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Special Issue on "Globalization of Food Systems: Impact on Food Security and Nutrition"

Emerging Challenges for Food and Nutrition Policy in Developing Countries

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Abstract

As the income and the average caloric intake of developing country populations increase, a relative shift in diets is taking place. The general pattern of change can be described as a shift towards more "westernized" diets and away from traditional ones. Accompanying this dietary trend are the substantial and rapid changes in food production, retailing and distribution systems. After reviewing these combined shifts and changes, the paper discusses the implications for rural poverty and food security, food safety and quality but also for diet-related non-communicable diseases and the related, emerging challenges for policymakers.

Keywords*: Food policy; food systems; nutrition; food insecurity; undernutrition; malnutrition; urbanization.*

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1. Introduction

Slow progress in the reduction of hunger and undernutrition worldwide means that the 1996 World Food Summit (WFS) target of halving the number of hungry people from 800 million in 1990–1992 to 400 million by 2015 will not be met. Unless the anaemic trend in hunger reduction observed since the beginning of the 1990s is strengthened, it will take many decades before the number of hungry people is brought down to 400 million. Hence, meeting the needs for adequate and nutritious food for large segments of the world population will continue to be at the centre of the development debate on food policy for many years to come.

However, as the income and the average caloric intake of developing country populations is increasing, a relative shift in diets is taking place. The general pattern of change will be a shift towards more "westernized" diets and away from traditional ones. Accompanying this dietary trend are the substantial and rapid changes in food production, retailing and distribution systems. The combined shifts and changes have important implications for rural poverty and food security, food safety and quality but also for diet-related non-communicable diseases. Issues that have been traditionally associated with the food policy debate in developed countries are gaining increasing relevance for developing countries.

The purpose of this paper is to "set the stage" for the papers included in this issue of e-JADE, which deal mainly with changes in food systems, nutrition and their impacts on food security and health. The papers in the volume were prepared for a workshop held in October 2003 organized jointly by the Agriculture and Economic Analysis Division (ESA) and Food and Nutrition Division (ESN) of FAO in order to provide a multi-disciplinary forum for discussion of the cross-cutting issues related to the effects of globalization on food systems, food security and nutritional status. The contributions to the workshop explored two themes in parallel: (i) the transformation of food systems and the effect of this on small farmers in developing countries; and (ii) the impact of globalization and urbanization on dietary patterns and nutritional status of urban populations.

The paper will start by presenting an overview of actual and expected changes in the habitual diets and consumption patterns of populations in developing countries and will discuss the evolution of some of the major "drivers" underpinning such changes, including demographic change and increases in income, changes in food marketing and changes in food trade and production structures. On the basis of the analysis, a number of challenges to policy and to international cooperation will be discussed, ranging from promotion of healthy diets to food safety control throughout the food chain.

2. Future Changes in Dietary and Food Consumption Patterns and Their Determinants

Changes in food systems are the result of a number of inter-related factors. While income increases and the ensuing changes in diets could be considered key determinants, a number of other factors interact to shape the structure of – and changes in – food markets. Those factors include technological changes in all stages of the food chain, urbanization, the rapid integration of national and international markets for goods, capital and labour and dramatic improvements in communications.

