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Food consumption of low income groups in Poland and Belgium

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Foreword

Food consumption in the last decades has changed significantly in the European countries. The directions of changes were not always in compliance with contemporary dietary recommendations and guidelines. The different factors influencing dietary changes include: policies of food supply, pricing and technology, production, marketing activities and public health messages. However, it should be stressed that for low-income consumers economical status of the household and cost of food are still decisive determinants influencing food choice. The abundance of food assortment, including highly processed and convenience products on the one hand and low purchasing power of vulnerable population groups on the other hand, push the choice towards products which are not valuable from the nutritional point of view.

Changing food consumption patterns, lifestyle and consumer behaviour caused wide-spreading prevalence of obesity and other non-communicable diseases, contributing to overall mortality and morbidity in Europe.

In the nineties of the XX century two major processes influenced the general conditions of European societies living, namely the transformation of Central and East European countries into market economies and as a consequence of this the enlargement of the European Union. These two phenomena lead to economical development and improvement of markets of all goods and services, including food products and out of home food consumption.

In spite of visible symptoms of an overall progress, economical and social deterioration of part of population, and poverty and hunger are among the most important social problems of today's Europe. It is very difficult to effectively counteract these issues and to prevent them. Having in mind these circumstances it was valuable to focus on understanding the structural changes in the two countries representing the "old" and "new" Europe, namely Belgium and Poland. The book presents the outcomes of research on socio-economic aspects of quality of life, directed towards the improvement of food consumption and upgrading health status of low--income population groups in both countries.

Research teams from Gent University in Belgium and Warsaw University of Life Sciences (WULS – SGGW) in Poland developed and carried out the project entitled "Social stratification in food consumption in Poland and Belgium" that was accepted in the frame of bilateral scientific and technological cooperation of UGent (BOF No 01150904). The project started in February 2004 and ended in December 2006.

The first and second chapter of the book give a background to the issues investigated within the project. In chapter three the methodology applied in the research to investigate food consumption of low-income groups is described. Comparative analysis of food consumption in Poland and Belgium on the base of secondary data is the topic of chapter four. The next two chapters (number five and six) present the results of field research regarding food consumption and nutritional behaviour of low income consumers both in Poland and Belgium. Food consumption and nutritional behaviour of low income groups in both countries are compared in chapter seven. The last chapter, number eight, deals with food policy programmes for low income groups on the background of different countries' experiences.

Chapter I

DETERMINANTS OF FOOD CONSUMPTION

Renata Januszewska, Barbara Kowrygo, Jacques Viaene

1. Introduction

Food is the most important need of human being. The process of addressing food is multidimensional and serves many purposes. The first and foremost one is to satisfy hunger and keep the person alive. Second, it allows to enhancing peoples' physical growth and keeps them in good health. Subsequently, it makes them fit for work, and helps stay intellectually and physically active. And the last one is to enable the person to perform social functions and feel good, which is related to hedonistic feelings.

Human behaviour is governed by economic, biological, demographical, socio-psychological and cultural factors which form an integrated system. These factors determine consumption changes as well as hierarchy of nutritional needs, and may act as stimuli, constraints or circumstances. The factors vary in importance from society to society and from individual to individual.

2. General determinants of food consumption

Existing literature offers various detailed classifications and descriptions of determinants which affect overall consumption (demand) structure, and food generally (Meulenberg and Viaene, 2005). Many divisions or models are similar to one another, although there are differences in the way hierarchy is stressed or in the influence exerted by particular factors.

Figure 1 presents a general synthesis of food consumption determinants – cause and effect relation. A general food consumption framework is defined by external environment of household and household members. It is shaped by country's natural resources such as food production capacity, overall market and economic situation, law and finance systems, marketing actions undertaken by food producers and traders, organizations of social life, and government policy concerning agricultural, food and nutrition. Consuming subjects, in this case households and individual consumers, do not have a direct influence on the above mentioned determinants, therefore

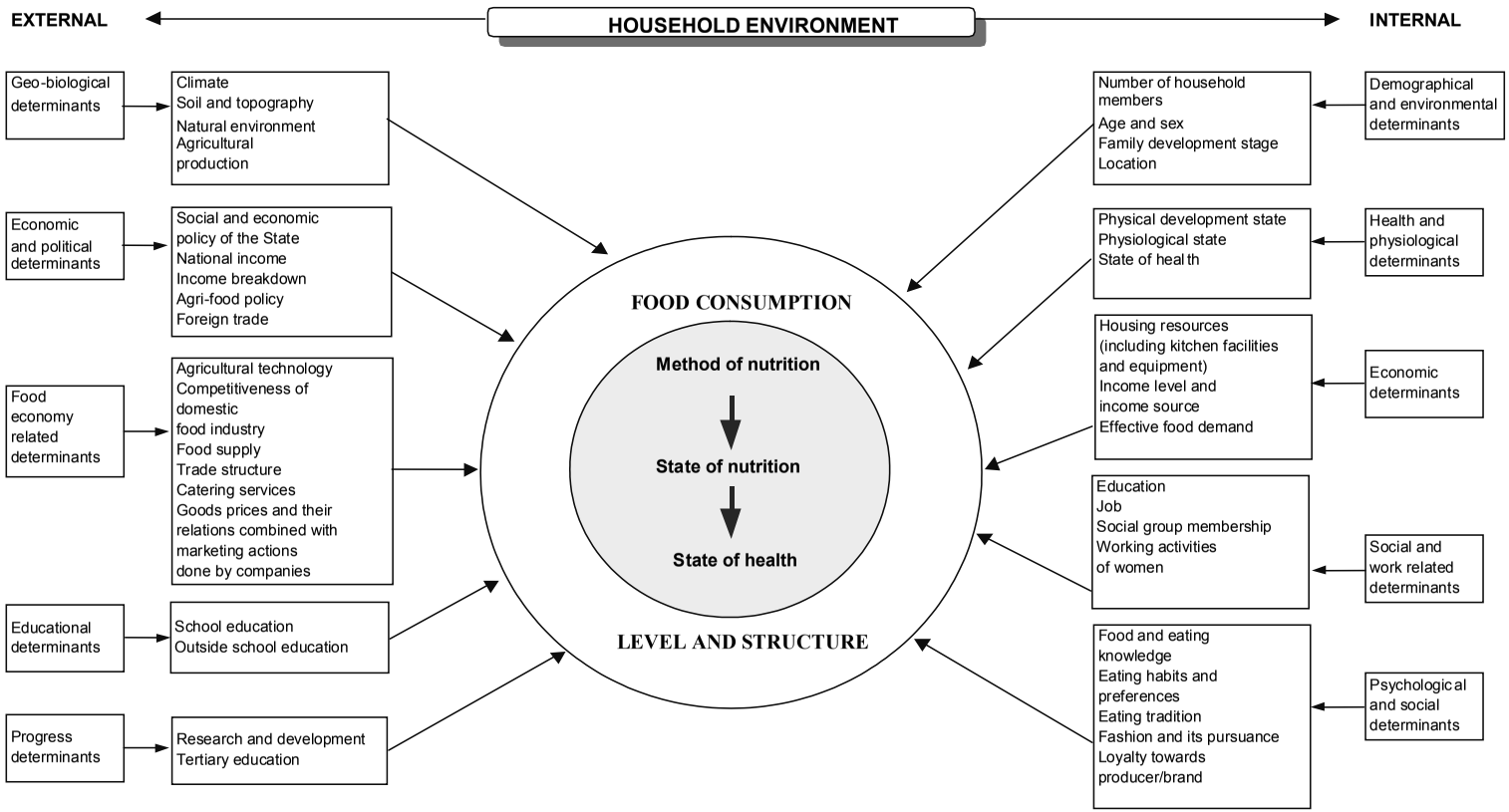

FIGURE 1. Food consumption determinants
Source: Kowrygo, 2000.

their behaviour is marked by adjusting to the existing situation. As far as internal environment of consumer is concerned, food consumption is mostly determined by household income, price and availability of products and services.

The internal conditions of consumer behaviour are linked with motives which drive a particular consumer: his or her personality, learning and memorizing skills, preferences, likings, and nutritional habits. In the second half of the twentieth century it was observed that some of food consumption determinants are at the same time tools which can be used for shaping food consumption policy. The most significant ones are income, price, and food supply (Kołodziejek, ed., 1980).

It ought to be stressed that the two groups of determinants related to macro- and micro-environment of each consumer/household are integrated into a dependency chain – method of nutrition – state of nutrition – state of health – marked by consumption level and structure which is also influenced by other determinants (e.g. genetic ones).

The last few decades have seen changes in European dietary patterns; not always positive. Several factors shape dietary changes: policies on food supply, pricing and technology, production, promotion activities and public health messages. A combination of consumer demand and commercial investment in mass production largely determines the direction of changes (WHO, 2002).

Almost forty years ago Périssé et al. proved that there are relationships between the development of a given country expressed as GDP per capita and the structure of an average diet (Drewnowski and Popkin, 1997). The authors declared that increased GDP is accompanied by bigger share of sugar, animal and vegetable fat in the daily food intake as well as a sharp drop in energy obtained from complex carbohydrates. The share of proteins in daily diet energy remains almost unchanged, but in rich countries as opposed to poor countries, animal proteins prevail. There are also alterations within the energy obtained from animal fat. The richer the country the bigger the share of visible fats as well as of the invisible fat from animal products; and the lower the share of invisible vegetable fat. The trends in changes in the energy structure of the diet have been proved among others by FAO/WHO research done in the 1980s, as well as studies by Posner et al. (1994) and Chevassus-Agnes (1994) at the beginning of 1990s.

The need of changes in contemporary human eating patterns call for a profound knowledge of both general determinants of food consumption and particular factors determining food choice and nutrition.

Figure 2 shows the relationship of a wide set of factors influencing the choice of food. It also indicates the importance of public policy in many sectors ranging from agriculture and food processing, manufacturing and trade to retailing, catering and advertising all of which shape the availability and accessibility of food.

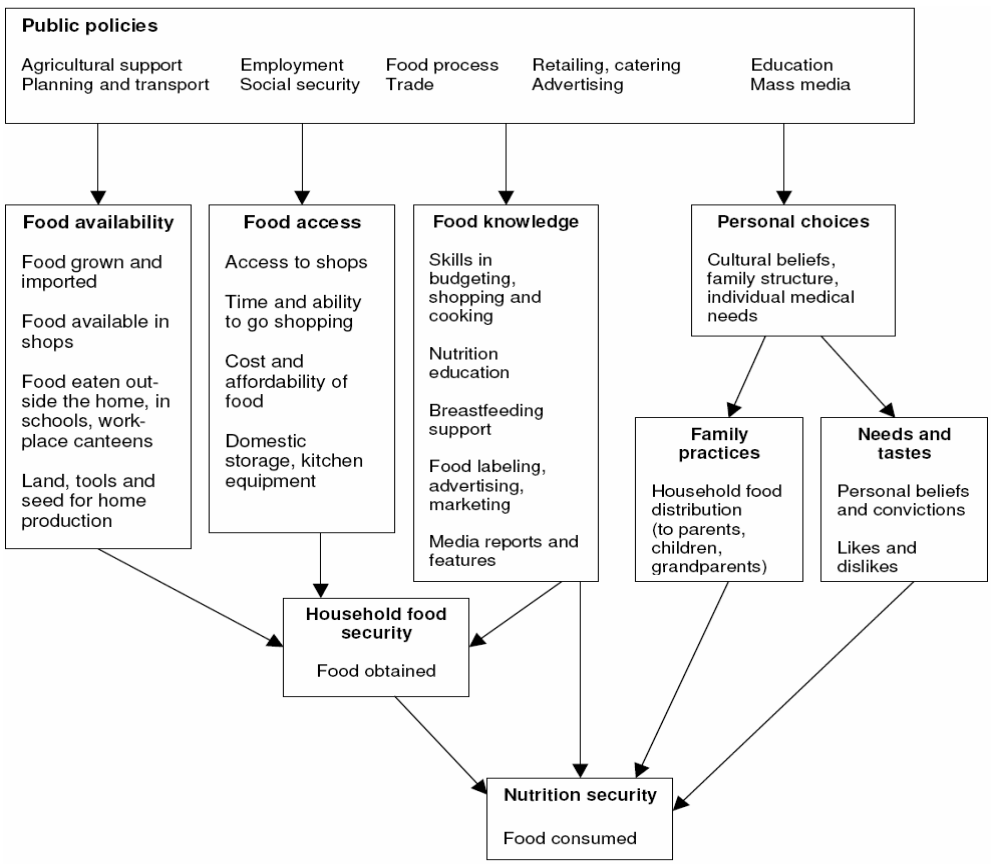

FIGURE 2. Factors influencing food choice
Source: WHO, 2002.

The Pan-European Survey of Consumer Attitudes to Food, Nutrition and Health found that the top five influences on food choice in 15 European Union countries are quality /freshness (74%), price (43%), taste (38%), trying to eat healthy (32%) and what my family wants to eat (29%). In the USA the following order of factors affecting food choice has been reported: taste, cost, nutrition, convenience and weight concerns (Glanz et al., 1998).

European Food Information Centre, whose goal is to enhance the public understanding of nutrition and food safety made a list of food choice factors, which include (EUFIC Review, 2005):

- biological determinants such as hunger, appetite and taste,
- economic determinants such as cost, income, availability,
- physical determinants such as access, education, skills (e.g. cooking) and time,
- social determinants such as culture, family, peers and meal patterns,
- psychological determinants such as mood, stress and guilt,
- attitudes, beliefs and knowledge on food.

The complexity of food choice is obvious from the list above, which is in itself not exhaustive. Food choice factors also vary according to life stage and the power of one factor will vary from one individual or group of people to the next. Thus, one type of intervention to modify food choice behaviour will not suit all population groups. Rather, interventions need to be geared towards different groups of the population with consideration to the many factors influencing their decisions on food choice (EUFIC Review, 2005).

3. Socio-economic status as a determinant of food choice

It must be underlined that household income and the cost of food is an important factor influencing food choice, especially for low income consumers. Low income may restrict the ability to buy food on the basis of health and limited access to healthy foods (Dowler et al., 1997; James et al., 1997). When socio-economic differences in consumption of food and nutrition are observed, they are generally in line with health inequalities. However, the poor in affluent societies do not suffer from dramatic energy and nutrient deficiencies; in fact over-nutrition is more common than under-nutrition.

A special report on health inequalities published in the journal of Social Science and Medicine in 1990 revealed striking differences in many countries between social groups in regard to structural and lifestyle factors. Studies show that lower socio-economic groups have greater incidences of premature babies, low birth-weight babies, hearth disease, stroke, and some cancers (Carr-Hill, 1990; Spruit, 1990; Wnuk-Lipiński, 1990; Aiach and Curtis, 1990; Duch and Sokołowska, 1990; Rodriguez and Lemkow, 1990; Lagasse et al., 1990; James et al., 1997). Risk factors including lack of breast feeding, smoking, physical inactivity, obesity, hypertension, and poor diet are clustered in lower socio-economic classes. The diet of these groups provides energy from foods such as meat products, full cream milk,

fats, sugars, canned products, potatoes and cereals. This diet is also low in vegetables, fruit and whole-wheat bread (Krebs-Smith et al., 1995; Li et al., 2000; Krebs-Smith and Kantor, 2001; Simila et al., 2003). As a consequence, poor people have fewer intakes of essential nutrients such as calcium, iron, magnesium and vitamin C than people in higher social classes.

Socio-economic status is represented by multiple indicators including income, education, and occupation, all of which may operate independently or interact in leading to inequalities that influence food choices. Socio--economic indicators are proposed in many studies (Stronks et al., 1996; Cantillon et al., 1999; Duncan et al., 2002). A review of fifteen European countries showed that high educational level is associated with a more healthy diet (Roos and Prättälä, 1999; Irala-Esteves et al., 2000). A higher education level tends to be associated with a wider knowledge of a healthy diet (Margetts et al., 1997). Differences in the intakes of energy yielding nutrients are less evident but those with high education tend to have a smaller intake of fat. Obesity also varies by socio-economic status. A study based on twenty six (mostly European) populations shows that lower education is associated with higher Body Mass Index (BMI) in approximately half of male and in almost all of female populations (Molarius, 1999). Many studies indicate the importance of socio-demographic indicators such as employment status and age (Frank-Stromborg et al., 1990), urbanisation and region (Cook, 1990), and social and cultural determinants (Lagasse et al., 1990). Other studies show the positive relationship between gender and food choices (Furst, 1991; Lupton, 1996; Grogan et al., 1997). Socio--economic indicators are also proposed in many studies (Cantillon et al., 1990; Stronks et al., 1996; Duncan et al., 2002).

Additionally, prices and incomes have been reported as significant explanatory variables for food purchase in developed countries (Ritson and Petrovici, 2001). Prices and consumer incomes could account for 97% of variation in the US demand for food (Huang, 1985). This implies that economic factors are key indicators of food choices, particularly in low income groups (Dobson et al., 1994, Kaufman et al., 1997). The recent study of Duncan and others (2002) shows that economic indicators are considerably more sensitive than traditional ones, such as education and occupation. However, the study also shows the difference in relative rates of morality between two groups of respondents under and above 64 years of age. In this regard, the earlier findings of Lehmann and others (1990), which show that people in lower socio-economic groups live shorter, are confirmed.

Many analyses indicate that low income groups spend a very high share of the total budget for food, confirming Engel's Law (Engel et al., 1986).

According to Maseide (1990), it is more important to focus upon vulnerable groups, like low income groups, than on all socio-economic classes in order to plan effective health policies that aim to improving health conditions of the whole population. Importance of such research is recognised and national studies have been launched inside (FSA, 2004) and outside Europe (CBPP, 2004).

4. Final remarks

There are many influences on food choice and state of nutrition and health of the consumer. Among them the education level, employment situation, demographical and socio-cultural determinants are most often underlined. However the economical factors, especially household's income and the cost of food are the decisive factors determining the access to food products and possibility of purchase. The food choice of low income group of consumers depends in the highest degree on these factors implying a greater tendency to consume unbalanced diets resulting in under- (micronutrient deficiency) or over-nutrition (overweight and obesity).

For this reason it is important to pay attention and to analyze the direction of changes in nutrition of low-income consumers, representing mainly so called vulnerably groups: children, young, older, living alone, homeless or unemployed people.

Increasing number of low income population in modern/affluent society shows that it is necessary to develop both governmental and non governmental actions, which integrate local committees and aim at improving living conditions including accessibility to shops and availability of food affordable to people with low income.

Literature indicates that general changes in nutrition behaviour are not always positive. Therefore, there is a need for multi-aspect monitoring of food consumption and formulating as well as implementing a new and well-focused national nutrition policy.

Chapter II

SPECIFICITIES OF POVERTY PHENOMENON IN POLAND

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1. Introduction

Among priority goals of the social policy in many countries, there is a struggle against poverty and social exclusion. The programmes devoted to this goal require identification of the social groups most endangered by poverty and requiring help. There is the need to answer the questions: Who is poor? What is the incidence and degree of poverty? Has the sphere of poverty extended since the time of economic transformations? In this chapter, an attempt to answer these questions is undertaken from both the methodological and empirical points of view.

After a short presentation of methodological assumptions adopted in the survey[1] – the empirical results of the analysis of the sphere of poverty in Poland are presented. An assessment of the scope and degree of poverty is made in the separated socio-economic and demographical profiles of households, and the results obtained are compared with the results of research carried out earlier (based on household budgets in the 1990s).

Identification of poverty and determination of its dimensions are not simple tasks for the reason that poverty is a multidimensional phenomenon. The analysis of the sphere of poverty is extended by factors other than income[2] describing the situation of separated households in terms of their housing conditions, health and education. An alternative to use single measures of poverty might be the synthetic measure[3], based on information on separated aspects of poverty, i.e. income, housing conditions, health and education.

[1] There are defined: poverty, data sources, ways of measuring its scope and depth.
[2] The analyses based on income have the longest tradition among studies on poverty worldwide.
[3] A way that takes into account the multidimensional concept of poverty is aggregation (combination) of various measures into one index.

2. Poverty concepts and measures

2.1. Definition of poverty

A few dozens years ago, an answer to the question "What is poverty?" was somehow simple and precise. The majority of poverty definitions include inability to obtain the goods essential for living, of which food is the most obvious element. Poverty was measured with a degree of under nutrition or with per capita consumption. An alternative approach defined the person (or household) as indigent if he (it) did not have at his (its) disposal a sufficient income to obtain food to meet basic needs. Despite many discussions on a precise definition of both 'economic resources' and 'basic needs', this approach has been popular and used in surveys till now. In 1976, the International Labour Office (ILO), presenting their programme for fight against poverty and unemployment, established that the basic needs of the population in each country should be taken into account. In result of broadening the concept of basic needs by additional aspects (dwelling, education, health care and culture), the definition of poverty has also been broadened. The poor is that human being who has failed to reach the minimum level of consumption of goods or services considered as basic.

The current concept of poverty is defined in a broader way – it includes social and political aspects of life deterioration. The Council of Ministers of the European Community was the first to formulate it in 1984 (Eurostat, 1990): "Poverty relates to persons, families or groups of people whose material, cultural and social measures are limited to such a degree that the level of their life declines beyond an acceptable minimum in the country of residence".

The United Nations Development Programme in its Report in 1991 states that: "Most people are poor as they do not have land, capital, credit or the possibility to obtain a fair job (...). They do not have access to welfare services on an adequate level (...). Moreover, they admit that poverty relates also to freedom and human rights" (World Bank, 2003).

Defining poverty in this broad context, as a complex social phenomenon, they admit existence of the three dimensions of poverty: economic, human and political. Economic poverty is a result of an unequal distribution of resources: capital and land, and improper exploitation of those resources. Human poverty is connected with an insufficient access to the essential facilities indispensable for just existence. A low or none share in the decision-making process is defined as the political dimension of poverty.

With broadening the scope of basic needs, a shift is made from the concept of understanding poverty as merely lack of resources for meeting, to the concept of understanding poverty as lack of opportunities and limitation of choices resulting from social and personal contingencies, necessary for conducting a valuable life.

All the efforts aimed at broadening the traditional definition of poverty explain the essence of the phenomenon but make measurement more difficult (Kordos, 1996).

2.2. Sources of information on poverty

Poverty has many faces, depending on the place, time, and it may be described in many ways. However, the most important in surveys on poverty are statistical sources, published mainly by the Central Statistical Offices. Information on consumption and income is obtained by representative surveys where households are asked to reply to detailed questions on expenditure and sources of income.

2.3. Measurement of poverty

To measure poverty, several highly important issues appear:

- definition of the degree of wealth,
- choice of the poverty line, i.e. the threshold below which a given household or person is considered as poor,
- choice of the indicator of poverty that is only applied in relation to the whole population or subgroups.

Selection of the degree of wealth, the poverty line, equivalence scale and basic measures of poverty are very important as they influence the results of measurement. Different methods sometimes lead to contradictory conclusions.

2.3.1. Indicators of wealth – income or consumption

Income or consumption are indicators of wealth estimating poverty with the use of money-based measures.

It is known that consumption better reflects a current living standard and the possibility to meet the basic needs in the household. Consumer expenditure reflects not only goods and services the household may have at its disposal based on its current income, but also it is important to have access to the credit market.

The main benefit to use income as the measurement of poverty is the possibility to compare income with the data from other sources, e.g., with salaries, pensions, etc. Irrespective of whether income is used or consumption, it is highly important that the data collected from the household or individuals are fair and reliable.

2.3.2. Equivalent scales

Households of a different size and demographic composition have different needs and this fact is not easy reflected through the measures of poverty. Variety of the needs is taken into account by the equivalence scales.

The use of the equivalence scales, budgets of households of various types may be altered accordingly to their needs[4] adjusted due to the social and demographic features of the household as the scales equivalence are rates (indicators) that allow determining volumes of income for different types of the households based on the income fixed for the representative household. Overall, this leads to dividing the total income by the number of persons adjusted with value of scale related to the number of persons[5]. If the scale adopts value 1, and the reference family is one person, then value of the adjusted income is equal to the per capita income amount.

