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The Growing Global Obesity Problem: Some Policy Options to Address It

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Abstract

The last few decades have seen fundamental changes in food consumption patterns around the world. These changes were characterized not only by an increase in overall calorie intakes but also by a shift in the composition of the diet towards more meat, eggs, dairy products as well as more fats and oils, i.e. a shift towards high calorie diets that are also much richer in saturated fats and cholesterol. The main drivers of this transition include factors such as: (i) rapidly falling real prices for food; (ii) urbanization with the development of new marketing channels and the spread of supermarkets into developing countries; (iii) and freer trade and globalization with the emergence of large, trans-nationally operating food companies. This diet transition also brought about a rapid increase in the prevalence of overweight, obesity and related non-communicable diseases (NCDs). Initially, these problems were limited to developed countries, but more recently, there are growing concerns that the adverse effects of a rapid nutrition transition could even be more severe in developing countries. The growing health concerns have also given rise to a intense debate about possible remedies to stop and reverse the obesity epidemic in developed countries, and, perhaps even more importantly, to prevent similar developments in developing countries. Some of these policy options are being examined in this paper. The instruments analysed include price interventions, both at the level of primary commodities and final consumer goods (tax on fat food), direct incentives to reduce and disincentives to maintain an excess body weight; finally the paper also presents some experience gathered with a combination of various measures in integrated nutrition programmes.

Keywords: *Nutrition transition, obesity, NCDs, policy options*

1. Introduction

The last two centuries have seen a fundamental transformation of diets in essentially all affluent countries. At the beginning of this transformation was the agro-industrial revolution of the nineteenth century which provided people with the expertise to produce more, the income to

[1] The views expressed by the author in this document do not necessarily represent those of FAO.

consume more, and increasingly sophisticated food products. The modernization of agriculture has played a pivotal role in bringing about change. The rigorous application of scientific advances to traditional agriculture, mechanization, genetic improvements and the development of fertilizers and pesticides enabled a doubling and redoubling of food production within the time span of a few decades. In fact, productivity growth was so strong that growth in production comfortably exceeded growth in demand and afforded a rapidly growing population more and better food at declining real prices. Agricultural productivity growth also promoted the industrialization of the then largely agrarian societies. It helped accumulate capital, free up labour and provide ever more and more nutritious food. Eventually, a virtuous circle was created where productivity growth, rising incomes and better nutrition became mutually supportive and thus spurred overall economic development.[2] At least for the nineteenth century, however, these developments remained largely limited to industrial countries.

It took more than a century before the agro-industrial revolution started to reach the first developing countries. With the beginning of the 1960s, the same factors that had initiated the agro-industrial revolution in the developed world in the previous century got a foothold in the food and agricultural sectors of parts of the developing world. The combination of modern varieties, expansion of irrigation, more and improved input supplies and the widespread mechanization of production made more food available to consumers in developing countries. Since the early 1960s, the average calorie availability in the developing world has increased from about 1 950 to 2 680 kcals/person/day while protein availability nearly doubled from about 40 to 70 g/person/day. The prevalence of undernourishment declined from 37 percent in 1970 to 17 percent in 2000 and, while more than 840 million of people (FAO 2003) are still food insecure, this is more often the result of adverse local production conditions, war and civil strife, a lack of income and of access to food rather than the inability of the world as a whole to produce and provide enough food.

As in the industrial world of the nineteenth century, consumers in developing countries have benefited the most from advances in agricultural productivity. In real terms, food prices have declined to the lowest levels in history and, together with gains in broader economic growth, have enabled consumers today to eat better while spending less and less of their budget on food. However, not all countries and regions have benefited from these advances. In parts of the developing word, notably in sub-Saharan Africa, these advances have not even started to yield a meaningful impact. But in many developing countries, the progress in access to providing more, better and cheaper food has been impressive.[3] The rapid decline in real food prices has allowed consumers in developing countries to embark on food consumption patterns that were reserved for consumers in industrialized countries at much higher gross domestic product (GDP) levels. Today, a consumer in a developing country can purchase more calories than ever before and more than consumers in industrialized countries ever could at comparable income levels. In China, for instance, consumers today have about 3 000 kcals/day and 50 kg of meat per year (FAO 2004) at their disposal – at less than US$1 000 nominal income per year (World Bank 2002).

In addition to falling real prices of food, rapid urbanization has affected and will continue to affect consumption patterns. Essentially the entire population growth over the next 30 years will be urban. Urbanization creates a new and improved marketing and distribution infrastructure; attracts supermarkets and their sophisticated food handling systems (cold chains, etc.); makes for better roads and ports, thus improving the access of foreign suppliers and the importance of imports in the overall food supply; and, all in all, will promote a globalization of dietary patterns. Most important from a nutrition perspective, these changes include not only a shift towards higher food energy supplies but also a shift towards more fats and oils and more animal-based foodstuffs, and thus higher intakes of saturated fat and cholesterol.

The shifts in consumption patterns and lifestyles have resulted in a rapid increase in the prevalence of obesity and related non-communicable diseases (NCDs) in developed countries.

2 Fogel (1994) estimates that half of the overall economic growth in France and England in the nineteenth century was a result of better nutrition.

3 While not all developing countries have benefited from rapid income growth and nor have they experienced the same rapid socio-economic transformations that come with rapid industrialization and urbanization, the number of countries that are in the process of a profound transformation of their food economies is steadily increasing. As population giants such as China, India, Indonesia, Brazil and Mexico are among the most rapid transformers, the nutrition transition affects a large and growing share of the developing world's population.

Many developing countries are in the process of undergoing a similar nutrition transition (see WHO 2003), with probably even more adverse health impacts. The main compounding factor of these nutritional changes is a phenotypic and genotypic predisposition towards developing obesity and NCDs. The phenotypic predisposition is the result of rapid transition from hunger and undernourishment towards overnutrition and affluence. There is ample empirical evidence that hunger and malnutrition "programme" the next generation to develop a more efficient energy metabolism and thus to have a higher propensity to develop obesity and related NCDs (see Delisle 2002 for a comprehensive discussion). In addition, populations of developing countries have on average a genetic predisposition towards developing obesity and NCDs (thrifty *genotype,* Miller and Colagiuri 1994).

The combination of: (i) the rapid nutrition transition with a rapidly declining share of expenditure on food as a percentage of total expenditure/income; (ii) urbanization; (iii) the shift in diet towards more animal products; and (iv) the phenotypic and genotypic predisposition towards a more efficient metabolism and NCDs could spark a rapid increase in the prevalence of obesity and NCDs in developing countries over the next generations. The human and economic toll could be dramatic and, for many, the exit out of food poverty may be associated with a straight entry into health poverty. This means that, while fewer people will suffer from hunger and chronic undernourishment, more will have health problems related to obesity and NCDs. The impacts will be felt more strongly than in developed countries as fewer consumers in developing countries will be able to afford the needed medical treatment even if they can afford more food. Many NCDs have a lethal impact if left untreated.

The rapid increase of NCDs also suggests that some of these concerns have already become a reality, at least in *developed* countries. Phenotypic and genotypic predisposition for obesity and NCDs in *developing* countries, in conjunction with the rapid nutrition transition towards higher calorie availabilities in general and more livestock products in particular, suggests that their populations may have to cope with an even bigger problem in a shorter period of transition. The policy messages emerging from these links are straightforward. First, all efforts that help fight hunger today and improve the nutritional situation of women of child-bearing age have the potential to yield an extra dividend for coming generations. Second, nutritional education and supplementary feeding programmes for pregnant women that ensure a balanced and healthy diet are even more important than hitherto assumed.[4] Third, policy-makers in developed and developing countries alike have to think about possible policy measures that can help contain a growing obesity problem without thwarting progress in fighting hunger.