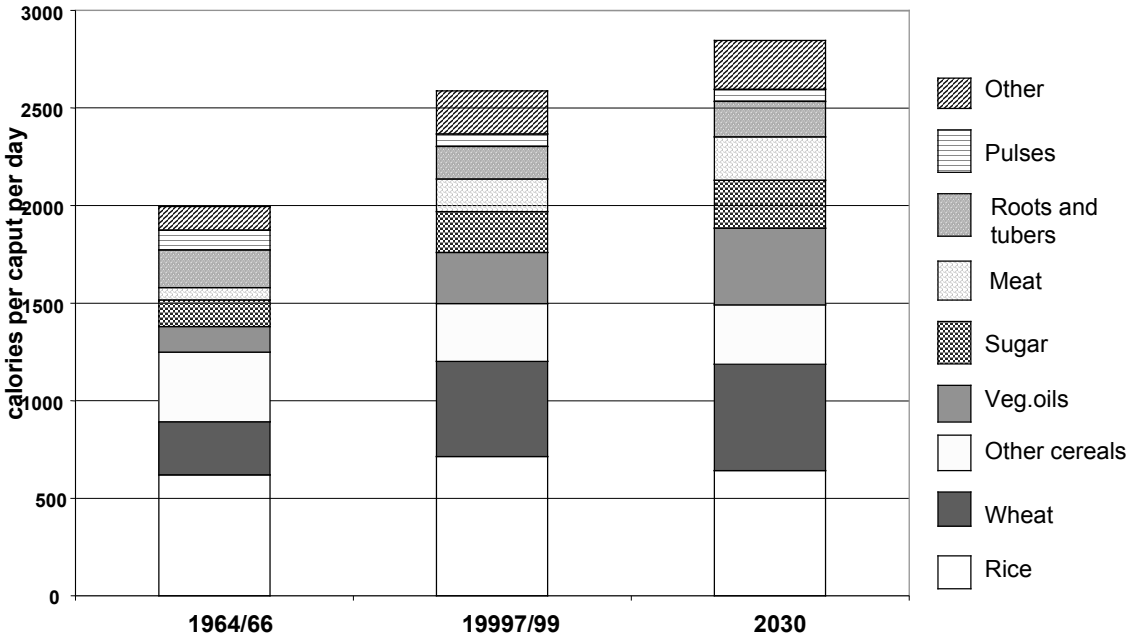
For purposes of exposition, this paper starts from changes in diets and then analyses various determinants or correlates of diet change. Such determinants could be thought of as "supply" and "demand" related although no clear distinction can be made and it is made here only for purposes of analytical convenience. The fundamental factors on the "demand side" are the overall growth in income per capita and demographic shifts (such as changes in the age composition of the population) and urbanization. Changes in the structure of imports and production and of food retail and distribution are considered to be the main "supply side" factors.

The closer integration of global economies – through expanded trade, investment capital and communications links – accelerates a process of dietary convergence among countries with different income levels and lifestyles. Changes in diets both influence, and are influenced by, changes in the production and distribution/retail systems such as the emergence of supermarkets and fast food chains and the commercialization and integration of the smallholder producer sector. This group of determinants can be considered as constituting "supply" factors.

Changes in the structure and nature of diets

Dietary changes in the developing countries are both quantitative and qualitative. They are also occurring faster now than in the past. Changes include shifts from cereal and calorie-based diets towards higher energy density with a greater role for fat and added sugar in foods, greater saturated fat intake mostly from animal sources, reduced intakes of complex carbohydrates and fibre, and reduced fruit and vegetable intakes (Drewnowski and Popkin 1997). The effects of those changes on human health are often compounded by life style changes which include reduced physical activity at work and during leisure time (Ferro-Luzzi and Martino 1996). Figure 1 illustrates the nature of shifts in the structure of diets in developing countries from the 1960s to the 1990s and projected up to 2030 (Bruinsma 2003).

Figure 1: Past and projected changes in diets in developing countries: 1964-66 to 2030



Source: Bruinsma 2003

Changes in the structure of the diets are dramatic in those developing societies that are in the process of rapid economic development and transformation, alongside an accelerated process of urbanization, such as China and India in Asia, and several countries in Latin America including Brazil, Mexico and Chile. Data from China show that while the intake of cereals and the consumption of coarse grains decreased during the past two decades in both urban and rural populations, this was accompanied by a dramatic increase in the consumption of animal foods over the same period, illustrating a shift away

from a predominantly carbohydrate diet to one with increasing contributions from fat. A similar, but less dramatic, change is also observed in India, with figures that suggest a doubling in the intake of calories from fat over a 20-year period. In Chile, the proportion of energy from fat (both animal and vegetable sources) increased from 19 percent in the mid-1970s to over 28 percent in 1998. The picture is much the same in Mexico and Brazil.