In practice, the set of equivalence scales that are used is wide (Szulc, 2004). Thus, e.g., in international surveys on wealth, inequalities and poverty related to households, carried out in the second half of the 1980s within the framework of Luxemburg Income Study, the scales are classified in terms of the purposes they are aimed at (Buchman et al., 1988). Two groups of the scales are distinguished namely, the scales of an expert nature and the scales based on surveys and constructed with use of the multidimensional analysis. In the first group of scales, there are the scales that pursue only statistical purposes, for example to estimate the number of people who live below the poverty line (the STAT scale) as well as the scales serving as the tool to determine benefits of social programmes (the PROG scale). The second group of scales is estimated based on surveys on consumption expenditure (the CONS scale) or based on assumptions of sufficient consumer's income (the SUBJ scale). To build the latter, questions concerning estimates of one's income, minimum income, have to be answered. Moreover, values of the scales differ as follows:

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[4] Since it is known that per capita minimum expenditure in the several-person household will be lower due to certain fixed costs, irrespective of the number of persons.

[5] $D_E = D/LOS^e$, where: D_E – adjusted (equivalent) income; D – total income in the household, LOS – number of persons in the household; *e* – the scale in respect of the number of persons.

- the STAT scale: 0.72,
- the CONS scale: 0.36,
- the PROG scale: 0.55,
- the SUBJ scale: 0.25.

Therefore, different values of income in relation to the number of persons in the household depend on the construction of equivalent scale.

An equivalent scale takes into account the size of the household and other demographic features of the household, e.g., age of the household's members. The OECD scale assigns the value 1 to the first adult person, the value 0.7 to each further adult person, and the value 0.5 to each child aged below 14. In this case, the 3-person family consisting of two adults and a child below 14 will have the value of the scale equal to 2.2. The equivalence scale being equal to 2.7 for the household consisting of 3 adults and one child means that this household must spend 2.7 times more than the one-man household to achieve the same level of consumption. It is considered that the OECD scale assigns a relatively too large importance to many--person families. Therefore, in the modified OECD scale, the second and every further person has the value of 0.5, and to each child below 14 the value of 0.3[6]. It is proper to add that the above-mentioned scales are standard in the EU countries' statistics.

2.3.3. Poverty lines

When income, consumption or non-pecuniary measures are defined for an individual or household, the next step is to define one or more poverty lines. Poverty lines are the terminal points separating the poor from those in better situation. The lines may be pecuniary (e.g., a definite level of income or consumption) or non-pecuniary (e.g., a definite level of literacy). There are two main ways for determining the poverty line: relative and absolute.

Relative poverty lines are defined in relation to an overall distribution of income or consumption in the country, e.g., the poverty line may be fixed at 50% of the national average income or consumption.

Absolute poverty lines are set up within certain absolute standards that households should agree to meet their basic needs. For the pecuniary measures, these absolute poverty lines are often based on estimates of costs of the basic nutrition needs, i.e. the food-related basket considered as the minimum for health of the typical family, to which there is added provision for non-food-related needs.

[6] This change results from a diminishing share of expenses on foods in the households' budgets. With an increase in the number of persons in the household, expenses on foods grow significantly faster than, e.g., expenses on housing.

Sometimes, alternative poverty lines are based on subjective measures of poverty determined by respondents.

Setting up a proper poverty line is a difficult matter. Poverty lines differ from one another over time and space, and each country uses the lines that are relevant to its level of development, social standards and values[7].

In the European Union countries, the poverty lines amount to 60% of the median of average equivalent income or the arithmetic mean of households' expenditure.

2.3.4. Poverty indicators

It is obvious that income or expenditure may not adequately reflect a complex, multidimensional phenomenon as poverty. Nevertheless, when it comes to a quantitative analysis of poverty, it is usually restricted to the income aspect, and mainly monetary.

The income aspect of poverty (income poverty) comprises both the synthetic and specific measures (Kordos, 1991). Having the information on income and poverty line, the problem is to apply adequate total measure summing up individual measures for assessing the phenomenon of poverty. Such measures are aggregated measures of poverty (Panek et al., 1999). There are many alternative measures of poverty and mostly three of them are used (World Bank, 2004):

1. Incidence of poverty (headcount index) – is the share of population whose income (or consumption) is below the poverty line. This means the share of population that may not afford the basket of essential commodities.

2. Poverty gap index – is a measure giving information on how far poor households are from the poverty line[8]. It is obtained by adding all "deficits" of the poor households and dividing this sum by the number of poor households. The above measure is described as the cost of elimination of poverty (in relation to the poverty line), as expressed in money[9]. This measure is used for non-pecuniary indicators assuming that the distance is significant. e.g., the poverty gap index in education may be a number of years in education necessary or required to reach the definite threshold of education.

3. Poverty severity index – this index measures not only the distance that separates the poor from the poverty line (poverty gap index) but also

[7] The poverty line value fluctuates from 30 cents per day in the poorest countries to a few dollars or so in rich countries.

[8] The concept of "income deficit".

[9] It means that every poor will receive exactly such amount, which is necessary for them to get rid of poverty.

inequality among the poor. It means that a greater attention should be paid to those households, which are placed further from the poverty line.

An alternative for use of the above-specified measures of poverty may be combining the information about various aspects of poverty, such as creating the measure called "well-being composite index" that takes into account income, employment, health and education.

2.4. Other measures of poverty

2.4.1. Human poverty index

Evaluation of poverty in all the dimensions is the best way of poverty measurement. This goal is achieved by a system of human indices.

The United Nations Development Programme (UNDP) developed an index measuring the social aspect of poverty that is called the human poverty index (HPI) (World Bank, 2003). This aggregate index is constructed for both the developing countries (HPI-1) and for the OECD countries of high incomes (HPI-2). Both indices include information on the three dimensions of quality of life: long and healthy life, knowledge, and decent standard of living. The HPI-2 index additionally takes into account another aspect of life – social exclusion.

In case of the advanced countries, the human poverty index HPI-2 is:

$$\text{HPI-2} = \left[\frac{1}{4}(P_1^{\alpha} + P_2^{\alpha} + P_3^{\alpha} + P_4^{\alpha})\right]^{\frac{1}{\alpha}}$$

where:

P_1 – percentage of people whose life expectance does not exceed 60 years;
P_2 – percentage of people being functional illiterates;
P_3 – percentage of people whose income is below the poverty line, which is below 50% of median of per capita disposable income;
P_4 – rate of a long-term (lasting 12 months or longer) unemployment;
α – indices level of poverty.

The human poverty index is a concept providing an indication about poverty in both rich and poor countries. It is a standardised measure, with a value ranging from 0 to 100.

2.4.2. Social exclusion indices

In 1999 at the summit in Lisbon, the EU developed a programme of social actions. Marginalisation, besides poverty and unemployment, is considered as a barrier for socio-economic development. Having effective methods to

reduce these phenomena is one of the main objectives of the social policy of EU member states.

In order to carry out an effective policy of counteracting social exclusion, a system of information is needed that would allow to diagnose precisely and to compare the situation in the EU Member States. Adoption by the Member States of a set of jointly developed and agreed indicators[10] covering the four most important areas concerning social exclusion (income, employment, health and education) serves this objective (MLSP, 2004).

The following indicators are connected with income (poverty gap):

- the poverty line fixed at the level of 60% of median of an equivalent income disposable in a given country;
- incidence of poverty prior to and after taking into consideration of social transfers according to the gender;
- incidence of poverty according to:
  - socio-economic groups,
  - age,
  - type of economic activities,
  - gender,
  - type of ownership of flat;
- incidence of poverty with adoption of different poverty lines (the so-called index of dispersion around the poverty line);
- degree of poverty;
- differentiation of equivalent income distribution (Gini index, relation of quintile V to quintile I).

The indicators related to employment are:

- households without employed persons,
- rate of long-term unemployment,
- coefficient of variability of the regional employment rate.

The indicators related to health are:

- life expectancy,
- self-assessment of the state of health.

Education indicator is only represented by the number of young people not continuing education in secondary and higher-level schools.

Research is under way on widening and supplementing the list of indices of social exclusion by new ones, specific for each country. The list of indicators in the area of diagnosis of material situation of the poor includes the indices measuring threat of poverty, the indicators on effectiveness of various forms

[10] At the summit in Laeken in December 2001, 18 statistical indices on income, poverty and social exclusion are approved.

of assistance. The measures on the issue of employment relate the "invisible categories", i.e. the people looking for a part-time job, temporarily employed on contracts, or those employed for a definite time-period.

3. Social geography of poverty in Poland

3.1. Premises

This part of the study consists of poverty incidence in Poland and its spread among the groups of households according to income level and other selected socio-demographic characteristics.

An analysis of the relative poverty was carried out setting up the poverty line at the level of 60% of the value of median of equivalent income for the whole set of households that consists of 529.5 PLN. Below this poverty line, there were 16.8% of households in Poland in 2003. The index measuring the degree of poverty (determining an average "deficit" of income in relation to the poverty line for the poor population) reached the value of 27.1%. This means that a household with the equivalent income below 60% of value of median has an average deficit in the monthly budget of about 143.3 PLN.

3.2. Poverty in Poland

3.2.1. Poverty by socio-economic group in 2003

The group least vulnerable to poverty are, besides retired people's households (only 6.5% of the households are poor in this group), the households of self-employed people and employees' households (Fig. 1). The households living on non-earnings sources dominate the group of households with income below 60% of the value of median. Also for farmers' households, the group of poor is 2.5 times larger than in the case of total population. Thus, earlier conclusions are confirmed on dominance of farmers' households and the households living on non-earnings sources in the group of the poor.

The social groups with high percentages of the poor are characterised by high degree of poverty. The degree of poverty – as for the European standards – is quite significant, and in the poorest households, it amounts to 38.6%. "Deficit" to equivalent income in the agricultural households exceeds 200 PLN, whereas in the households living on non-earnings sources approaches 190 PLN. The households of retired people need an amount of 108.8 PLN to leave the sphere of poverty.

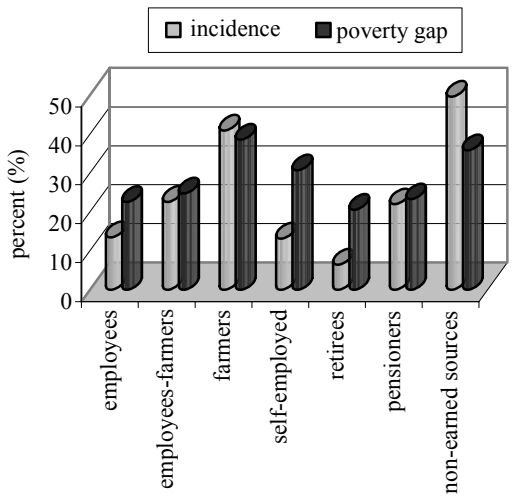

FIGURE 1. Poverty incidence and poverty gap by socio-economic status of the household head

3.2.2. Poverty by household composition

A high number of children in the family is a main determinant for a disadvantageous position of the household; i.e. the most disabled in terms of poverty are families with the highest number of children[11]. It turns out

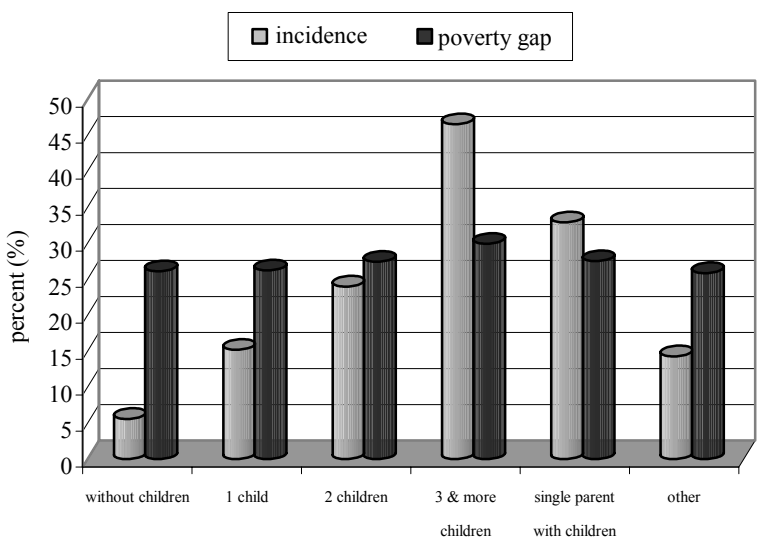

FIGURE 2. Poverty incidence and poverty gap according to the type of family

[11] With three or more children as opposed to not numerous families (with one child or two children).

that the presence of the third child in the family increases the probability of a significant decline in the material living standard of the family and drives such family in the poverty area.

In 2003, more than 46% of the families with 3 or more children were in the sphere of poverty. In the case of families with four or more children, almost half of them had at their disposal a monthly equivalent income lower or at least equal to 529.5 PLN. In addition, the remaining indices – depth and severity of poverty – point out to a difficult situation of numerous families. The smallest poverty incidence is among the childless families (Fig. 2).

3.2.3. Poverty by level of education of the head of household

The greatest poverty incidence (above 24%) occurs among the households with the lowest status of education – elementary, technical and primary education. Just these groups are characterised by both a high frequency of occurrence of poor households and a significant depth of poverty.

Quite a large depth of poverty is attributed to the household, in which its head has a higher education; however, there are not many poor households in this group, only 2.4%. The fact of significant differentiation of income takes also place among poor households whose head has secondary education (Fig. 3).

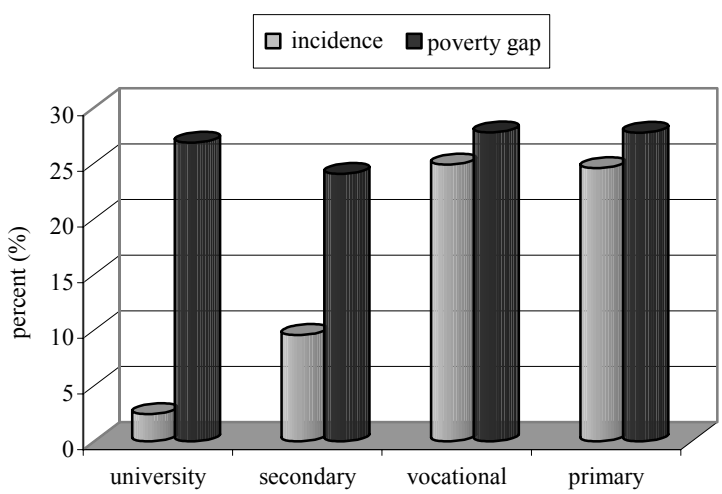

FIGURE 3. Poverty incidence and poverty gap according to the level of education of the head of household

3.2.4 Poverty by the province

An analysis of the data from Table 1 gives a significant differentiation of the incidence of poverty in provinces although not so significant as in the case of poverty in the socio-economic groups, or in the households with different number of children.

TABLE 1. Incidence, depth, severity of poverty and HPI in households by province in 2003 (%)

No	Province / Voivodship	Poverty incidence[1]	Poverty gap index (P_1)	Poverty severity index (P_2)	HPI $\alpha = 3$
1	Mazowieckie	12.58	25.25	10.21	22.13
2	Śląskie	14.76	25.76	10.13	21.83
3	Opolskie	14.95	30.20	14.99	24.70
4	Wielkopolskie	15.71	27.31	11.67	22.02
5	Lubuskie	15.92	23.84	9.25	23.49
6	Pomorskie	16.23	26.37	11.21	22.75
7	Łódzkie	16.25	28.02	12.32	25.13
8	Małopolskie	16.43	25.87	10.44	22.68
9	Zachodniopomorskie	17.44	27.52	11.57	24.58
10	Dolnośląskie	18.17	29.26	13.02	23.30
11	Kujawsko-Pomorskie	18.65	29.05	13.27	24.34
12	Lubelskie	19.34	28.45	12.57	26.09
13	Warmińsko-Mazurskie	20.53	26.09	10.53	27.94
14	Podkarpackie	21.57	26.11	10.83	25.62
15	Świętokrzyskie	22.60	27.18	12.37	26.64
16	Podlaskie	23.44	28.00	12.70	28.12

[1]Percent of poor households.
Source: Radziukiewicz, 2003.

The Mazowieckie Province has the lowest percent of poor households, whereas the agricultural provinces of eastern and southeastern Poland, i.e. Podlaskie, Podkarpackie and Świętokrzyskie Provinces are characterised by the highest extent of poverty. More than 1/5 of households in these provinces are in the sphere of poverty. In addition, the agricultural Warmińsko-Mazurskie Province has a significant incidence of poverty exceeding 20% of the households. Perhaps, it relates to the fact that unemployment and poverty is larger in the countryside than in towns.

In six provinces: Kujawsko-Pomorskie, Dolnośląskie, Zachodnio-pomorskie, Małopolskie, Łódzkie and Pomorskie, 16% to 19% of households are below the poverty line. The lowest percent of poor households (below 16%) is in the following provinces: Mazowieckie, Śląskie, Opolskie, Wielkopolskie and Lubuskie. Difference in terms of the poverty incidence between the Mazowieckie Province and the Podlaskie Province amounts to as

many as 10.86%, and shows that regional approach is an equally important factor in the policy to reduce poverty in the country and to alleviate its effects.

3.3. Cumulating of poverty

Poverty in Poland is obviously not limited to a single element, which is low income. Another factor of poverty relates to housing conditions (Beskid, 1995). Housing conditions are mainly determined by the fact of possession of house or an apartment.

An indicator on "housing poverty" is the information about the households dwelling in premises without bathroom. Housing conditions are also determined by the per capita living space. It is assumed that there is poverty in those households having a per capita floor not bigger than 10 m^2. Poor families are usually renting municipality flats or sub-renting residential premises and paying social rent (Table 2).

Discussing each of the above-mentioned elements of housing poverty separately, gives the result of a highly dispersed situation. About 15.5% of households have cheap residential premises, almost 11% of households have overcrowded flats (having less than 10 m^2 per capita), and 8.3% of households have no bathroom.

The relationship between human poverty and housing poverty is not obvious. Difficult housing conditions for one-person households correspond with almost 21% of poor households, i.e. being below the income-related poverty line. About 25% of poor households have no bathroom, and 22% are renting the cheapest residential premises. Housing poverty combined with poverty gap concerns only 3% of households. About 50% of households are located below the income-related poverty line and not belonging to the housing property group.

In order to reach poor households, access to knowledge is an important criterion. Percentage of households that do not have computer and access to Internet reflects poverty in the sphere of education ("education poverty").

Another sphere of poverty – besides income, bad housing conditions, and low education – is health. Even without clear analyses, the situation is that illness moves families towards poverty.

The symptoms of poverty result in different groups of poor households as presented in Table 2. Obvious is the fact that the families may have low income though they have computers or good housing conditions. It also appears that the poverty gap is related to one of the forms of housing

TABLE 2. Cumulating of poverty in households in 2003

Specification	Percent of poor households							
	total	with symptoms of housing poverty				with income < than expenditure	without computer or Internet	with a disabled person
		without bath-room	minimum floor	cheap premises	at least with one of symptoms			
Total	**16.82**	**24.26**	**20.89**	**21.65**	**47.50**	**58.63**	**85.24**	**17.64**
Socio-economical type of household:								
Employees	13.45	17.93	**29.61**	27.22	51.52	52.75	79.91	0.88
Employees – farmers	22.56	19.65	18.86	1.96	33.01	59.14	85.66	1.18
Farmers	40.94	24.47	11.28	0.01	29.36	**77.45**	87.45	5.53
Self-employed people	13.15	20.00	12.83	23.40	39.62	63.02	71.70	1.13
Retired people	6.48	36.22	8.86	17.32	49.02	60.04	**92.72**	10.04
Pensioners	21.98	25.79	16.58	21.98	47.35	57.85	90.79	**81.69**
Living on non-earnings sources	**49.69**	**30.72**	23.64	**33.21**	**57.51**	60.57	87.66	9.86
Biological type of a family:								
Married couple, childless	5.59	28.84	3.13	27.59	43.89	**64.89**	**97.49**	**31.35**
with 1 child	15.20	17.56	10.89	20.16	38.05	64.07	85.69	16.91
with 2 children	23.98	16.23	22.68	18.67	40.37	58.94	75.37	10.95
with 3 children	40.39	17.25	32.93	20.38	55.53	58.01	75.78	8.89
with 4 and more children	**61.10**	23.77	**56.83**	20.77	**65.85**	49.73	83.33	9.56
Single parents with children	32.88	27.20	21.24	**38.60**	56.22	61.14	87.05	13.99
Others	14.30	**30.64**	16.09	19.98	48.86	58.04	90.54	23.27
Number of persons in the household:								
1	7.72	**48.33**	1.00	**30.39**	**60.78**	**66.96**	**95.27**	**27.65**
2	9.61	32.41	3.83	28.96	49.89	65.68	94.26	26.92
3	15.07	22.99	9.23	22.24	42.21	62.38	87.75	19.79
4	21.44	18.58	21.46	19.21	40.04	57.70	79.03	14.36
5	31.51	19.55	29.90	18.70	46.81	54.52	79.71	11.83
6 and more	**36.21**	21.64	**50.73**	17.24	59.29	51.95	85.58	13.45
Type and size of place of living:								
Town ≥ 500 thousand inhabitants	6.40	**29.11**	**27.74**	**47.95**	**61.64**	**65.41**	75.68	**21.92**
≥ 200–500 thousand	10.61	15.66	21.97	39.14	55.81	61.62	75.76	15.15
≥ 100–200 thousand	12.64	24.66	25.20	44.77	60.86	52.55	83.65	16.35
20–100 thousand	13.71	21.39	24.28	36.76	54.22	57.57	84.05	18.61
below 20 thousand	16.99	19.78	22.98	31.62	50.70	56.55	82.03	18.66
Countryside	**26.51**	26.97	17.86	6.06	40.14	59.97	**88.99**	17.14
Education:								
Higher	2.44	5.56	13.89	8.33	22.22	**67.59**	50.93	9.26
Secondary	9.55	11.17	15.53	17.87	32.69	65.58	72.49	12.99
Elementary technical	**24.86**	19.67	**23.04**	21.10	45.49	59.12	85.10	14.78
Primary	24.54	**38.80**	21.24	**25.25**	**59.77**	54.88	**94.35**	**24.59**
Age of the head of household:								
24 years and less	21.85	24.37	26.47	**24.37**	55.04	52.52	89.50	8.40
25–34	20.07	22.06	**31.24**	22.58	52.68	55.05	85.88	4.95
35–44	**23.79**	18.74	25.61	21.18	44.80	57.70	77.79	9.05
45–54	18.96	23.98	16.56	23.15	45.46	**63.55**	85.74	23.79
55–64	12.07	32.09	9.80	19.59	44.43	60.14	92.57	**39.53**
65–74	8.20	32.03	10.58	17.83	47.63	59.61	94.15	28.41
75 years and more	6.60	**49.01**	9.93	17.88	**62.91**	56.29	**96.03**	27.15
Position of the head of household:								
Blue-collar worker	**21.95**	**19.51**	**31.18**	**28.02**	**53.78**	50.89	**83.17**	**0.89**
White-collar worker	4.20	8.98	20.70	22.66	38.67	**63.28**	61.33	0.78

Source: Radziukiewicz, 2006a–d.

poverty in case of 40.7% of households. In the majority of households (85.4%), poverty gap corresponds with lack of computer or with lack of access to Internet and in some households (17.6%) it relates to both income and disability. A simultaneous occurrence of all symptoms of poverty – poverty gap (BD), housing (BM), education (BE) and health (BZ) – is recorded in 1.5% of all households.

Finally, the question rises what are the factors to cumulate various symptoms of poverty. Taking into account the multidimensional nature of poverty, primarily a synthetic index of poverty (WSKU) is constructed in the following form:

$$WSKU = BD + BM + BE + BZ$$

When a given syndrome of poverty has occurred in the household, a relevant partial factor gets the value 1, and in the case of absence of this syndrome – the value 0. For the households touched with each of the syndromes of poverty, the poverty index has the value 4 and the value 0 for the households without any of the "symptoms" of poverty. The above-specified measure is a sum of partial indices and informs which household is "poorer", i.e. when one household has a higher value of the poverty index WSKU than the other household.

In this way, a specific value of the poverty index is assigned to each household. In 62.4% of households, none or only one of the symptoms of poverty occurs; in 26% of households 2 symptoms of poverty is a fact, and 10% of households have 3 symptoms. The value of the poverty index (WSKU) equalling 2 is arbitrarily assumed as a threshold poverty, and this results in 11.5% of poor households. This index gives an idea about the relation between poverty gap and poverty factors.

In order to find out the influence of each of the factors, a logit model is developed (Radziukiewicz, 2006a–d). Analysis of the results of assessed logit function mostly confirmed the conclusions from the analyses of poverty carried out so far.

4. Conclusion

Analysis of impact of social and economic factors on a differentiation of poverty in Poland and comparison with the surveys carried out earlier allow summarising and presenting the most important conclusions.