As far as the fight against hunger is concerned, there is no shortage of programmes and projects that could provide or at least promise success. But policy approaches that could help contain or reverse the global obesity problem are rather new. The various proposals and their pros and cons are being discussed at the moment in many developed countries (for example, Australia, the United States and the United Kingdom).[5] The remainder of this paper aims to shed some light on the various proposals and will also try to assess possible interactions and incompatibilities with other policy measures. It will first look at the effects of price interventions, both at the level of primary commodities and final consumer goods (tax on fat food), then examine the possibilities of tax on excess body weight (tax on fat people), and finally present some experience gathered with a combination of various measures in integrated nutritional programmes. The discussion of the various policy options includes an examination of their effectiveness and efficiency, and an evaluation of their pros and cons and their compatibility with other policies. However, the presentation and discussion of possible policy measures will be limited to a few instruments; the focus will be placed on policy measures that have received particular prominence in the current public discussion in developed countries and in developing countries in rapid economic and nutrition transition; no claim is being made that the selection of instruments is comprehensive or representative.

4 They could be of critical importance in those developing countries where the prospects for a rapid increase in calorie availability combined with a more efficiently "programmed" metabolism could result in a disproportionate increase in obesity and related NCDs.

5 For the United Kingdom, see for instance: http://news.bbc.co.uk/1/hi/uk/2988314.stm; for the United States: http://www.usatoday.com/life/2002/2002-02-19-diet.htm; for Australia: http://www.consumerfreedom.com/headline_detail.cfm?HEADLINE_ID=1960

2. Food Price Interventions

One of the most popular proposals to come to grips with the growing obesity epidemic and associated public health costs has been the proposal of a tax on energy-rich foodstuffs.[6] These proposals are now being discussed by health officials and public policy-makers with a view to identifying their *effectiveness* in reaching their stated objectives, their *efficiency* relative to other measures, and their shortfalls and side-effects. In principle, interventions could take place at two different levels. The first would be to influence producer prices for food, i.e. interventions at the agricultural producer level. There is a long history of such interventions in Organisation for Economic Co-operation and Development (OECD) countries and an equally long debate about the effects and problems that have emerged with such interventions on agriculture, but relatively little has been said about consumers and food consumption. The second entry-point for price interventions would be at the consumer price level. These interventions are currently largely limited to surcharges in the form of value added tax (VAT) and total or partial exemptions from such VAT surcharges. The following will try to shed some light on possible impacts of the two types of interventions and will try to provide answers that arise in the context of policy interventions.

The case for food price interventions

The basic case for food price interventions rests on the notion that higher prices could provide a means to reduce excess food consumption, which is in turn associated with significant societal externalities. Put differently, the price of food energy set by a free market reflects the cost of producing the food rather than true cost (which is the production cost plus the external costs of treating NCDs such as coronary heart disease (CHD) or non-insulin dependent diabetes mellitus (NIDDM)). If food markets fail to capture the full costs of excess consumption, a tax – set at the level where production cost plus tax will equal the production cost plus external costs – would provide an economically efficient solution.

But there may be important rejoinders to the tax argument. For instance, that a tax on excess food consumption could be a regressive tax as it creates an extra burden on people with higher calorie needs or lower incomes. Moreover, interventions on food prices in a system of increasingly freer trade in food and agriculture are likely to create incompatibilities with commitments taken elsewhere, notably those taken within the World Trade Organization (WTO). Not liberalizing trade means foregoing efficiency gains to be had from a better allocation of production, which would need to be taken into account in the overall cost–benefit analysis of such a tax. How effective and efficient these taxes are in practice, and how compatible they are with other policy reforms will be discussed in the following section.

Price interventions at the producer level: "a tax on primary products"

As already mentioned, producer price interventions for food products are a commonly used tool of agricultural policies in developing and developed countries alike. Numerous studies have analysed their impacts on agriculture, farm households, incomes, the environment or rural development. But relatively little is known about their impacts on consumers and food consumption patterns. In fact, many analyses simply assume that changes in producer prices are fully transmitted to the consumer level or that consumers are implicitly assumed to change their consumption patterns according to a change in producer prices.

Interventions at the producer level have been subject to controversial policy debates, particularly those associated with higher border protection, intervention price systems and export subsidies. Any suggestion to increase such measures for the sake of possible health benefits would

6 For details of a recent debate at governmental level on a tax on fatty foods in the United Kingdom, see for example: http://www.theage.com.au/articles/2004/02/19/1077072753005.html?from=storyrhs or http://news.bbc.co.uk/1/hi/health/3502053.stm

therefore add to an already contentious debate and should be most carefully vetted before any inference is drawn.

Much of the rationale put forward by the proponents of agricultural price interventions rests on the observations that countries with massive support to agriculture, high producer prices and high border protection are benefiting from relatively moderate prevalence levels for obesity. This relationship is depicted in Figure 1, which in fact suggests that the OECD countries with the highest Producer Support Estimate (PSE) rates (Japan, the Republic of Korea, Norway and Switzerland) have the lowest prevalence rates of obesity, while Australia, New Zealand and the United States, all with low or middling levels of protection, are burdened with relatively high prevalence rates of obesity. The question that arises in this context is whether this relationship is of a causal nature, i.e. whether it is a matter of correlation or causation.

A necessary condition for a causal relationship is that a price increase at the level of the protected agricultural product has a substantial impact on final consumer prices. The question therefore is how and to what extent prices are transmitted along the food chain and to what extent the value share of farm products affects the final consumer price. A number of empirical studies help to find an answer to this question (e.g. Wohlgenant). These studies show that: (i) the value share of primary products in the final consumer good has been declining over time (with rising value share of services included in the product); and (ii) that there are considerable differences across commodities (for example, very low for wheat/bread and high for eggs). The high service element in the differences also means that the margins between producer and consumer prices are typically much higher in developed than in developing countries. For some products at least, an increase in the producer price in a developed country (regardless of whether through higher border protection, higher support prices or a combination of the two) may therefore not create a sizeable increase in consumer prices. This suggests that a change (increase) in producer prices for food would in general be a rather blunt tool to change food prices at the consumer level and thus have little influence on food demand. Figure 2 should help explain the channels that affect the transmission of prices from producers to consumers.