Table 1: Population in developing world and amount of kilocalories consumed, 1964–2030

	Population by calories consumed (billions of persons)					
Year	**1964-6**	**1974-6**	**1984-6**	**1997-99**	**2015**	**2030**
Kcals.						
<2200	0.47	0.32	0.42	0.56	0.46	0.20
2200-2500	1.70	0.33	0.43	0.49	0.52	0.84
2500-2700	0.05	0.94	1.16	1.20	0.35	0.33
2700-3000	0.04	1.13	1.33	0.68	2.17	2.31
>3000	0.03	0.20	0.25	1.62	2.31	3.05
Total	2.29	2.92	3.59	4.56	5.81	6.73
Percent of population in countries with average DES of more than 2700 Kcals						
	31.7	45.5	44.1	50.6	77.1	79.6

Source: Bruinsma 2003

Reductions in poverty and changes in caloric intake

Income growth per capita for the developing countries as a group is expected to accelerate in the future from 1.7 percent per annum in the 1990s to 2.7 percent between 2001 and 2005 and 3.4 percent in the period 2006 to 2015, with concomitant reductions in poverty. The latest projections by the World Bank show that the incidence of poverty is expected to decline in all regions, bringing the overall prevalence for the developing countries from 23.2 percent in 1999 to 13.3 percent by 2015 (World Bank 2003). One implication of this will be an increase in caloric intake as shown in Table 1. Developing countries are expected to make significant progress in terms of per capita caloric availability from an average of 2680 kcal per capita per day in 1997-99 to 2850 kcal in 2015 and 2980 kcal in 2030. By 2030, about 80 percent of the world population is expected to live in countries where average caloric intake is likely to be more than 2700 kcal/person/day.

Demographic changes and the demographic transition

The United Nations 2001 assessment of world population prospects (UNFPA 2001) indicates that a slowdown in world demographic growth is increasingly likely. Nevertheless, the world population of

6.06 billion in 2000 will grow to 7.2 billion in 2015, 8.3 billion in 2030 and 9.3 billion by 2050, thus increasing the demand for food.

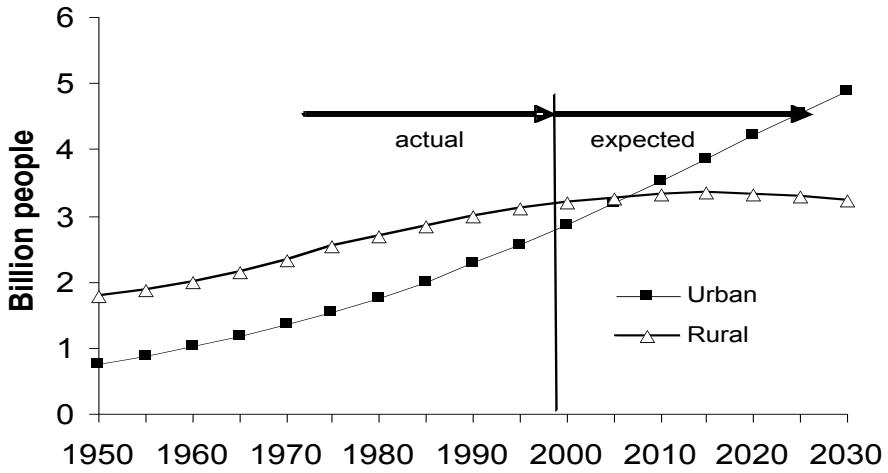
An important aspect of the demographic change in populations that influences trends in food consumption is the change in the demographic pyramids of countries in the developing world. As a result of better health and nutrition, infant and childhood survival is improving, causing a shift in the age structure of the population in most developing countries. In the early stages of this transition the dependency ratio increases, the increase being reversed at later stages of the process. Such shifts have implications for development and poverty reduction as well as for dietary consumption patterns. Early in the transition – with many more children than adults (i.e. a high dependency ratio) and rapid population growth – the demographic structure handicaps poverty reduction. The situation reverses later in the transition, when the age structure is less heavily weighted towards the very young with more representation from young adults in the demographic pyramid. Indeed, countries in the later stages of the demographic transition have been the most successful in bringing down mass poverty as an increasing number of young adults, most of them in the economically productive group, make up a larger share of the population.

