What is more, he finds that in 2001/03, the largest gaps between EU prices and world prices created by the CAP were for commodities most associated with overnutrition: sugar, beef and milk. Another critical issue is the extent to which first (farmgate) consumer prices translate into final consumer prices. Given the extent of value-addition that takes place for the vast majority of products in the developed world, commodity prices may only be a small fraction of final prices paid by consumers. In the EU case, Schmidhuber computes that in aggregate the policy-induced tax is only about 5 percent of consumer food expenditure. Thus agricultural policy has likely had an extremely limited dietary impact in the EU. Interestingly, Schmidhuber speculates that a larger dietary effect arising from traditional CAP measures might have been felt in food importing developing countries, particularly those in the Near East and North Africa, due to surplus disposal with the aid of export subsidies.

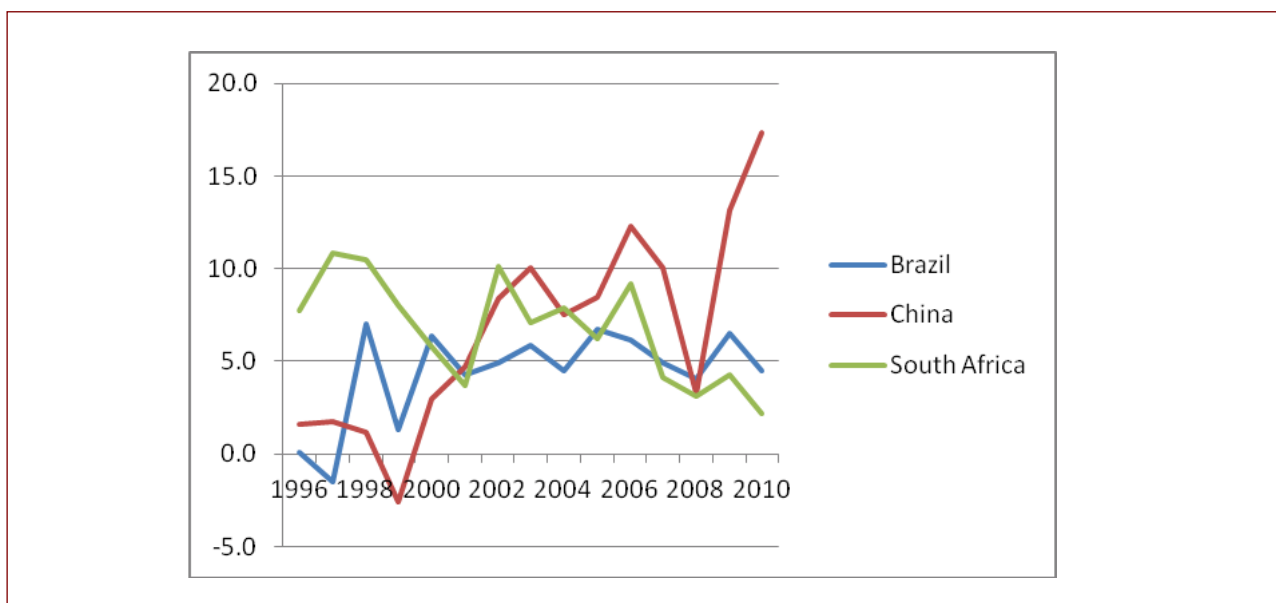
As the CAP continues to undergo transformation, reform measures that bring EU prices in line with world prices might then actually act to worsen diets, even if weak price transmission to final consumers softens the effect substantially. Sugar reforms were instituted in 2006, with sugar intervention prices reduced by 36 percent over a four year period. Bonnet and Requillart (2011) model this to find that the reforms would raise consumption by 1 litre per person per year in France, with consumption of added sugar increasing by 124 g (somewhere below 500 calories) per person per year. This effect is modest as expected, but also confirms that increased market efficiency might not be consistent with improved nutritional outcomes.

Qualitatively similar results have been found for the US case. Miller and Coble (2007) find that direct government payments in the US have a negligible effect on the affordability of food given their small cost shares in final prices. Rickard et al. (2012) simulate the removal of support to commodities over the 1990s and early 2000s and find a minimal counterfactual impact on calorie intakes. Removal of all policies, including border policies restricting import of dairy and sugar would actually cause an increase in calorie consumption. As US policies have become less distorted over the 1990s and 2000s, during which time commodity prices have also become less important in determining consumer prices, they find that the ability of agricultural policy to impact calorie intake has diminished.

### 3.1.3 Producer support in non-OECD countries: Trends

Information on policy evolution is much more sparse and scattered for non-OECD compared to OECD countries. Generally, it has been noted that non-OECD and developing countries have traditionally supported agricultural producers much less than developed countries have. This can be seen for the case of three ‘emerging’ countries in Figure 3.2 below. For the most part in the last fifteen years, it can be seen that Brazil, China and South Africa have all had % PSE levels less than 10 percent, in marked contrast to the OECD case in figure 3.2. Orden (2007), in a study of agricultural policy in India, Indonesia, China and Vietnam, note that support levels have always been low compared to the developed world, and that all these countries have made progress in moving from relative autarky and state-directed development to a more market-friendly setting in the last few decades. That said, there is substantial heterogeneity in policy trends, these countries have shown a tendency for occasional policy reversal, and protection levels have increased in some cases. For example, India which traditionally followed a strategy of implicit taxation of producers to keep consumer staple

Figure 3.2 percent PSEs in Brazil, China and South Africa



Source: computed from OECD database.



prices low, has in the last few decades shown substantial countercyclical fluctuation in policy support around a slowly increasing trend. Increased support to producers in the form of escalating input subsidies is a prominent feature of recent agriculture policy in India. Average implicit taxation of producers in 11 agriculture-based countries in Sub-Saharan Africa declined from 28 percent in 1980-84 to 10 percent in 2000-2004 (World Bank, 2008).