Figure 1: Support for agriculture and the prevalence of obesity

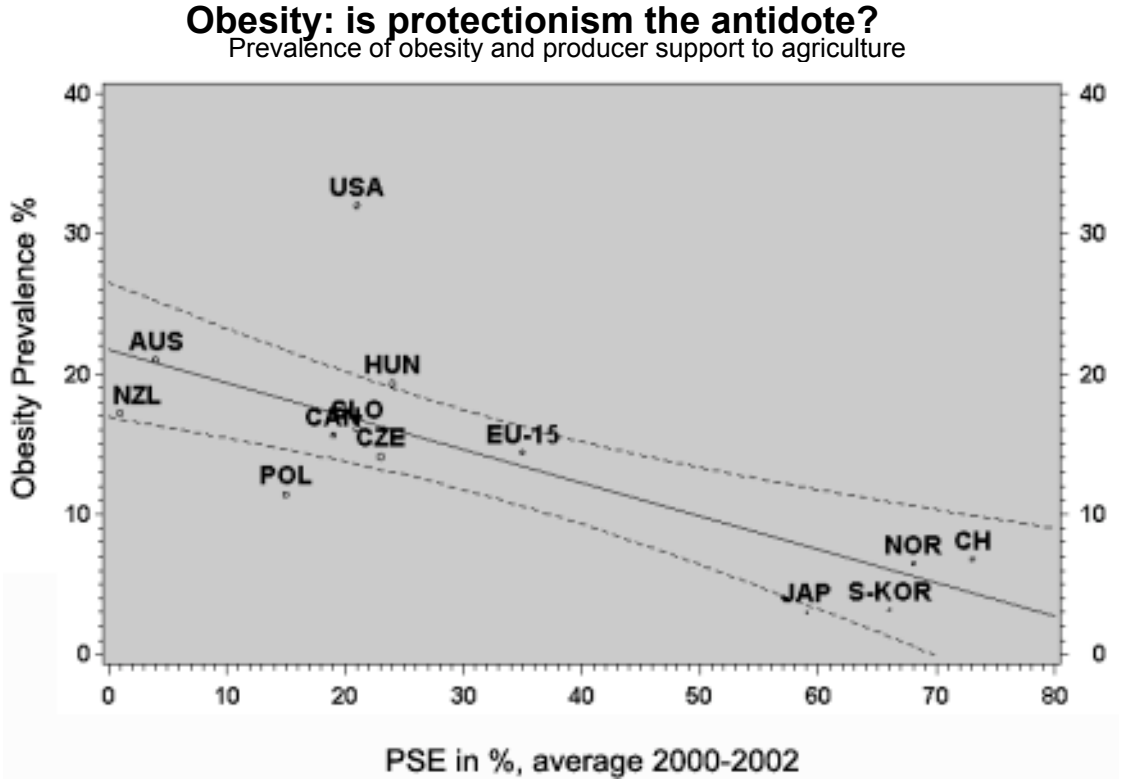
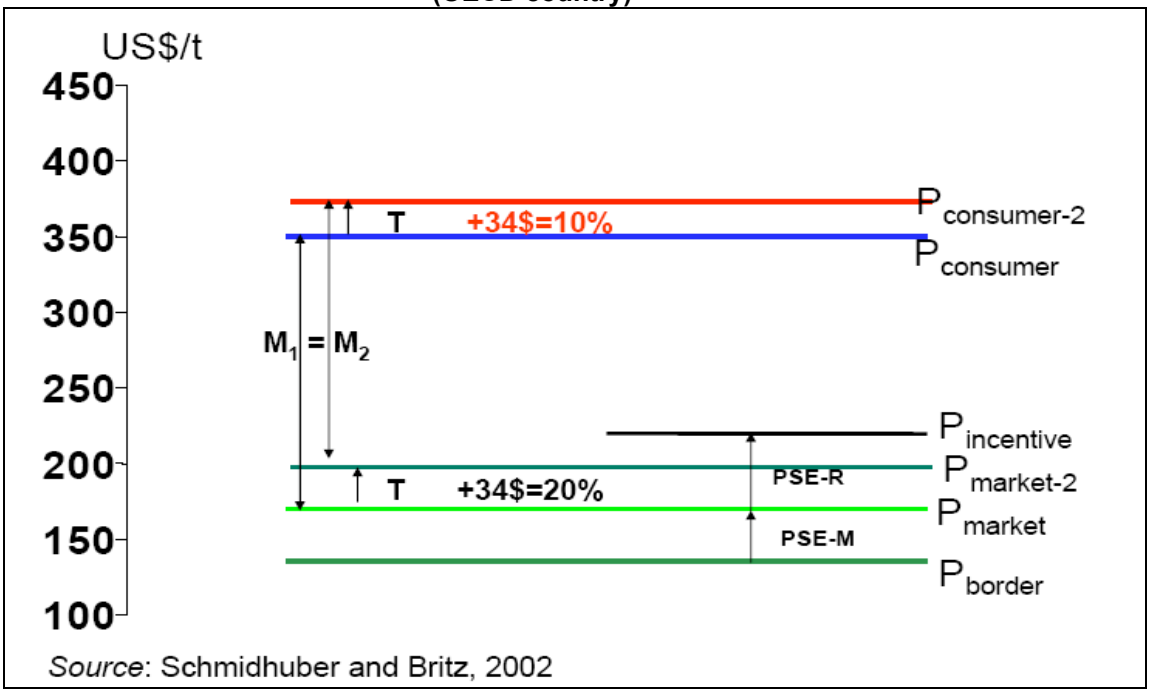


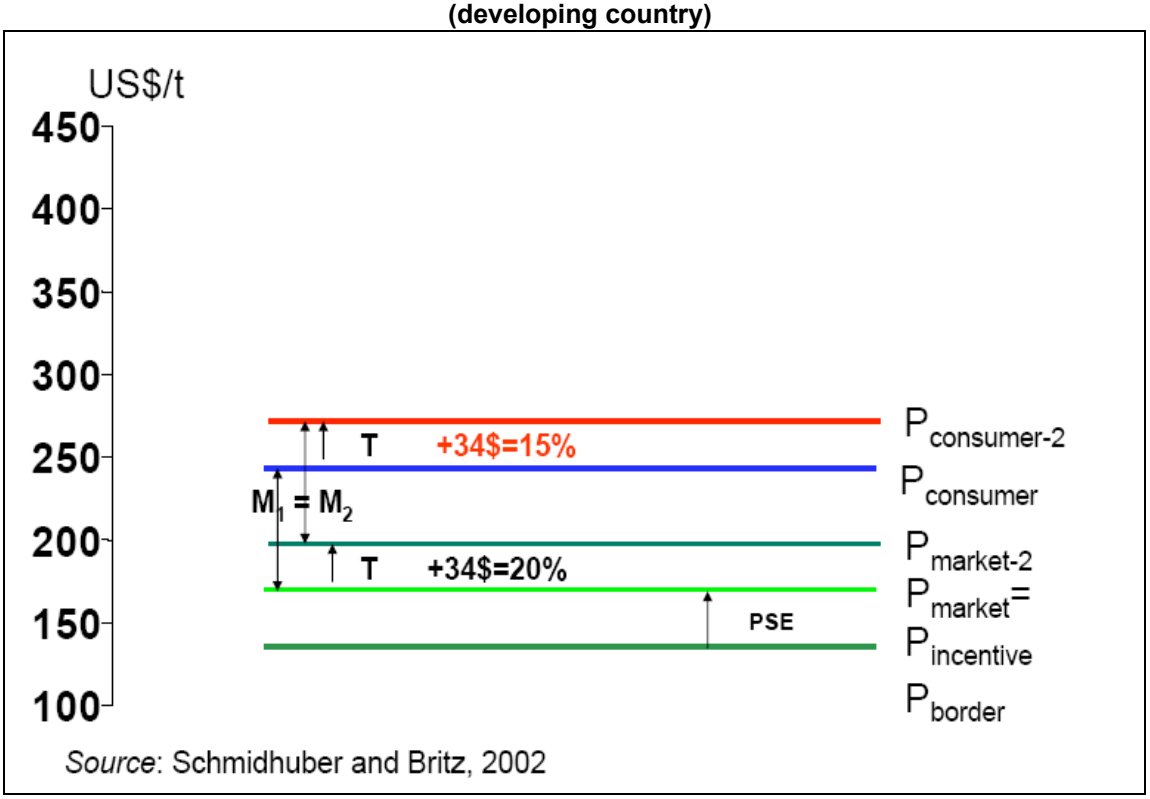
Figure 2: Examples of the agricultural price formation at support levels and processing margins