Urbanization and dietary changes

A significant proportion of the addition to the world population between 2000 and 2030 will be located in urban areas. Projections show that urbanization rates will increase between 2000 and 2030 relative to that of the past 30 years. The urban population, estimated at about 2.9 billion in 2000, is projected to reach 4.9 billion by 2030. Most of the increase will be in the cities of developing countries, the population of which is expected to increase from 1.9 billion people in 2000 to about 3.9 billion people by 2030 (UNFPA 2001). This change will account for almost the entire increment in developing countries' population growth.

At the beginning of the 1960s, only about 20 percent of the population of the developing countries lived in urban areas. By 2000 the share had risen to nearly 40 percent and is expected to rise to 56 percent by 2030. The aggregate picture of a rapidly urbanizing world masks large regional differences. Urbanization will proceed slowly in many developed and transition countries, where the vast majority of the population is already living in urban areas. At the other end of the scale are sub-Saharan Africa and Asia, where urban populations will be growing at an astounding rate of nearly 5 percent per year. Also remarkable is the outlook for Latin America: while is already the most urbanized part of the developing world, urbanization is expected to further continue at a rate of more than 2 percent annually.

Figure 2: Trends in urbanization



Source: UN World Population Prospects: The 2002 Revision (http://esa.un.org/unpp)

An important development accompanying urbanization is the increase in urban poverty. In developing countries urbanization is not necessarily the result of overall development and the creation of employment and income opportunities in industry and/or in services. "Push factors", including weak agricultural growth and overall rural decline, have played and continue to play an important role in generating rural to urban migration. Risk aversion and income diversification motives are also pushing migrants to the cities.

In Africa for instance, urban population grew by 5.2 percent per year in 1970–1995 while per capita GDP was declining by 0.66 percent on an annual basis (Opal and Fay 2000). Research results for India show that the poor urbanize faster than the population as a whole (Ravallion 2001), while survey data on poverty and child undernutrition show that "in a majority of countries the absolute number of poor and undernourished individuals living in urban areas has increased, as has the share of overall poverty and undernourishment coming from urban areas" (Haddad, Ruel and Garrett 1999). The data presented in Table 2 provide support to the thesis that poverty may be on the increase in urban areas despite the fact that average incomes are higher in urban relative to rural areas.

Table 2: Urbanization and poverty

		Percent poor living in urban areas		Number of urban poor (thousands)	
Country	**Survey years**	***Year 1***	***Year 2***	***Year 1***	***Year 2***
Bangladesh	1983/4–1991/2	11	12	6 686	7 665
China	1988–1995	7	11	19 203	28 139
Colombia	1978–1992	36	38	2 052	1 808
Ghana	1987/88–1992/3	25	29	1 203	1 353
Nigeria	1985/6–1992/3	22	31	8 176	10 278
Indonesia	1990–1993	16	15	5 760	3 717
India	1977/78–1993/4	19	23	57 210	72 510
Pakistan	1984/5–1991	25	26	11 669	10 928

Source: Haddad, Ruel and Garrett 1999

Urbanization is accompanied by changes in habitual dietary practices and food consumption patterns. Important forces driving the differences between rural and urban diets are the higher average wages and opportunity cost of time in urban areas and the higher participation of women in the labour force. Other determinants of the structure of diets in urban areas include demographic factors, the organization of food markets and the lower relative prices of processed foods relative to staples in urban relative to rural areas.

Move to the cities has historically been associated with a decrease in household size and a disconnection between places of work and residence. As poverty is "transferred" from rural to urban areas, new poor urban dwellers will most likely reside away from central markets and need more commute time between residence and work. This fact, combined with a smaller number of family members, raise the fixed cost associated with food preparation as a percentage of the total household time available and households tend to move towards prepared foods.