Input subsidies, having become unfashionable in the 1980s, have experienced a resurgence in interest since the mid-1990s, with the thinking now oriented towards 'smart' subsidy systems that attempt to overcome some of the inefficiencies and excesses of the previous generation of input subsidy policies (Dorward, 2009). Zambia, Ghana, Kenya and Malawi are among countries that have instituted new or substantially redesigned input subsidy schemes in the last two decades, mostly oriented towards production of staple grains.

Following the food price crisis in 2007-08, many developing countries have brought back or strengthened support measures for producers. Maetz (2011) notes that input support programmes for fertilizers and seeds have been particularly popular, as have agricultural insurance and infrastructure improvement programmes. What is more, policies introduced in 2008 appear to have some staying power, being found to largely continue in 2010 (Maetz, 2011).

#### *3.1.4: Producer support in non-OECD countries: Impacts on diets*

Although the documentation of policies in place and computation of indices of producer support in developing countries has improved substantially, there is very little evidence directly linking producer support changes to changes in diets and nutrition. There are anecdotal accounts or scattered bits of evidence, including accounts of changes to producer support transforming sectors and causing dietary change. For example, Hawkes (2007) discusses the dismantling of monopoly state procurement of pork in China in the late 1980s, which removed indirect taxation of pork producers, promoting larger-scale poultry production, increased pork availability and eventually an expansion of pork in Chinese diets. Improved diet diversity and population nutritional status have been connected in an anecdotal and generic way to agricultural investments and policy reforms, for example in China (Huang, 2010). Holden and Lunduka (2010) report that 30 percent of households in their sample from Malawi perceived that the fertilizer coupon system had increased maize consumption, while over 60 percent perceived no change in their diets. However, there is a large gap in terms of rigorous evidence connecting domestic agricultural policy and dietary outcomes along the lines of research for the EU and the US described above. As noted by Schmidhuber (2007), the fact that developing countries have had much lower support levels than developed countries implies that policies have had much less scope to impinge on diets. On the other hand, levels of processing and value-addition are also lower in developing countries and thus a farmgate commodity price effect is likely to translate more strongly into a consumer food price effect.

#### *3.1.5 Summary*

Transfers from consumers and the public to support producers have been on the decline in the developed world in the last two decades. In addition, they have also become less economically distorting. Several researchers, particularly from the public health arena, have implicated domestic agricultural support patterns in the exacerbation of dietary trends. Closer examination by economists in Europe and the US, however, show that these arguments do not stand up well to scrutiny. Patterns of support have amounted to a tax on food consumers, particularly for several less healthy food categories. A key point is that commodity price changes have only a small bearing on food prices faced by consumers in the developed world, thereby limiting any potential policy effects. In addition, food price elasticities in the developed world are generally small, and much of substitution in diets tends to happen within food categories. Support patterns in developing countries have always been significantly lower than in developed countries, allowing less scope for policy change to impact diets. However, it is also true that the link between commodity price changes caused by policy and food prices faced by consumers is likely to be higher in developing countries, and elasticities are also larger. A few anecdotal examples apart, there is not much by way of an evidence base. On the whole, our judgement in this case is that domestic agricultural policy is only of a second-order of importance in terms of influencing diets. Demographic trends, urbanisation and agricultural productivity trends are all likely more important levers.

## 3.2 Trade Policies

The major achievement in the past 20 years in the area of agricultural trade policy has been the signing of the Uruguay Round Agreement on Agriculture (URAA) in 1994. This represented the first time food and agriculture were specifically addressed in multilateral trade agreements<sup>9</sup>. Bound tariffs were introduced and a tariff reduction formula was agreed, though this was applied by most countries in ways that minimized the reduction in applied tariffs. The Agreement also included commitments to reduce export subsidies and, perhaps most importantly, introduced discipline on domestic support. Because agricultural policy reform has been heavily influenced by trade agreements, it is in practice difficult to make a clear distinction between the effects of agricultural and trade policies, and many commentators have not considered it relevant to do so, notably in modelling the impact of the URAA.

Subsequent progress in addressing concerns about non-tariff barriers (NTBs) was made with the Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) Agreements of the newly created World Trade Organisation (WTO) in 1995. The Doha Round has so far failed to further capitalise on progress and it is partly frustration that multilateral talks have stalled that has led to the creation of over 200 regional agreements notified with the WTO, together with various bilateral treaties. As part of the WTO, the TRIMS Agreement (Trade-Related Investment Measures) has facilitated substantial progress in investment liberalisation which has freed up foreign direct investment (FDI) and restricted discrimination against foreign owned firms. As well as increasing levels of international trade, liberalisation has changed relative prices of food groups and increased the range of products consumers can choose amongst. Changes in relative prices and availability of themselves induce changes in food consumption and diets but they can also lead to longer term nutritional implications by helping to shape consumer preferences (Chopra, 2002; Chopra et al., 2002).

