Urbanization, Lifestyle Changes and the Nutrition Transition

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Summary. — Broad shifts are occurring at a rapid pace in the structure of diet, physical activity patterns, and obesity patterns in urban areas in lower income countries. Examples from China and selected other countries along with pooled time-series and cross-sectional analysis of shifts in diet and occupation structure associated with urbanization are presented. Patterns of obesity from nationally representative surveys indicate that the problems of obesity and dietary excess represent an important challenge facing many lower income countries, particularly their urban populations. © 1999 Elsevier Science Ltd. All rights reserved.

Key words — nutrition transition, urbanization, obesity, dietary trends

1. INTRODUCTION

The forces that have created major shifts in fertility and mortality patterns have also been linked with equally important shifts in diet, physical activity, and body composition. The concept of the nutrition transition relates to the sense that the underlying shifts in economic, demographic, and related forces that affect fertility, mortality, and disease patterns also affect the structure of diet, physical activity, and body composition trends. The concept of the nutrition transition focuses on large shifts in the structure of diet. The same underlying socioeconomic and demographic changes associated with these dietary changes are also linked with shifts in physical activity, average stature, and body composition patterns. As we will show below, urban residency is linked with large changes in diet and body composition and also with high levels of obesity in lower and middle-income countries.

The nutrition transition has followed five broad patterns: (a) hunting and gathering food, (b) famine, (c) receding famine, (d) degenerative disease, and (e) behavioral change. The major features of each pattern are summarized in Table 1 (Popkin, 1993). These patterns are not restricted to particular periods of human history. For convenience, the patterns are outlined in past tense as historical developments; however, “earlier” patterns are not restricted to the periods in which they first arose, but continue to characterize certain geographic and socioeconomic subpopulations.

As others have shown (Haddad, Ruel and Garrett, 1999), many urban populations in the world still face food insecurity and related problems. But in the same populations where undernutrition and food insecurity are found, other subpopulations, often even in the same household, suffer dietary excess and obesity. It is this complex intertwining of economic and social conditions that creates this rapid transition among some urban subpopulation groups offers a major challenge for food and nutrition policy in many countries in Asia, Africa, Latin America, and the Caribbean.

This article summarizes some of the information that documents these broad shifts in the structure of diet, physical activity patterns, and obesity patterns in urban areas in lower income countries. The particular focus is on the

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Table 1. Summary characteristics of and broad changes in dietary patterns and their relationship to social and economic factors

<table>
<thead>
<tr>
<th>Transition profile</th>
<th>Pattern 1: Collecting food</th>
<th>Pattern 2: Famine</th>
<th>Pattern 3: Receding famine</th>
<th>Pattern 4: Degenerative disease</th>
<th>Pattern 5: Behavioral change</th>
</tr>
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<tbody>
<tr>
<td>1. Nutrition profile</td>
<td></td>
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<tr>
<td>Diet</td>
<td>Plants, low-fat wild animals; varied diet</td>
<td>Cereals predominant; diet less varied</td>
<td>Fewer starchy staples; more fruits, vegetables, animal protein; low variety continues</td>
<td>More fat (especially from animal products), sugar and processed foods; less fiber</td>
<td>Less fat and processing; increased carbohydrates, fruits and vegetables</td>
</tr>
<tr>
<td>Nutritional status</td>
<td>Robust, lean, few nutritional deficiencies</td>
<td>Children, women suffer most from low fat intake; nutritional deficiency diseases emerge; stature declines</td>
<td>Continued MCH nutrition problems; many deficiencies disappear; weaning diseases emerge; stature grows</td>
<td>Obesity; problems for elderly (bone health, etc.); many disabling conditions</td>
<td>Reduced body fat levels and obesity; improved bone health</td>
</tr>
<tr>
<td>2. Economy</td>
<td></td>
<td></td>
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<tr>
<td>Hunter-gathers</td>
<td>Agriculture, animal husbandry, home-making begin; shift to monocultures</td>
<td>Second agricultural revolution (crop rotation, fertilizer); Industrial Revolution; women join labor force</td>
<td>Fewer jobs with heavy physical activity; service sector and mechanization; household technology revolution</td>
<td>Service sector mechanization, industrial robotization dominate; leisure exercise grows to offset sedentary jobs</td>
<td>Food preparation cost falls significantly with technological change</td>
</tr>
<tr>
<td>Primitive; onset of fire</td>
<td>Labor-intensive, primitive technology begins (clay cooking vessels)</td>
<td>Primitive water systems; clay stoves; cooking technology advance</td>
<td>Household technology mechanizes and proliferates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsistence; primitive stone tools</td>
<td>Subsistence; few tools</td>
<td>Increasing income disparity; agricultural tools; industrialization rises</td>
<td>Rapid growth in income and income disparities; technology proliferation</td>
<td>Income growth slows; home and leisure technologies increase</td>
<td></td>
</tr>
</tbody>
</table>
### 3. Demographic profile