All factors above induce a move away from traditional time-intensive food preparation towards precooked, convenience food at home but also fast food, snacks and street foods for outside meals. Urbanization is now recognized to contribute to an increase in the consumption of food cooked outside the house and an increase in purchase and consumption of precooked and processed meals. Evidence shows that, following internal migration from rural to urban areas, the shift in the dietary pattern that leads to marked changes in the intakes of sugar, salt and fat by urban populations is related to the length of stay in urban areas and influenced very strongly by the access to mass media such as television ownership.

Urban diets are higher in fat content, higher in sugar and salt content and contain higher amounts of meat and dairy products than rural ones and contain lower amounts of fibre and higher intakes of alcohol (Popkin 2002). IFPRI calculations have shown that countries with an urban population share of 75 percent or more consume about 4 percentage points more calories from vegetable and animal fat and 12 percentage points more energy from sweeteners than countries with an urban population share of 25 percent.

The trend towards food away from home is also strong among the poorest segments of urban populations. Empirical evidence shows that smaller and poorer households have higher expenditure shares on prepared street foods. Data from an Accra-wide survey show that households in the lowest income quantile consumed 31.4 percent of their caloric intake away from home, more than any other income group (Maxwell et al. 1998). Particularly for the urban poor, the shift towards fast and convenience foods is also a shift away from fresh fruits and vegetables, pulses, potatoes and other roots and tubers towards a diet with increasing consumption of sugar, salt and fat in the diet (Smil 2000). It is also often a shift from a diet rich in fibre, minerals and vitamins towards one rich in energy, saturated fats and cholesterol.

In addition to changes in dietary patterns, internal migration contributes to pressure on shelter and food as well as essential public services like safe water, sanitation, transportation and medical care among others. Urbanization is not unrelated to changes in the demographic pyramid: it is mostly the young adult population that demonstrates increasing participation of women in the workforce and increased dependence on out-of-home food consumption, as well as a qualitative shift in the food products consumed toward largely high-value and processed or pre-prepared foods.

The spread of supermarkets in the urban areas of developing countries

The factors that induce change in diets (urbanization, increases in per capita incomes, opportunity cost of time) are behind the spread of supermarkets and other large food retail outlets in developing countries. The rapid spread of supermarkets and large food distribution and retail outlets in developing countries is a major component of the changes in food systems. Those large retail outlets tend to replace central food markets, neighbourhood stores and street sellers of food in urban areas. Retail

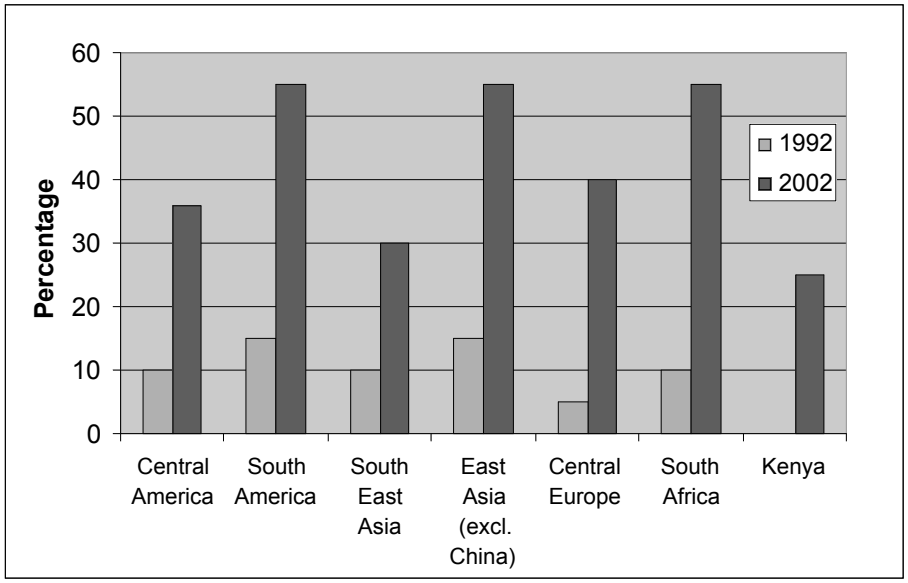
food trade in the urban centres in many developing countries is already characterized by the co-existence of major distribution chains and small-scale commercial outlets. If the more developed regions such as Latin America and countries in East Asia are a precursor of what will follow in the less developed regions, then supermarkets and large distribution will progressively dominate food markets in urban areas around the world (Reardon, Berdegué and Farrington 2002; Reardon et al. 2003).