However, arguably the most important impact of multilateral trade agreements has been indirect. The freeing up and promoting rapid expansion in non-agricultural trade has stimulated rapid global economic growth for most of the past 20 years, and this has been the major driver for dietary change.

### 3.2.1 Modelling the impact of trade liberalization

Trade economists have used partial and general equilibrium models to simulate the impact of trade liberalisation, notably the URAA. The former (for example, the OECD/FAO AGLINK model) focus on agriculture and include commodity and policy detail while general equilibrium models take account of interactions with non-agricultural sectors. These models typically divide the world into regions, impose supply and demand elasticities and estimates of price transmission by commodity group (including a non-food sector or sectors) and solve for equilibrium prices and quantities that clear the market (World Bank, 2008). The focus is most often on farm incomes and economic welfare. Models study the distributional consequences of reform on types of farmer and on poverty prevalence within and between countries at different stages of development (e.g. Anderson et al., 2011). Of course, both incomes and prices impact on food consumption, as shown in 2.1 and 2.2.

The review articles by Anderson (2010) and Anderson et al. (2011) summarise findings from the World Bank's Linkage model and various other Global Trade Analysis Project (GTAP) applications: trade-related policy reforms in the agricultural sector added around 1 percent to GDP of developing countries and 0.7 percent to developed countries' GDP from the mid-1980s. Developing countries' value added in agriculture is 4.9 percent higher than it would have been without agricultural and trade policy reforms.

Prices tend to be modelled as a byproduct of analysing farmers' incomes and production, and they are often unreported, as is their impact on consumption. URAA induced reform has tended to raise world food prices by reducing incentives for over-production by the major developed countries, notably the EU and USA, though this has come about mainly through

<sup>9</sup> Although a part of the earlier Tokyo Round, progress to remove trade barriers was modest.

domestic policy reform (lowering intervention payments and a move to direct payments to farmers) rather than removal of tariff protection (see section 3.2). Increased prices help exporting countries but (at least in the short run) harm importing countries. Within countries, the urban poor lose if food prices increase (at least in the short run). However, for farmers in developing countries there are opposing forces: the substitution effect of a price rise raises the opportunity cost of food consumption and reduces overall food consumption as well as causing substitution between foods because of relative price changes; the income effect results because higher prices mean higher incomes which leads to higher consumption of both food and non-food items. The balance depends upon price and income elasticities and farmers' marketable surplus in relation to total production, but it is not uncommon to find higher food prices leading to higher food consumption (Brooks et al., 2008).

The World Development Report (World Bank, 2008) shows that the proportions of the population in the different farming/non-farming, urban/rural and food buyer/food seller categories varies widely among developing countries. For example in Vietnam only 6.1 percent of the poor were urban and 5.8 percent landless rural. The small holder poor were fairly evenly divided between net buyers and net sellers. By contrast, in Bolivia, 50.9 percent of the poor were urban and of the rural poor only 5.6 percent were net sellers; the impacts of trade reform induced price changes on diets would be similarly diverse.

In fact, conceptually the impact of a world price rise on food consumption and diets depends on a number of additional country-specific factors, notably price transmission from world to domestic markets (which depends on institutions and non-trade policies as well as trade policies) and price transmission through the food chain (which depends upon the extent of market concentration and power of food manufacturers and retailers as well as on the share of agricultural produce in final food value--the degree of processing).

Finally, in the longer run, price changes in developing countries feed through labour markets to impact upon incomes of even the landless poor; for example World Bank (2008) reports a study of Bangladesh which suggests that the average landless poor household loses from an increase in rice prices in the short run, but gains in the long run as wages rise over time. Anderson et al. (2011) report average real developing country unskilled worker wage would rise by 3.5 percent from removal of 2004 agricultural trade barriers.

Sharma et al (1996) estimated the impact on world commodity prices of the URAA using FAO's World Food Model (results were similar to other models at the time): wheat +6.9 percent, rice +7.3 percent, coarse grains +4.4 percent, fats and oils +4.2 percent, bovine meat +8 percent, pig meat +10.4 percent, sheep meat +9.9 percent, poultry +8.4 percent and dairy products +7.6 percent. This and other early analyses of the impact of the URAA made overly optimistic assumptions about how the agreement would translate into tariff reductions and reductions in domestic support, so are considered to be overestimates of the actual impact. In fact, the World Bank has estimated that full trade liberalisation would only raise agricultural primary commodity prices by 5.5 percent (this includes cotton and animal feeds; of foods, only dairy products would increase by more than this). Processed food prices would rise by 1.3 percent (Anderson et al., 2006; World Bank, 2008). Transmission from world to domestic prices is frequently below 50 percent (World Bank, 2008: p109).