<table>
<thead>
<tr>
<th>Category</th>
<th>Demographic Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality/Fertility</td>
<td>Low fertility, high mortality, low life expectancy</td>
</tr>
<tr>
<td>Morbidity</td>
<td>Much infectious disease; no epidemics</td>
</tr>
<tr>
<td>Age structure</td>
<td>Young population</td>
</tr>
<tr>
<td>Residency Patterns</td>
<td>Rural, low density</td>
</tr>
</tbody>
</table>

#### 4. Food processing

<table>
<thead>
<tr>
<th>Category</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonexistent</td>
<td>Food storage begins</td>
</tr>
</tbody>
</table>

importance of urban residence in this process. Unfortunately the analysis is static in that we do not have many panels that can allow us to unravel the dynamic changes in urban residence and its effects on diet and activity. We have a few examples from China. Rather, we must use crosscountry comparisons along with the limited longitudinal analysis and our understanding of the urbanization process to infer anything about the dynamic processes faced by the world.

2. THE STRUCTURE OF DIET AND URBANIZATION

People living in urban areas consume diets distinctly different from those of their rural counterparts and the general shifts in their diets enhance energy and fat density and lead to great potential for chronic disease-related health problems. A large descriptive literature on comparisons of urban and rural diets can be summarized as urban diets show trends toward consumption of superior grains (e.g., rice or wheat, rather than corn or millet); more milled and polished grains (e.g., rice, wheat); food higher in fat; more animal products; more sugar; more food prepared away from the home; and more processed foods (Popkin and Bisgrove, 1988).

These contrasts between urban and rural eating patterns are more marked in lower income than in higher income countries. In higher income countries, market penetration into rural areas is common, and national integrated food distribution systems exist.

(a) Crosscountry analysis

Elsewhere we have used data from the Food and Agriculture Organization (FAO) food balance sheets for 1962–90, now available in the FAOSTAT database (Drewnowski and Popkin, 1997). We combined data on food availability, expressed in percentage of daily energy from macronutrients, with the official estimates of gross national product (GNP), as established by the World Bank (World Bank, 1995). In both cases, GNP per capita was expressed in 1993 dollars to allow for an easier interpretation of the results. A basic Ordinary Least Squares (OLS) regression was used to relate dietary data (the proportion of energy from vegetable and animal fats, carbohydrates, caloric sweeteners, and protein) for those countries for which full sets of data were available in 1990 to the logarithm of per capita GNP. This research used all countries for which both sets of data were available. These numbered 133 in 1990. The percentage of energy from each macronutrient was the dependent variable and the independent variables were GNP per capita, the proportion of the population residing in urban areas that year, and an interaction term between GNP per capita and the proportion of urban residents. All variables in this regression were highly significant ($p > 0.01$).

Simulations are used to provide some insight into the potential effect of shifts in the proportion of the urban population on the structure of the diet. Urbanization rates were set at the proportion of urban residents worldwide at either 25% or 75%. Given rapid rates of urbanization in developing nations, this level of urbanization will be seen in most countries by the year 2020 (United Nations, 1995). As shown in Figures 1 and 2 for higher rates of urbanization, there is a substantial increase in the consumption of sweeteners and fats. The implication is that a shift from 25% to 75% urban population in very low income countries is associated with an increase of approximately four percentage points of total energy from fat and an additional 12 percentage points of energy from sweeteners.

This regression model predicts that rapid urbanization, usually associated with greater incomes and economic growth, can have independent effects on diet structure. At lower income levels, according to the regression model, urbanization can more than double the amount of sweeteners in the diet. The model confirms previous observations that people living in urban areas consume diets distinct from those of their rural counterparts (Popkin and Bisgrove, 1988). The potential impact of urbanization in flattening the income-sweetener relationship deserves further analysis; however, it is clear that the increased urbanization of lower income countries is associated with an increase in the proportion of energy from sweeteners and fats.