The impact of a tax/tariff with high margins (OECD country)



Source: Schmidhuber and Britz, 2002

The impact of a tax/tariff with low margins (developing country)



Source: Schmidhuber and Britz, 2002

The upper pane of Figure 2 depicts the main factors that affect the *horizontal* and *vertical* price transmission for food products in a *developed* country (Schmidhuber and Britz 2002). What is referred to as the horizontal transmission is essentially the transmission of primary product prices across the border from international markets to the domestic commodity market. In many OECD countries, this process is often heavily affected by agricultural policy measures. In this process, the internal price formation starts from a (low) border price that is raised, e.g. through a tariff, to the level of the domestic market price. For producers, this market price is further increased (e.g. through a direct transfer) to the level of the farm incentive price, which drives the level of input applications and allocated area. The domestic market price is where the vertical price transmission process starts. It starts with a wholesale operation (cooperative), pooling supplies from farmers; the primary products (cereals) are then further processed at various stages (flour, bran, etc.); intermediate products are further refined (different types of flour), added to other products and eventually sold as the final consumer good (bread, breakfast cereals, etc.) by a retailer (supermarket, bakery). In this multistage process, the various agents often add considerable margins for the processing or marketing services they provide. As a result, the value share of primary good (wheat) eventually accounts for only a small share of the final value of consumer good (bread)[7,8].

The situation is quite different where primary products account for a larger value share in the final consumer good (Figure 2, lower pane); not an atypical case for the price formation in many *developing* countries. Any price increase at the producer level would translate into a more substantial increase in consumer prices and, where consumers are price responsive, result in a reduction of consumption. Higher consumer prices for food in developing countries, however, may also mean that – other things being equal – undernourishment may increase. It also explains, although does not justify, why many developing countries have chosen to tax their agriculture to the benefit of (urban) consumers rather than protecting it.

From the consumer point of view, the impacts of low shares on the final product is in effect described by Marshall's theory of derived demand (Marshall 1920), i.e. that demand is typically fairly inelastic where the primary commodity forms only a small component of the final good. It may therefore be more efficient to levy a tax directly at the consumer level, again distinguishing the impacts of low and high price elasticities of demand.

Price interventions at the consumer level: a tax on "fat food"

A similar, although in its impacts somewhat different, approach to address the growing obesity problem is the proposal to levy a tax directly on consumer prices of food. Particularly in developed countries, the discussion has recently advanced from the theoretical proposition to examining actual and operational issues. Public health officials[9] in particular have been proposing concrete measures to increase the costs of energy-dense and "saturated fat rich" foods by adding an extra tax on energy-rich food or reducing the food VAT exemptions that are still in place in many countries.

While enthusiasm among public health advisors for such a tax is understandable, issues pertaining to the economic effectiveness and the operational efficiency of such measures in reducing obesity are less clear. Again, the effectiveness of such a measure depends crucially on how responsive consumers of these foods are to price changes induced by (higher) taxes. The elasticities used in the FAO@2030 model[10] in Figure 3 give an idea of the general link between income levels and the responsiveness of demand with respect to income levels. They show a clear and strong decline of income elasticities with rising incomes and thus suggest that rich consumers are likely to react much less to a tax on certain foods than poor consumers.

7 Notable consumer price impacts are only likely if tariffs are extraordinarily high and/or processing and marketing margins are very small. Rice in Japan could be a case for more significant impacts on consumer prices, except that consumers in Japan have shown little responsiveness in their consumption of rice.

8 In Figure 2 (upper pane), the margin between producer and consumer prices is assumed to be 100 percent. For cereals, the margin may exceed 500 percent and more, while it should be less than 100 percent for eggs.

9 Dr Martin Breach, spokesperson for the British Medical Association, for instance, proposed a 17.5 percent VAT on high-fat foods. The Australian Medical Association is promoting similar measures.

10 A description of the model is available in Schmidhuber and Britz 2002.

Figure 3: Income elasticities at different income levels

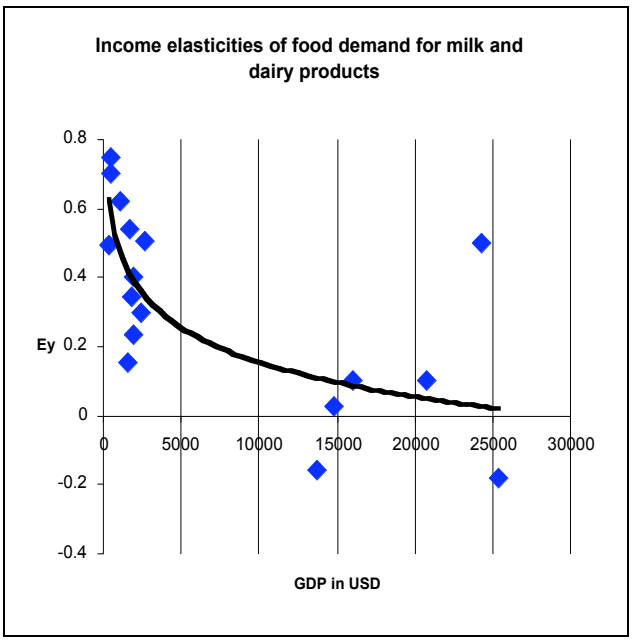
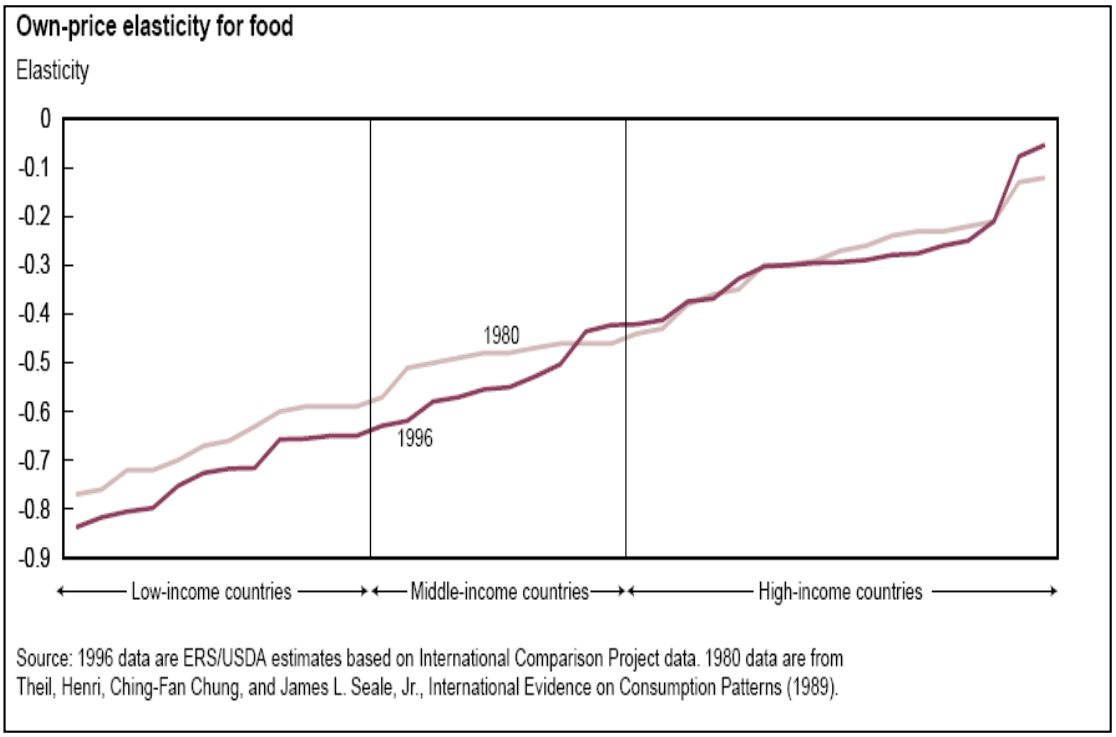