The analysis of relative poverty established the poverty line at the level of 60% of median value of an equivalent income of households in 2003. On the

one hand, there were 16.8% of households below the so formulated poverty line in Poland. On the other hand, the index determining an average income "deficit" in relation to the poverty line for the population of poor reached the value of 27.1% what indicates that poverty in Poland is moderately deep.

Households of pensioners, and the families composed of more than five persons (with more than three children) are often exposed to poverty. The households, whose head has vocational or primary education, being at the age of 25–34 are also exposed to greater poverty. Definitely less poverty endangers households of the southern and northwestern regions that those of the eastern region.

In Poland, the incidence of poverty due to unemployment of members of the household is the largest. The incidence of poverty in case of the households whose head is unemployed is very high (50%). In difficult situation are also the households whose head remain unemployed for a period logger than one year (79.7%). Among them, a highly unfavourable situation is in case of households not receiving unemployment benefit (80.7%).

The Mazowieckie Province has the lowest percent of poor households, whereas agricultural provinces of eastern and southeastern Poland, i.e. Podlaskie, Podkarpackie and Świętokrzyskie are characterised by the greatest scope of poverty. In addition, the agricultural Mazursko-Warmińskie Province has a considerable incidence of poverty, exceeding 20% of household. In six provinces: Kujawsko-Pomorskie, Dolnośląskie, Zachodniopomorskie, Małopolskie, Łódzkie and Pomorskie, below the poverty line there are from 16 to 19% of households. The lowest percent of poor households (16%) is attributed to the provinces: Mazowieckie, Śląskie, Opolskie, Wielkopolskie and Lubuskie.

The index of human poverty calculated for 16 provinces shows that human poverty in Poland fluctuates from 24.9% in the Warmińsko-Mazurskie Province to 18.5% in the Wielkopolskie Province. In the two provinces: Podlaskie and Warmińsko-Mazurskie, this index is close to 25% what indicates that almost 1/4 of the population of these provinces are touched by human poverty. The largest human poverty is attributed to the Świętokrzyskie and Podkarpackie Provinces. The Lubuskie, Opolskie, Małopolskie and Pomorskie Provinces (value of HPI amounts to 20.1, 20.1, 19.6 and 19.3%, respectively) constitute the population with the lowest human poverty.

The incidence of poverty was rapidly growing in the period of transition, and currently, the growing trend is considerably slower. Certainly, optimistic may be the fact, observed in 2003, of declining of the fraction of poor households living on pensions and on non-earning-related sources, as

well as large households. However, irrespectively of positive changes, the dimension of poverty remains at a high level.

Poverty is divided equally among the households with income below 60% of the median value of equivalent income. Poor households living on non-earnings-related sources had the lowest average equivalent income and poor households with higher education had the highest income. The lowest differentiation of income among poor households is assigned to the households of pensioners and those whose head is at the age of 65–74, and the highest to households of farmers and married couples having two children.

Chapter III

METHODOLOGY APPLIED TO ANALYSE FOOD CONSUMPTION OF LOW INCOME POPULATION GROUPS

Renata Januszewska, Krystyna Rejman, Jacques Viaene, Barbara Kowrygo, Xavier Gellynck

1. Introduction

The research focuses on problem detecting and policies related to food consumption patterns among the low social classes in Belgium and Poland. Even though the background of the relation between nutrition and health is extremely complicated and until today still largely unknown, the impact of social inequality on the life and health expectancy is a field of research that has been growing rapidly during the past decades. Since the publication of the so called "Black Report" on inequalities in health in the United Kingdom (Townsend et al., 1979) the scientific interest in this topic within the industrialised world increased.

Social groups have different priorities toward food consumption and different ideas about what constitutes healthy eating (Lang, 1998). Low income may restrict the ability to buy food on the base of health and limited access to healthy foods (Dowler et al., 1997; James et al., 1997). When socio-economic differences in food consumption are observed, they are generally in line with health inequalities. However, the poor in affluent societies do not suffer from dramatic energy and nutrient deficiencies; in fact over-nutrition is more common than under-nutrition.

The term "social class" covers however a quite extensive number of mutually interacting person-specific characteristics of demographic, economical, psycho-social and cultural nature, the impact of which can fluctuate over time and space. In many researches the variables used as indicators of social class are measured in a different way and indicate various aspects of social class. An important current topic within this context concerns the question to what extend differences in health behaviour (nutritional behaviour) are determined by economical factors like income or rather by cultural factors that are related to education (Power et al., 1991; Glendinning et al., 1994). Prices and incomes have been reported as significant explanatory variables for food purchase in developed countries (Ritson and Petrovici, 2001).

Multiple indicators including income, education, and occupation, all of which may operate independently or interact in leading to inequalities that influence food choices, represent socio-economic status. A review of fifteen European countries showed that high educational level is associated with a more healthy diet (Roos and Prättälä, 1999; Irala-Estevez et al., 2000). Those with higher education, with the exception of Southern European countries, tend to consume more vegetables, fruits and cheese and less fats and oils. A higher educational level tends to be associated with a wider knowledge of a healthy diet (Margetts et al., 1997). Differences in the intakes of energy yielding nutrients are less evident but those with high education tend to have a smaller intake of fat. Obesity also varies by socio-economic status.

The Body Mass Index (BMI) is important in the food consumption studies since obesity status explains a large share of overall mortality and morbidity in Europe (Stronks et al., 1996; Puska, 2000). A study based on twenty-six (mostly European) populations shows that lower education is associated with a higher BMI in approximately half of male and in almost all of female populations (Molarius, 1999). Different energy needs as well as cultural and social factors have been suggested as causes of nutritional inequalities (Hulshof et al., 1991; Roos et al., 1996).

The diet of the low-income groups provides energy from foods such as meat products, full cream milk, fats, sugars, preserves, potatoes and cereals. This diet is also low in vegetables, fruit and whole-wheat bread (Krebs-Smith et al., 1995; Krebs-Smith and Kantor, 2001; Simila et al., 2003). As a consequence, poor people have lower intakes of essential nutrients such as calcium, iron, magnesium and vitamin C than people in higher social classes. A recent study shows that food consumption among poor people in Belgium is mostly related to age of respondents and is not influenced by education, profession or region of living (Januszewska and Viaene, 2005). Results indicate that the total amount of food purchased per person in a low-income group is not significantly lower than in the medium and high-income groups.

The objective of the current research is to focus on the low income respondents in Belgium and Poland and to analyse their food consumption patterns and nutritional status.

The project called “Social stratification in food consumption in Poland and Belgium” was developed by University of Gent in Belgium and Warsaw University of Life Sciences in Poland with the aim to analyse food consumption of low income groups based on primary and secondary data.

2. Structure of the project

2.1. Identification of consumption determinants and existing food consumption patterns included in chapter IV

There are five specific tasks of desk research:

- to analyse and describe differences and similarities between social classes in the purchase and consumption of food as well as nutrients;
- to identify groups of food items that have the highest proportional contribution to the intake of nutrients, and to determine in what way these foods contribute to this intake – high intake, frequent intake, nutritional density and index of food quality (Sorenson and Hansen, 1975);
- to study differences between social classes on the intake of macro- and micro- nutrients in foods groups;
- to study the evolution of the proportional budget share within the total budget for all foods and for specific food groups;
- to compare the nutrient supply per head in households with the recommended daily allowances (RDA) (Murphy et al., 2002) and to establish the vulnerable groups.

The relevant databases that include nutrition and economic data between 1980 and 2000, in Poland and Belgium, are explored. Budget panel data developed by the Polish Central Statistical Office (GUS) and Belgian National Institute of Statistics (NIS) as well GfK (market research organisation) are examined. These analyses provide insights into three levels of data:

- national food balances (NIS, GUS) and FAO's Food Balance Sheet database show trends in food consumption patterns, i.e. food supply per head;
- the expenditure patterns for food and specific groups of food – market purchase, self-provision, and supplementary alimentation;
- the household budget data on food consumption in Poland and Belgium give some insights in a social gap in food consumption patterns.

Food consumption volume, income, food prices and household composition data are explored and incorporated into descriptive and econometric analysis. The analyses are performed within and between the participating countries. Standard statistical procedures as described in Malhotra (1996), and econometric analyses (Greene, 1997) are implemented. The examples of databases that are used for this project are:

- databases on purchase and consumption of food items on household level,

- databases on consumption determinants: demographic, economical and other characteristics of social groups (income, economic growth, GDP, unemployment, system of social subsidies, food price changes, etc.),
- databases on the expenditure share for food items within the household budget.

2.2. Empirical research: nutritional behaviour and food consumption patterns included in chapters V and VI

Empirical research is based on the findings of the project "European Food Consumption Survey Method" (EFCOSUM), which was undertaken within the framework of the EU Programme on Health Monitoring in 2001. The project emphasises the need for co-ordinating nutritional surveillance activities within the European Union (Ballard-Barbash, 2001). Pan-European food consumption surveillance on an individual level based on uniform procedures and 24 hours recalls appears the first choice to provide comparable dietary intake data and dietary indicators appropriate for use in the Health Information Exchange and Monitoring System (HIEMS).

A special importance of the current project is attributed to the fact that Poland is a new Member State and tries to harmonise many regulations including food and beverages sector. Thus, all efforts in implementation of research on internationally comparable new data on population food intake are supported. According to Brussaard et al. (2002) "It is recommended that any country that carries out a (national) food consumption survey includes the minimum amount of 24 h recalls to allow a calibration with other countries".

In the frame of undertaken empirical research three aims were assigned:

- to characterise the low-income respondents in the Belgian and Polish sample;
- to establish the relationships between BMI (Body Mass Index) respondent groups on the one hand, and physical activity and health as well as social functioning related variables on the other hand;
- to find out the relationships between BMI groups, food behaviour, frequency of food consumption and the nutritional value of diet consumed.

2.2.1. Research model

Taking into account the aims showed above the model developed by Mela (1996) was adapted for analysing the research results. The model shows a schematic representation of prominent aspects of eating behaviour, food preferences and nutrients intake to the development of obesity (Fig. 1). The

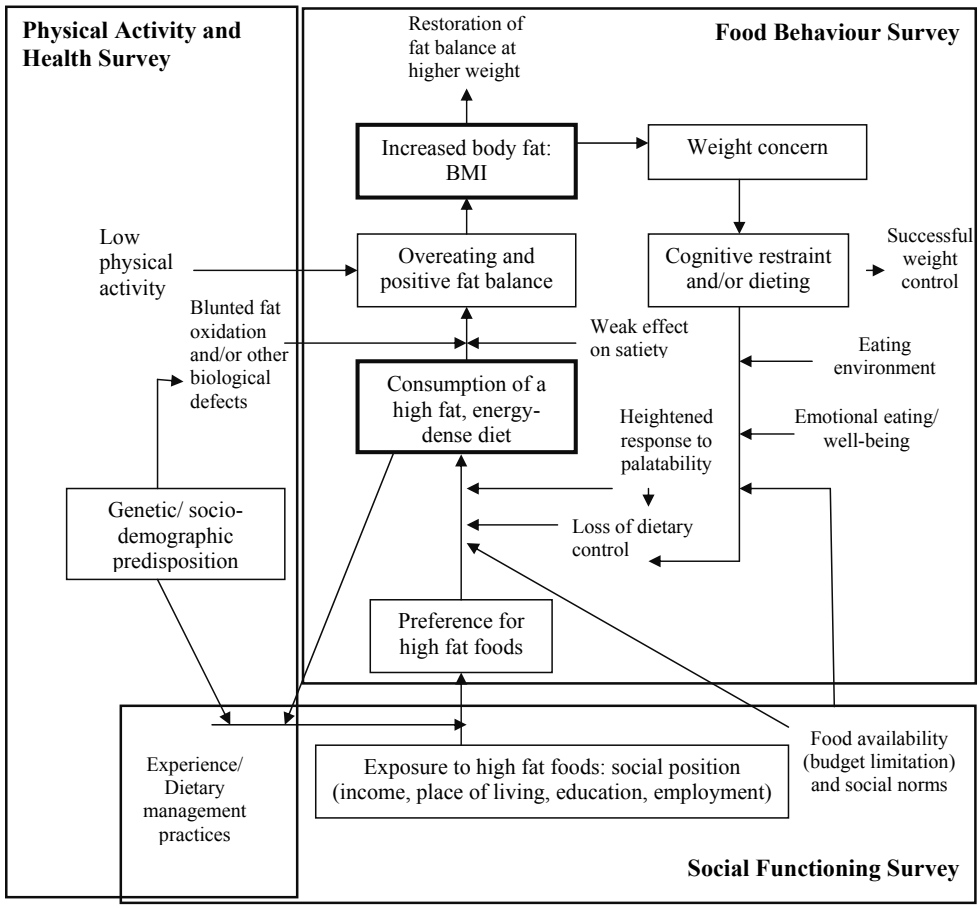

FIGURE 1. Human nutrition and health survey research model
Source: Based on Mela, 1996.

model allows for interplay of physiological and cognitive forces which might act to promote higher fat intakes in association with the susceptibility or presence of obesity. It is argued that fat containing foods may have greater reinforcing psycho-biological effects for certain individuals or under certain conditions. In this way, these foods became more potential stimuli for the acquisition and maintenance of conditioned preferences. Further on, it is suggested that increased liking may be mediated through variations in the stimulation or function of neural mechanisms responsible for hedonic responses. This assumption leads to the theoretical scenario in which predisposed individuals gain weight on such a diet.

Mela suggests that it is possible to test the links between characteristics of metabolism and the existence or acquisition of preferences. Based on

such approach, the empirical research in the current project was developed. The variables measuring the nutritional and psychological conditions for excessive intakes and poor weight control are combined with physiological effects of energy-dense, high-fat foods and a heightened responsiveness to such foods. Mela's model is linked to three parts of the research questionnaire. These parts are associated with three aspects: health and physical activity, social functioning and food related behaviour. Some elements of the original model are however not investigated. To measure fat oxidation or restoration of fat at higher weight requires another methodological approach. Understanding of the relationships between foods and behavioural characteristics and their links to overeating and obesity can potentially contribute to formulating and predicting responses to prevention and treatment strategies.

2.2.2. Research questionnaire

The main questionnaire, Food Frequency Questionnaire and 24 hours Recall Method are integrated into one research questionnaire based on the approach developed by Ballard-Barbash (2001) and Food and Drug Administration (FDA, 2003).

The main questionnaire consists of three parts (see the Annex 1):

1. Physical Activity and Health Survey (PAHS) includes the following variables: internal and external health factors; health behaviour related to physical activity; diet-related diseases and medical history.

2. Social Functioning Survey (SFS) focuses on three aspects: emotional eating (well being), social involvement and effects of illness (consequences of diseases).

3. Food Behaviour Survey (FBS) focuses on three areas:

- knowledge, attitude and preference: knowledge and importance of dietary guidelines, awareness of diet-disease links; self-assessment of nutrition; sources of diet and health information,
- food environment: out-of home free meals consumption and food provision; budget limitation of food consumption,
- actual food behaviour: dietary management practices, food choice and meal patterns; FFQ and 24 h RM.

In Food Frequency Questionnaire (FFQ) the respondent is asked about usual frequency of consumption of foods chosen as specific dietary indicators during the last year (Buzzard, 1998b). For the estimation of food quantities consumed, questions regarding the portion size are included. The development of the food list is crucial for a successful and reliable data collection. Ideally, the food list is adapted to the studied population. The

applied food frequency questionnaire consists of 42 food and drink products representing all food groups. Different food items are recognized as specific dietary indicators e.g. fats and oils, fruit and vegetables, fish and fish products. Consumption frequency is recorded on a six-point scale. The results are presented in two ways: as percentage of occurrence of each frequency category and as mean frequency for each product. Then, food and drink products are classified into six types of frequency (Table 1).

TABLE 1. The method of food consumption frequency evaluation

Frequency scale	Mean frequency
1 – a few times per year or never	1.00–1.49
2 – one-three times a month	1.50–2.49
3 – once a week	2.50–3.49
4 – a few times per week	3.50–4.49
5 – once a day	4.50–5.49
6 – a few times per day	5.50–6.00

A 24 hours recall method (24 h RM) is conducted in parallel with FFQ. The method is selected by EFCOSUM group as most suitable to get internationally comparable new data on population means and distributions of actual energy and nutrients' intake. The method is originally attributed to Wiehl (1942) and includes an interview. A few aspects are important when applying this method:

1. Training of interviewers. The method is dependent on well-trained interviewers skilled in the identification of available foods and meals, in preparation practices used generally in particular population groups. The interviewers are familiar with the nutritional habits (eg. foods usually eaten together) in order to be able to get detailed and complete answers and to control the accuracy of data. For an evaluation, a coding system of foodstuffs and meals, and also a computerised program are needed (Beaton et al., 1979; Nelson and Bingham, 1997; Slimani and Valsta, 2002; De Henauw et al., 2002). The investigator asks the respondent to enumerate the foods and beverages consumed in the preceding full day, including their quantity. Due to intra-individual variability, a single 24 h recall does not represent the usual individual intake but it characterises the average intake of a group or population.

2. Dietary indicators. Since 24 h recall method registers total daily consumption, a few determinants of nutrition are selected for comparison of consumption between population groups and countries. Critical indices of nutrition are defined as the consumption of food products or nutrients which are significantly related to the current recommendations for proper

nutrition and prevention of diet-related diseases. The following list of dietary indicators has been selected as the most relevant, to start with:

- food groups – vegetables, excluding potatoes; fruit, excluding fruit juices; whole grain bread; and fish and shellfish,
- nutrients – total fat, saturated (and trans) fatty acids, polyunsaturated and monounsaturated fatty acids (PUFA and MUFA) as well as proteins and carbohydrates intakes expressed as percentage of dietary energy supply (%DES); and alcohol as g/day (WHO, 1990; FAO, 1994).

3. Album of food portions. To facilitate the 24 h recall, the adapted picture book of portion sizes including country-specific dishes, with additional household and other relevant measures, was presented to the respondents. The album was developed by the National Institute of Food and Nutrition in Poland (Szponar et al., 2000).

4. The Nutrient Database and the software. There are many food classification systems in Europe and therefore, it is difficult to find out common grounds for food classification at the European level (Ireland et al., 2002). Thus, the national food composition tables are used in the research. These food composition tables are applied for calculation of the content of nutritional components in the consumed food in both countries. The food composition tables are published by the National Institute of Food and Nutrition in Poland (Kunachowicz et al., 1998) and by NUBEL (2004) in Belgium.

2.3. Comparison of low income consumer groups in both countries included in chapter VII

This part of the research includes the comparative analysis of the results of primary data, which are collected by the consumer survey in Poland and Belgium (the main questionnaire, FFQ and 24 h RM). A pooled data set is constructed in order to realise cross-country analyses. Body Mass Index is used to determine food consumption and behaviour of investigated consumer (Bray, 1990; Berger, 1995; Hunt and Hillsdon, 1996). BMI groups are calculated utilizing the formula:

$$BMI = \text{weight (kg)} / \text{height}^2 \text{ (m)}$$

Respondents are grouped in the four standard BMI groups:

- underweight: BMI < 18.5,
- normal weight: BMI = 18.5–24.9,
- overweight: BMI = 25–29.9,
- obese: BMI ≥ 30.

The obtained insights in consumer attitude and behaviour form the input for policy recommendations. In order to explore existing food and nutrition policies and measures in both countries, four steps were taken:

- first: the types of policies identified;
- second: the measures and interventions taken in both countries identified;
- third: the effect and outcomes of these policies and interventions evaluated;
- fourth: the comparative perspective to policies and intervention in each country assessed.

The intention is to use the framework, developed by Diderichsen (1998) and refined by Whitehead and colleagues (2000), for mapping the impact of policies on the social pathways to health inequalities. In this framework (Fig. 2), the pathways leading to illness or health are approached from the perspective of the individual or the society.

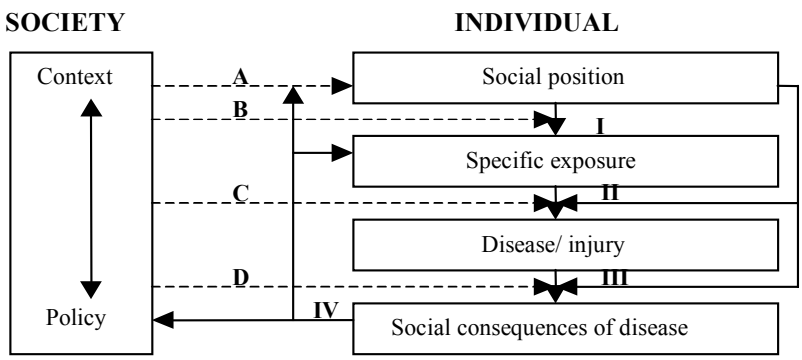

FIGURE 2. Framework for researching policy impact on health inequalities
Source: Whitehead et al., 2000.

On the one hand, an individual's social position (for example defined by gender, occupational class or ethnic origin) may influence the exposure to important health risks such as poverty, nutritional deficiencies, dangerous working conditions, health damaging behaviours etc. According to Figure 2, four important mechanisms to create different probabilities of being exposed to specific health hazards or risk conditions are:

(I) The impact of social position on health through differential exposure.
(II) A specific exposure may lead to ill-health or disease of an individual, depending on whether other contributory risk factors or risk conditions are present (differential vulnerability).
(III) The effects of the illness on the ability to stay employed, live independently and participation in the community (differential consequences of disease).

(IV) Consequences of disease might feed back into a causal pathway, like the etiological process (investigation of disease causes) and influence social stratification and insurance policies.

On the other hand, the societal perspective focuses on how the prevailing social context interacts with and influences the pathways from social position to ill-health. Four distinct entry points, at which policy may influence the pathways between social position and health consequences, are, in accordance with Figure 2:

(A) Policy may influence the social position individuals occupy in society (modifying effect of social context and policy on social stratification).
(B) Policy may influence exposure to health hazards faced by people in different social positions (differential exposure).
(C) Policy may influence the effect of being exposed to a hazardous factor (differential vulnerability).
(D) Policy may influence the impact of being ill (differential social consequences of disease).

Policies and interventions to reduce nutritional inequalities can be universal or selective. Universal measures are directed to the population as a whole with the idea that all citizens should have equal access to adequate food and proper diet. The universal approach does not always explicitly aim to diminish inequalities. The selective measures aim at improving the conditions of the least advantaged. Food related inequity and the balance between the universal and selective principles have been central themes in European food and nutrition policies since the nineteenth century onwards. Most recent interventions have followed the selective approach, i.e. targeted at the less advantaged groups, such as low income mothers, ethnic groups in deprived areas or homeless young people (Prättälä et al., 2002).

2.4. Food policy recommendations for low income groups included in chapter VIII

The important aspect is to find out the knowledge of the specific characteristics of each country involved in this project in regard to social circumstances of healthy eating. Cross-national differences and product category effects (Frewer et al., 2000) are captured and presented. Analysing such information at the national level permits consumers to make informed choices about consumption of specific foods that are especially interesting for health status.

The extensive review of food policy in different countries is done in regard to the dietary goals, dietary guidelines, cooperation in the food chain, and communication with consumers (FAO/WHO, 1992b, c). Taking these findings into consideration a proposal of food and nutrition policy is elaborated for the vulnerable groups of population, based on the information gained from primary and secondary research.

Chapter IV

FOOD CONSUMPTION IN POLAND AND BELGIUM ON THE BASE OF SECONDARY DATA

Ewa Halicka, Renata Januszewska, Barbara Kowrygo, Jacques Viaene, Xavier Gellynck

1. Introduction

Popkin (1994) described the phenomenon of nutritional transition i.e. the changes in dietary patterns that follow economical development and urbanization, as being complete in Europe, North America and Australasia. This concept implies a transition of diet towards an "industrial-type" model which is relatively low in starch staple foods and high in foods of animal origin, sugar and processed products. However analysis of population-based data shows that significant changes are still continuing to take place. In some cases consumption patterns reflect the influence of non-economical determinants on consumer behaviour and can be linked to health-oriented choices of some population groups. Additionally in Poland and other Central European countries consumption trends were in the nineties radically modified or even reversed by economical factors due to the development of market economy.

Assessing, analysing and monitoring nutritional situations are the major priorities of food policy measures (FAO/WHO, 1992a). The most comprehensive and widely comparable database used to assess diets internationally comprises the FAO's Food Balance Sheets (FBS). The FBS are compiled from a highly disaggregated set of supply-utilisation accounts (Schmidhuber and Trail, 2006). This source of data delivers internationally comparable data that reflects the mean per capita supply of food, available for consumption.