Aggregate food price elasticities from the international comparison project (Frazao et al., 2008), are around -0.7 for low income countries, -0.5 for middle income countries and -0.25 for high income countries. As predicted by consumer theory, given a limited degree of substitution between foods and non-foods, aggregate food income elasticities for the same country groups are of similar but opposite sign. Applying crude back of the envelope calculations would suggest the following at the aggregate level: a 5 percent trade-policy reform induced world price rise with 50 percent transmission to domestic food prices, accompanied by a 1 percent trade-policy reform induced rise in GDP would induce *reduction* in food consumption in low, middle and high income countries respectively in the order of 1 percent, 0.7 percent and 0.4 percent. The impact among food groups depends upon own and cross-price elasticities, but if, as suggested by Sharma et al. (1996) meat product prices rose more than other commodities from trade policy reform and demand is more elastic,

their demand cut-back would have been somewhat sharper than for staple products. However, rises in livestock product prices driven by rapid income growth in developing countries and the impact of biofuels on feed prices have been much more significant than those driven by trade policy reform.

### 3.2.2 Regional trade agreements (RTAs).

WTO trade reforms are complemented by a proliferation of regional and bilateral agreements, indeed almost 200 RTAs have been notified to the WTO. RTAs, along with ‘bilateral agreements’, such as the recent US–Australia Free Trade Agreement are becoming critically important, largely driven by lack of progress on a multilateral agreement (Rayner et al., 2006). RTAs include the North America Free Trade Agreement, MERCOSUR, ASEAN (Association of Southeast Asian Nations), the Central American Free Trade Agreement (CAFTA-DR), the Southern African Development Community (SADC) with 15 member states and the proposed Euro-Mediterranean partnership involving EFTA and Southern Mediterranean states. In general these agreements involve not only tariff removal, but harmonization or mutual recognition of standards to remove non-tariff barriers. More than a third of global trade is between countries that have some form of reciprocal regional trade agreement (Baffes and De Gorter, 2005; World Bank, 2008).

The implications of regional agreements are not in principle different from multinational agreements. Thow and Hawkes (2009), in a case study of CAFTA-DR, argue the agreement promoted imports and lowered prices in Central America of meat, dairy, temperate fruits, French fries and processed snacks—i.e. mainly energy dense foods associated with the nutrition transition.

### 3.2.3 Tariff Escalation

Tariffs on average are greater on processed products than on their less-processed forms, a phenomenon known as tariff escalation. Analysis by ERS of tariff data from 22 countries found average tariffs of 30 percent on fully processed goods, but only 17 percent on primary products (Regmi and Gehlhar, 2005). This process has persisted post-URAA as countries (notably developed countries) seek to add value domestically (Diaz-Bonilla and Reza, 2000). Since tariffs also have the capacity to encourage FDI at the expense of trade (a process known as tariff-hopping), tariff escalation may be said to make some contribution to promoting FDI in processed foods. However, although tariff escalation may have played a part in this process, section 2.4 showed there are other more important contributors to FDI linked to investment liberalization and the optimal organization of global supply chains.

### 3.2.4 SPS, TBT and Private Standards

The SPS and TBT Agreements were intended to stop the creeping use of non-tariff barriers (NTBs) as protectionist replacements for reduced tariff barriers. In requiring the adoption wherever possible of international standards and specifically referencing Codex, the WTO Agreements raised the importance of Codex standards and politicised them. In the 2002 Codex Evaluation (Traill et al., 2002) member states were surveyed and two thirds of high income country respondents and 90 percent of low income country respondents found Codex standards very important to their food exports, while more than 80 percent of country respondents in all country income classes found them very important for ensuring the safety of food imports. Thus by contributing to a reduction, in the use of NTBs as trade barriers<sup>10</sup> and promoting confidence in import standards, Codex and the WTO have effectively increased the availability and diversity of food products traded, and, inevitably, consumed.

The principles by which removal of NTBs make a wider range of foods available at lower price and hence enhance diversity of diets was described by the European Commission (2010) in justifying the use of the mutual recognition principle in the creation of the Single European Market “European consumers can thank the principle of mutual recognition for the increase in the range of products on sale at ever-decreasing prices. Selling their products on a market which covers half a continent enables businessmen to make economies of scale and hence reduce their costs, to the greater benefit of

<sup>10</sup> New NTBs remain a significant concern, notably relating to inspection and labelling requirements

the man in the street. Freedom of movement, as achieved through mutual recognition, attacks national rules which tie consumers to a given product, for example, by laying down a particular composition for this or that foodstuff. This type of rule, apart from arbitrarily depriving consumers of the opportunity to discover the specialities and traditional products of other Member States, whose composition differs from that laid down by the law of the importing country, prevents the interpenetration of markets - to the detriment of both business and consumers". These principles apply equally to international and regional trade agreements that remove NTBs. As such they could be argued to promote the process of globalization of diets.

In addition to public standards such as Codex, the globalization of supply chains has been said to lead inexorably to the dominance of private standards. Gereffi and Christian (2009) give examples of KFC dictating the type of chickens farmers should raise and the product and process standards the chickens must meet. Similarly, McCain which supplies potatoes to McDonald's dictates product standards to growers and also chooses the level of vertical control over the processing, packaging, and distribution stages of the supply chain. Multinational manufacturers also link their business practices to the demands of global retail buyers such as Wal-Mart, who are likely to impose specific pricing and packaging requirements (Gereffi and Christian, 2009). Such developments have led to concern over the control of global standard setting and the possible marginalisation of public standards, but for the purpose of the present review both public and private standards work in the same way through enhancing availability and lowering prices. The authors are not aware of any quantitative assessment of these impacts on diets.