The emergence of supermarkets in the developing countries is both a result and a cause of the shifting dietary patterns associated with urbanization. Increases in income and of the opportunity cost of food preparers' time contribute to an increase in demand for higher value-added (prepared and semi-prepared) but also safer foods. Supermarkets have a distinct advantage in supplying such foods.

The spread of supermarkets is facilitated by the economies of scale of moving large quantities in urban areas, and the relaxation of restrictions to capital flows and foreign direct investment by developing countries. Improvements in transportation, and the increase in ownership of private vehicles and refrigerators, facilitate the acquisition and storage of large quantities of foods in homes, and the establishment of supermarkets outside city centres. The experience acquired by multi-national corporations in managing large, complex chains is an additional factor facilitating this expansion.

This trend towards domination of the retail sector by supermarket chains started in Latin America, due to higher and fast-rising incomes and fast-growing cities, and spread to Asia and (to a lesser degree) Africa. Supermarkets are now servicing not only the upper-class neighbourhoods in capital cities, but are increasingly penetrating the food markets of the poor and appearing in intermediate and small cities and towns. This expansion translates into a dramatic increase in the share of food retail sales captured by supermarkets, as shown in Figure 3 for countries for which data are available.

Figure 3: Share of food retail going through supermarkets



Source: Berdegué et al. 2003; Reardon et al. 2003; Neven (for Kenya; presentation at FAO October 2003 workshop)

Along with the growth in supermarkets, a rapid rise has been observed in the number of Western fast food chains serving the big cities, and increasingly spreading out into smaller towns with significant implications for urban diets. Table 3 presents, as an example, the case of the spread of McDonald's, globally and in Asia in particular, between 1987 and 2001. The observed growth in fast food chains does not derive only from multi-national corporations, such as McDonald's, but also from

domestic firms copying the products and operational procedures of foreign companies (Pingali and Khwaja 2004).

Table 3: The spread of fast food chains in Asia/Pacific: The case of McDonald's 1987–2002

	1987	1997	2001	2002
Asia/Pacific				
Japan	604	2347	3718	3891
Australia	204	642	711	726
Taiwan	22	233	341	350
China	3	184	392	546
Philippines	13	157	231	236
South Korea	0	114	289	357
Hong Kong	36	140	185	216
Other	69	549	656	813
Total Asia/Pacific	*951*	*4456*	*6523*	*7135*
USA	7567	12380	12953	13491
Europe	755	3886	5622	6052
Latin America	99	1091	1546	887
Global Other	539	1319	2773	3543
Global Total	*9911*	*23132*	*29417*	*31108*

Source: McDonald Corporation, Annual Reports, as cited in Pingali 2004

While the presence of large retail outlets and fast-food chains respond to consumer demand for their products and services, they also influence the dietary patterns in developing countries. Studies indicate that about 75 percent of a person's daily requirement for salt may be provided in one processed meal purchased from a retail outlet. Fast foods are also rich in animal fat and sugar. Hence, while in general food purchased from large retail outlets and fast food outlets from retail outlets may be safe (barring incidents like salmonella outbreaks from lettuce), their regular consumption can certainly be a cause for concern from the point of view of nutrition and the increased risk of the diet-related diseases.

Supporting dietary changes: Shifts in production and trade patters of developing countries

Dietary changes in developing countries receive an additional push by an increasingly liberal world trading environment and by better infrastructure: transportation facilities, ports and roads, trains and airports. Projections on imports of temperate-zone commodities by developing countries are revealing as to the changing dietary patterns in those countries. Net imports in this product category increased by a factor of 13 over the last 40 years, from a minor deficit of US$1.7 billion in 1961-63 to US$24 billion in 1997-99.