The FAO-based data analysis presented in this chapter focuses on the period from 1989, i.e. from the introduction of market economy in Poland, to 2003. For Belgium 1989–1999 FAO data show the combined average per capita supply of food in Belgium and Luxembourg, from 2000 – data concerns only the Belgian population.

In the second part of the chapter analysis of household budget data is shown indicating significant socio-economic diversification of food consumption in Poland and Belgium. Household Budget Surveys (HBS)

occupy a position between the food balance sheets of FAO and the specially designed individual nutrition surveys (Elmadfa and Weichselbaum, 2005). HBS collect data on food availability among nationally representative samples of households and provide a more detailed and valid description of the dietary choices of the population. The exploitation of HBS-derived data for nutritional purposes was evaluated and implemented in the context of the DAFNE (Data Food Networking) initiative in which national datasets from 16 European countries were classified into 56 sub-groups. However in the presented analysis more current HBS data collected in Poland and Belgium are presented.

2. Comparison of food quantities available for consumption in Poland and Belgium

In order to compare the FAO data in both countries the most important food groups were selected and analysed: plant-derived (vegetal) foodstuffs, animal-derived foodstuffs, fats and oils as well as main nutrients and energy in diet.

2.1. Trends in vegetal food products' consumption

According to Food Balance Sheet data the average per capita supply quantities of cereals and potatoes – the traditional staple foods in Poland are significantly higher than in Belgium. In comparison to other EU countries Poland is ranked third (136 kg) in the case of cereals, following Italy and Lithuania. In Belgium the supply level of cereals and potatoes is below EU-25 average which was 123 kg in 2003. As shown in Figure 1 (Annex 2) the mean cereal supply in Belgium constituted only 70% of the Polish level.

The supply of potatoes in Poland is also very high in comparison to all EU countries and is bigger only in Latvia. In the second part of the nineties the falling tendency in consumption stabilized at 130–135 kg/capita/year what constitutes almost 140% of the Belgian level.

Sugar and sweeteners consumption in Belgium was on average 49.4 kg/ /capita/year vs. 44.3 kg in Poland. For Poland, radical price increase in 1990 determined a drop to below 40 kg/capita/year in 1991/1992. In the following years the consumption leveled out at 42–45 kg/capita. Currently sugar supply in Poland constitutes circa 82% of the Belgium level which fluctuates between 55 and 59 kg in the last decade showing a growing trend.

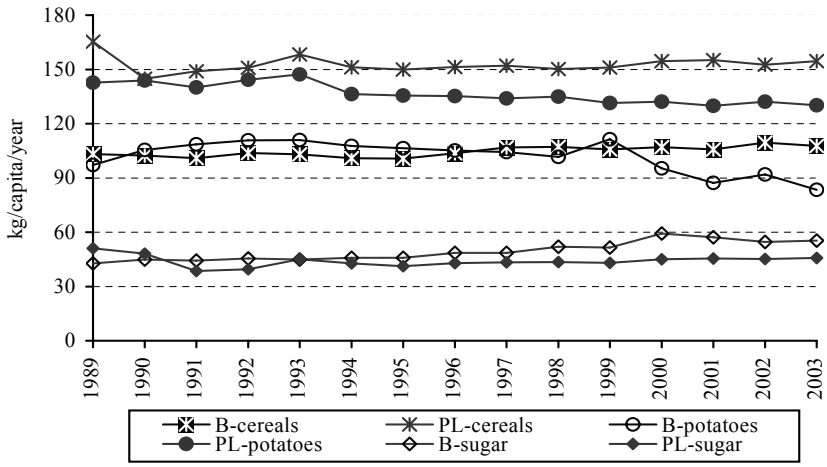

FIGURE 1. Consumption of main vegetal products in Poland and Belgium, 1989–2003, kg/capita/year
Source: FAO, 2006.

The consumption of vegetables and fruit is characterized by significant yearly fluctuations due to weather conditions and changes in price and supply in both countries (Fig. 2, Annex 3).

According to FAO data the per capita quantity of fruit available for consumption in Poland has shown an increase from 32 and 57 kg per year in the analysed period; however it ranks last among EU-25 countries, after Slovakia. In comparison to Belgium it is about 20 kg/capita less. The growing trend in fruit consumption in Poland comprises the increase of imported southern-grown species. The demand for apples, which constitute 50% of overall fruit consumption and berries, remains relatively unchanged (Halicka, 2005).

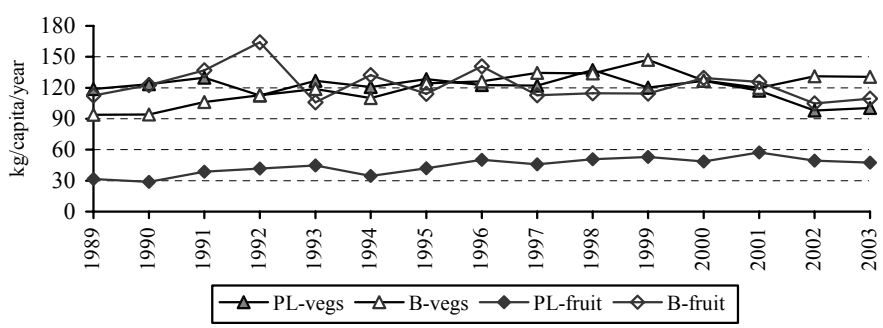

FIGURE 2. Consumption of fruits and vegetables in Poland and Belgium, 1989–2003, kg/capita/year
Source: FAO, 2006.

FAO data show that the supply of vegetables in the Polish and Bel-Lux markets was quite similar in the nineties. According to WHO recommendations the daily supply of fruits and vegetables on Balance Sheet level should be at least 600 g, i.e. 219 kg per year. Neither of the studied countries meets this recommendation. In 2003 the yearly supply was only 148 kg/capita in Poland and 199 kg/capita in Belgium.

The remaining groups of vegetal products, i.e. pulses and tree nuts, constitute a very small share of consumed plant-derived products. The supply of tree nuts in Poland is since the introduction of market economy and the development of imports 5 times bigger than in the previous decades while the consumption of pulses remains stable.

2.2. Consumption of main animal products in Poland and Belgium

In Poland, after a sharp fall in animal products' consumption due to liberalization of prices in 1990, it has increased in the period 1989–2003, with the exception of milk. As shown in Figure 3 the per capita level of milk and milk products' has decreased to 173 kg in 2003 (Annex 4).

In the years 1992–1995 the consumption of milk and its products in Poland and Belgium was almost at the same level. Since 1996 consumption of this group of foodstuffs in Belgium continued to grow, reaching 256 kg in 2003 that is almost 150% of the Polish supply level. Besides important economical (price and income) factors the falling trend in Poland was determined by the growing supply of juices, soft drinks and mineral water. The effect of

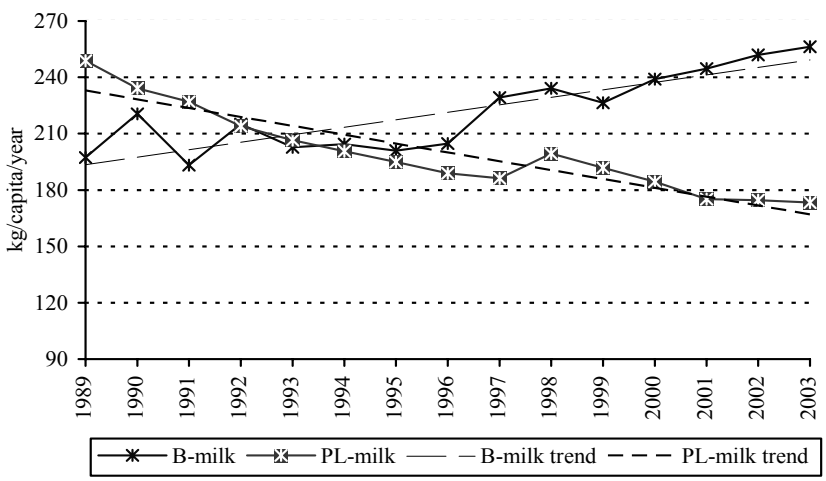

FIGURE 3. Dairy products consumption in Poland and Belgium, 1989–2003, kg/capita/year
Source: FAO, 2006.

decreasing dairy products' consumption is particularly negative in the context of observed fall in animal protein consumption (Kowrygo, 2000).

Meat and meat products supply level was lower in Poland through the whole analysed period (Fig. 4, Annex 5).

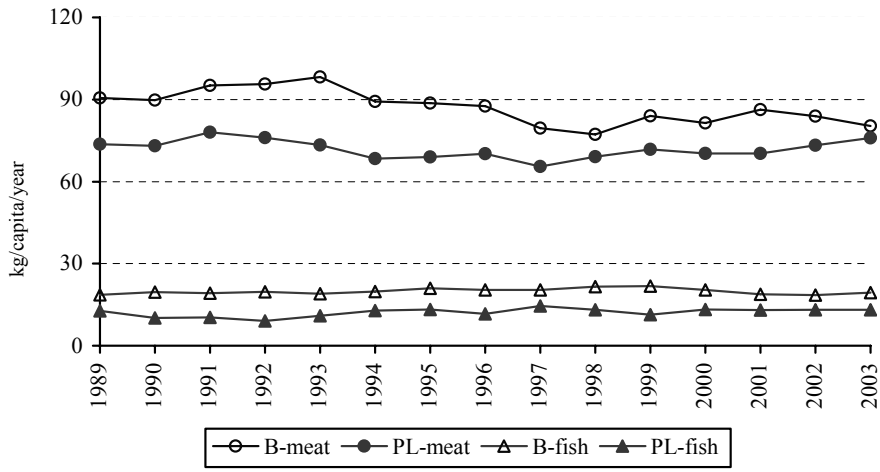

FIGURE 4. Meat and fish products' consumption in Poland and Belgium, 1989–2003, kg/ /capita/year
Source: FAO, 2006. B-fish in 2001 – domestic data.

Due to sharp price increase in the beginning of the nineties, meat and its products' consumption in Poland decreased to a level below 70 kg/year while in Belgium the average consumption level was 87 kg. It is interesting to notice that in 2003 the yearly per capita supply of meat products in Poland was only 4 kg lower than in Belgium.

Fish and seafood consumption in Poland shows major yearly fluctuations, with a low (9 kg/capita) in 1992 and slowly growing trend. In Belgium the consumption is higher and fluctuates around 20 kg per year. Since 2001 FAOSTAT does not show Belgian data but according to domestic data the consumption remained stable, between 18.5 and 20.4 kg/capita/year.

2.3. Consumption of fats and oils in Poland and Belgium

Comparison between Poland and Belgium shows that the total per capita supply of fats and oils in Poland in 2003 was two times below the Belgian level (Fig. 5, Annex 6). Due to nutritional aspects and high energy value of fats this situation has a major influence on the diet structure and health of consumers. Belgian per capita supply of animal fats, which include butter and cream, constitutes 175% of the Polish level.

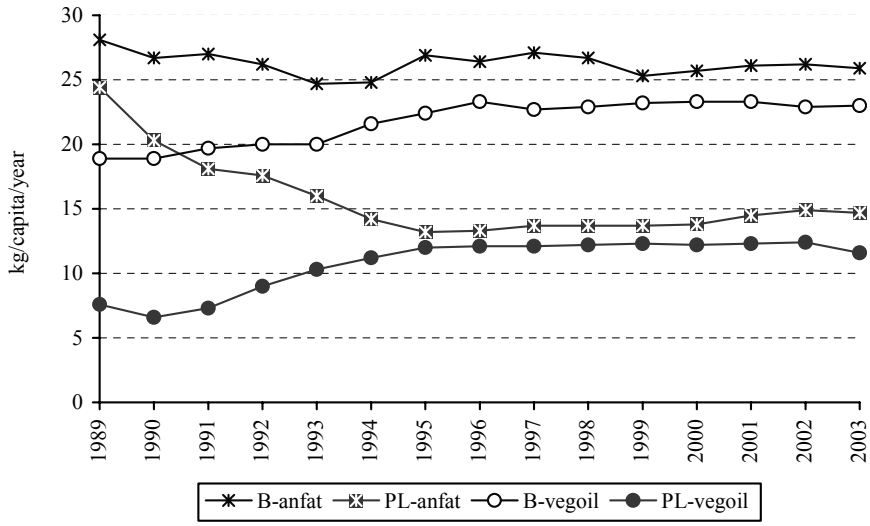

FIGURE 5. Vegetable and animal fat consumption in Poland and Belgium, 1989–2003, kg/capita/year
Source: FAO, 2006.

The trend in butter consumption in both countries was downward since 1989, however in Poland it is currently lower than in Belgium and constitutes about three quarters of the Belgian level. The same situation describes the supply of cream, which is about 1.6 times higher in Belgium than in Poland.

In the years 1989–1995 the supply of vegetable oils in Poland increased steadily (almost twofold) due to growth of production potential and marketing activities of new investors while supply of animal fats gradually decreased. In 1995 the consumption of animal fats constituted 60% of the 1990 level. The main vegetable oils consumed in Poland are traditionally rapeseed and mustard oils (also processed to margarine), although the consumption of soybean and palm oils show a growing trend.

In Belgium a growing trend can be observed in the case of vegetable oils but the tendency in quantity of animal fats available for consumption is rather stable. The consumption of both types of fat exceeds 20 kg and is high compared to other EU countries.

2.4. Trends in daily energy (DES) and nutrients' supply

FAO Food Balance Sheets are also a source of information on the diet structure of populations at country level. The collected data show that per capita daily energy supply in Belgium is higher than in Poland (Fig. 6, Annex 7).

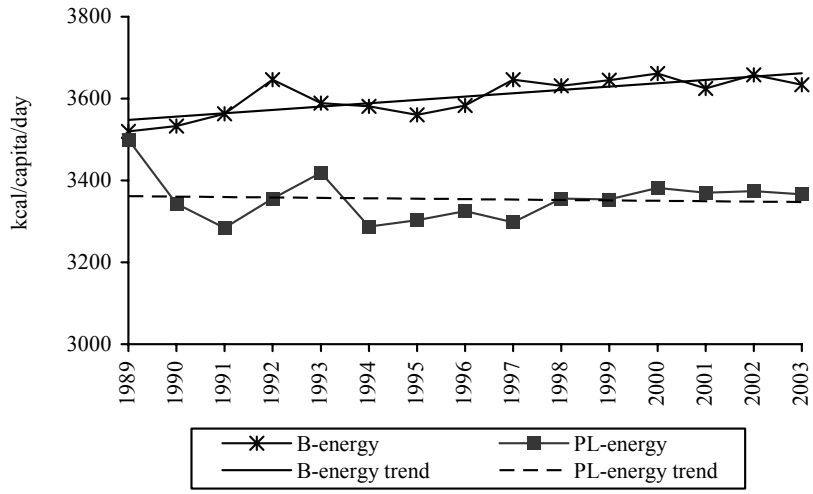

FIGURE 6. Diet energy supply in Poland and Belgium, 1989–2003, kcal/capita/day
Source: FAO, 2006.

During the period 1989–2003, the total energy supply in Poland fluctuated between 3290 kcal and 3500 kcal, which means on average 3354 kcal and was highest in 1989. In the two decades proceeding economical transformation the energy value of the Polish diet was estimated at even higher level.

In Belgium during the period 1989–2003 the average daily energy value of diet was about 3605 kcal and was 7% higher than in Poland. In Belgium the energy in diet shows a growing trend, while in Poland it is rather stabilized. In comparison to other EU countries in 2003 Belgium was ranked 6th according to amounts of calories in diet, Poland was 16th. The majority of energy in both Poland and Belgium is derived from vegetal products. In Poland since 1993 less than 30% of energy comes from animal foods, in Belgium the share of animal products in energy supply has been gradually decreasing from 35% in the late 1980s to 31% in late 1990s.

According to FAO data in Poland carbohydrates are the major source of energy (57–58% of calories), followed by dietary fats (30%) and proteins (12%). In Belgium the role of dietary fats in energy supply is significantly bigger (39–40%), while carbohydrates deliver less than 50% of calories and proteins about 11–12%.

The level of consumption of fats and proteins in daily diet in Poland and Belgium since 1989 does not show significant changes (Fig. 7). The Belgian fat intake constituted about 146% of the Polish level in 2003. Fat intake in Belgium is also high compared to other EU countries (second place, after France), Poland ranks 17th.

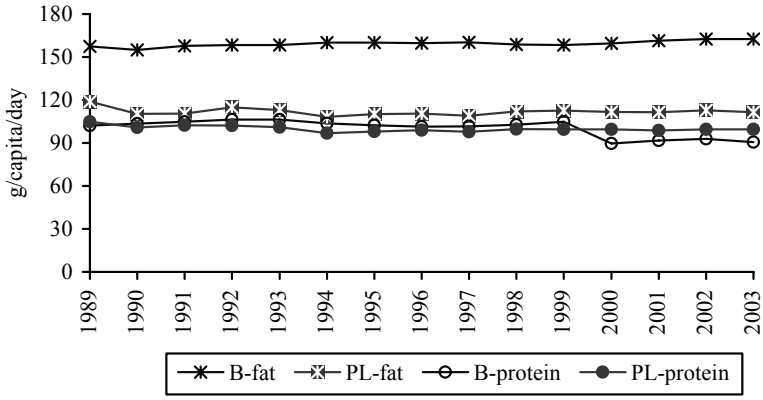

FIGURE 7. Consumption of dietary fat in Poland and Belgium, 1989–2003, g/capita/day
Source: FAO, 2006.

In the last 15 years and until 2000, total daily protein consumption stabilized at 99–102 g/day in Poland and 102–106 g/day in Belgium. However, since 2000 the intake of protein according to FAO is lower in Belgium than in Poland. This situation is linked to the lack of data concerning Belgian fish supply in the FAO database.

3. Food availability at household level in Poland

Secondary data on food consumption (availability) on household level in Poland are collected yearly by the Central Statistical Office GUS (Główny Urząd Statystyczny). The Household Budget Survey sources come from about 33 thousand households, which conduct records of all food purchases, contributions from the household's own production and other people. The surveys are based on a sampling method which allows a generalization of the results to all Polish households. The data obtained have several limitations. For example no records are collected on the type and quantity of food items and beverages consumed outside the home. Data before 1993 can not be directly compared with later years due to significant methodology changes, related to the classification of households and method of survey.

Since 1993 the data are collected with the use of the monthly rotation method instead of yearly or quarterly ones and households are classified into six socio-economic groups, i.e. households of employees, employee-farmers, farmers, self-employed, retirees & pensioners and persons with unearned sources of maintenance.

Changes in food consumption in terms of food availability in an average Polish household in the years 1993–2005 are presented in Table 1.

TABLE 1. Consumption of main food groups in Polish households, 1993–2005, kg/capita/ /year

Food groups	1993	1995	1999	2002	2004	2005
Cereals	101	94	113	107	104	101
Potatoes	114	105	93	90	83	80
Vegetables[1]	74	71	67	66	64	69
Fruits	51	45	45	49	47	45
Meat	65	61	67	65	65	66
Fish	5.5	5.3	4.4	4.8	4.9	5.0
Fats and oils, incl.:	20.9	19.1	19.0	18.9	18.8	18.3
animal fats	4.9	3.7	3.0	2.6	2.6	2.5
vegetable oils	10.6	12.0	11.8	12.1	12.2	12.0
butter	5.4	3.4	4.2	4.1	4.0	3.7
Milk (litres)[2]	89	84	69	62	62	53
Eggs (pcs)	183	181	182	181	179	181
Sugar	31	28	28	25	24	18

[1]Including legumes.
[2]Excluding condensed and powdered milk.
Source: GUS, 1994–2006.

Overall in the analysed years the consumption of most groups of products showed a falling trend. The biggest decreases were observed in the case of animal fats, sugar, milk and potatoes.

Traditionally food consumption is highest in the households of pensioners and retirees. These types of households typically include only adults, are usually smaller sized (one or two-persons) and have a low level of out-of--home consumption (Table 2).

TABLE 2. Consumption of main food groups in different types of Polish households in 2005, kg/capita/year

Food groups	Employees	Farmers	Self--employed	Retirees and pensioners
Cereals	91.3	121.6	84.1	119.2
Potatoes	68.2	101.8	63.1	102.1
Vegetables	60.1	79.2	61.4	86.9
Fruits	40.7	43.9	46.2	54.4
Meat	59.0	82.0	59.5	77.9
Fish	4.4	4.4	5.3	6.6
Edible fats:	16.0	19.7	11.3	23.0
animal fats	1.9	4.5	1.6	3.5
vegetable oils	10.9	11.8	9.4	14.6
butter	3.2	3.4	4.3	4.9
Milk (litres)	44.2	79.9	44.0	66.4
Eggs (pcs)	163	215	162	217
Sugar	15.2	26.2	13.9	23.9

Source: GUS, 2006.

The differentiated income and food expenditure levels in Polish households in 2005 (Table 3) shows that the highest income characterizes households of the self-employed. On average food and non-alcoholic beverages comprise 28% of the total expenditures in households – its share being 36% in the farmers' and almost 24% in self-employed households.

TABLE 3. Income and expenditures in different types of Polish households in 2005

Specification	Grand total	Employees	Farmers	Self--employed	Retirees and pensioners
Average monthly per capita in PLN					
Available income	761.5	770.0	606.2	977.1	800.2
Expenditures:	690.3	684.4	533.9	869.8	746.0
food and non alcoholic beverages	194.1	180.2	192.8	204.9	227.2
alcoholic beverages and tobacco	18.8	19.5	14.1	23.6	18.3
In percent[1]					
Share in expenditures:					
food and non alcoholic beverages	28.1	26.3	36.1	23.5	30.4
alcoholic beverages and tobacco	2.7	2.9	2.6	2.8	2.5

[1]Percentage of expenditure (total = 100%).
Source: GUS, 2006.

According to the "Social Diagnosis" Report (Czapiński and Panek, 2005) the share of households which are not able to fulfil nutritional needs due to insufficient income increases with the number of children in the family (Table 4).

TABLE 4. Share of households which are not able to fulfil basic nutritional needs

Products	Total	Married couples (%)				
		without children	with one child	with 2 children	with 3 or more children	incomplete families
Vegetables[1]	12.0	6.7	6.0	10.1	17.9	16.2
Fruits[1]	19.0	11.2	11.1	17.3	27.5	26.3
Meat[2]	22.6	13.9	14.7	20.5	32.3	31.2
Meat products	22.5	14.9	14.0	19.0	32.1	28.6
Fish[1]	34.3	23.8	26.4	31.4	46.8	42.5
Butter and edible fats	8.8	4.9	5.2	7.0	14.4	12.1
Milk	6.4	3.4	4.0	4.9	10.2	9.8
Dairy products	15.0	8.7	11.4	12.6	22.1	21.5
Sugar	5.9	3.0	3.3	4.4	8.8	9.2
Sugar products	30.4	20.6	22.3	28.1	40.3	40.6

[1]Including preserves.
[2]Including poultry meat.
Source: Czapiński and Panek, 2005.

The largest share of households does not meet the needs in the case of fish (34.3%) and sugar products (30.4%). More than 40% of incomplete families can not fulfil the nutritional needs regarding these groups of products.

Analysis of quintiles (groups of households, each consisting of 20% of total group, according to income) show that the expenditure on food and beverages in Polish households in 2004 varied from 20.7% in the highest income households (V quintile) to 42 % in the lowest income households (I quintile). Together with the increase of income the expenditure on most of food products increases, with the exception of flour, full-fat milk and mixed (rye-wheat) bread (Gulbicka and Kwasek, 2006).

The most significant differences in food consumption between household with highest and lowest income levels can be observed in the case of relatively more expensive food products. These include fruit and vegetable juices, mineral water, veal and beef, dried fruits, nuts, rye bread, fish and processed potatoes as well as milk products. For example in the highest income group the consumption of veal was 5 times bigger than in the lowest one and in the case of beef 3.8 times bigger. The differences are much smaller in the case of poultry and pig meat (33 and 43%). Smaller diversification of food consumption is also characteristic for relatively cheaper products, such as flour, milk, bread, potatoes, vegetal fats, cream and pasta.

In the lowest income group (I quintile) the calculated average dietary energy value is 1750 kcal/day, what is below the minimum level of food security of 2000 kcal per capita on household level as recommended by FAO/WHO (1992a). The influence of household composition on food consumption in Poland is presented in Table 5.