### 3.2.5 Investment Liberalization

The global regulatory environment around FDI has become significantly more liberal: between 1991 and 1999, there were 1035 changes in regulations governing FDI worldwide. Many of the new regulations were forged in trade agreements and investment treaties: the number of bilateral investment treaties rose from 181 at the end of 1980 to 1,856 at the end of 1999 (Hawkes, 2006).

Investment liberalization has inevitably led to the spread of multinational enterprises at all stages of the food chain, the impact of which we discussed in Section 2.4. The specific role of policy as opposed to other forces promoting globalization has not been much quantified, though Traill (2006) found openness to inward FDI to be an important stimulus to the spread of supermarkets in middle and low income countries. More commonly assessment is based on correlations between liberalisation and sales/consumption in case studies. For example, as part of NAFTA, Mexico abolished many restrictions on foreign investment in the Mexican Foreign Investment Act, 1993 (Hawkes, 2006) and between that year and 1999 American food processing investment in Mexico more than doubled to USD5.3b. Sales from US affiliates at USD12.3b were more than four times processed food exports (of USD2.8b). Likewise liberalisation stimulated investment by American owned retail chains (Walmart de Mexico is now the largest retailer) (Hawkes, 2006).

### 3.2.6 Summary

Traditional trade liberalization models indicate relatively minor price changes for agricultural commodities. In reality, such impacts are likely dwarfed by other changes in food supply systems which were stimulated and facilitated by liberalization, and increased the availability of and competition in important markets, notably oils, meats and processed foods (Hawkes, 2010; Jaramillo and Lederman, 2005). This has been reflected in nutrition surveys indicating rising consumption of such 'transitional' foods (Thow and Hawkes, 2009), with respect to evidence from Guatemala. (Thow and Snowdon, 2010), relate the cautionary tale of how exports of unhealthy bi-products of sheep ("mutton-flaps" from New Zealand) and poultry ("turkey-tails" from the US) found their way into the hearts (via the stomachs) of Fijians and Samoans before imports were eventually banned). In India, market liberalization in the mid-1990s stimulated a rapid increase in imports of low-priced vegetable oils (Hawkes, 2006), which corresponded with a simultaneous increase in consumption. It also stimulated a switch in the type of oils consumed, away from traditional peanut, rapeseed, and



cottonseed oils, and towards imported palm and soybean oils<sup>11</sup>. Indeed, Drewnowski and Popkin (1997) argue that the nutrition transition typically begins with major increases in imports of oilseeds and vegetable oils. During the 1990s, China implemented new tax and import regulations to encourage soybean imports. Subsequently, imports of soybeans and soybean oil increased, the amount of calories from vegetable oils available for consumption increased and household survey data suggest that vegetable oil consumption has increased significantly throughout China in the past fifteen years. Of course this does not prove causation, and these and other Chinese dietary changes would not have taken place without income growth. Indeed, the contribution of non-agricultural trade policy reform on income growth should not be forgotten as potentially the major policy impact on global diets of the past 20 years.

### 3.3 Food policies targeted at consumers

Various policies affect diets by targeting consumers directly, not necessarily with the ultimate goal of improving nutrition. Consumption choices may be affected through three routes: (a) by providing direct access to free food; (b) by supporting access to food through income subsidies; and (c) by altering the absolute and relative price levels between foods and of foods relative to non-foods. The range of policy actions which influence diets through income and price measures and fall under (b) and (c) is very broad, and the focus in this section is limited to those measures whose ultimate goal is to change nutrition and nutrition outcomes.

#### 3.3.1. Evolution of Food Aid and other International Food Assistance Programs

Food aid has the potential to alter diets in some regions of the world for the following reasons: (i) food aid may constitute a significant proportion of food consumption of vulnerable households in chronically food insecure recipient countries, (ii) food aid programmes have typically paid inadequate attention to local diets and consumption patterns in the design of rations (Rogers et al., 2011), and (iii) Trade promotion objectives have historically underlain food aid provision by some of the largest donor countries, based on the premise that local preferences can be shaped in favour of donor foods, thereby providing expanded trade opportunities in the longer run (Barrett, 2006). This is especially possible in the case of ‘program food aid’, which involves government-to-government transfers not targeted at specific vulnerable groups and sold on the open market.

The key events which have affected the functioning of food aid programmes during the period under consideration are the WTO agreements towards the liberalization of agricultural markets and the adoption of the 1999 Food Aid Convention (FAC). The Uruguay Round Agreement (URAA) ruled out the (direct or indirect) tying of food aid to commercial exports and also stipulated that food aid should be based on free provision to the maximum extent possible, or on highly concessional terms (Barrett and Maxwell, 2006). The 1999 FAC, which was due to expire in 2002 but has been renewed on a year-by-year basis since then, co-ordinates multilateral food aid interventions among donor countries, also with a stated aim of decoupling food aid from export promotion measures and with a growing focus on nutrition and food fortification (Hoddinott et al., 2008).