What is important for the purpose of the discussion of the food economy is the expected pattern of food imports (Table 4): while the cumulative increase in imports of temperate zone products is expected to be 154 percent between 1997-99 and 2030, meat imports are expected to increase by

389 percent during the same period, while a cumulative increase of 17 percent is expected for vegetable oils and oilseeds.

Table 4: Imports of temperate zone products of developing countries

Commodity category	Net trade of developing countries (negative values denote net imports)					Cumulative increase
	1961/63	1979/81	1997/99	2015_	2030_	1997/99 to 2030
	Billions US$ (current)			Billions US$ *(of 1997-99)*		Percentage
Total food	1.14	-11.52	-11.25	-30.7	-50.1	345
1. Temperate zone	-1.72	-18.17	-24.23	-43.8	-61.5	154
Cereals (excluding rice)	-1.57	-14.25	-17.4	-31.9	-44.6	156
Wheat	-1.53	-10.45	-10.3	-17.3	-23.5	128
Coarse grains	-0.04	-3.8	-7.1	-14.7	-21.1	195
2. Meat	0.22	-0.56	-1.18	-3.4	-5.8	389
Ruminant	0.27	0.14	-0.93	-2.5	-4.6	395
Non-ruminant	-0.06	-0.71	-0.25	-0.8	-1.2	372
Milk	-0.37	-3.36	-5.65	-8.4	-11.1	97
3. Competing	3.13	4.29	6.2	6.3	5.9	-4
Vegetable oils and oilseeds	0.81	0.52	-0.57	-0.6	-0.6	17
Fruit, vegetables and citrus	0.24	1.67	8.4	9.7	11.2	33

Source: Bruinsma 2003

In response to changes in diets and in the structure of food demand, pronounced shifts are also expected in the composition of agricultural production of the developing countries. FAO's projections show that between 1997 and 2015, wheat and rice production in developing countries will grow at the modest rate of 28 and 21 percent respectively. On the other hand, significant growth in production is expected for vegetable oils and oilseeds (61 percent), beef and veal (47), mutton and lamb (51), pig meat (41), poultry meat (88), milk and dairy products (58). Coarse grain production is expected to increase by 45 percent in response to an expected increase in the demand for feed (Bruinsma 2003).

3. Concluding Remarks: Changes in Food Systems and the Challenges to Food and Nutrition Policy

The persistence of hunger in the developing world means that ensuring adequate and nutritious food for the population will remain the principal challenge facing policy makers in many developing countries in the years to come. However, the rapid transformation of diets and the changes in food systems at all levels (production, processing and distribution/retail) pose a number of important additional challenges to food security, nutrition and health policy in the developing countries.

Changes in diets towards higher fat and sugar content are expected to result in higher incidence of diet-related non-communicable diseases (NCDs). Already, a number of countries experience what is termed "epidemiological transition", i.e. a gradual shift from a prevalence of infectious diseases to the

prevalence of chronic ones associated with changing diets and a sedentary lifestyle. NCDs take an enormous toll in lives (33 million premature deaths worldwide) and account for 58.5 percent of premature deaths due to heart disease, stroke, cancer, diabetes and lung diseases affecting the most productive age-cohort of the population (World Health Organization 2002). The paradox lies in the fact that the incidence of nutrition-related NCDs can occur alongside high prevalence of hunger and malnutrition in the same context (country, city, district or household).

The magnitude of the challenge to policy-makers and other stakeholders can be exemplified using evidence from Latin America and Asia showing that obesity exists in both poor and rich households and both undernutrition and obesity co-exist within the same household. In China, 8.1 percent of households had an underweight and an overweight member within the same household (Doak et al. 2002). The poor may be even more prone to obesity due to predisposing factors associated with low birth weight and childhood undernutrition

Urbanization is likely to increase the "effective demand" for food safety. In developing countries, the informal sector is often a significant producer, processor, distributor and preparer of food and food products (e.g. street foods). On one hand, there is a need for greater regulation and food safety control. On the other, public systems to ensure food quality and safety suffer from lack of organization and adequate funding. When imposing standards that are difficult and costly to achieve, policy makers need to be wary of the implications for low-income food producers, sellers and consumers. Regulation has to be accompanied by capacity building, nutrition education and other means of support.