TABLE 5. Share of food and non alcoholic beverages in expenditures on consumer goods and services according to number of persons in households in 2005

Number of persons	Grand total	Share of expenditure by type of households (%)			
		employees	farmers	self-employed	retirees and pensioners
1	25.9	18.9	–	–	29.8
2	28.4	23.3	37.1	21.4	32.2
3	28.1	26.4	36.6	23.6	33.3
4	29.2	28.4	35.8	25.0	33.8
5	33.4	32.0	38.8	28.8	37.2
6 and more	37.6	35.5	40.5	32.6	40.7

Source: GUS, 2006.

The share of food and alcoholic beverages in expenditures on consumer goods increases with the number of persons in households. It exceeds 40% in the case of large families, in which the head of household is a retiree, pensioner or farmer and is lowest in households of self-employed.

4. Household budget data on food consumption in Belgium

4.1. Methodology of Belgian analysis

In Belgium two sources of information – NIS (Nationaal Instituut voor de Statistiek) and GfK (Gesellschaft für Konsum und Absatzforshung) can be used to collect food purchase and expenditure data.

NIS organises regular household budget surveys with the representative sample of about 3000 families. GfK is a private company and collects systematic purchase data on a monthly base for about 2000 families since 1995. In the current study the data from the year 2000 by NIS and data from the year 2001 by GfK are analysed.

Due to the fact that the two databases were set up with different objectives the following limitations of these databases can be noticed:

1. The two databases consist of data about purchase and expenditure for food products. The household panel data of GfK does not take into account the out of home consumption and no one of the two databases takes into account the food self-produced. Therefore, the original figures do not give the effective consumption of food products.

2. The database of GfK does not include certain food products such as bread, pastry and sugar products, while in the NIS database these products are included. It means that these databases are not comparable. Furthermore, it is impossible to formulate hard conclusions about the nutritional content of the diet per person because there is no record about the dietary intake.

3. The sampling methods of each of the two databases contain limited information about socio-economic criteria. The used socio-economic criteria are adapted to the norms of social stratification, e.g. age or profession groups.

4. The extended databases of 2000 or 3000 families on the one hand and about 150 to 200 food products on the other hand, produce huge data matrixes, which are not easy to handle. Therefore, the purchase data of food products are aggregated into seven food groups (meat, fish, poultry, dairy, edible fats, vegetables, fruit). The analysis is made with the aggregated data per family.

5. The classification of social classes into groups in each of the databases occurs ex post and is adapted to the available data. It means that social stratification is not homogeneous for the two databases.

The major problem is that NIS and GfK collect data at the household level. To obtain the data at the individual level, the adaptation is made by using a quantity or Q-factor and income equivalent:

Quantity or Q-factor: the Q-factor indicates the weight of food purchased by adults and children (Cantillon et al., 1999):

Q-factor = 1 + 0.5 (number of adults – 1) + 0.3 (number of children)

Income equivalent: income per household is divided by the Q-factor resulting in income equivalent or income per adult person:

Y' = Y/Q-factor

Quantity of food purchased per person (PP):

PP = Purchase per household / Q-factor

Expenditure on food per person (EP):

EP = Expenditure per household / Q-factor

For NIS, the income classes are established from frequencies in the original database. The income classes are based on the income equivalent (Y'), and four groups of households are considered in relation to the Relative Poverty Level (RPL). RPL relates to half of the average expenditure of the total population. Thus, the RPL draws the line between relative rich and relative poor households. The lowest 25% of the total sample is called "Poor Income", the next 25% "Low Income", the sample over RPL till next 25% is called "Medium Income", and the top 25% is "High Income" (Table 6).

TABLE 6. Mean monthly income per person in 2000, NIS

Income groups	Income (€)			N (%)
	minimum	maximum	mean	
Poor	280	988	736	125 (25%)
Low	1000	1352	1201	125 (25%)
Medium	1368	1785	1598	125 (25%)
High	1814	7916	2970	125 (25%)
Total				500 (100%)

In regard to GfK, the three distinctive groups of households are separated by cluster analysis taking into account the income equivalent (Y'). Table 7 indicates the mean monthly income per person in the three income groups.

TABLE 7. Mean monthly income per person in 2001, GfK

Income groups	Income (€)			N (%)
	minimum	maximum	mean	
Low	222	806	627	208 (42 %)
Medium	841	1308	1032	215 (43%)
High	1363	2355	1627	76 (15%)

This later procedure corresponds to the Relative Poverty Level method, however only three income groups are chosen, because the high income class is underrepresented in GfK database.

4.2. Results and discussion of the Belgian data

The analysis procedure comprises three steps. First, the descriptive analyses show differences between quantity of food purchased per person (PP) and expenditure on food per person (EP) for the total sample of respondents and within income groups.

Second, by regression analysis the relationship between PP or EP and socio-economic variables is determined. Third, the possible relationship between income group and the other variables is found out.

4.2.1. Average quantity of food purchased and expenditure on food

Quantity of food purchased per person (PP) and expenditure on food per person (EP) are calculated for all food categories. Further the PP and EP for the income groups are considered and the difference between these groups is tested by the analysis of variance (ANOVA). Finally, the budget share of EP is calculated and the ANOVA test is applied.

The collected information from NIS data relates only to expenditure for food items. This expenditure is not significantly different between income classes. However, there is a difference in budget share in expenditure for all food and drink categories between income classes. Thus, the law of Engel is again confirmed. The low income group spends a higher share of their budget (23%) than high income class (8%). The additional analysis is computed with the insight to the expenditure for 43 groups of food and drink items. The significant difference between income classes is tested. There are only five groups of products with a significant difference between income classes. Consumers with a higher income clearly spend more for cakes and pastry, fresh meat, fish and crustaceans in can, as well as cheese. Expenditure for milk and milk products is higher for the people in the class with a medium income.

The results of GfK database are presented in Table 8 that shows the average quantity of food purchased per person in Belgium. There is no significant difference in purchase of different food groups between the three income groups, although it is noticed that a total consumption of food by the low income group is lower than the one calculated for other income groups. The only significant difference is the greater quantity of fish purchased by the high income group.

Table 9 presents the average expenditure on food per person in Belgium in 2001, which is 1825 €. The most expensive is meat since the annual expenditure on meat is 624 € while expenditure on fruit (394 €), dairy (262 €), vegetables (253 €), fish (131 €), poultry (104 €) or fat (58 €) is lower.

TABLE 8. Quantity (kg per capita) of food purchased by income group, in 2001, GfK

Income groups		Quantity of food purchased								N (valid)
		meat	fish	poultry	dairy	fat	vegs	fruit	total	
Low		78	13	17	117	20	196	238	679	208
Medium		74	15	19	126	21	206	260	721	215
High		78	20	17	122	22	207	277	743	76
ANOVA Df = 2	Sig.	0.541	0.000	0.507	0.536	0.543	0.606	0.211	0.498	Total 499
	F	0.6	8.1	0.6	0.6	0.6	0.5	1.5	0.6	

TABLE 9. Expenditure (€ per capita) on food by income group, in 2001, GfK

Income groups		Expenditure on food								N (valid)
		meat	fish	poultry	dairy	fat	vegs	fruit	total	
Low		615	103	99	237	51	228	362	1695	208
Medium		597	126	108	272	60	252	391	1806	215
High		659	164	104	276	62	280	429	1974	76
ANOVA Df = 2	Sig.	0.283	0.000	0.534	0.011	0.073	0.008	0.128	0.001	Total 499
	F	1.2	11.7	0.6	4.5	2.6	4.8	2.0	6.7	

Food expenditure between the three income groups is diversified, i.e. the low income group spends significantly less money on fish, dairy and vegetables. A total food expenditure per person is lower in the low income group (1695 €) than in medium (1806 €) or high income ones (1974 €).

In Table 10 the budget share in expenditure for different kinds of foods over the three income groups is presented. The analyses confirm Engels's Law, i.e. the low income group spends a higher share (%) of the total budget for food, than the medium and the high income groups. The low income group has 2.3 times higher budget share (23.6%) in food expenditure than the high income group (10.1%).

TABLE 10. Budget share (%) in food expenditure by income group, in 2001, GfK

Income groups		Budget share								Total
		meat	fish	poultry	dairy	fat	vegs	fruit	total	
Low		8.6	1.4	1.3	3.2	0.7	3.1	4.9	23.6	100
Medium		4.8	1.0	0.8	2.2	0.4	2.0	3.1	14.6	100
High		3.4	0.8	0.5	1.4	0.3	1.4	2.2	10.1	100
ANOVA Df = 2	Sig.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	×
	F	86.4	11.1	31.6	63.7	28.1	53.4	44.8	148.4	

4.2.2. Significant socio-economic variables explaining PP and EP

In the regression analysis, the variance in PP and EP, and per income group is explained by the five socio-economic variables: income (IN), region (RE), education (ED), profession (PR) and age (AG). In this way it is possible to

indicate which variable is relevant for the total amount of food purchased, or expenditure on food within each income group:

$$PP \text{ or } EP = a + b1(IN) + b2(RE) + b3(ED) + b4(PR) + b5(AG)$$

Analysis of NIS data show that variation explained is lower than 10%, with exception for the high income class. Income is the only significant variable having an influence on food expenditure.

For GfK, the regression analyses is calculated for the four variables (region, education, profession and age) that have a potential influence on quantity of food purchased and expenditure on food. Age is the only one variable that has a positive significant impact on the quantity of food purchased. This means that the quantity of food purchased and the corresponding expenditure on food increase with the age of people. Older people in a high income groups purchase twice more food than older people in the low income group. The wealthier elderly people spend also twice more money on food in total than poorer ones. However, the explained variance remains below 10% for the low and medium income group, and is about 20% for the high income group.

4.2.3. Relationship between income group and the other variables

The relationships between income groups and region, education, profession and age are analyzed by chi-Square test.

Analysis of NIS data show the relation between income classes on the one hand and region, education, profession and age on the other hand. Only the link between low education and low income is significant. Additionally, not active people can be again found in the lowest income class.

In GfK database, the relationships between income groups and the four social variables (region, education, profession and age) are calculated. It is important to find out how the low income group can be characterized in terms of region of living, education, profession and age. The link between income and region is not significant. For the three regions in Belgium, the distribution of respondents over the income groups is almost the same.

In Table 11 the relationship between education and income groups is presented. In the case of Belgium, the primary education refers to the education at the elementary grade while the secondary education indicates all degrees obtained after additional five years of studies but before entering the college or the university.

Table 12 shows that low income group is mainly composed of workers who are technical employees without higher or university education. The

TABLE 11. Relationship between income group and education

Income groups	Education (%)			Total (%)
	primary	secondary	higher and university	
Low	50.6	38.7	37.6	42
Medium	38.3	47.0	41.0	43
High	11.0	13.5	21.4	15
N = 490, X^2Test: Df = 6, p = 0.026				100

TABLE 12. Relationship between income group and profession

Income groups	Profession (%)			Total (%)
	workers	office-employees	independent or free profession	
Low	53.9	41.7	26.1	42
Medium	36.7	45.6	49.3	43
High	9.4	12.8	24.6	15
N = 446, X^2Test: Df = 6, p = 0.000				100

office employees and people with an independent or free profession have mostly medium incomes.

In Table 13 the relationship between income groups and age is presented. It is interesting that the low income group is composed of younger rather than older people. The pensioners above the age of 65 years have rather medium incomes when comparing to other age groups.

TABLE 13. Relationship between income group and age

Income groups	Age (%)			Total (%)
	≤ 44 years	45–64 years	≥ 65 years	
Low	42.3	44.2	33.3	42
Medium	37.1	39.9	58.6	43
High	20.6	15.8	8.1	15
N = 499, X^2Test: Df = 6, p = 0.006				100

4.3. Conclusions from analysis of Belgian data

First, the food purchase per person in the low income class is not significantly lower than for medium and high income classes. It is shown in the sample of Belgian consumers, and contradictory to the presented literature, that people having low income do not purchase significantly less vegetables and fruit than people with medium and high incomes. The exception is the quantity of fish purchased that is much lower for the low income group than other income groups. The data suggest that the difference from the amount

of food purchased between the three income groups should not be vital for any health inequalities in Belgium. Since the methodological problem was already indicating difficulties in reaching the most vulnerable and really low income group by secondary data, such a conclusion cannot be made in this research.

Second, with regard to expenditure on food in Belgium, two aspects are explained. First, it is shown that people with low income spend significantly less money on total food in general, and specifically less on fish, dairy products, and vegetables. The analysis also indicates that regardless of the level of income Belgians spend approximately the same amount of money on fruit. Second, the budget share on food expenditure for the low income group is indeed 2.3 times higher than in the high income group. This fact shows that poorer people may have other experiences with food availability and food choice, i.e. its quality and variety, than richer people. Since the budget share in food expenditure is higher for the poor and low income classes the medium and high income classes may focus more on quality and variation while purchasing food items.

Third, the socio-economic variables explaining the quantity of food purchased and expenditure on food per person are related to people's age regardless the income group. The cross-tabulation analyses show significant relationships between education, profession and income groups. Primary education and low professional status are characteristic for low income groups in Belgium.

The comprehensive statistical data of NIS and GfK related to purchase and expenditure for food items give indication and insight in the fact that the low income classes spend less money on fish, dairy, vegetables and fruit. These are food products, which are considered generally as "healthy" food. In this perspective, it is clear that people from the low income classes have less healthy food consumption behaviour.

As it was indicated before, really low income food consumers were not interviewed in the NIS and GfK panels. Therefore the current research does not generate relevant conclusions over the unhealthy food consumption pattern of this social group. Even though Belgium is known as a relative homogeneous country, where the range of income difference between rich and poor is a factor 5 as in the current sample, the results of this study may not be overestimated. Since both household panel data of NIS and GfK are not quite relevant to come up with conclusions about a healthy diet, more specific data have to be collected in Belgium in order to test these general findings.

5. General conclusions

Although the nutritional status of Polish and Belgian populations is not reflected in the "average" descriptions in statistical databases, the FAO Balance Sheets are a valuable source of data that enable comparison between countries. Research focusing on differences between socio-economic groups brings more understanding of the consumer decision-making process in regard to the quantity of food purchased and food expenditure.

The analysis of FAO Food Balance Sheet FBS data for Poland and Belgium implies that the economical transition in Poland in 1989 had a major influence on the consumption patterns of the population. The most important changes in 1989–2003 concerned the average per capita supply of fruits, edible fats – of both animal and plant origin – and milk. The levels of consumption of these products are one of the most important diet-related factors influencing health. In 2003 the average consumption of fruits and vegetable oils in Poland was about 150% of the 1989 level and 60% in the case of animal fats. These changes can be evaluated as positive. However, the tendency in the case of full fat milk, of which supply in 2003 was only 70% of the 1989 level, is negative from the health perspective.

In Belgium, the observed changes in food consumption are less significant. However the majority of them may have important health implications, contributing to increased obesity, heart disease and diabetes prevalence. These negative trends include decrease in fruit and increase in fat consumption.

The analysis based on FBS data shows that food consumption is currently lower in Poland than in Belgium, both in the case of animal and vegetable products. Two exceptions from these general characteristics are identified – consumption of cereals and potatoes is higher in Poland. Two groups of products i.e. eggs and pulses have currently a similar consumption level in both countries. There is also a growing trend for higher consumption of fish and vegetable oils in both countries.

In Poland, the total energy intake was lower than in the previous decades, reaching its minimum in 1994 and later stabilizing at slightly above 3350 kcal/capita/day. In Belgium the energy intake shows a growing trend.

The research shows that overall foods purchase per person in low income households in Belgium is not significantly lower than for medium and high income class. In Poland differences are observed in the case of fruit and vegetable juices, mineral water, veal and beef, dried fruits, nuts, rye bread, fish, potato and milk products. In Belgium the socio-economic variables explaining the quantity of food purchased and expenditure on food

per person are related to age regardless the income group. In this research, the relationship between education and income groups is highly significant confirming other studies showing that lower education is linked with lower income. In Poland the share of food in expenditures increases with the number of people in household and is the highest in the households in which the head is a retiree, pensioner or farmer.

The observed trends indicate that food policy measures are needed to redirect some of the negative (unhealthy) trends in food consumption. According to the basic lessons of food security planning in preparing food strategies clear, short-term goals should be set (Maxwell, 2001). These should focus on the increase of fruit and dairy products consumption in Poland and reduction of fats and sugar in Belgium. Food consumption and expenditure data on household budget level collected in Poland and Belgium due to methodological reasons were not used for comparison purposes but enabled the identification of consumption patterns needed to set policy goals for different socio-economical and income groups of households.

Chapter V

ANALYSIS OF FOOD CONSUMPTION AND NUTRITIONAL BEHAVIOUR OF LOW INCOME CONSUMERS IN POLAND

Krystyna Rejman

1. Sample, size and fieldwork

The research based on interviews with 240 low income respondents was carried out in a Central Poland medium-size city (38,000 inhabitants) during the first quarter of 2005. In order to select the target group of consumers, the city was chosen taking into consideration high indices of unemployment and decreasing standard of living due to economic transition. The selection factor to sample was monthly income per person which varied depending on household size. For a single person, the income ceiling was set at 1100 PLN[1] per month. For the respondent living in households with two or more persons the ceiling was 800 PLN per person, taking into consideration monthly income of the Polish households amounted to 1020 PLN on average in 2004 (GUS, 2006).

The data were collected by face-to-face interviews. Each interview took roughly one and a half hour. To assure the best practise of 24 h recall dietary interviews, two publications of the National Institute of Food and Nutrition in Poland (IŻŻ) were used. The first was a video film "Instruction on Conducting 24 Hours Dietary Recall Interview" (IŻŻ, 2000), providing a very detailed guidance for the fieldwork. The second was "Album of Photographs of Food Products and Dishes" (Szponar et al., 2000) used during the interviews to facilitate respondent to give a precise description of the volume/amount of daily food consumed.

The research has the same steps as in the Belgium study, namely: Physical Activity and Health Survey (PAHS), Food Behaviour Survey (FBS), Social Functioning Survey (SFS), Food Frequency Questionnaire (FFQ) and 24 hours Recall Method (24 h RM).

[1] 1 euro = ±4 PLN in 2005.

2. Research design

Data were collected through the questionnaire consisting of four parts:

1. Socio-demographic characteristics of low income respondents and BMI groups.
2. Physical Activity and Health Survey (PAHS) and Social Functioning Survey (SFS):
   - PAHS include the following variables: internal and external health factors; health behaviour related to physical activity; diet-related diseases and medical history;
   - SFS focuses on: emotional eating (well being), social involvement and effects of illness (consequences of diseases).
3. Food Behaviour Survey (FBS):
   - knowledge, attitude and preference (knowledge and importance of dietary guidelines, awareness of diet-disease links; self-assessment of nutrition; sources of diet and health information; dietary management practices, food choice and meal patterns);
   - food environment (out-of home free meals consumption and food provision; budget limitation of food consumption).
4. Food Consumption:
   - frequency of food consumed – Food Frequency Questionnaire (FFQ);
   - amount of food consumed – 24 h Recall Method (24 h RM).

3. Data analysis

The data obtained from the respondents were analysed in two steps. In the first step Body Mass Index was calculated for 215 respondents, as 25 persons from the sample refused to indicate their weight. The assessment of the diet by comparison with the recommended dietary allowances (RDA) was applied to this smaller sample of the consumers (N_{RDA} = 215).

In the second step the data collected in 24 h RM were entered to DIETA 2000 Program (Rybarczyk, 2000), which enables to calculate for each respondent the following values:

1. Nutritional value of the diet including:
   - dietary energy supply (DES) in kcal/day and its structure;
   - daily nutrition intake of the following:
     - energy nutrients in grams/day: total, animal and vegetable protein, total fat, saturated fatty acids (SFA), monounsaturated fatty acids

(MUFA), polyunsaturated fatty acids (PUFA) and total carbohydrates,
- minerals in mg/day: sodium, potassium, calcium, phosphor, magnesium, iron, zinc, copper,
- vitamins per day: A (μg), E (mg), thiamine B_1 (mg), riboflavin B_2 (mg), niacin (mg), B_6 (mg), C (mg),
- other compounds of the daily diet: water (g), alcohol (g), cholesterol (mg), and dietary fibre (g).

2. Nutritional evaluation of the diet based on:
   – comparison of DES structure, including share of SFA and MUFA in total energy, as well as cholesterol, dietary fibre and salt daily intake following the WHO recommendation (WHO, 1990);
   – comparison (in %) of the daily nutrients intake in N_{RDA} respondent sample with the recommended dietary allowances (RDA); the Polish RDA are determined by gender, age, weight, physical activity (and additionally for pregnant and breastfeeding women) (Ziemlański et al., 2001).

4. Results and discussion

4.1. Introduction

The results are presented and discussed in the following six steps:
– socio-demographic characteristics of the low income consumers and Body Mass Index groups;
– characteristics of low income respondents through PAHS and SFS surveys;
– characteristics of respondents through FBS survey;
– characteristics of respondents through food consumption variables, based on FFQ and 24 h RM data;
– relationships between BMI groups and PAHS, SFS and FBS variables;
– relationships between BMI groups and FFQ and 24 h RM.

Frequencies of answers obtained from FBS, PAHS, FFQ and 24 h RM were calculated as well as its share (%) indicating relative importance. In rank questions the mean ranks were calculated using arithmetical mean. For continuous variables (high, weight, number of people in the household and nutritional data obtained from 24 h RM) basic statistics were calculated. All statistical analysis were made using System SAS® 9.1 version (SAS Institute Inc., 2004b).

Relationships between BMI groups and PAHS and SFS variables were evaluated using the methodology of cross-tabulation and chi-square tests applying the FREQ procedure (Der and Everitt, 2002), also using Spearman rank correlation ratio and Pearson correlation ratio (CORR procedure) (Schlotzhauer and Littell, 1997). The same methodology and procedure was applied to evaluate the relationships between BMI groups and all variables from FBS, FFQ as well as 24 h RM.

One-way ANOVA analysis with Tukey-Kramer multiply range test were applied to evaluate the relationships between BMI groups and 24 h RM variables.

4.2. Socio-demographic characteristics of the low income consumers and BMI groups

4.2.1. Socio-demographic data

In the sample of 240 low income consumers, 83% of respondents were women and 17% were men. Their main socio-demographic characteristics were as follows:

1. Almost half of the interviewees (47%) were people between 36 and 50 years old. The second biggest group were respondents up to 35 years old (32%), and people over 50 constituted 21% of the sample.

2. About 54% of consumers have secondary education, 22% primary or vocational education and 24% higher/university degree.

3. Most respondents (58%) were living in three- and four-persons' household (30 and 28%, respectively). People living in two persons' families comprised 19% of the group, 14% lived in the households of five or more persons, and the remaining 9% were singles.

4. White collar workers prevailed in the group (44%), followed by retired persons (20%), physically working people (13%) and people who didn't work by choice (e.g. because they were rearing small children). There were 12 unemployed persons in the sample (5%).

5. Full-time job was the main source of income for most of the respondents (62%), retirement pay ranked second (21%), and the income from self--employment was on the third place (14%).

6. Unsurprisingly, two thirds of respondents self-assessed their households' financial situation to be average, 11% assessed it as bad or very bad, and 23% as good. The relevant indices for the total number of the Polish households obtained in the Central Statistical Office survey equal 52, 34 and 14%, respectively (GUS, 2006).

4.2.2. Body Mass Index groups (BMI)

The distribution of respondents into four BMI groups showed that there are only 7 underweight persons (women) in the sample. For further analysis these respondents are included into the normal weight group (Table 1). Finally, three BMI groups were retained: normal weight plus underweight people with 61.4% of the sample, overweight group 31.2%, and obese group 7.4%.

TABLE 1. Consumers' characteristics regarding BMI groups (N_{RDA} = 215)

BMI groups	N_{RDA}		Frequency (%)	
Underweight	7	132	3.3	61.4
Normal weight	125		58.1	
Overweight	67		31.2	
Obese	16		7.4	

4.3. Characteristics of low income respondents through PAHS and SFS surveys

4.3.1. Physical Activity and Health Survey (PAHS)

Physical activity. Boosting physical activity is considered as the most important goal to improve public health nutrition (Ottley, 2003). The guideline is underlined in the frame of national food policy programmes for both developed and developing countries (e.g. France, Poland, USA, Sweden, China, and Korea) as well as for each population group. Almost 50% of the respondents self-assessed their physical activity as moderate and 20% as high or very high. Moreover, 55% of the group performs an intensive physical activity/work at least once a week.