Trends over the last twenty years show a substantial reduction in global food aid shipments, going down from 12.3 million tonnes in 1991 to 5.4 million tonnes in 2010 (World Food Programme, 2006). Significantly, much of this reduction has come from the dramatic decline in program food aid from 6.4 million tonnes in 1991 to 0.2 million tonnes in 2010. Of the other two categories of food aid, emergency food aid has increased somewhat and now represents 72 percent of total food aid compared to 18 percent in 1990, while ‘project’ food aid (i.e. food aid provided as grants to specific poverty-reduction and disaster-prevention schemes) has halved. This partly reflects reductions in farm subsidies including disposal of surplus production in the US and Europe, that were the source of much of past food aid, particularly program aid, following multilateral trade negotiations (Barrett et al., 2002). Thus the impetus for a key source of diet distortion due to food aid, *i.e.* the trade promotion/surplus disposal objective, has been in decline in the last twenty years. There are still reports of distortions – *eg.*, shipments of maize to pastoral areas in the Horn of Africa in the 1990s and 2000s causing

<sup>11</sup> These developments may also, at least in part, be attributed to domestic policy decisions on what products to prioritize.

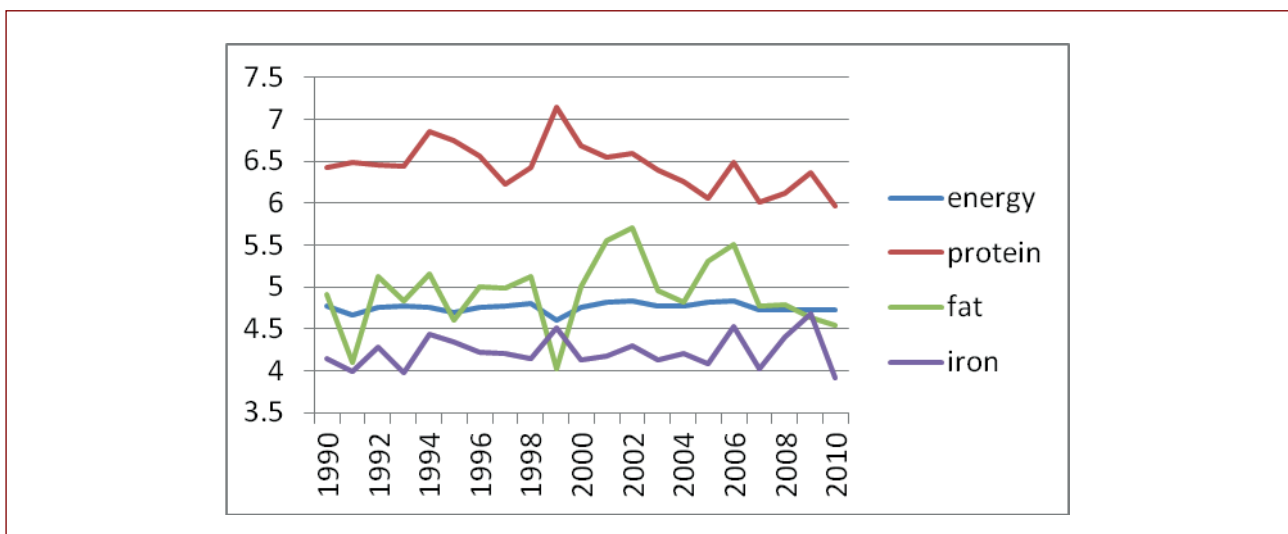
traditional protein-heavy pastoral diets traditionally based on animal products to shift towards carbohydrate-rich diets based on grain (Barrett and Maxwell, 2005). Although this potential still exists and there are occasional examples, there is not much evidence to indicate substantial widespread effects.

Additionally, although emergency food aid programmes have been found to improve nutritional outcomes by buffering short-run shocks (for example, Quisumbing, 2003)), there is evidence to indicate that food aid is too unreliable and too poorly-targeted for even the most vulnerable households to be able to depend on it for any length of time. For example, in South Wollo, Ethiopia, a highly famine-prone region in one of the largest food aid recipient countries in the world, Little (2008) finds during the 1999-2000 and 2002-03 disasters that food aid quantities available to households were less than 50 kg every 3 months. Market purchases were much more important than food aid as sources of food in 2000, in spite of massive food aid imports (Little, 2008). A recent review (Awokuse, 2011) explores a range of failure and success cases and cites food-for-work interventions as the more likely to generate positive nutritional outcomes for people at risk of hunger, especially children. In terms of targeting, considering data between 1990 and 2002, the evidence suggests that bilateral and WFP food aid have become increasingly responsive to need in recipient countries (Young and Abbott, 2008), although results confirm that donors mainly react to sudden crises and are less responsive to production shortfalls.

In recent years, there has been a growing emphasis on the nutritional content of food aid. The graph below shows the evolution of the WFP food basket based on the so-called *individual requirements met on average* (IRMA), which measure the average number of individuals satisfied by the nutrient content of one ton of food aid. This statistic requires great caution, because of aggregation issues and the focus on availability rather than actual intakes, but it does allow some (indirect) monitoring of the evolution of the WFP food basket in terms of nutrient content. Since 2006 the IRMA values for fat have decreased, but overall there is still little evidence of longer term trends in the food basket since 1990.