Analyzing the impact of urbanization on diet structure is a key public health issue. Urbanization and economic growth, closely linked since the industrial revolution, give every sign of becoming dissociated. In the past rapid urban growth was concurrent with economic growth, but now urban growth dominates most low-income countries.
Figure 1. Relationship between the proportion of energy from each food source and gross national product per capita with the proportion of the population residing in urban areas placed at 25%, 1990. (Source: Food balance data from the FAOUN; GNP data from the World Bank; regression work by UNC-CH Reprinted from Drewnowski and Popkin (1997) Nutrition Review 55:31.)

Figure 2. Relationship between the proportion of energy from each food source and gross national product per capita with the proportion of the population residing in urban areas placed at 75%, 1990. (Source: Food balance data from the FAOUN; GNP data from the World Bank; regression work by UNC-CH Reprinted from Drewnowski and Popkin (1997) Nutrition Review 55:31.)
In a large number of descriptive and more rigorous longitudinal studies, we have found that diets in urban areas of China were more rapidly becoming diverse and shifting to what would be termed the Western-diet, higher in meats, edible oils, and other fats and refined carbohydrates and lower in fiber. The China Health and Nutrition Survey (CHNS), a longitudinal study of about 4,000 households from eight provinces of China is used for this analysis. At each time period three days of dietary intake were collected from each individual in the family. Combined with weighed household food intake, this allows us to develop quite accurate profiles of each person’s diet (Zhai et al., 1996). More detail on the surveys is obtained elsewhere (Entwisle et al., 1995; Popkin et al., 1993).

While the traditional Chinese diet was felt to be a low-fat one, only a small and rapidly diminishing proportion of the population now follows this traditional low-fat pattern and an ever-increasing proportion is consuming more than 30% of their energy from fat. This high-fat diet was significantly more common in urban and higher income populations than in rural and lower-income ones (see Table 2). At the same time, there were decreases in the proportion of adults consuming a low-fat diet among all income groups.

The effects of urban residency on food choices in China have been studied in fully specified longitudinal models of food choice. These models of adult food consumption used the first three waves of the CHNS. When income, food price, and a range of other sociodemographic variables are controlled for, we find that there is still an urban effect on the likelihood of consuming selected food groups as well as on the consumption of food by those selecting to consume each food group (Guo et al., 1998) (see Table 3).

While it is clear from this work that urban residence is linked with shifts in the structure of diets toward more higher fat foods, little is understood about the dynamics. That is, we do not have any clear sense if the causes for these changes are underlying SES factors such as higher incomes and lower food prices or there is a broader more synergistic effect of all these factors that creates a unique urban residence effect. In addition, there are no studies on the rapidity of change to tell us if change is occurring in different ways in urban and rural areas.

### 3. URBANIZATION AND SHIFTS IN PHYSICAL ACTIVITY PATTERNS

#### (a) Crossnational trends

A major change in economic structure associated with the nutrition transition is the shift from a preindustrial agrarian economy to industrialization. This transformation then accelerates; the service sector grows rapidly, industrial production is dominated by capital-intensive processes, and time-allocation

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**Table 2. Percentages of study population aged 20–45 in high and low energy consumed from fat dietary intake categories by tertile of household income, CHNS 1989, 1991, and 1993**

<table>
<thead>
<tr>
<th>Distribution of sample by % energy from fat</th>
<th>Household income</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>% Consuming &lt;10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>14.3</td>
<td>10.0</td>
<td>1.5</td>
<td>8.6</td>
<td>2.7</td>
</tr>
<tr>
<td>Rural</td>
<td>39.2</td>
<td>17.3</td>
<td>14.7</td>
<td>24.7</td>
<td>9.1</td>
</tr>
<tr>
<td>Total</td>
<td>36.5</td>
<td>16.4</td>
<td>12.2</td>
<td>18.6</td>
<td>7.1</td>
</tr>
<tr>
<td>% Consuming &gt;30%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>19.1</td>
<td>25.4</td>
<td>36.4</td>
<td>19.1</td>
<td>45.5</td>
</tr>
<tr>
<td>Rural</td>
<td>7.6</td>
<td>12.8</td>
<td>12.9</td>
<td>12.0</td>
<td>19.9</td>
</tr>
<tr>
<td>Total</td>
<td>8.8</td>
<td>14.3</td>
<td>17.3</td>
<td>14.6</td>
<td>27.7</td>
</tr>
</tbody>
</table>

*a The proportion differs significantly from middle and high-income groups within same year (p < 0.05).