Diet related diseases and medical history. High blood pressure was the most frequent disease, diagnosed/at risk for 1/3 of the group, followed by high blood cholesterol level and heart diseases (25% in each case), and obesity/overweight (20%) (Table 2). Lower occurrence (14–7%) was noticed for diabetes, atherosclerosis, liver diseases, and osteoporosis. Altogether, cardiovascular and heart diseases (CHD) were diagnosed by doctor in connection with improper food consumption pattern and habits in the case of 41% of respondents. Further 50% were informed about being at risk of CHD. In general, the occurrence of non communicable diseases among the consumers was rather moderate, comparing with average national ratios (Rywik et al., 2005; Weinkauf and Kajcińska, 2006).

Almost 80% of respondents measured regularly their blood pressure (35%) or at least once during last year (44%). Other medical blood indices

TABLE 2. Occurrence of diet related diseases in low income consumers group, % of respondents

Type of disease	Diet related diseases incidence			Not stressed
	diagnosed	at risk	total	
High blood pressure	17.5	12.9	30.4	69.6
High blood cholesterol	12.5	12.1	24.6	75.4
Heart disease	8.8	15.8	24.6	75.4
Obesity or overweight	9.2	10.8	20.0	80.0
Diabetes	3.3	10.4	13.7	86.3
Atherosclerosis	2.5	8.3	10.8	89.2
Liver disease	4.2	5.4	9.6	90.4
Osteoporosis	1.7	5.4	7.1	92.9

were not checked regularly: blood cholesterol was measured by 40% of the respondents (12% regularly and 27% at least once during last year), and blood glucose 44% (11 and 33%, respectively).

Only 7.5% of respondents followed a special diet recommended by the doctor, and one person in five applied a diet of their own. In most cases it was a weight-loss diet (11%), followed by low cholesterol, low calorie and low fat diets (8% for each type). About 10% of the consumers were under medical consultation/treatment in connection with the diet.

About 6% of low income consumers had to avoid certain food items due to allergy (in descending order it was milk, fish, eggs, and nuts). About 35% of the respondents did not take any supplements (e.g. vitamin, minerals, amino acids, herbal supplements) and 20% supplemented the diet often or regularly.

Specific exposure for dietary related diseases and health self--assessment. The low income consumers had rather low exposure to non communicable diseases related to smoking and drinking alcohol. Only 20% of the respondents declared current smoking and 25% said they were smoking in the past. Only 2% of respondents were heavy-users of alcohol and 4% were drinking regularly but moderate amounts. Perhaps hereditary determinants of diet related diseases could have been stronger; as such the diseases occurred in consumers' families as well as among their ancestors in over 80% of the sample. The self-assessment of consumer body weight in general agreed with results of BMI calculation. Finally, the consumers considered themselves as quite healthy: 55% gave the mark very good and 25% good.

4.3.2. Social Functioning Survey (SFS)

Emotional well-being and social involvement. About 70% of the interviewed low income consumers described their emotional state as good, 18% as bad and the remaining 14% didn't have any opinion. Surprisingly,

opposite frequency was noticed in the case of self-assessment of being stressed. Almost 75% of the respondents perceived themselves as permanently (27%) or sometimes (48%) stressed. Stress factors at work, overall situation at home and financial situation were the three main determinants influencing respondent's mood (33, 25, and 15%, respectively). Some people stipulated other factors, like the current situation in Poland or in the world, health reasons, loneliness or unregulated marital status. Almost 40% of the respondents had not any specific method of reducing stress, but 16% mainly ate more, 13% smoked, 9% exercised/worked physically, and 5% ate less. The respondents did not feel socially excluded. Only 8% had social contact less often than once per month and half of the group met family or friends at least once per week. Over 40% of the group was involved in working for the community, and 10% of the respondents were often engaged in social work.

Effects of illness and social problems. About 9% of the low income respondents had health disability preventing them from working and only 2% received social welfare support due to health problems. Also a small part of the group (8%) had some help from family (5%) or social service units (3%) due to difficulties in satisfying their food/nutritional needs. Social problems occurred in the households of 15% of low income consumers. Half of the problems were unemployment (7% of the total group), being a single mother (3%), incomplete family (2%) and alcoholism (1%).

4.4. Characteristics of low income respondents through FBS survey

4.4.1. Knowledge, attitude and preference

Sources of diet and health information. Low income consumers did not recognized professional institutions operating in the food-nutrition--health field (e.g. medical/dietetic counselling, school and special courses) as a source of such information (Table 3). Mass media played that role for almost 80% of respondents followed by food advertisement (60%) and family and friends (54%).

Nevertheless over 82% of the consumers heard about dietary guidelines. Food guide pyramid was the best known guideline and familiar to 56% of respondents while "5-a-day programme" was the least known information (for 38% of the investigated group).

Awareness of diet-disease relationships. Almost 70% of the respondents were aware of links between nutrition and health and further 26% rather agreed with this statement. Almost the same answer frequencies were for

TABLE 3. Sources of diet and health information, % of respondents

Source of information	None	A little	A lot	Total
Medical doctor	47.9	40.4	11.7	100
Other health providers like a nurse or dietician	72.9	18.3	3.8	100
Food advertisements	32.1	60.4	7.5	100
Mass media programmes and articles	21.7	58.7	19.6	100
Newspaper or magazine articles	20.8	58.4	20.8	100
Grocery store handouts or displays	57.5	40.0	2.5	100
Food labels or packaging	44.2	47.9	7.9	100
Health organisations	83.3	13.3	3.4	100
Friends, family members or acquaintances	28.3	53.8	17.9	100
Diet, health or cookbooks	34.6	40.8	24.6	100
School & educational courses	75.4	17.9	6.7	100

the possibility of disease prevention by proper nutrition. Respondents who were convinced of health-diet links (n = 213) indicated in the open question the most common non communicable diseases of nutritional origin. Obesity and overweight were indicated by 39% of this group, heart diseases by 31%, CVD and increased cholesterol level by 28%, digestive tract diseases by 27%, diabetes by 22%, and blood hypertension 21%. About 10% of consumers mentioned osteoporosis, cancer and anaemia. Less than 5% of the respondent mentioned other diseases, such as allergy, tuberculosis, eye diseases, physical and mental activity decreasing, rickets, caries, and constipation.

Food products enumerated as preventing diet-related diseases by more than half of the group are vegetables (75%), fruit (70%), whole grain bread or other brown bread with high content of dietary fibre (47%), fish and sea-food (45%), milk and milk products (38%), and olive oil (27%). Fish oil and poultry meat were mentioned only by 15% of the consumers. In this light an almost three-fold increase of consumption of poultry meat and processed poultry product noticed in Poland over the last 15 years was due to their economical availability (low price) rather than for dietetic value.

Self-assessment of nutrition and meal patterns. Generally, respondents evaluated food quantity in household nutrition to be good because (only 11% stressed some deficiencies or insufficient amount of food). Diversity of food was evaluated much worse as over 30% of households considered their nutrition to be little diversified or insufficiently diversified (Table 4). During the last year 10% of households suffered nutrition deterioration, due to health reasons (42% of answers), decrease of money for food (40%), food price increase, family situation and greater interest in food and nutrition (each of the above 21%). It is worth mentioning that 12% of respondents noticed an improvement in their households' everyday nutrition during the last year.

TABLE 4. Self-assessment of nutrition in the low income consumer households, % of respondents

Amount of food	%	Diversity of food	%
Too abundant	10.0	Very diversified	3.7
Relevant	77.5	Diversified	62.9
With some deficiencies	10.8	Little diversified	27.1
Insufficient	0.4	Not diversified enough	4.6
Don't know	1.3	Don't know	1.7

Adults usually had three meals per day, while eating frequency among children was a little bit higher. Respondents usually had one hot (cooked) meal per day. In 10% of the households people had more hot meals daily and probably it was practiced due to the lower cost of meals totally prepared at home.

Dietary management practices. More than 80% of the respondents were looking for some information on the food item label, but it was everyday or frequent behaviour only for 35% of them. In the case of nutritional facts respondents have a rather passive attitude, as only 18% always or often read it and even fewer (11%) declared checking the energy value of the products. For these consumers the avoiding/including certain food items in the daily diet was the most frequent practice for keeping track of the amount of energy or nutrients intake.

The 5-points Likert scale was used to evaluate food preparation management of low income consumers based on complying with current dietary guidelines (Table 5). The scale started with score 1 meaning "definitely not agree" and ended with score 5 for those who definitely agree. The following assumption for answer evaluation was used: mean rank 1.0–2.5 = not important, > 2.5–3.5 = mean important, > 3.5–4.5 = important, and > 4.5–5.0 = very important. Respondent declared large consumption of cereal products and potatoes, resulting that these products are the staple food in low income consumer household. The important features of food intake were also: consumption of a lot of vegetables and fruit, food diversification, and diminishing the amount of fat contents in meals. Consumers were also aware of the guidelines on healthy food intake. They knew the importance of eating a lot of fruit, vegetables, and fish. They also are aware of the higher nutritional value of vegetable fats compared with animal fats. However their knowledge does not translate into conscious nutritional behaviour, as butter is by far the most important fat used in their households, and self-evaluation of number of portions of consumed fruit and vegetables equals 2.5.

TABLE 5. Evaluation of food preparation management in the low income consumer households on the base of dietary guidelines compliance

Statements	Mean rank[1]	Frequency of answers (%N)		
		don't agree[2]	neither/ /nor	agree[3]
One should eat daily lots of fruit and vegs	4.59	3.4	2.9	93.7
For good health, one should eat lot of fish	4.33	4.2	10.0	85.8
Plant oils are better for health than animal fat	4.28	5.0	14.6	80.4
Cereal products and potatoes are basis of the diet in my household (staple food)	3.89	12.9	13.3	73.8
We eat plenty of bread, cereals, rice	3.71	16.2	15.0	68.8
We eat plenty of fruit and vegs	3.67	17.5	18.8	63.7
We eat variety of food	3.62	17.1	18.3	64.6
I limit fat content, while preparing meals	3.60	22.1	13.3	64.6
I try to limit consumption of salt	3.24	28.3	20.0	51.7
We eat food with adequate dietary fibre	3.10	24.6	40.8	26.7
We eat food low in cholesterol	2.98	32.5	33.8	33.7
We eat small amount of red meat	2.98	37.9	31.3	30.8
We eat at least 2 servings of dairy daily	2.97	42.5	15.4	42.1
I chose fat reduced products, while shopping	2.92	40.8	25.0	34.2
We eat food low in animal products	2.34	62.5	22.1	15.4
We use a lot of fat to increase satiety of meals	2.03	74.2	17.1	8.7

[1]5-point Likert scale was applied with the options: definitely not agree = 1; not agree = 2; neither/nor = 3; agree = 4; definitely agree = 5.
[2]The sum of two frequencies: definitely not agree and not agree.
[3]The sum of two frequencies: agree and definitely agree.

The evaluation of the remaining statements indicates low nutritional awareness of the respondents who considered limitation of salt intake, consumption of adequate quantity of dietary fibre and low intake of cholesterol to be of average importance. They said the same about low consumption of red meat, high intake of dairy products, and buying low fat products. Consumers did not agree with the statement concerning the low consumption of food products of animal origin as well as using a lot of fat for increasing satiety of meals prepared at home.

Food choice and its determinants. Preferences and food habits were the most important factors influencing everyday food consumption in low income respondent households (75%) (Table 6). Financial situation was the second factor (57% of the sample). However, for 25% of the group financial situation was the most important determinant and for 20% was the second most important. Convenience of meal preparation was the third main factor (52%). Nutritional-health determinants of food choice were important for less than 30% of the respondents. Almost 18% of respondents tried to apply dietary knowledge and follow the guidelines, 15% choose food product looking mainly at energy and nutritional value.

TABLE 6. The ranking of factors influencing everyday nutrition in the low income consumer households, % of respondents

Factor	Main factor	Second factor	Third factor	Total
Preferences and food habits	45.4	15.4	14.6	75.4
Financial reasons	26.3	19.2	11.3	56.8
Convenience of meal preparation	5.4	19.6	26.7	51.7
Life-style	7.1	16.3	19.6	43.0
Applied specific diet/health factors	8.8	12.5	7.9	29.2
Knowledge and dietary guidelines	2.9	8.3	6.7	17.9
Energy and nutrient value	2.9	5.4	7.1	15.4
Own production/self-supply	0.8	2.1	3.3	6.2
Commercials	0.4	1.3	2.9	4.7

The majority of respondents preferred white bread (36%) or diverse types of bread with white bread prevailing (48%). It means that this kind of bread is most frequently consumed in 84% of the households, while only 16% of respondents buy brown-whole-grain bread, following the dietary guidelines. The results of food frequency questionnaire confirmed these observations. Consumer behaviour is somewhat better in the case of liquid milk choice, as almost half of the sample (47%) consumed skimmed or semi-skimmed milk most frequently. One third of the respondents preferred full milk and 16% of them buy milk directly from the farm.

As for fat spreading on bread, butter was predominant (41% of respondents), followed by butter-margarine mix or butter-vegetable oil mix (30%) and margarine (25%). There is still a strong tradition to eat bread with butter in Poland. So the explanation of twofold decrease of butter consumption revealed in secondary data (chapter 4 based on food balances and household budget survey data) is the reduction of using butter for frying and baking as well as the consumption of more convenience and high processed foods which contain vegetable fats.

Although vegetable oils were the fats used most often in meal preparation – 96% of households (Table 7), only one fifth of the respondents declared the oils to be the most important ones in terms of quantity, which puts the vegetable oils on the third place after butter and margarine. More than half of respondents (55%) ranked vegetable oils as the second main fat in the household. The third fat most frequently used was margarine. Lard and olive oil were the least popular fats for food preparation in the respondent household. Low consumption of lard and olive oil was further confirmed by FFQ studies where these fats were among the food products most seldom consumed, 1–3 times a month. Low lard consumption proved that consumers were aware of health threats linked with saturated fatty acids consumption.

TABLE 7. Fat consumption in low income respondent households and order of their importance (% of respondents)

Consumption		Ranking of fats regarding consumption level					
fat	%	main fat	%	second fat	%	third fat	%
Butter	87.5	Butter	43.2	Vegetable oils	54.5	Margarine	22.5
Margarine	81.7	Margarine	35.0	Butter	17.5	Butter	21.3
Vegetable oils	96.3	Vegetable oils	19.6	Margarine	15.8	Vegetable oils	19.6
Olive oil	47.5	Olive oil	2.5	Olive oil	6.3	Lard	12.1
Lard	46.7	Lard	0.0	Lard	5.4	Olive oil	10.8

In the case of butter other food choice determinants played decisive role, e.g. taste, easy digestion, habit. Olive oil consumption is not common due to high price, but rapeseed oil is the most popular vegetable oil in Poland and its fatty acid composition is nutritionally even better than that of olive oil. To summarize, the quantitative ranking of consumed fats is as follow: butter, vegetable fats, margarine, olive oil, and lard.

4.4.2. Food environment

Food provision and shopping venues. All respondents indicated shopping as a source of food provision, and for 99.6% of them it was the main way of food provision. Over 40% of the respondents supported their household budget by food self-supply. Almost 10% obtained food from social welfare institutions and donations and approximately 5% exchanged food with their neighbours.

Market place was the most common for food shopping as almost 87% of respondents are used to buy food there (Table 8). After the economic changes, the market place grew in importance because it has become a place for trading processed food products by small manufacturers and intermediaries, not only for agricultural products as it was before. Prices at the market are lower and fruits, vegetables, eggs, meat bought directly from farmers are of higher quality. The place is also popular because of social aspect. Large self-service stores and traditional retail shops located close to place of living are also very popular places of food purchase. Over 80% of the respondents choose them for everyday shopping because of low prices and accessibility/good location. These reasons placed supermarkets as the main place of shopping taking into account the total amount of purchased food (41% of respondents). Market place is the second and the third place for food purchase in this ranking (32% and 26% of the group, respectively).

As for the self-supply, the respondents obtained mainly vegetables (36% of respondents), fruits (30%), eggs (19%), and potatoes (17%). Self-supply of

TABLE 8. Places of food shopping and its ranking with regard to total amount of purchased food (% of respondents)

Places	%	1st source	%	2nd source	%	3rd source	%
Market place	86.7	Large self--service stores	41.3	Market place	32.1	Market place	26.3
Large self--service stores	82.1	Normal size shops	24.6	Traditional shops	23.3	Traditional shops	25.0
Traditional shops	81.7	Traditional shops	20.8	Regular size shops	22.9	Regular size shops	13.3
Regular size shops	67.1	Market place	11.3	Large self--service stores	16.7	Large self--service stores	11.7
From producer	30.8	Wholesale	1.3	From producer	2.9	From producer	6.3
Wholesale	23.3	From producer	0.8	Wholesale	1.7	Wholesale	5.0

other food products declared less then 10% of the respondents, especially when it came to meat and milk (8 and 5%, respectively).

Almost 75% of respondents processed food for out of season period. In this way the respondents could save on food expenses during winter and spring time. The most common was sour cucumber, followed by processed fruit; mushrooms (pickled and dried), other processed vegetable products, frozen fruits and vegetables, and sour cabbage.

Budget limitation of food consumption and food subsidies. Only 4.2% of the respondents declared their households received support in the form of subsidized meals. Most of the meals were subsidized school lunches for children. About 18% of the respondents declared that they had to limit the purchase of food.

Almost 37% of the respondents stressed that an improvement of their financial situation would influence their food consumption and 16% of the interviewees did not have any opinion in this respect. About half of the respondents were satisfied with their food consumption level and structure. When the household budget increase, most respondents would buy better quality food or brand food and buy more diversified food products (Table 9).

TABLE 9. Changes in food consumption declared by low income consumers in the case of financial situation improvement

Changes	Yes	No	Don't know	Not answer
Buying food of better quality/brand food	33.3	2.5	0.9	63.3
Buying more diversified food	28.3	7.1	1.3	63.3
Eating out more often	18.3	15.0	3.4	63.3
Less/no help the social services	14.2	18.8	3.8	63.3
Buying more expensive food	13.8	18.3	4.6	63.3
Buying more food	12.5	21.7	2.5	63.3
Buying more processed food	7.5	24.2	5.0	63.3

The respondents have a rather conservative attitude towards food consumption. Only 7% of them stressed that better financial situation would make them buy more processed food. It is rather a typical attitude among Polish consumers. They are afraid of preservatives and new ingredients or technologies. Generally, consumers in Poland are used to prepare their meals at home. The share of expenditures for eating out in total household expenditures is less than 5% (GUS, 2006). Home made meals are perceived to be safer and have better quality.

4.5. Characteristics of low income respondents through food consumption variables

4.5.1. Frequency of food consumption (FFQ)

No products were consumed with the lowest frequency "a few times per year" according to FFQ results (Table 10). "One to three times per month" respondents consumed food with a nutritional value preventing diet related diseases, e.g. fish, fish products, legumes and olive oil. Other nutritionally desirable products, e.g. grits, grain flakes and muesli, potato meals, and pasta and rice were consumed also with a low frequency ("once a week"). In contrast, lard, potato fries, soft drink, jam, egg and cream were also consumed at low frequency, but it means nutritionally proper behaviour.

Polish low income respondents consumed "at least once a day" the following four food products: mineral water, apples (during the apple season), white bread and tea. Water and apples exert a positive influence on consumers' nutrition, which cannot be said about white bread and tea. However, this is what food consumption patterns and nutritional habits are like in Poland.

The remaining 22 food products were consumed with a frequency of "a few times per week". Among them, the least frequently consumed were poultry, red meat, fruit, processed/cooked vegetables, and yoghurt. Most often were consumed 4 food products/meals: butter, coffee, soup and boiled potato. With regard to nutrition, the above mentioned frequency distribution is generally positive. However, a good diet should include more frequent consumption of whole-meal bread, fruits and fermented dairy drinks boosting the intake of vitamins, minerals and not-nutritional chemical compounds, including functional ones, such as probiotics, flavonoids and dietary fibre.

On the other hand, the frequency of the consumption of cakes and confectionery, as well as of butter, margarine and red meat products should

TABLE 10. Average food consumption frequency among low-income Poles

Food products	Mean frequency	Standard deviation	Type of frequency
Sour milk	1.78	1.08	one to three times per month
Lard	1.85	1.04	
French fries	2.01	0.94	
Olive oil	2.03	1.24	
Legumes	2.06	0.90	
Processed fish	2.22	0.82	
Fresh fish	2.40	0.71	
Grits	2.53	0.94	once a week
Grain flakes and muesli	2.79	1.38	
Potato meals (e.g. pancake, potato dumpling)	2.81	1.03	
Pluck and processed meat products	3.11	1.35	
Pasta and rice	3.26	0.89	
Jam, honey	3.29	1.22	
Soft drinks (e.g. coke, lemonade)	3.32	1.70	
Eggs (boiled, fried, scrambled, omelette)	3.44	0.83	
Cream	3.49	1.03	
Poultry meat	3.55	0.85	a few times per week
Meat: pork, beef, veal, and other red meat	3.56	1.03	
Processed poultry (slices)	3.59	1.32	
Southern fresh fruits	3.66	1.28	
Other vegetables (boiled, frozen, pickled, etc.)	3.67	0.99	
Total fruit (fresh, frozen, canned)	3.74	1.48	
Yoghurt, kefir and other milk drinks	3.75	1.23	
Whole-grain bread	3.78	1.60	
Yellow cheese, inc. brie and maturated cheese	3.80	1.04	
White (cottage) cheese, and flavoured cheese	3.81	0.96	
Vegetable oil	3.94	0.99	
Processed red meat (sausages, charcuterie, etc.)	3.95	1.24	
Sweets, chocolate, etc.	3.96	1.34	
Cakes and cookies	3.98	1.25	
Liquid milk	4.10	1.32	
Fruit and vegetable juices	4.14	1.50	
Fresh vegetables and salads	4.21	0.93	
Margarine and mixed fats	4.30	1.77	
Butter	4.37	1.89	
Coffee	4.37	1.86	
Soup (excluding milk soup)	4.38	0.75	
Boiled potatoes	4.46	0.73	
Mineral water	4.69	1.53	at least once a day
Fresh apples	5.06	1.05	
White bread	5.29	1.24	
Tea	5.85	0.52	

be lower, as most of the respondents tend to choose cheap products containing a lot of fat (saturated and trans).

There were two additional questions in the FFQ: the daily amount of liquids and number of fruit and vegetable servings. The average daily consumption of liquids was 2.6 litres which is the amount recommended in dietary guidelines (more than 2 litres per day) (Table 11). However, the results of 24 hour dietary recall revealed lower consumption, between 0.9 and 3.4 litres per day, 1.9 litres on average.

TABLE 11. Consumption of liquids (in litres per day) and fruit and vegetables (in servings per day) by low income Polish consumers, % of respondents

No of fruit and vegs servings	0	1	2	3	4	5
Frequency of answers	4.2	19.6	30.8	28.7	12.1	4.6
Mean number of fruit and vegs servings daily consumption = 2.54						
Amount of liquids	up to 1 litre	> 1 to 1.5 l	> 1.5 to 2 l	> 2 litres		
Frequency of answers	9.2	42.9	32.5	15.4		
Mean amount of liquid daily consumption = 2.63						

The average number of fruit and vegetable portions consumed daily was only 2.5. Consumers, who followed the recommended daily intake of 5 servings, represent less than 5% of the group. Almost the same percentage of respondents does not eat any fruits and vegetables. The largest group (31%) consumes as little as 2 portions of fruit and vegetables daily and similar percentage of the respondents eats 3 portions. The portions usually include apple, vegetable content of soups, salad or cooked vegetables served with the main course. Since there is a wide range of fresh and processed fruit and vegetables supplied, the only constrains in boosting these consumption are low income and food habits.

4.5.2. Amount of food consumed (24 h RM)

The average daily diet of the low income respondent consists of 1944 kcal, coming from 66 grams of protein, 73 grams of fat and 269 grams of carbohydrates (Table 12).

These nutrients provided 13.7, 31.9, and 53.4% of daily energy supply (DES), respectively. However high standard deviation is noticed for most of the nutrients intake and energy value of the diet indicate big differences among consumes.

The average diet of low income consumers in general showed deficiency of nutrients and energy (Table 13). Twelve out of twenty nutrients were consumed in insufficient amount. The biggest deficiency 62% in comparison with RDA – was in copper intake, and almost 30% of thiamine and calcium.