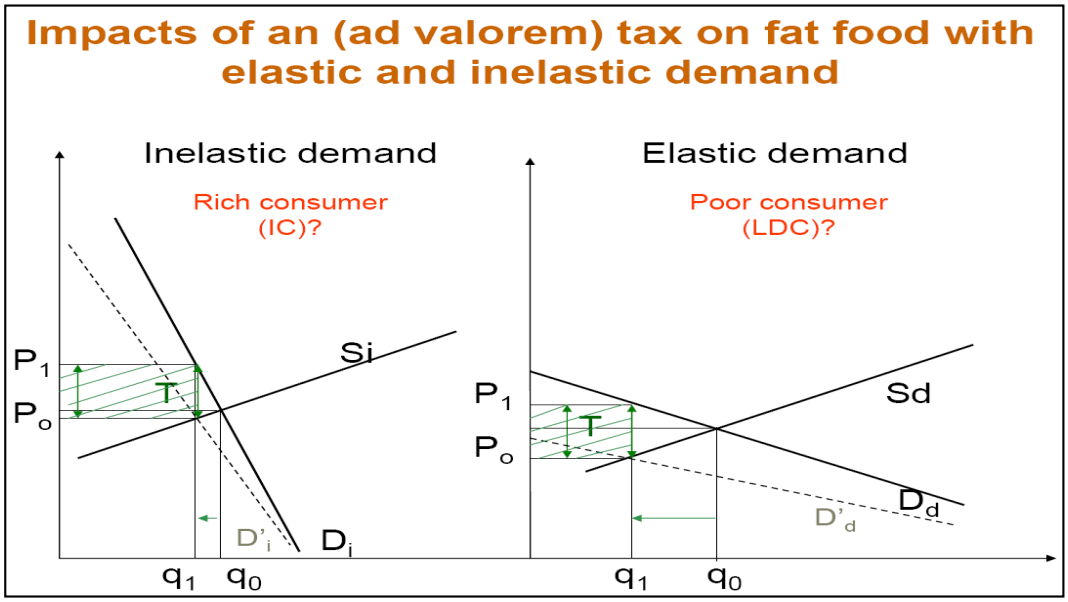
Figure 4: Price elasticities for food across income ranges



Source: Regmi et al. 2001

Assuming the basic relationships between food demand, incomes and prices, the principal impacts of a change in food prices, e.g. through a tax, can be examined. Figure 5 depicts the demand response to a tax on excess calories with price elastic (right pane) and price inelastic (left pane) demand. Where demand is inelastic (rich consumers, left pane of Figure 5), a tax on fat food will bring about only a small reduction in demand, thus only providing a small contribution to reducing food intakes and possibly obesity. In fact, the impact of the tax on demand will decline with the elasticity, while the tax revenues will increase. This low-responsiveness situation characterizes many food markets in developed countries, particularly where income differences within an economy are relatively small. The effect could be quite different in middle-income developing countries or in developed countries where incomes are less evenly distributed. Here a tax on excess calorie consumption – applied uniformly across all income strata – would do little to reduce obesity in the high-income-low elasticity strata but could have a consumption-contracting effect on poor elastically reacting consumers.

Figure 5: Impacts of a tax on food with elastic and inelastic demand



There is empirical work that – by and large – confirms these theoretical expectations. In China, for instance, Guo et al. (1999) documented the possible reactions of consumers to price changes in various food items across a range of income strata. They found that: (i) consumers in low-income strata are more responsive to price changes for certain food items than rich consumers. For example, pork consumers in the poorest strata are reacting three times as elastically as consumers in the richest strata; and (ii) "an increase in the price of a food tends to drive consumption away towards its substitutes". They finally conclude that "increases in food prices have much less favourable effects for the poor" (Guo et al. 1999).

Where income elasticities are low but substitutability between the various foodstuffs is high, a price-induced reduction of consumption in a given good is associated with higher consumption of its substitutes. In such a situation, taxes may well help to direct consumption of single food components in the desired direction, but the impacts on overall energy intake are likely to be limited. If, for instance, calories from animal fats are being taxed, consumption of vegetable oils and fats is likely to increase.[11] Numerous other side-effects could result.

11 As King (2002) puts it: "If the government regulates the content of, say, fast food, people will find fat elsewhere".

A tax on animal fats, for instance, should promote the production and consumption of so-called "light" products (light yoghurts, low fat milk, etc.), while consumers would tend to reduce foodstuffs with high calorie contents. But the excess fat is likely to surface elsewhere in the food chain either domestically or abroad. One vent for surplus in many developed markets is the fast food and snack food industry that adds extra fat and sugar to many of its products, including ice cream, hamburgers and French fries. If these "junk" foods were to be taxed, the fat and sugar added currently to ice creams and hamburgers would occur elsewhere in the food chain. If not domestically, the high calorie parts of a foodstuff could be exported and end up in developing countries. A case in point is poultry meat, where rich economies already consume predominantly the lean parts (breasts), while the fattier parts (leg quarters, wings) are primarily exported, with possible adverse effects on the food consumption patterns and agricultural economies of those countries that import them.

Another problem with a tax on excess calorie consumption is that in practice such a tax would have to be imposed on food items rather than on nutrients (energy) directly. As food items typically contain a group of different nutrients, a tax on a food item rather than on a nutritional component could bring about undesired side-effects. Guo et al. (1999), for instance, found that higher pork prices in China may indeed help reduce the intake of energy and saturated fatty acids of rich consumers but may cause an undesired fall in protein consumption by the poor.

A look at excess body weights and dietary energy supply (DES) levels across countries seems to confirm the described impacts of a food tax on overweight and obesity. The left pane of Figure 6 depicts the DES levels and *male overweight*[12,13] in those countries for which OECD and the International Obesity Task Force (IOTF) provide information. It may help to illustrate a number of different issues that characterize the relationship between dietary energy supplies and excess body weight across different populations. First, it suggests that a considerable overweight/obesity problem can exist even where food supply levels are low on average. Second, the prevalence of excess body weight increases with the average food availability. Third, once the DES exceeds a certain level (about 3 300 kcals/person/day), there is no more increase in the prevalence of overweight. In fact, if obesity estimates were included, the curve would be flatter. The latter reflects the fact that a large share of calories above 3 300 calories is likely to be wasted. All in all, the relationship between food availability and excess body weight resembles a typical input–output function (agricultural production function, diminishing production increments per unit of additional applications of an input, e.g. fertilizer, beyond a certain level).