On balance, it seems that the decreasing relevance of food aid, and its dominating emergency nature over the last two decades have resulted in a small role (if any) in determining long-term nutritional outcomes.

Figure 3.3 Trends in the aggregate food basket of the World Food Program: Individual requirements met on average (IRMA) by one ton of food aid



Source: our processing of WFP data, <http://www.wfp.org/fais/nutritional-reporting>.

Since the 2004 Tsunami and the rapid cash-based response of the international community, there has been a growing preference for alternative cash and financial interventions as opposed to in-kind food aid (Barrett et al., 2009). Cash transfers to vulnerable subjects are more effective when the local food markets of recipient countries are functioning well. Even when they are not but there is availability of food in nearby regions, local purchases and/or triangular transactions are preferred. There is evidence that local and regional procurement programmes have been generally more cost-effective and especially more timely than in-kind food aid (Lentz et al., 2012). WFP local and triangular procurement has increased significantly over the last two decades (World Food Programme, 2006).

Other types of financial support are those provided by the IMF (e.g. the Compensatory Financing Facility, CFF) or by other institutions (e.g. the European Union with the STABEX programme replaced after 2000 by the FLEX programme) aimed at financing unanticipated food imports in response to a food security crisis (Barrett et al., 2002). In general, these compensatory financing schemes have been found to have very limited stabilising effects on trade for countries experiencing a shortfall in agricultural exports, especially because actual disbursement can be quite slow (Aiello, 2009).

### *3.3.2. Domestic food assistance programmes and price subsidies*

Domestic food policies targeted at vulnerable consumers are an important and growing item in the policy agenda of developed and developing countries.

In developed countries, domestic food and nutrition assistance programs have grown in relevance and have improved in targeting. The US is at the forefront, in 2010 there were 15 programs for a federal expenditure of USD68.2 billion, while about 14.5 percent of US households were food insecure at least some time during the same year (Coleman-Jensen et al., 2011).

The main current food stamp program (the Supplemental Nutrition Assistance Programme, SNAP) covers about 40 million people every month, compared to less than 20 million reached by the Food Stamp Programme (FSP) in 1998, not least because the scale of these programs follows the economic cycle. Eligible recipients are provided with electronic debit cards which can be used in approved retail stores to purchase food. Eligibility is based on household financial resources, and able-bodied adults are also required to accept employment or training programs referred by the SNAP office

The US food stamp programs have been blamed for leading to increased intake of unhealthy nutrients while having little effect on fruit and vegetable intake (Fox and Cole, 2004) but they remain substantially free from choice-constraining mechanisms. Criticism that the scheme encourages over-consumption of unhealthy foods has been addressed by enhancing the complementary education programme.

US domestic food assistance programs over the last 20 years have been successful in reducing food insecurity, to an extent of about one third according to the most rigorous estimates (Nord and Golla, 2009). Some have argued that participation in food stamp programs has increased the likelihood of being obese, especially for women (Gibson, 2006), but this evidence becomes weak once counterfactual trends are taken into account; and non-participants weight growth rates were faster than those of participants (Alston et al., 2009; Meyerhoefer and Pylypchuk, 2008; Jensen and Wilde, 2010).

In contrast to food stamps, the Women, Infants and Children (WIC) program in the US and the Healthy Start programme in the UK are targeted at infants and at pregnant and lactating women in low-income groups. In these schemes, food vouchers are constrained to be used for foods such as fruit and vegetables and milk (Dowler, 2008). This type of program has been relatively successful in achieving the nutrient goals, without increasing calorie availability (Barrett et al., 2002), and according to USDA is one of the most successful and cost-effective nutrition intervention programs, as participant



children record higher mean intakes of iron and vitamins without an increase in food energy intake, fat or cholesterol. Improved growth rates and reduced rates of foetal death and infant mortality have also been shown<sup>12</sup>.

In many developing countries (including India, Ethiopia and Bangladesh) there are domestic food-for-work programs based on the same principle as the international ones, i.e. able-bodied vulnerable recipients are paid with food in exchange for public unskilled work. When they are well-timed and well-targeted, these programs are generally found to be effective (Holden et al., 2006). Other types of domestic FAP work through price subsidies both as an instrument to address food insecurity and to maintain price stability. For example, the Indian Public Distribution System (PDS), a large scale program offering subsidies for wheat, rice edible oils and sugar to poor households was found to have a significant (albeit relatively small) effect on calorie intakes (Kochar, 2005). During the 1990s, developing countries have adjusted the targeting of their food assistance programs, in order to improve their cost-effectiveness.

Similar to international FAPs, the goal of these domestic programs was to provide calories mainly through staple foods and save lives through emergency relief. Despite a fair amount of heterogeneity across countries, most case studies show that domestic FAPs are successful over the short- and may potentially have achieved long-term effects on food security especially through price stabilization as in India, where farm support based on public procurement at official minimum support prices was accompanied by public distribution programs from stocks (del Ninno et al., 2007).

On the other hand, there is some evidence that price subsidies contribute to rising obesity rates in some developing countries (Asfaw, 2007); even when subsidies are calibrated to promote healthier eating in the target population, their effectiveness may be reduced by the income effect of recipients spending their effective increase in real income on non-subsidised (energy-dense and cheap) foods (Jensen and Miller, 2010).