To the extent that developing country governments do not impose international-level standards, private standards are being implemented by the leading players in retail and food processing (Reardon and Farina 2002). Hazard Analysis and Critical Control Point (HACCP), ISOs, traceability systems and private quality labels are becoming entry tickets to international markets and increasingly the reference for quality in the domestic market of developing countries. This has led to an acceleration of obligational contract relations with raw material suppliers, involving detailed specification of production and delivery conditions.

The emergence of large retail food markets has led to greater consumer choice, convenience and, probably, lower prices for the retail services provided. Food quality and safety have also improved. At the same time, such retail outlets compete with traditional food markets but also with each other on the basis of quality, price and consistency by setting up highly centralized, efficient procurement systems. This leads to consolidated supply chains with a handful of reliable producers able to deliver large volumes of consistently high-quality goods. The wholesale system is being transformed as specialized wholesalers replace the traditional intermediaries. They cut transaction and search costs, and enforce private standards and contracts on behalf of the supermarkets, possibly excluding many small farmers from access to supermarket customers.

Diffusion of supermarkets in fact implies both opportunities and challenges for smallholder farmers. There are large benefits in being part of a dynamic market and having a guaranteed market outlet, technical assistance, etc. However, there are also threats. Large retailers need large product volumes. They prefer to deal with only a small number of large, reliable suppliers and not a multitude of small fragmented producers. This is leading to a dramatic consolidation of the procurement system. For small farmers to participate in these new dynamics, it will be crucial that they have the ability to supply according to strict quality and safety standards. They will need to adapt to institutional and organizational change, with sufficient technological and managerial capacity to provide high quality, year-round large volumes, with more stringent delivery conditions and the ability to bridge a finance gap. There is much evidence to suggest that consolidation is leading to a considerable degree of exclusion of small farms and firms (Wilkinson, this volume).

Understanding the procurement system of large retailers means understanding the future conditions of farming to supply those dynamic markets. For small farmers, getting into a supermarket's procurement system may mean investing in irrigation, greenhouses, trucks, cooling sheds and packing technologies, among other things. A few successful experiences show that the key success factors for smallholders supplying supermarkets include overcoming small size through cooperatives or out-

grower schemes, focussing on products with a high market potential and involving private and/or public sector organizations that combine business and development objectives.

The challenges faced by smallholder agriculture should be seen in the context of the general trends that will influence the structure of agricultural production. Namely, the transformation of diets and rising import competition will contribute to the increasing commercialization of the farm sector in developing countries. This is expected to result in larger operational holdings, reduced reliance on non-traded inputs and increased specialization of farming systems. While the speed of these transformations differs substantially across countries, they are all moving in the same direction (Pingali and Khwaja 2004).

In the process of commercialization, rapidly-increasing scales of production are being observed particularly in the livestock sector, which is trying to supply rapidly-growing markets for meat, milk and eggs. Both global analyses and country case studies (conducted by FAO in Brazil, India, Thailand and the Philippines) confirm that advanced technology embodied in breeds and feeds appears to be critical to the success stories for poultry around the world, and the same is likely to become true for hogs over time. Much of this technology is only relevant for relatively large-scale operations, at least for poultry. Thus, there are strong reasons to believe that technology itself could be a prime driver of the displacement of smallholders from the livestock sector.

Small-scale producers obtain lower financial profits per unit of output than large-scale producers, other things being equal. This suggests that, in the absence of deliberate action, small-scale producers will eventually be put out of business by competition from large-scale producers, especially since the better-off producers will scale up (de Haen et al. 2003).

"Retooling" smallholders with appropriate technology and knowledge that makes them able to face the requirements posed by such dynamic markets and rapid changes will be a formidable challenge for research and extension systems in developing countries.

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