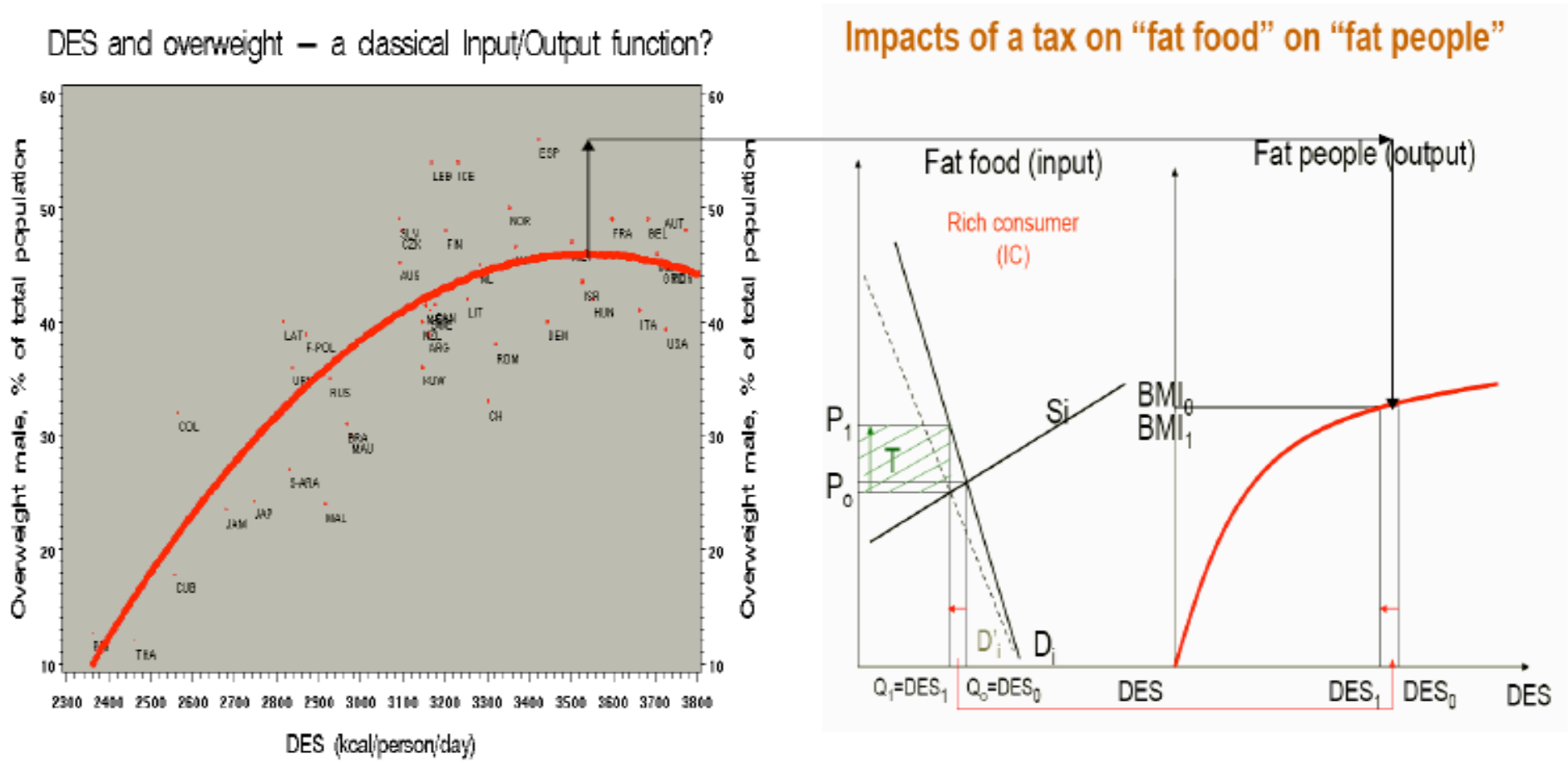
The tax on fat food (input) – in the context of an input–output function – helps to illustrate the possible impact of a change in input prices (tax on fat food) on the level of output (excess body weight). The right pane of Figure 6 combines the impacts of a tax on excess food energy intake in the input market with the likely effects on the output market (excess body weight). It underlines that the small impacts of the tax on actual food availability are even further reduced as the tax is effective in the flat part of the food energy/body weight curve. The flat part of the curve reflects the fact that a high DES is associated with high levels of waste; societies with more than 3 300 kcals also waste a lot more food and may thus not experience such a rapid increase in the prevalence of excess body weight.

Waste is in fact usually the most elastic form of utilization and may therefore be the first to be reduced when prices rise (through tax). Again, this buffer is likely to be more (less) pronounced where incomes and food availability are high (low). As DES levels climb above the 3 300 kcals threshold, the largest part of the incremental food availability is likely to be wasted. This means that a tax on excess calorie consumption (e.g. on calorie-rich foods) may primarily reduce the level of waste in rich countries/for rich consumers while it may affect more directly the poorer consumers with lower waste levels. In the worst case (elastic poor and inelastic rich consumers and large income disparities), a tax on food may do little about obesity and increase undernourishment. In the best case (high level of equality, low food demand responsiveness), it will have a small impact on obesity, reduce waste to a certain extent and be an effective means to collect money that could be used to finance programmes for nutrition education.

12 Male overweight was chosen because of the larger sample size, which also included low-income countries.
13 A look at the prevalence of excess body weight across different income strata within a country would have been preferable, but was – in the absence of data - impossible.

As shown above, the link between calorie availability and excess body weight of Figure 6 is based on a cross-country (intercountry) analysis of available data. It was also mentioned that an intracountry analysis of excess body weight would have been preferable but had to be dismissed because of a lack of income-stratified obesity data. The problem with the cross-country data is that it may not be representative of the obesity distribution within a country. In fact, there is growing evidence that – within rich countries – excess body weight is increasingly a problem for poorer consumers, who rely heavily on the cheap but empty calories of the fast food industry. Nestle (2003), for instance, claims that obesity is increasingly becoming a problem of the poor who are disproportionately high consumers of cheap dietary energy. In this case, a tax on certain energy-rich food items ("junk food") could in fact have a curbing impact on consumption. The problem is of course whether poor consumers in developed countries have alternatives that they could resort to in the case of an extra tax on such food items.

Figure 6: Impacts of a food tax on excess body weights



Source: OECD/FAO/ITCF, years vary from 1991 to 2001
FAO, Global Perspectives Studies Unit, 2003

Nevertheless, the disadvantages of food price interventions are likely to outweigh their advantages in reducing or reversing the trend towards a higher prevalence of obesity. For rich consumers, inelastic demand will limit the desired impacts on food demand, while for poor consumers high prices may create an added food insecurity problem. That said, targeted price interventions at the consumer level can have an impact on food consumption patterns if: (i) they are targeted; (ii) demand is reasonably elastic; and (iii) consumers have a choice to shift to healthier foods. Where marketing and processing costs are high and taxes are applied to the final consumer good, the tax revenues could be considerable, the impacts on primary agriculture would be small and thus the trade distortions would be minimal. Where processing margins are small and demand is elastic, tax revenues would be small and the risk of creating adverse impacts on food security could be considerable.

3. A Tax on Excess Body Weight: "Tax on Fat People"

The low effectiveness and efficiency of a tax on energy-dense foods in reducing excess body weight in affluent societies, its potential for creating added trade problems and the risk of increasing food insecurity in poor societies or poor segments of rich societies pose the question of a more effective alternative. One of the most frequently discussed options is a tax on excess body weight rather than on excess calorie consumption. Colloquially, this proposal is being referred to as a tax on "fat people" as opposed to a tax on "fat food".