### 3.3.3. Taxation of unhealthy foods

Fiscal measures aimed at improving diets have become prominent in the policy debate in developed countries over the last decade. In the past year the first ‘fat taxes’ and ‘soda taxes’ were introduced in some European countries like Finland, Denmark and France (Capacci et al., 2012). The impact of these taxes, depends on their size and on price elasticities (Thow et al., 2010). The ‘twinkie taxes’ on confectionary and soft drinks in 30 US states, some dating back to the 1960s or even earlier, are very small, so their impact on diets has been negligible, although they have raised substantial amounts of tax revenues (Jacobson and Brownell, 2000). Fat taxes in developing countries would have a greater impact on consumption, because of the higher price elasticity, but have been considered in a context where the dominant problem has been under- rather than over-nourishment. The option of combining taxation on unhealthy foods to fund subsidies for healthier foods is also judged to be infeasible in unstable food systems.

### 3.3.4 Summary

International food aid has been drastically reduced and largely confined to emergency relief over the last two decades, and the emphasis has shifted towards cash transfers and local or regional procurement as opposed to in-kind food aid. Domestic food assistance programs such as food stamps and public distribution systems continue to exist. With few exceptions, all of these programs have been aimed at generic food security (more calories) with little nutrition targeting. Recent experiences in Europe and the US like the WIC program and the Healthy Start program seem to suggest success in addressing nutrition imbalances of pregnant women and children. Fiscal measures aimed at improving diet quality have been too limited or too recent to have been evaluated.

<sup>12</sup> <http://www.fns.usda.gov/wic/aboutwic/howwichelps.htm#diet%20outcomes>.

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## 4. CONCLUSIONS

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Aggregate trends in most parts of the world over the last 20 years indicate general nutritional improvement and movement towards adequacy in terms of calorie availability, diet quality and variety and anthropometric outcomes. However, these aggregate trends tend to mask very substantial heterogeneity that becomes increasingly apparent at successive levels of disaggregation. While an improvement at the global scale is indicated, there has been little change in Africa, and in particular Sub-Saharan Africa, while Asia as a whole has moved much closer to meeting WHO nutritional norms in these 20 years. However, within Asia, while countries such as China and Vietnam have made remarkable progress in dietary and nutritional improvement, nutrition indicators in India show stagnation over this period. Within many countries, the phenomenon of co-existence of overnutrition and undernutrition in the population is obscured in consideration of country-level statistics.


In the many regions where dietary change has been observed, the weight of evidence indicates that globalization has been the dominant force for change. International investment liberalization, linked to trade reform, has been an important precondition for globalization and its dietary effects. The impacts of globalization (through growing levels both of food trade and, more importantly, investment), are much more than through their influences on prices and incomes. Their impact on preferences and lifestyles is critical and they have made available a range of foods that satisfy these new demands and were never previously available. These changes have been complemented and facilitated by growing urbanization and demographic change (most notably increased workforce participation of women).

Income growth has worked in tandem with globalization patterns to exert an important influence on dietary change since 1992. This includes positive effects in the form of hunger reduction and diet quality improvement, as well as negative effects when in the process of transition, undernutrition elimination tips over into overnutrition prevalence. The size of these adverse effects depends on the evolution of income distributions in both developing and developed countries. Although direct evidence remains scarce, the available information suggests that countries experiencing increases in inequality are most exposed to overnutrition problems.

The sectoral origin of growth also matters. Agricultural growth has been more effective than non-agricultural growth in alleviating stunting in this period. Agricultural growth has also exerted a strong effect on calorie intakes, particularly where starting levels of intake have been low, though its influence on diet diversity appears weak. Trade and agricultural policy reforms in themselves have not had a major impact on diets (other than through influences on globalization and income growth). However, agricultural investments have been shown to exert an important influence on productivity growth in agriculture, and given agricultural growth has an important influence on undernutrition outcomes, declining public investment in agriculture over this period implies a missed opportunity.

Consumer policy vehicles like food aid, food assistance programs, local procurement programs and public distribution systems do not seem to have had major diet quality effects, but they have been effective in their basic goal of assuring minimum calorie requirements are met, particularly in emergencies. Although there is plenty of room for improvement in terms of addressing diet quality concerns, progress on this front has been slow.

From 1992 until around 2002 food price trends were relatively flat or slightly downwards. These trends were not strong enough to have a major impact on diets, though they may have promoted some switch to animal-source products which are more responsive to a price fall, bolstering the encouragement to livestock product consumption induced by income growth. The food price crisis in 2007-8 had a significant short-term impact on diets and nutrition, generally reducing diet diversity and quality, particularly among the poorest. Longer-run evolution of food prices, their nutritional implications, and policy implications with regard to determinants such as biofuel developments and public investment in agriculture will no doubt be an important area for research in coming years.



We close by making two points about broad research directions for the future: (i) Although this paper has focused on the drivers of dietary and nutritional change in the last twenty years, important questions remain to be answered about how dietary and nutritional improvement can be spurred in regions where outcomes have remained largely static – eg. parts of Sub-Saharan Africa and South Asia, and (ii) Given the extent of heterogeneity in nutritional outcomes and the co-existence of under and overnutrition problems in many parts of the world, future research focus may well need to be on nutrition inequalities rather than on overall trends.

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