TABLE 12. Energy and nutrients' daily intake of the Polish low income consumers

Energy/nutrients	Unit	Mean	Minimum	Maximum	Standard deviation
Energy	kcal	1944.4	548.4	4832.0	782.2
Protein, total	g	65.9	5.9	182.1	30.0
Protein, animal	g	41.0	0.0	147.5	24.1
Protein, vegetal	g	25.0	5.0	62.9	9.9
Fat, total	g	72.8	1.8	233.6	41.2
Carbohydrates, total	g	268.8	53.4	580.9	94.8
Sodium	mg	3506.5	157.2	9323.3	1546.8
Potassium	mg	2838.2	737.8	6667.7	1122.3
Calcium	mg	617.8	111.3	3001.5	402.2
Phosphorus	mg	1095.0	201.6	2813.7	450.7
Magnesium	mg	263.2	66.0	647.5	96.9
Iron	mg	10.4	2.9	55.0	5.3
Zinc	mg	8.9	1.0	24.1	3.9
Copper	mg	1.1	0.2	2.7	0.4
Vitamin A (retinol eq.)	mg	1261.1	88.0	29,228.6	2374.5
Vitamin E	mg	9.861	1.509	35.304	5.766
Thiamine	mg	1.156	0.213	3.826	0.644
Riboflavin	mg	1.452	0.319	8.961	0.807
Niacin	mg	14.0	2.5	49.1	8.5
Vitamin B_6	mg	1.550	0.272	3.805	0.725
Vitamin B_{12}	mg	3.251	0.0	56.946	4.769
Vitamin C	mg	77.3	2.1	454.3	73.3
SFA	g	26.4	0.2	115.6	18.1
MUFA	g	29.7	0.1	110.1	17.6
PUFA	g	10.6	0.4	35.4	6.4
Cholesterol	mg	251.6	0.0	1300.7	184.0
Dietary fibre	g	18.3	3.3	42.1	7.6
Energy from protein	% DES	13.7	3.7	27.5	3.4
Energy from fat	% DES	31.9	1.8	64.8	8.1
Energy from carbs.	% DES	53.4	22.0	94.5	8.5

The latter is due to low and still decreasing consumption of milk and dairy products (expressed as the amount of raw milk) in Poland.

The intake of other minerals was also below recommendations, excluding sodium and phosphorus. Over-intake of phosphorus was the consequence of high cereal product consumption, especially bread. Very high phosphorus intake combined with potassium deficiency results in a nutritionally improper ratio for both minerals. Deficiencies of vitamins B intake are due to low meat consumption, and riboflavin (B_2) intake is related to low milk consumption.

The intake of vitamins A, E, C, B_{12}, protein, and sodium exceeded the recommended allowances. Vitamins A, E, and C are antioxidants which deactivate free radicals and prevent cancer, so their high consumption is therefore positive. Contrary to that, very high intake of sodium (six times

TABLE 13. Energy and nutrients intake by low income consumers comparing (%) with recommended dietary allowances (RDA = 100%)

Energy/nutrients	Percentage of RDA on average	Minimum	Maximum	Standard deviation
Energy	82.1	29.5	208.7	29.1
Protein, total	125.9	12.3	295.2	52.4
Fat, total	93.2	2.9	304.9	46.9
Sodium	602.0	27.3	1505.3	263.0
Potassium	82.1	21.1	190.5	32.1
Calcium	71.4	11.2	375.2	46.6
Phosphorus	163.0	25.2	432.9	67.1
Magnesium	91.1	23.6	231.3	32.4
Iron	79.4	20.8	323.5	41.4
Zinc	83.8	10.4	221.6	33.7
Copper	47.9	11.5	122.4	19.3
Vitamin A (retinol eq.)	205.8	14.7	4871.4	406.1
Vitamin E	124.9	18.9	441.3	70.6
Thiamine	71.9	14.6	228.9	38.0
Riboflavin	84.5	22.8	448.0	44.6
Niacin	76.1	14.8	260.9	45.2
Vitamin B_6	84.6	17.0	237.8	38.1
Vitamin C	131.8	3.5	757.2	123.8
PUFA	131.9	6.1	414.3	73.5
Vitamin B_{12}	164.2	0.0	2847.2	249.5

more than the recommended level) is negative, especially in the context of arterial hypertension, which was the most frequent diet related disease in the respondent group. WHO recommendations also indicate that sodium intake should be much lower, as the intake of sodium equals 8.8 g of salt per day per person (Table 14).

TABLE 14. Comparison of daily diet's energy structure of low income consumers with WHO recommendations

Diet's compounds	Respondent diet (%DES)[1]	Recommendations[2] for developed countries (%DES)
Protein	13.7	15
Fat	31.9	30
Carbohydrates, of which: complex carbohydrates sugar	53.4 **40.5** **12.9**	55 **45** **0–10**
SFA	12.2	0–10
PUFA	4.9	3–7
Cholesterol (mg/day)	251.6	300
Dietary fibre, total (g/day)	18.2	27–40
Salt (g/day)	8.8	0–6

[1]Daily Energy Supply.
[2]WHO (1990): Diet, nutrition and the prevention of chronic diseases. Report of a WHO Study Group. Technical Report Series, 797, Geneva.

The comparison of energy structure of the average diet of low income consumers with WHO recommendations showed that the share of fat exceeded by nearly 7% the ceiling for people living in developed countries. The fatty acids structure was not in accordance with recommendations as the share of energy obtained from saturated fatty acids was higher by 22% than the acceptable level given in the WHO dietary goal. Other discrepancies between the WHO recommendations and food consumption concerned the share of energy supplied from sugar, which was nearly 30% higher, and insufficient intake of dietary fibre – one third less than the lower limit of recommended amount. It should be underlined that cholesterol consumption did not exceed the permitted level.

4.6. Relationships between BMI groups and PAHS, SFS and FBS variables

Significant relationships (p-value 0.05) between consumer behaviour recognized within FBS and PAHS surveys and consumer BMI are shown in the Table 15.

The relationships, which occurred with growing BMI values, were divided into the following four groups:

1. Food provision and meal preparation
   - the number of people having two hot meals per day is increasing;
   - the number of people obtaining a lot of fruit through self-supply is growing;
   - the number of people who limit the purchase of basic food products is increasing;
   - the number of people who declared they did not use more fats in order to make their meals prepared at home more filling is growing.
2. Nutrition and health education
   - overweight and obese consumers more frequently than normal weight people learned about the relationship between nutrition and health from medical doctors;
   - growing BMI values are accompanied by lower number of consumers who learn about the relationship between nutrition and health from leaflets, posters, commercial materials, and from organizations working in the areas of food and health;
   - fewer overweight and obese people have heard of food guide pyramid;
   - the number of people reading the labels of food products is growing, however the information does not concern nutritional and energy

TABLE 15. Significant relationships between BMI groups and PAHS, SFS and FBS variables

Behaviour	Cross-tabulations (%)			χ^2 value	p-value
	under-weight and normal	over-weight	obese		
Two or more hot meals / day	8	13	18	5.878[1]	0.02
High self-supply of fruit	37	25	67	12.786	0.04
Budget limitation for food purchase	12	29	35	5.487[1]	0.02
Looking for any info from packaging	71	67	94	12.876	0.04
No use of fat to increase satiety of meals	43	73	100	7.376[1]	0.01
Hearing nutrition-health info from medical doctor	43	58	82	16.408	0.01
Hearing nutrition-health info from health institutions	20	12	6	4.105	0.04
Having nutrition-health info from leaflets	50	31	24	9.664	0.04
Knowing about food guide pyramid	66	45	24	16.480	0.00
Frequent diet's supplementation	12	27	23	13.420	0.04
Frequent checking of cholesterol level	63	73	88	17.463	0.03
Frequent checking of blood pressure	24	54	53	23.610	0.00
Hypertension diagnosed / at risk	18	43	53	22.449	0.00
Diabetes diagnosed / at risk	8	13	24	4.293[1]	0.04
High cholesterol diagnosed / at risk	13	42	53	29.388	0.00
Heart diseases diagnosed / at risk	13	42	35	21.897	0.00
Obesity / overweight diagnosed / at risk	3	28	65	93.168	0.00
Osteoporosis diagnosed / at risk	7	9	0	11.205	0.02
Sclerosis diagnosed / at risk	6	22	12	12.748	0.01
Poor health / self-assessment	21	45	65	25.712	0.00
Overweight and obese / self-assessment	25	72	82	104.491	0.00
Being stressed person	77	75	53	19.346	0.00
Having frequent social contacts	19	36	18	17.578	0.02

[1]Chi-square Mantel-Haenszel test.

values of the products as no significant relationships for responses on such a question were indicated.

3. Medical behaviour
   - overweight and obese people more often and regularly than normal weight people use diet supplements;
   - overweight and obese people more often check blood pressure and cholesterol level;
   - among people of BMI equal or higher than 25, the percentage of diagnosed diet related diseases or risk of diet related diseases is higher in the case of: high blood pressure, diabetes, high cholesterol level, heart diseases, overweight or obesity, osteoporosis (not many respondents but the relationship was visible), and arteriosclerosis. Only liver diseases do not show a relationship with BMI;

- overweight and obese people more frequently assessed their health to be poor or rather poor;
- the higher BMI the higher the percentage of people who see themselves as overweight and very overweight, as well as people who are not able to assess their body mass type;
- overweight and obese people are less stressed than people with regular body weight.

4. Social involvement
   - overweight people are more involved in social life, while only a small percentage of people with regular body mass or obese people undertake social activities.

4.7. Relationships between BMI groups and FFQ and 24 h RM variables

4.7.1. BMI versus FFQ variables

In general, the analysis showed that there were no significant differences (p-value 0.05) in food consumption frequency between BMI groups of low income consumers. This was observed in the case of 36 out of 42 food products/groups included in the food frequency questionnaire The same remark refers both to food products which are important from the nutritional point of view (e.g. fruit, vegetables, fish, dairy products, legumes, whole grain bread and grits) and foodstuffs which have to be limited in the diet (cream, yellow cheese, red meat, fats, eggs). In this case significant differences occurred only for confectionery products.

TABLE 16. Significant relationships between BMI groups of low income consumers and FFQ variables

Food products	Cross-tabulations[1] (%)			χ^2 value	p-value
	underweight and normal	overweight	obese		
Liquid milk	33	49	47	21.634	0.02
Yellow cheese	28	12	18	18.329[2]	0.04
Cereal flakes	15	9	6	18.692	0.04
Fruit and veg juices	48	46	12	18.933	0.04
Mineral water	68	58	25	19.676	0.03
Chocolate, sweets	40	27	18	6.297	0.00
Cakes	38	22	29	5.893[3]	0.02
Jam, honey	16	12	6	34.490	0.00

[1]Consumption at least once a day.
[2]Credibility ratio chi-square test.
[3]Mantel-Haenszel chi-square test.

The links between BMI and frequency of food consumption were stressed only for 8 food products/groups (Table 16). In general these products have high energy value, so together with BMI growing the consumption frequency was decreasing. In the case of liquid milk changes of variables had the same direction: the higher BMI the higher consumption frequency.

4.7.2. BMI versus 24 h RM data

ANOVA test showed that energy and nutrients' daily intake is not linked to age, education level and number of persons living in the respondent household. Only BMI is the feature, which significantly differentiates the amount of nutrients intake and energy value of the daily diet (Table 17). The relationships in most cases were confirmed using Tukey-Kramer test (p-value 0.05).

TABLE 17. Significant relationships between BMI groups of low income consumers and energy value of daily diet and daily nutrients intake, and % of RDA coverage

Nutrients/energy	Mean intake			R^2	p-value
	under- and normal weight	over-weight	obese		
Energy (kcal)	1817.2	2164.3	1931.4	0.029	0.042
Protein, total (g)	62.3	73.4	70.2	0.029	0.043
Fat, total (g)	68.0	84.8	71.1	0.036	0.020
Sodium (mg)	3288.0	3933.5	3819.0	0.038	0.017
Vitamin E (mg)	9.406	11.486	9.332	0.029	0.044
Vitamin B_6[1] (mg)	1.483	1.730	1.749	0.028	0.049
SFA (g)	24.2	30.8	27.4	0.028	0.048
MUFA (g)	28.1	34.7	28.4	0.031	0.037
PUFA (g)	10.1	12.4	9.7	0.033	0.030
Dietary fibre (g)	17.2	20.7	19.7	0.045	0.008
% of coverage of recommended daily allowances					
Fat	86.9	105.3	94.8	0.032	0.032
Sodium	561.1	670.2	672.7	0.042	0.011
Potassium[1]	78.0	88.0	92.4	0.028	0.049
Phosphorus	152.5	178.2	189.4	0.043	0.010
Vitamin E	116.2	143.6	119.5	0.032	0.034
Thiamine	66.7	81.7	75.3	0.033	0.029
Vitamin B_6[1]	79.7	91.6	96.7	0.028	0.049

[1]Significant differences not confirmed by Tukey-Kramer test, p-value 0.05.

The difference of energy consumption between overweight group comparing to underweight and normal weight consumers equals almost 350 kcal (p-value 0.042). Highest disparities (25%) occur in total fat intake (p-value 0.020) as well as in each type of fatty acids: the biggest (differences over 27%) in SFA intake (p-value 0.048), followed by MUFA (p-value 0.037) and

PUFA (p-value 0.030) (differences 24 and 22%, respectively). Sodium and dietary fibre intakes in overweight people group exceed the intake in the group of under- and normal weight consumers by 20%. The average fat intake among overweight consumers (85 g/day) caused the exceeding of recommended daily allowance by 5.3% and is significantly higher than in the under- and normal weight group (p-value 0.032). Significant differences were stressed also in the case of RDA coverage for three minerals (sodium, potassium, phosphorus) and three vitamins (E, thiamine, B_6).

ANOVA shows that gender of low income consumers is the next factor deeply influencing the nutritional value of their diet and other diet indicators (Table 18). All relationships are confirmed by Tukey-Kramer test (p-value 0.05). The differences do not occur only in the case of three vitamins: vit. A

TABLE 18. Significant relationships between male and female and energy value of diet, nutrients intake, and % of RDA coverage

Nutrients/energy	Male	Female	R^2	p-value
Energy (kcal)	2754.4	1782.4	0.215	< 0.0001
Water (g)	2276.0	1798.3	0.150	< 0.0001
Protein, total (g)	96.0	59.9	0.201	< 0.0001
Protein, animal (g)	62.2	36.7	0.155	< 0.0001
Protein,vegetal (g)	33.8	23.2	0.159	< 0.0001
Fat (g)	108.3	65.7	0.145	< 0.0001
Carbohydrates (g)	360.4	250.4	0.188	< 0.0001
Sodium (mg)	4880.0	3231.8	0.158	< 0.0001
Calcium (mg)	852.7	570.9	0.068	< 0.0001
Iron (mg)	13.4	9.8	0.064	< 0.0001
Vitamin E (mg)	12.523	9.329	0.043	0.001
Thiamine (mg)	1.751	1.038	0.171	< 0.0001
Ryboflavin (mg)	1.858	1.370	0.051	0.001
SFA (g)	42.1	23.3	0.150	< 0.0001
MUFA (g)	43.7	26.9	0.127	< 0.0001
PUFA (g)	13.8	10.0	0.050	0.001
Cholesterol (mg)	358.1	230.3	0.067	< 0.0001
Dietary fiber (g)	23.9	17.1	0.113	< 0.0001
Energy from carbs (%)	50.8	54.1	0.020	0.027
Percentage of coverage of recommended daily allowances				
Energy	92.9	79.7	0.030	0.010
Protein, total	155.5	119.4	0.071	< 0.0001
Fat, total	112.8	88.8	0.039	0.004
Sodium	818.2	554.1	0.150	< 0.0001
Calcium	96.8	65.7	0.066	< 0.0001
Iron	120.4	70.3	0.219	< 0.0001
Vitamin E	153.5	118.6	0.036	0.005
Thiamine	102.2	65.2	0.142	< 0.0001

(as a total, retinol, and beta-carotene), vit. C, and vit. B_{12} – as well as in the share of protein and fat in daily diet energy. Women consume almost 1000 kcal less than man and as a consequence they meet RDA in 80%, while their male counterparts in 93%. Female respondents also do not cover the RDA for fat (11%), while men exceed the allowance by 13%. In low income women diet deep deficiencies of calcium and iron intake (35 and 30%, respectively) are very alarming in connection with osteoporosis or blood diseases risk. The same remark regards very high sodium intake by low income consumers, which exceeds RDA level more than 8 times among men and 5.5 times among women. This could be the explanation that hypertension is the most common diet related disease in the interviewed group. Also too high cholesterol intake (almost 360 mg which means 20% more then daily allowance) is the risk factor of cardiovascular diseases noticed in the men's diet. Women daily food consumption shows big thiamine deficiency (35% less comparing to RDA). Vitamin B_1 is not considered to be a risk factor of any diet-related disease. However psychological discomfort, hyporeflexia, and fatigue are the symptoms of its deficiency caused by disturbances of function of the nervous system, liver and myocardium.

5. Conclusions

1. The studied group of 240 low income consumers consisted mainly of adults less than 50 years of age, with medium, elementary or vocational level of education and lived in 3–4 person households.

2. **PAHS.** The respondents self-assessed their own level of physical activity as average or high. Hypertension was the most frequent diet-related disease, diagnosed/at risk for one third of the group, followed by high blood cholesterol level and obesity/overweight. In general respondents used to check their blood pressure regularly, while checking cholesterol or glucose level was a rather seldom practice. The respondents did not read food labels and did not control daily calorie or nutrients' intake. Smoking or drinking alcohol occurred rarely in the group and were not the risk factors of non communicable diseases.

3. **SFS.** Most respondents self-assessed their emotional status as good, but they perceived themselves as stressed people. Three reasons inducing stress predominated in the consumer sample: job, overall situation at home and financial situation of the household. Most common ways of dealing with stress were eating more food, smoking or physical work. The respondents did not feel socially excluded and almost half of them were involved in working

for the community. Social problems, such as unemployment, single motherhood, incomplete family or alcoholism related to a small part of the group.

4. **FBS.** The main sources of information on food-nutrition-health links are the public media and relatives. Food guide pyramid is the most popular dietary guideline among the respondents. Only about 1/3 of the consumers know common diet-related diseases, while knowledge on foodstuffs preventing such diseases is good. The main factors determining everyday nutrition are: preferences and food habits, financial situation and convenience, showing that the purchase decision are made in a big degree in relation to hedonistic approach and adaptation to modern lifestyle, even among low income consumers. Large consumption of cereal products and potatoes as the staple food in a household, food diversification and diminishing fat use are the most important features of food preparation. However one third of the group self-assesses nutrition in the household as little or not enough diversified. Low income consumers are also aware of healthy food choice, but this knowledge does not translate fully into proper food choice.

The majority of food consumed in the household is obtained by shopping, but over 40% of the group completes consumption by self-supply (vegetables, fruit, eggs, and potatoes) and 10% obtained additional food from social welfare. Food processing for out of season consumption is a very common custom allowing respondents to improve the household budget.

5. **FFQ.** The low income consumers everyday diet consists of white bread, boiled potatoes, soup, mineral water, tea, coffee, butter and margarine, liquid milk as well as apples, fresh vegetables and juices. The first three products are high in energy and financially affordable at reasonable price, but represent rather low nutritional density. In contrast to dietary guidelines, fish, legumes, grits, olive oil are consumed very rarely. Respondents recognized themselves as heavy users of fruit and vegetables, while FFQ showed 2.5 fruit and vegetables servings per day on average. Frequency of food consumption in general did not depend on consumer BMI.

6. **24 h RM.** The average daily diet of low income respondents mainly lacks minerals (copper, calcium, iron, zinc, potassium) and vitamins (thiamine, niacin, riboflavin, vitamin B_6). The intake of sodium is very high exceeding six times the recommendations. The share of energy from total fat and saturated fat exceeds recommendation. Energy and nutrients' daily intakes are not linked to age, education level and the number of persons living in the respondent's household. The only two consumers' features significantly influencing nutrients and energy intake are BMI and gender. Between the groups of underweight and normal BMI consumers and the overweight consumers significant differences occurred in the case of:

energy, protein, fat, SFA, MUFA, PUFA, sodium, vitamins E and B_6, and dietary fibre intakes. Gender influenced the nutritional value of low income consumer diet more than BMI. Differences between men and women did not occur only in the case of three vitamins A, C, and B_{12} as well as with respect to the share of protein and fat in daily energy structure.

For low income consumers, economical factors, preferences and habits as well as convenience of preparing meals determine the food choice and everyday nutrition and could influence health worsening. For this population group it is essential to improve knowledge on food, nutrition and health linkages with the aim to create proper food choice and behaviour.

Chapter VI

ANALYSIS OF FOOD CONSUMPTION AND NUTRITIONAL BEHAVIOUR OF LOW INCOME CONSUMERS IN BELGIUM

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1. Sampling frame, size and fieldwork

The analysis of secondary data in the first work package of the project shows that there are no relevant available data about food consumption and nutritional behaviour of low income groups in Belgium. The research of Dewilde et al. (2003) shows that 13% of Belgian population is described as poor. The other findings published in the Belgian National Action Plan for Social Inclusion 2003–2005 are based on the European Community Household Panel (ECHP data) and indicate the yearly net income of poor people as 17.915 € for the family of two adults and two children, and 8.531 € for the individuals living alone.

Following this rule, the respondents in the current research are selected:

- living in the average family: monthly income of max 400 €/person/ /month;
- living alone: monthly income of max 700 €/month.

A minimum convenient sample of 100 households in Ghent, Belgium was selected in order to establish trends in the average intake of foods and nutrients. A survey with low income respondents was implemented in 2005. As selection criterion, the respondents were asked about the number of people living in the family and a total family net income per month. Based on this information, each interviewer calculated the monthly income per person.

The fieldwork was carried out in the best possible standardized way bearing in mind the issues of personal training, defining the level of standardization of 24 h RM, and application of the Album of Food Portions – adapted to Belgian foods and drinks – for quantification of portion sizes. For three months, seven trained people worked face-to-face with 100 respondents responsible for provision of food in their households.

2. Research design

Following the research methodology explained in Chapter 3, data are collected through the questionnaire consisting of four parts:

1. Socio-demographic characteristics of low income respondents and BMI groups.
2. Physical Activity and Health Survey (PAHS) and Social Functioning Survey (SFS)
   - PHAS include the following variables: internal and external health factors; health behaviour related to physical activity; diet-related diseases and medical history;
   - SFS focuses on: emotional eating/ well being, social involvement and effects of illness/consequences of diseases.
3. Food Behaviour Survey (FBS)
   - knowledge, attitude and preference (knowledge and importance of dietary guidelines, awareness of diet-disease links; self-assessment of nutrition; sources of diet and health information; dietary management practices, food choice and meal patterns);
   - food environment (out-of home free meals consumption and food provision; budget limitation of food consumption).
4. Food Consumption
   - frequency of food consumed – Food Frequency Questionnaire (FFQ);
   - amount of food consumed – 24 h Recall Method (24 h RM).

3. Data analysis

These 24 h RM data were firstly entered into NUBEL (2004) program. These data were converted from food consumption levels into nutrient intakes and they include the following information: energy intake, protein, fat, saturated fats, monounsaturated fatty acids, polyunsaturated fatty acids, linolic acid, cholesterol, digestible carbohydrates, sugars, starch, alcohol, fibre, water, sodium, potassium, calcium, phosphor, magnesium, iron, zinc, copper, vitamins (A, B_1, B_2 and C), fat % of dietary energy supply (DES), carbohydrates % of DES and protein % of DES. All these nutrient intakes per person were then computed into the SPSS database that already included socio-demographic characteristics of the respondents, answers to the questions from PAHS, SFS, FBS surveys and food consumption frequencies (FFQ). In this way, one multi dimensional database was created.

4. Results and discussion

The results are presented and discussed in the following six steps:

- socio-demographic characteristics of the low income consumers and Body Mass Index Groups,
- characteristics of low income respondents through PAHS and SFS surveys,
- characteristics of respondents through FBS survey,
- characteristics of respondents through Food Consumption variables (including FFQ and 24 h RM),
- relationships between BMI groups and PAHS and SFS variables,
- relationships between BMI groups and FBS variables, including FFQ and 24 h RM.

4.1. Socio-demographic characteristics of the low income consumers and Body Mass Index Groups

4.1.1. Socio-demographic data

The socio-demographic data show that a majority of poor people in Belgium are old, having rather low education and living alone in the rented apartments in the cities (Table 1). They are mostly unemployed, retired or do not work by the choice. Among the unemployed ones, one third did not find even part-time job during the last year. They represent equally male and female respondents.