*b The proportion differs significantly among three income groups within same year (p < 0.05).

*c The proportion differs significantly from corresponding value in other two years (p < 0.05).

*d The proportion differs significantly from corresponding value among the three years (p < 0.05).
patterns change dramatically. Associated socioeconomic changes especially important in the nutrition transition are changes in women’s roles (especially with respect to patterns of time allocation), in income patterns, in household food-preparation technology, in food production and processing technology, and in family and household composition.

The sectoral distribution of the labor force toward industry and service has accelerated around the world. Occupational data obtained from the World Bank are used to study the structure of the occupations. *A priori*, one would expect that there would be few agricultural jobs in urban areas relative to rural areas. We would also expect a much more rapid increase in the proportion of service jobs in urban areas. We ran time-series regressions for a set of lower-income countries for 1972–95. The regression equation, using OLS weighted by the total work force in each country, produced significant year, proportion urban, and urban interacted with year coefficients (\(p < 0.001\) for all three sets of regressions for service, manufacturing, and agricultural occupations). We simulated the occupation time trends for two scenarios—25% of the population in the country is urban and 75% is urban.

The results, as expected, show a much higher and more rapid shift toward service and away from agriculture in the urbanized countries (see Figures 3 and 4). In contrast, the less urbanized countries are more highly agricultural and have seen a much slower shift toward service and manufacturing employment. One of the most inexorable shifts with modernization and industrialization is the reduced use of human energy to produce goods and services. The result is obviously a marked shift in activity patterns at work, a trend particularly associated with our shift into increasingly capital-intensive production and increasingly sedentary service and commercial work in more urbanized populations.

**b) China case study**

Unfortunately, there are few studies of this shift in activity and energy expenditures. One quite simple measure of overall activity has been collected in each survey of the CHNS. In Table 4, we grouped physical activity measures into low, middle, and higher (with low being the least stressful and active patterns) (Popkin, 1998). Activity patterns for Chinese adults shifted remarkably during 1989–93. In particular, urban residents in all income groups were more likely in 1993 to have adopted a more sedentary activity pattern (Table 4). In contrast, this pattern was not seen in the rural areas. In fact, rural residents, particularly low-income ones, showed a significant change from low and moderate activity patterns toward a high physical activity pattern.

### 4. URBANIZATION AND OBESITY

**a) Crosscountry descriptive work**

Body mass index (BMI) is the standard population-based measure of overweight and obesity status. This uses height in meters divided by weight in kilograms squared. For adults, the cutoffs used to delineate obesity are less than 18.5 for thinness (chronic energy deficiency), 18.5 to 24.99 for normal, 25.0 to 29.99 for overweight Grade I, 30.0 to 39.99 for overweight Grade II, and 40.0 and above for overweight Grade III (WHO, 1995). For this article, Grades II and III are combined. Ideally

<table>
<thead>
<tr>
<th>Determinants*</th>
<th>Rice</th>
<th>Wheat flour</th>
<th>Coarse grains</th>
<th>Red meat</th>
<th>Eggs</th>
<th>Edible oils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban (1.0)</td>
<td>-0.16**</td>
<td>0.49**</td>
<td>-0.12**</td>
<td>0.12**</td>
<td>0.00</td>
<td>-0.04</td>
</tr>
<tr>
<td>Urban (1.0)</td>
<td>-65.61**</td>
<td>19.70**</td>
<td>-50.45**</td>
<td>-2.99</td>
<td>2.28</td>
<td>-1.98**</td>
</tr>
</tbody>
</table>

*By food prices in the state store and annual per capita income.
** Indicates the parameter estimates are significantly different from zero at the 1% and 5% levels, respectively.
Figure 3. Shifts in the distribution of occupations for lower income countries, simulations assuming 25% of the population living in urban areas, 1965–93. (Source: World Bank, 100 countries figure created using simulation of OLS weighted regression of pooled timed series with urban interaction term.)

Figure 4. Shifts in the distribution of occupations for lower income countries, simulations assuming 75% of the population living in urban areas, 1965–93. (Source: World Bank, 100 countries figure created using simulation of OLS weighted regression of pooled timed series with urban interaction term.)
we would follow these cutoffs universally; unfortunately many published results use earlier cutoffs (e.g., many use a level for Grade I of a BMI above 25 and others use the National Center for Health Statistics percentile cutoffs that gave males a cutoff of 27.8 and females 27.3) and the datasets are unavailable for revision.