While such a proposal may sound exotic at first, in practice it is not. In fact, there are already various forms of incentives or disincentives in place that aim to reduce excess body weight (or prevent increases in excess body weight). However, none of these measures are referred to as a tax on fat people. Health insurance policies, for instance, offer discounts on premiums for clients with normal body weights. Car insurers have started to offer discounts to normal weight customers as there is growing evidence that obese drivers have a higher risk of causing an accident. Even fast food chains introduce implicit taxes on overweight people by rejecting obese job applicants (Greenhouse 2003). On the incentive side, employers offer free access to gyms to their employees even during working hours as there is ample evidence that excess body weight reduces the productivity of their staff and increases disability and sick leave claims (Figure 7). In the United States, probably the most important incentive to reduce excess body weight was brought about by a new policy of the Internal Revenue Service (IRS 2002), stating that "obesity is medically accepted to be a disease in its own right". For taxpayers, this now means that treatment specifically for obesity can be claimed as a medical tax uction.[14]

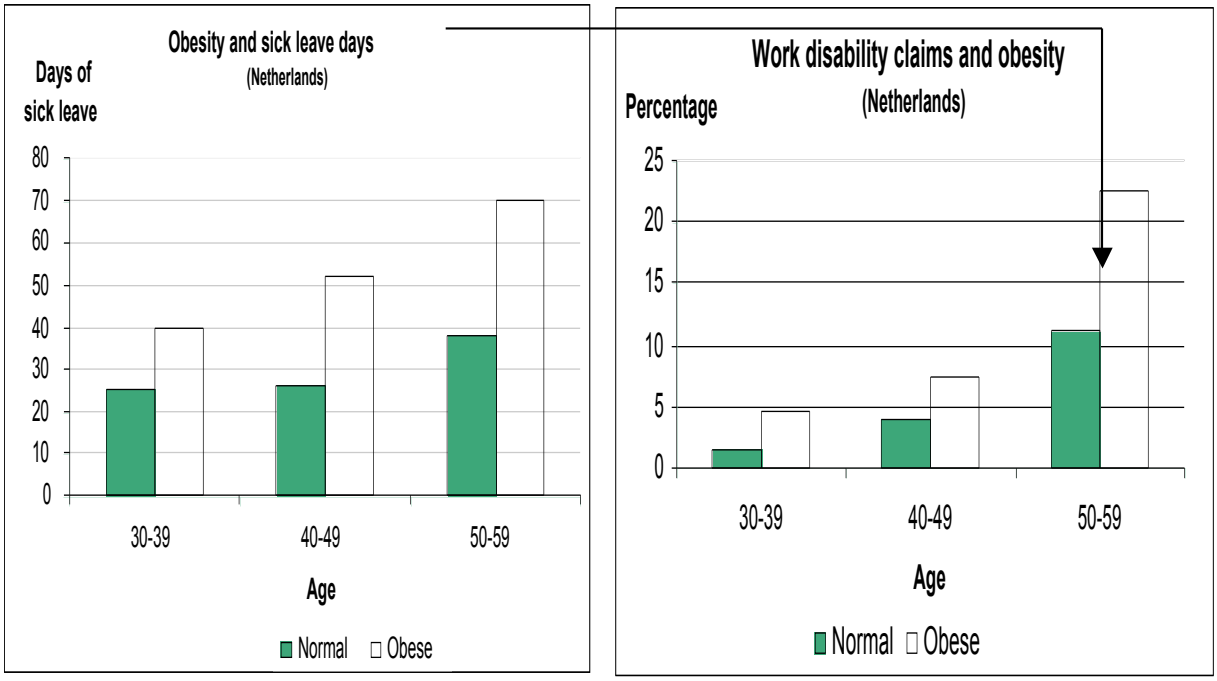
The basic case for these measures rests on the social costs that overweight people cause for society (Figure 7). To the extent that obesity creates external costs for society, a tax on fat people could be perceived as a "Pigouvian" tax that helps bring private costs (low premium and low perception of personal health damage) in line with the social costs for society, i.e. higher health expenditures, lower productivity or more disability claims. To the extent that obesity is a question of nurture rather than nature, such a tax would essentially reflect the application of the "polluter pays principle" for obesity. The crucial questions for practical policy implementation are: (i) whether such a tax on the "output" (excess body weight) would be more efficient and more effective than a tax on the "input" (excess food consumption); (ii) what differential impacts such measures would have on rich and poor consumers, food availability and food security; and (iii) to what extent obesity is a condition caused primarily by phenotypic and genotypic predisposition or whether it is predominantly the result of a food energy imbalance (calorie intake in excess of calorie expenditure).

There are a number of reasons that suggest that a tax on excess body weight would be both more effective and more efficient than a tax on excess food energy intake. First, a tax on excess food energy would address only the calorie intake side of the dietary energy imbalance but leave the calorie expenditure side completely unaddressed. When calorie requirements are high because of physical work, exercise or a less efficient metabolism, a tax on food may create additional

14 "Uncompensated amounts paid by individuals for participation in a weight-loss program as treatment for a specific disease or diseases (including obesity) diagnosed by a physician are expenses for medical care that are deductible under §213, subject to the limitations of that section."

private costs without creating a societal benefit. On the contrary, the extra food costs may reduce workers' productivity, lower their physical activity and thus create an extra cost for society. Poor consumers would be hardest hit. A tax on fat people would avoid that problem as it directly taxes the result of the dietary energy imbalance rather than only the energy input side. Moreover, a tax on excess body weight should not have any trade distorting impact, as there is simply no need to maintain the food tax distortion through a price wedge for food at the border. Finally, to the extent to which the tax on excess body weight lowers food demand, food prices may actually fall and thus afford an added advantage to poorer consumers. But a tax on excess body weight may not be without pitfalls. Most important, lower body weights *per se* are not a guarantor for a healthier diet and lifestyle. In fact, there is no shortage of unhealthy ways to reduce excess body weight.

Figure 7: Economic costs of obesity



Source: Narbro, et al. 1996

The discussion on the various price and tax intervention mechanisms suggests that there are considerable differences in the efficiency and effectiveness of these measures in helping to reduce the prevalence of obesity. Probably the least efficient and least effective measure would be an intervention at the producer price level. It would also be the measure least compatible with other policy objectives, notably freer trade. While probably more efficient, a tax on consumer prices of food may also cause undesirable side-effects, notably where income inequality is large and where low-income strata react elastically to changes in food prices. A direct tax on excess body weight should be the most efficient and effective measure, but will not be sufficient on its own.

There is also growing evidence (Barker 1994) that the effect of a phenotypic or genotypic predisposition can crucially affect the occurrence and degree of obesity. Moreover, a high prevalence of obesity in a given generation can be the result of a higher prevalence of undernourishment in the parent generation, and countries that undergo a rapid nutrition transition may suffer most. In this case, the "polluter pays" principle would certainly not apply and could in fact represent a grossly unfair policy measure.

4. Integrated Health and Nutrition Programmes

The preceding discussion suggested that there is no simple or single solution. Instead, there is growing evidence that it will take a combination of policy instruments to address the problem of obesity and related NCDs successfully. Such an integrated programme has, for instance, been launched in Norway and has – overall – yielded very positive results. The details of the programme are available from Norum (1997). Without repeating the details, the correlates of success were: (i) a strong legal and institutional foundation of a population-wide effort in a national organization, i.e. the National Nutritional Council (NNC); (ii) a robust scientific and empirical backing;[15] and (iii) a combination of measures (from food price interventions to nationwide food education programmes) embracing a great number of stakeholders. Practical experience in Norway also suggests that there can be a considerable time-lag between the implementation of various measures and the first measurable success.