Nationally representative or large representative surveys from a few countries provide urban-rural comparisons of the obesity patterns. More thorough analysis of obesity patterns and trends is presented elsewhere (Popkin and Doak, 1998). In general, there are far higher levels of obesity (especially Grade II and above) in the Middle East, the Western Pacific, and Latin America. In Figure 5 we provide examples of obesity level differences between urban and rural areas. As expected, there is a much higher level of obesity in urban than in rural areas.

(b) China case study

All of the longitudinal analyses of the determinants of obesity in China have used fixed effects models and have thus removed any effect of residence in an urban area; however, when urban was interacted with a time-varying physical activity measure its coefficient was significant \( p > 0.001 \), from unpublished results). Cross-sectional OLS analysis of the effects of fully specified models that include urban dummy variables show that urban residents are far more likely to be obese, even when controlling for diet and physical activity and smoking behavior (Paeratakul et al., 1998).

5. HEALTH IMPLICATIONS

A range of changes in health accompany the nutrition transition in urban areas. Most immediate seems to be the emerging epidemic of non-insulin-dependent diabetes mellitus (NIDDM). There is a growing literature that documents rapid increases in NIDDM in many lower-income countries (Hodge et al., 1996, 1997; Levitt et al., 1993; Zimmet, McCarty and de Courten, 1997). Other work indicates that many of the other cardiovascular conditions related to NIDDM, such as hypertension, dyslipidemia, and atherosclerosis, are documented as increasing rapidly (e.g, Beaglehole, 1992). Recently a most provocative cancer study has laid a strong basis for linking the diet, activity, and body composition trends discussed above to the likelihood of increased rates of prevalence for a larger number of cancers (World Cancer Research Fund, 1997).

A related clinical and epidemiological literature highlights the importance of the same factors noted as being central to the nutrition transition—diet shifts, reduced physical activity, and obesity as also being critical determinants of NIDDM (Zimmet, McCarty and de Courten, 1997). We review this literature in more detail elsewhere (Popkin, 1998).

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<tbody>
<tr>
<td>Urban residence</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowest level</td>
<td>23.7b,d</td>
<td>34.3b</td>
<td>42.6</td>
<td>35.5c</td>
<td>45.4</td>
<td>42.8</td>
<td>44.5c</td>
<td>58.3</td>
<td>55.5a</td>
<td>55.5a</td>
</tr>
<tr>
<td>Middle level</td>
<td>49.6b,c</td>
<td>30.1</td>
<td>30.2</td>
<td>46.1c</td>
<td>39.7a</td>
<td>40.6</td>
<td>48.0a</td>
<td>34.5</td>
<td>32.0a</td>
<td>32.0a</td>
</tr>
<tr>
<td>Highest level</td>
<td>26.7b</td>
<td>35.6b</td>
<td>27.2</td>
<td>18.4</td>
<td>14.9</td>
<td>16.6</td>
<td>7.5</td>
<td>7.2</td>
<td>12.5a</td>
<td>12.5a</td>
</tr>
<tr>
<td>Rural residence</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowest level</td>
<td>15.3c</td>
<td>3.9b</td>
<td>4.8b</td>
<td>16.2c</td>
<td>12.3</td>
<td>12.6</td>
<td>23.7a</td>
<td>24.8</td>
<td>19.8</td>
<td></td>
</tr>
<tr>
<td>Middle level</td>
<td>22.2b,d</td>
<td>5.3b</td>
<td>7.9b</td>
<td>28.9c</td>
<td>14.1</td>
<td>13.3</td>
<td>35.2c</td>
<td>24.0</td>
<td>26.8c</td>
<td>26.8c</td>
</tr>
<tr>
<td>Highest level</td>
<td>62.5b,d</td>
<td>90.8b</td>
<td>87.3b</td>
<td>54.9c</td>
<td>73.6</td>
<td>74.1</td>
<td>41.1c</td>
<td>51.2</td>
<td>53.4</td>
<td></td>
</tr>
</tbody>
</table>

a The proportion differs significantly among three income groups within same year \( p < 0.05 \).
b The proportion differs significantly from corresponding value among three years \( p < 0.05 \).
c The proportion differs significantly from middle and high-income groups within same year \( p < 0.05 \).
d The proportion differs significantly from corresponding value in other two years \( p < 0.05 \).
6. DISCUSSION

This article presents a great deal of descriptive data that show that urban areas in lower and middle-income countries are further along on the shift toward more “Western diets” dominated by more refined foods and a higher fat diet and also a more sedentary lifestyle and more obesity. The conditions that are leading to the rapid change in diet, activity, and obesity are linked with many chronic diseases. Together these effects are leading to a rapid shift in the composition of disease in lower-income countries. Unlike infectious and childhood disorders, these chronic diseases are very medical care-intensive and these emerging disease patterns have important implications for health care costs for many decades into the future. They also can have important effects on productivity, morbidity patterns, and a wide range of measures of quality of life.

An issue that we have not addressed relates to the question: is this a rich or poor person’s disease and diet pattern? For lower-income countries, a crucial dimension of the relationship between socioeconomic status and nutrition is the distribution of chronic disease risk factors by income group. In particular, a World Bank study on adult health in Brazil (World Bank, 1990) indicates that where income constraints among the poor are not too severe, many risk factors for cardiovascular disease will likely be greater among the poor than among the rich. Monteiro et al. (1998) use 1996 data from Brazil to show that there is an independent effect of economic variables on the risk of female obesity only in rural areas (the poorer the woman, the lower the risk of overweight). In the urban context income does not matter and either formal education or access to information is each independently and inversely related to overweight (Monteiro et al., 1998). In other words, on the national level in urban Brazil the more educated are less likely to be overweight than the less educated.

To date, little is understood about the array of public health and macroeconomic price and other policy options for addressing these problems. Moreover as noted earlier, often this condition of urban dietary excess and obesity affects one segment of the population while another faces hunger and food insecurity. Our purpose is not only to understand the dietary and health changes taking place, but also to begin to focus attention on defining the program and policy changes that could redirect the nutrition transition in many regions of the world.

Much of our focus in food and nutrition and economic planning produces results that only enhance this nutrition transition and adverse set of lifestyle changes. Decades of fighting poverty and of working to increase fat and animal consumption is one aspect of this
current set of programs and policies that has led to an entrenched bureaucracy trained to encourage such activities.

One must go to Scandinavia and Mauritius to find countries which have attempted to deal systematically with the transition’s negative effects. The example of Norway demonstrates the difficulty of producing major changes in the structure of the diet (cf. Milio, 1990). Over a decade of very active food and nutrition policy implementation in Norway has included extensive agricultural, health, and nutrition education, and regulatory sector efforts to reduce saturated fat intake. These policies resulted in a decrease in the proportion of total and animal fat in the national diet.

In lower income countries, the most positive case is that of Mauritius. This small island republic in the Indian Ocean found such a high level of cardiovascular disease as part of an adult health survey conducted in 1987 that it launched a broad comprehensive health promotion program. The government used the mass media, price policy, other legislative and fiscal measures, and widespread education activity in the community, workplace, and schools. The results were remarkable: hypertension was reduced considerably, mean serum cholesterol decreased, cigarette smoking by men and women declined, as did heavy alcohol use, and there was increased activity (Dowse et al., 1995; Uusitalo et al., 1996). Obesity levels continued to increase and there was little change in the rate of glucose intolerance.

Development of food and nutrition and health policies for countries where problems of dietary excess and deficit exist side by side represents a new and pressing agenda. This is particularly the case in the more urban regions of the world, but as was shown from the limited data on obesity in a few sub-Saharan Africa countries, it is even beginning to be true for that region of the world. In such countries, the prevailing policies to promote agricultural and health change to address problems of deficit are quite different from those needed to address problems of excess. In one example of policy-relevant research, Guo et al. (1998) show how price changes in China could have improved protein intake and reduced fat intake if careful selection of prices to be subsidized took place.

The challenge is clear. Surprisingly little is known and minimal research is focused on this topic; however, the evidence from large-scale surveys and other sources indicates that the lifestyle changes associated with urbanization are producing major problems linked with dietary excess.

REFERENCES


Guo, X., Popkin, B. M., Mroz, T. A. and Zhai, F. (1998) Food price policy can significantly reduce the negative effects of the nutrition transition in China. Carolina Population Center, the University of North Carolina at Chapel Hill, Chapel Hill.