The Republic of Korea provides another example of a successful nutrition programme. Details are available from Lee, Popkin and Kim (2002). Kim, Moon and Popkin (2000) find that food energy intake and obesity levels in the Republic of Korea are approximately half of what might be expected in a country at that economic level, while vegetable intake is much higher than might be expected. Lee, Popkin and Kim (2002) suggest that a number of factors have contributed to this outcome. First, there has been a strong movement to retain traditional diets and food preparations. At the heart of this movement is a training programme, which has been offered by the Rural Development Administration since the 1980s. The Home Management Division of the Rural Living Science Institute (Suwon, Republic of Korea) has trained thousands of extension workers to provide monthly training sessions in cooking methods for traditional Korean foods, such as rice, *kimchi* (pickled and fermented cabbage) and fermented soybean products. The programme appears to reach a significant component of the newly married women in the Republic of Korea, but exact statistics are not available. At least to a certain extent, food consumption was also curbed by higher food prices, which were backed by domestic producer price support and border measures. The same combination of food traditions, educational programmes and higher food prices may help to explain the positive nutritional outcome in Japan where, as in Norway and the Republic of Korea, the prevalence of obesity and NCDs remained much lower than in other countries of comparable development and income levels (see Figure 1).

5. Summary and Conclusions

This paper has analysed some of the currently discussed policy options to reduce or avoid food-related causes of excess body weight and NCDs. The analysis included various options, from food price interventions at various levels to integrated nutrition programmes. Interventions at the producer price level have been identified as the least efficient and the least effective in changing nutritional outcomes and reducing excess body weight. They are also unlikely to be compatible with efforts to liberalize agricultural trade. Consumer price interventions are likely to be more efficient – at least in developed countries – particularly as their effects are not diluted by huge processing margins. But what plagues all price interventions is the fact that those consumers who should reduce excess energy intake are likely to be the least responsive to price increases and will thus not alter their consumption patterns only because food is more expensive. Alas, the opposite holds for poor countries or poor consumers in rich countries where higher food costs could bring about or aggravate undernourishment problems.

Probably more effective and efficient than a tax on food would be a direct tax on excess body weight, i.e. a tax on obesity itself. In fact, many developed countries have already instituted such taxes, mostly in the form of penalties for extra body weight or incentives (premiums/tax brakes) to lose excess body weight. The main advantages are: (i) no negative side-effects on food markets; (ii) compatibility with other policy measures; and (iii) no penalty for consumers who need high-energy intake levels because of a higher calorie expenditure. Moreover, the tax would not only have fewer side-effects but be more effective and efficient as it addresses the excess body weight

15 For example, the "Oslo Study" or the health surveys of the National Health Screening Service.

problem from both sides of the energy balance: the calorie intake side and the calorie expenditure side. The main drawbacks are possible difficulties in the actual implementation and the fact that a lower body weight in itself is no guarantor for a healthier diet.

The discussion of the various price intervention mechanisms also underlined that there is no single measure that is sufficient to address the problem. Where progress towards a healthier diet and – in the sequel a healthier population – has become reality, the underlying policy changes included a broad spectrum of measures. These measures encompassed not only price interventions and premiums but also measures to enhance nutrition transparency and education. But even for such integrated programmes, progress is not immediate and even in developed countries decades may pass before tangible impacts are produced. The diversity and complexity of successful approaches, the time-lag between policy measures and their impacts, the accelerating nutrition transition and predisposition to develop obesity and NCDs underline the urgency for action in developing countries.

References

Barker, D.J.P. 1994. *Mothers, babies and disease in later life.* London, BMJ Publishing Group.

Barker, D.J.P. 1995. Fetal origins of coronary heart disease. *British Medical Journal*, 311: 171–174.

Bruinsma, J., ed. 2003. *World agriculture: towards 2015/2030. An FAO perspective*. Rome, FAO and London, Earthscan.

Delisle, H. 2002. *Programming of chronic disease by impaired fetal nutrition. Evidence and implications for policy and intervention strategies*. WHO Report. WHO/NHD/02.3. Geneva, World Health Organization.

FAO. 2003. *The State of Food Insecurity in the World 2003*. Rome.

FAO. 2004. FAOSTAT data. (http://faostat.fao.org)

Fogel, R. 1994. Economic growth, population theory and physiology: the bearing of long-term processes on the making of economic policy. *American Economic Rev*., 84(3): 369–95.

Greenhouse, S. 2003. Obese people are taking their bias claims to court. *New York Times*, 3 August.

Guo, X., Popkin, B.M., Mroz, T.A. & Zhai, F. 1999. Food price policy can favorably alter macronutrient intake in China. *J. Nutrition*, 129: 994–1001.

Internal Revenue Service (IRS). 2002. Ruling 2002-19. Part 1, Section 213 – Medical, dental, etc. expenses. 26 CFR 1.213-1 (also §262; 1.262-1.) and Rev. Ruling 2002-19.

Kim, S., Moon, S. & Popkin, B.M. 2000. The nutrition transition in South Korea. *American J. Clinical Nutrition,* 71: 44–53.

King, A. 2002. A tax on fat? *EconLog*, 17 November.

Kynge, J. & Dickie, M. 2003. China encourages mass urban migration. *Financial Times*, 27 November.

Lee, M-J., Popkin, B.M. & Kim, S. 2002. The unique aspects of the nutrition transition in South Korea: the retention of healthful elements in their traditional diet. *Public Health Nutrition,* 5: 197–203.

Marshall, A. 1920. *Principles of economics.* 8th ed. Book 5, Chapter 6: 2). London, Macmillan.

Miller, J. & Colagiuri, S. 1994. The carnivore connection: dietary carbohydrate in the evolution of NIDDM. *Diabetologia,* 37: 1280–1286.

Narbro, K., Jonsson, E., Larsson, B., Waaler, H., Wedel, H. & Sjöstrom, L. 1999. Sick leave and disability pension before and after treatment for obesity. A report from the Swedish Obese Subjects (SOS) study. *Int. J. Obesity*, 23(6): 619–624.

Nestle, M. 2003. Have fat, will sue. *Financial Times* (suppl.), 14 December.

Norum, K.R. 1997. Some aspects of Norwegian nutrition and food policy. *In* P.S. Shetty & McPherson, eds. *Diet, nutrition and chronic disease. Lessons from contrasting worlds*. Wiley.

Popkin, B.M. 1993. Nutritional patterns and transition. *Population and Development Rev.,* 19: 138–157.

Regmi, A., Deepak, M.S., Seale, J.L. & Bernstein, J. 2001. Cross-country analysis of food consumption patterns. In *Changing structure of global food consumption and trade*. Agriculture and Trade Report. WRS-01-1. Market and Trade Economics Division, Economic Research Service, US Department of Agriculture.

Schmidhuber, J. & Britz, W. 2002. *The impacts of OECD policy reform on international agricultural commodity markets: first results of a quantitative assessment based on the @2030 model.* Schriften der Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaues e.V., Band 36, Münster-Hiltrup.

Seale, J.L., Regmi, A. & Bernstein, J. 2003. *International evidence on food consumption patterns.* Electronic Report from the Economic Research Service (ERS). Technical Bulletin No. 1904, October.

Shetty, P.S. 1997. Diet, lifestyle and chronic disease. Lessons from contrasting worlds. *In* P.S. Shetty & K. McPherson, eds. *Diet, nutrition and chronic disease. Lessons from contrasting worlds*. Wiley.

Smil, V. 2000. *Feeding the world – A challenge for the twenty-first century*. Cambridge, Massachusetts and London, MIT Press.

UN-HABITAT. 2003. *Challenge of slums*. Global Report on Human Settlements in 2003. United Nations Human Settlements Programme and London, Earthscan.

World Bank. 2002. *World Development Indicators*. CD-ROM.

World Health Organization (WHO). 2003. *Nutrition in transition: globalization and its impact on nutrition patterns and diet-related diseases* (available at http://www.who.int/nut/ trans.htm)