TABLE 1. Socio-demographic characteristics of 100 Belgian low income respondents, % of respondents

Socio-demographic feature	Sample characteristics
Income	Average: 200–700 € per person per month
Income source	31% pension, 27% social help/aliments, 13% full time job
Income self-evaluation	43% negative, 33% average, 24% positive
Gender	50% male, 50% female
Age	47% older than 50 years
Household composition	80% one person families, 20% 2 people families
Education	90% primary and secondary, 10% higher education
Profession	40% unemployed, 30% retired, 10% workers, 10% don't work by choice
Living place	80% cities, 20% suburban
House ownership	80% do not own house

4.1.2. Body Mass Index Groups

Respondents are grouped in the four standard BMI groups. Distribution of respondents in four BMI related groups is calculated (Table 2).

TABLE 2. Body Mass Index groups in the sample of low income respondents

BMI Groups	Four standard groups (%)	New groups (%)
Underweight	7	56
Normal weight	49	
Overweight	26	36
Obese	10	
Missing	8	8
Total	100	100

Taking into account that only 7% of people are underweight and only 10% of people are obese, the regrouping is made into two BMI groups as follow: underweight and normal weight (56%) and overweight and obese (36%).

4.2. Characteristics of low income respondents through Physical Activity and Health Survey (PAHS) and Social Functioning Survey (SFS)

4.2.1. Physical Activity and Health Survey (PAHS)

Physical activity. About 70% of the respondents say that their physical activity is low or moderate. More than 80% of the sample does not perform any kind of intensive physical activity during a week time, which is recommended by the World Health Organisation.

Diet related diseases and medical history. About 90% of the Belgian respondents did not follow any special diet during the last year. For those who did it, the main reason was to decrease cholesterol level. The majority (80%) of the low income respondents are not under any medical consultation related to the diet. They say that it is not necessary (23%) or that there are high costs of such consultation (3%). About 80% of the respondents do not take any vitamin or mineral products, such as multivitamins, single or specialised supplements. Only 11% of people have food allergies such as nuts (3%), fish (3%), and chocolate or milk products. Less than half (45%) of the Belgian sample regularly check blood pressure, and even less registers blood glucose (30%) or blood cholesterol (29%). About 30% of people are informed by the doctor that they have or are at risk of high blood pressure (31%), heart disease (22%), high blood cholesterol (22%) or obesity (22%).

Specific exposure for dietary related diseases. The respondents smoke regularly (42%) or smoked in the last years (28%). They drink alcohol either regularly and a lot (25%). It means that about 75% of the low income people do not drink alcohol in moderation or never. About 70% of the

respondents say that their families and ancestors suffered from the illnesses such as high blood pressure, diabetes, coronary-heart disease, obesity and cancer.

Health self-assessment. A remarkable observation is made about the health self-assessment of poor people. A majority of the low income respondents say that their overall health status is good (57%) or very good (18%). About 60% state to have a healthy body weight while 30% of the respondents think that they are overweight. Indeed, in the Belgian sample of respondents this result corresponds well to the calculated Body Mass Index (Table 2).

4.2.2. Social Functioning Survey (SFS)

Emotional well-being and social involvement. About one-fourth of the respondents say that their emotional health is not good. They consider themselves as stressed (60%) and the main reasons of that state are attributed to the following factors: financial situation (28%), problems in home (17%), and problems at work (7%). About 22% of the respondents have no specific method to reduce stress or smoke (11%), eat more (9%), eat less (6%), and drink alcohol (6%) or exercise physically (6%). The respondents keep social contacts with friends (70%) and family (60%) a few times per month. The majority never works for the local community (75%).

Effects of illness / consequences of diseases. About 25% of the low income people have some health disability preventing them from working. In this group of disabled people, only 27% have social support, and the other people either manage themselves or have a help from the family (73%). About 40% admits the existence of social problems in their households. The major problems are: divorce or feeling of isolation (13%), unemployment (11%), depression or emotional instability (7%), alcohol (2%) and accommodation (2%).

4.3. Characteristics of low income respondents through Food Behaviour Survey (FBS)

4.3.1. Knowledge, attitude and preference

Sources of diet and health information. The low income people who pay attention to nutrition get the information from the doctor or other health professionals (40%), friends or family members (20%) and food labels or packaging (15%). The least mentioned sources of dietary information are: the displays at the grocery stores (92%), the schools or special courses (87%)

and health organisation (79%). The majority of the respondents were never informed about the dietary guidelines (77%) and the five-a-day program (72%). However, the Food Guide Pyramid is known by about 60% of the low income people.

Knowledge and importance of dietary guidelines. There is a mixture of positive and negative nutritional practices performed by the low income people in the Belgian sample (Table 3). The positive nutritional knowledge and practices are seen for consumption of fruits, vegetables, cereals, dietary fibre and fish. The respondents also say that they try to limit fat and salt consumption. The major problems relate to self-stated high consumption of animal products (including red meat), bakery, potatoes and high-fat foodstuffs.

TABLE 3. Positive and negative nutritional practices by the low income people

Nutritional practices	Percentage		
	Don't agree	Neither/nor	Agree
Positive			
We eat small amounts of red meat	**43**	31	26
We eat food low in animal products	**50**	16	44
I choose fat-reduced products	**52**	13	35
Plant oils are better than animal ones	9	33	**58**
One should eat lots of fruit/vegs	2	8	**90**
We eat plenty of fruit/vegs	23	18	**59**
One should eat lots of fish	23	27	**50**
I limit fat when preparing meals	31	16	**53**
I try to limit salt consumption	30	17	**48**
We eat plenty of cereals	18	19	**63**
We eat foods with lots of dietary fibre	19	34	**47**
Negative			
We use lots of fat to satisfy satiety	**63**	21	16
We eat plenty of bakery and potatoes	17	20	**63**

Awareness of diet-disease relationship. The low income respondents in the Belgian sample have rather positive knowledge about the relationship between the diet and the illnesses. About 60% of them agree that there is a link between diet and some diseases. Also about 70% of the respondents agree that the proper nutrition can prevent diseases, and the cardiovascular diseases are most frequently recognised (23%). The food items that people think may prevent such diseases include: specific vegetables (61%), specific fruits (56%), fish and seafood (27%) and fibre in whole grain (23%). The omega 3 oils in fish are mentioned only by 9% of the respondents.

Self-assessment of nutrition. About 30% of the low income people say that the amount of the food consumed in their household is modest or insufficient. The same percentage says that the food is little or too less diversified and 20% admits that the nutrition in their household has worsened during the last year. The main reasons of that situation are attributed to the decreased funds for nutrition (12%) or increased prices of the food (6%).

Dietary management practices. About 35% of the low income respondents search for some information placed on the packaging while buying food and another 35% never looks at the displayed information on the package. As far as the nutritional label is considered, about 70% never reads it and 20% reads it only occasionally. Also 80% of the respondents read information about the calories displayed on the food packages. The ones who do it want to avoid certain foods (16%), include certain foods (15%) or record amounts of food products eaten at each meal or day (9%).

Food choice and meal patterns. The three most important factors that influence everyday nutrition in the respondents households are: financial reasons (39%), preferences and habits (25%) and lifestyle (12%). The most frequently consumed kind of bread is the whole grain bread (45%), half-full milk (1.5–2% of fat) (49%) and margarine (52%). Margarine (35%), butter (21%) and olive oils (16%) are three fats most frequently used for the preparation of meals in the low income households. The adults have on average three (64%) or two (29%) meals per day. The same is stated for the children (17, 9%, respectively). The majority of the respondents (82%) have one cooked meal per day, and only 13% of people eat hot meals less frequently.

4.3.2. Food environment

Out-of-home free meals consumption and food provision. About 40% of respondents consumed systematically subsidised meals during the last year. These meals were either paid by the beneficiary (32%) or free of charge (11%). Only 30% of the low income people produce food themselves or exchange it with the neighbours. The three most frequently produced food products are: vegetables including potatoes (14%), eggs (10%) and fruit (3%). The self-manufactured food items are: frozen vegetables and fruit (19%), other vegetables (19%) and fruit jam (14%). About 30% of the respondents purchase food in the large self-service shops where the prices are lower and 28% buy directly from the producer and market places where the food may have the best quality-price relationship.

Budget limitation of food consumption. The low income people admit that they limit the purchase of the basic food items (e.g. bread, milk, etc.)

either from time to time (31%), often (14%) or always (5%). The nutrition in 60% of these households will change positively as soon as their financial situation improves. In such a case, the respondents would buy food of better quality (44%), more diversified food (37%) or they would buy just more food (38%). Only 12% of the respondents say that they would buy more processed food, which is possibly attributed to the fact that they do not possess the microwave (36%), the oven for baking (29%) or the freezer (22%).

4.4. Characteristics of low income respondents through food consumption variables

4.4.1. Frequency of food consumed (FFQ)

In the FFQ, two questions about the amount of liquid drank and the number of portions of fruit and vegetables are recorded. About 40% of the low income respondents drink less than 2 litres of recommended liquid, including milk and soups per day. It means that the majority of the people (60%) drink more than 7 glasses of drinks per day. The nutritional recommendation of minimum five pieces of fruit or vegetables per day is followed only by 1% of the people. About 70% of them consume up to 2 pieces of fruit or vegetables per day and 25% do not eat these foodstuffs everyday.

Next, consumption of 42 foodstuffs is recorded on a 6-points frequency scale. Answers are then recoded in three groups: consumed a few times per year, 1–3 times per month and a few times per week.

The results of FFQ are presented in Table 4. The foodstuffs most and least frequently consumed are presented separately.

The least frequently consumed products are: lard, sour milk, cream, grain flakes, fresh and processed fish. Products consumed with frequency of one to three times per month are for instance: fresh and processed poultry meat, pasta, rice, grain flakes, beans, olive oil, vegetable oils, southern fresh fruit, fruit and vegetable juices as well as tea.

Higher consumption of some of these products would bring a positive nutritional change in the diet of low income respondent. Advantages of pro-biotics in sour milk products, omega-3 fatty acids in fish, mono unsaturated fatty acids in olive oil, vitamins in fresh fruits, and active polyphenols in tea, are well recognised.

The products most frequently consumed are: mineral water, coffee, boiled potatoes, margarines and mixed fats, liquid milk, brown bread, soups, potato meals, pork, beef, jam and honey. The majority of these products provide cheap energy and only some nutrients, minerals or vitamins.

TABLE 4. Frequency of food consumption by the low income group in Belgium

Food products	Mean frequency	Standard deviation	Type of frequency
Lard	1.10	0.36	a few times per year
Sour milk	1.16	0.54	
Pluck and meat processed articles	1.26	0.56	
Processed fish	1.31	0.60	
Cream	1.42	0.74	
Grits	1.44	0.90	
Fresh fish	1.47	0.70	
Vegetable oils	1.51	0.98	1–3 times per month
Grain flakes	1.58	1.06	
Yellow cheese	1.69	1.12	
Processed poultry	1.76	0.88	
Tea	1.76	1.35	
Bean, pea, lentils	1.81	0.80	
Southern fresh fruit	1.87	1.16	
Pasta, rice	1.91	0.93	
Olive oil	1.96	1.20	
French fries	1.97	0.88	
Eggs	2.03	0.91	
Poultry meat	2.15	0.84	
White cheese	2.17	1.16	
Candies, chocolate	2.23	1.21	
Processed red meat	2.27	1.12	
Cakes	2.36	1.28	
Fresh apples	2.38	1.34	
Fruit and vegetable juices	2.38	1.31	
Sugared drinks	2.38	1.50	
Butter	2.44	1.63	
Fresh vegetable and salads	2.51	1.12	a few times per week
Total fruit	2.53	1.25	
White bread	2.54	1.60	
Yoghurt	2.63	1.35	
Other vegs, boiled, frozen, conserved	2.82	1.03	
Potato meals	2.88	1.37	
Jam, honey	2.89	1.48	
Meat: pork, beef, veal	3.00	0.86	
Margarine and mixed fats	3.05	1.64	
Soups	3.13	1.22	
Brown bread	3.39	1.75	
Liquid milk	3.44	1.46	
Boiled potatoes	3.61	0.91	
Coffee	4.20	1.46	
Mineral water	4.39	1.41	

Frequency scale: a few times per year or never (1); 1–3 times per month (2); once per week (3); a few times per week (4); once per year (5); a few times per year (6).

4.4.2. Amount of food consumed (24 h RM)

The results of 24 h RM are presented in Table 5. High standard deviations for some nutrients, minerals and vitamins are recorded. Nevertheless, it can be stated that overall deficiency of calories, water, calcium, magnesium and vitamin C is observed for the whole sample of the respondents. The over consumption is noticed for fats, proteins and zinc. The sodium level is lower than recommended, which is a positive observation.

TABLE 5. Daily consumption of energy, nutrients, minerals and vitamins by the low income group in Belgium

Energy and nutrients	Mean	Minimum	Maximum	Standard deviation
Energy (kcal)	1694	263	4136	729.3
Protein (g)	64	13	198	32.5
Fat (g)	62	4	224	39.7
Saturated fat (g)	22	2	74	14.5
MUFA[1] (g)	23	2	83	17.1
PUFA[2] (g)	10	1	40	7.5
Linolic acid (g)	7	0	36	6.4
Cholesterol (mg)	203	0	1320	198.8
Carbohydrates (g)	208	28	446	91.1
Sugars (g)	62	0	240	42.9
Starch (complex carbohydrates) (g)	113	0	291	56.0
Alcohol (g)	5	0	106	14.9
Fibre (g)	15	1	61	9.4
Water (g)	1476	183	4046	769.0
Sodium (mg)	2855	518	8457	1730.1
Potassium (mg)	2573	262	7672	1293.9
Calcium (mg)	567	62	2376	394.4
Phosphorus (mg)	1079	207	4014	588.3
Magnesium (mg)	229	32	748	127.3
Iron (mg)	12	1	83	10.1
Zinc (mg)	14	1	81	16.1
Copper (mg)	1	0	6	1.2
Vitamin A (µg)	624	0	8986	1006.6
Vitamin B1 (µg)	1	0	4	0.7
Vitamin B2 (µg)	1	0	3	0.6
Vitamin C (mg)	51	0	443	61.2
Energy from fat (%)	32	2	73	11.9
Energy from carbohydrates (%)	50	18	85	11.1
Energy from protein (%)	15	4	34	4.7

[1]MUFA – monounsaturated fatty acids.
[2]PUFA – polyunsaturated fatty acids.

4.5. Relationships between BMI groups and PAHS/SFS variables

Cross-tabs and t-tests are calculated between BMI groups on the one hand and all variables from PAHS and SFS on the other hand. Table 6 presents only significant relationships between BMI groups and PAHS and SFS variables.

TABLE 6. Significant relationships between BMI groups, PAHS and SFS variables

Variables	Cross-tabulations (%)		t-test	p-value
	underweight and normal weight	overweight and obese		
I have been told by health professionals that I am at risk of high blood cholesterol	12	33	*	0.053
I have been told by health professionals that I am at risk of obesity	11	44	***	0.000
I am drinking alcohol regularly	18	36	**	0.019
My weight is too high	10	57	***	0.000
I have weekly contact with my family	40	53	**	0.002
I am regularly working for my community	39	8	**	0.002
I am divorced	11	0	*	0.042
I am older than 36 years	62	86	*	0.018

Explanations: *difference just significant $p < 0.05$; **very significant $p < 0.01$; ***extremely significant $p < 0.001$.

In the current research, the overweight group was told by health professionals about the personal risk of having high blood cholesterol (33%) and obesity (44%). This group drinks more regularly alcohol (36%) and is much less involved (8%) in some kind of community work than normal weight group (39%). About 86% of respondents in the overweight group are older than 36 years.

4.6. Relationships between BMI groups and FBS variables, FFQ and 24 h RM

Cross-tabs and t-tests are calculated between BMI groups on the one hand and all variables from FBS, FFQ and 24 h RM on the other hand. The results of Food Behaviour Survey are presented in Table 7.

In the main questionnaire of Food Behaviour Survey, there are five times more overweight people who use natural butter on bread. Overweight people do not receive food in form of gifts as frequently as underweight weight people, they also do not self-prepare foodstuffs. The study shows that underweight and normal weight people have higher knowledge about

TABLE 7. Significant relationships between BMI groups and FFQ variables

Survey	Variables	Cross-tabulations (%)		t-test	p-value
		underweight and normal weight	overweight and obese		
FBS	I frequently use natural butter on bread	5	25	*	0.013
	I receive food as a gift	61	30	**	0.009
	I prepare meat products	16	0	*	0.035
	I like to use more processed foods	20	0	**	0.006
	I like to eat more frequently out-of-home	26	33	**	0.009
	I think that olive oil can prevent illnesses	16	3	*	0.046
	I heart about Food Guide Pyramid	68	47	*	0.049
FFQ	Yoghurt	2.4	3.0	*	0.040
	Margarine and mixed fats	2.8	3.4	*	0.050
	Coffee	3.9	4.6	*	0.050

Explanations: *difference just significant $p < 0.05$; **very significant $p < 0.01$; ***extremely significant $p < 0.001$.

healthy nutritional behaviour while the overweight poor people eat more frequently out-of-home than normal weight people.

In FFQ, it is interesting to notice that consumption frequency of vegetables, fruits, bread and fish (recommended dietary indicators) does not differ significantly between BMI groups. The food products differently consumed by both groups are: yoghurt, margarine and mixed fats, and coffee. Overweight people consume more often these products than underweight people.

The analysis of 24 h RM follows in three steps: analysis of energy values; nutrients; and minerals and vitamins.

Energy value. The analysis show insignificant (p-value equal to 0.084) difference of 168 kcal consumed per day between two BMI groups. It means that while normal weight people consume 1638 kcal per day, the overweight people consume 1806 kcal per day. This value is still lower than the lowest energy level (1850 kcal/day) recommended for elderly female in Belgium.

Table 8 compares the recommended and calculated in the current study levels of kcal per day (NUBEL, 2004). The age categories are recommended by the Belgian nutritional system called NUBEL.

The data show that all calculated values of calories consumed do not exceed the recommended values for both gender groups in all age groups. The general conclusion is that the low income respondents in the Belgian sample consume fewer calories than recommended. ANOVA test shows that there are significant differences between gender groups in the same age group. All female respondents consume fewer calories than their male counterparts.

TABLE 8. Recommended and actual energy levels within age groups

Age categories	Recommended (kcal/day)		Calculated (kcal/day)	
	male (*n*)	female (*n*)	male (*n*)	female (*n*)
NUBEL				
18–59 years	3000	2150	1979[a] (37)	1370[b] (31)
60–74 years	2150	1850	2026[a] (9)	1340[b] (13)
≥ 75 years	2000	1850	1862[a] (4)	1772[a] (6)
Total	–	–	1978[a] (50)	1410[b] (50)

[a, b]ANOVA test: samples with scores a and b are significantly different.

Nutrients. T-test calculated between BMI groups is insignificant for the intake of all nutrients including the recommended dietary nutrients (saturated fatty acids as % DES; total fat as % DES; and alcohol as g/day).

Table 9 presents the recommended and the actual intake levels of various nutrients per day for two gender groups (NUBEL, 2004).

TABLE 9. Recommended and actual intake levels of nutrients per day

Energy and nutrients	Recommended levels	Actual levels					
		total (*n* = 100)		male (*n* = 50)		female (*n* = 50)	
		units	% DES	units	% DES	units	% DES[3]
Energy (kcal)	1850–3000	1694	100	1978[a]	100	1410[b]	100
Digestible carbs. (g)	55%	208	49.7	232[a]	46.9	185[b]	52.5
Protein (g)	41–50 g	64	15.3	74[a]	15.0	55[b]	15.6
Total fat (g)	< 30%	63	32.8	77[a]	35.0	48[b]	30.6
Saturated fat (g)	< 10%	23	11.9	27[a]	12.3	18[b]	11.5
MUFA (g)[1]	> 10%	24	12.3	30[a]	13.7	17[b]	10.9
PUFA (g)[2]	5.3–10%	10	5.2	13[a]	5.9	7[b]	4.5
Linolic acid (g)	> 2%	7	3.6	9[a]	4.1	5[b]	3.2
Cholesterol (mg)	< 300 mg	203	–	235[a]	–	171[a]	–
Sugars (g)	–	62	–	62[a]	–	62[a]	–
Starch (g)	–	113	–	128[a]	–	99[b]	–
Alcohol (g)	–	6	–	9[a]	–	2[b]	–
Fibre (g)	17–38 g	13	–	17[a]	–	14[a]	–
Water (g)	2000–2800 g	1476	–	1715[a]	–	1237[b]	–

[1]Monounsaturated fatty acids.
[2]Polyunsaturated fatty acids.
[3]DES – dietary energy supply.
[a, b]ANOVA test: samples with scores a and b are significantly different.

It is concluded that the levels of all nutrients consumed by the low income respondents do not exceed the recommended values published in NUBEL (2004). ANOVA shows that the values for all nutrients except of sugars and fibre differ significantly between male and female respondents. Cholesterol level does not differ between both gender groups and is not

higher than recommended 300 mg. Water consumption is lower than recommended daily intake of 2000–2800 g. Consumption of fibre is insufficient, since recommended lower limit of dietary fibre is 24 g per day.

Minerals and vitamins. Frequency consumption of all minerals and vitamins between the BMI groups does not differ. However, there are differences between genders. Table 10 presents the medium intake values of minerals and vitamins for the males and females belonging to the low income group (NUBEL, 2004).

TABLE 10. Recommended and actual intake levels of minerals and vitamins per day

Minerals/Vitamins	Recommended levels	Actual levels		
		total (n = 100)	male (n = 50)	female (n = 50)
Sodium (mg)	575–3500	2856	3300[a]	2411[b]
Potassium (mg)	2000–4000	2574	2886[a]	2261[b]
Calcium (mg)	900	568	634[a]	501[a]
Phosphorus (mg)	800	1079	1232[a]	927[b]
Magnesium (mg)	330–420	229	262[a]	196[b]
Iron (mg)	9–20	12	12[a]	12[a]
Zinc (mg)	7–9.5	14	15[a]	14[a]
Copper (mg)	1.1	1.4	1.4[a]	1.4[a]
Vitamin A (μg)	600–700	624	816[a]	433[b]
Vitamin B_1 (mg)	0.9–1.1	1.3	1.5[a]	1.1[b]
Vitamin B_2 (mg)	1.3–1.6	1.1	1.3[a]	0.9[b]
Vitamin C (mg)	70	52	61[a]	42[a]

[a, b]ANOVA test: samples with scores a and b are significantly different.

Results of ANOVA show that there are no differences in intake of calcium, iron, zinc, copper and vitamin C between male and female respondents. For the other minerals and vitamins, the values are significantly lower for female respondents.

Another observation is that the values of calcium, magnesium and vitamin C are lower than recommended. Typical diseases associated with deficiency of these minerals are: osteoporosis, kidney stones, high blood pressure, pregnancy-induced hypertension and cardiovascular diseases. The study of Simon and Hudes (2000) suggests that vitamin C is involved in the metabolism of cholesterol and may have implications for blood cholesterol levels. Recent cases of vitamin C deficiency occurred in children and the elderly on very restricted diets (Stephen and Utecht, 2001; Weinstein et al., 2001). Deficiency of vitamin C causes scurvy that is rare in the developed counties because it can be prevented by as little as 10 mg of vitamin C daily (Simon and Hudes, 2000).

The values of phosphorus, zinc and copper exceed the recommended levels. There is a growing concern about the increased amounts of phosphates in the diet, which can be attributed to phosphoric acid in soft drinks and phosphate additives in commercially prepared foods (Calvo, 2000). High blood phosphate levels reduce the formation of the active form of vitamin D (calcitriol) in the kidneys, reduce blood calcium and lead to increased parathyroid hormone release. It is often concluded that the substitution of milk, dairy products and other calcium rich foods with soft drinks and snack foods containing high levels of phosphate presents a serious risk to bone health.

Zinc plays important roles in growth and development, the immune response, neurological function and reproduction. Shellfish, beef and other red meats are rich sources of zinc. Nuts and legumes are good plant sources. Zinc content in the diet of male part of the Belgian respondents is relatively high comparing to the Belgian standard. However, recent study estimated the average dietary zinc intake for adult men as13 mg per day (FNB, 2001). The lack of sensitive indicators of zinc nutritional status in humans makes it difficult to determine the level of zinc intake most likely to promote optimum health. Following the Linus Pauling Institute (LPI, 2006) recommendation to take a multivitamin/multi-mineral supplement containing 100% of the daily values of most nutrients will generally provide 15 mg/day of zinc in addition to that in foods.

Copper is a critical functional component of a number of essential enzymes, known as cuproenzymes. Some of the physiologic functions are cooper--dependant and include: energy production, connective tissue formation, iron metabolism, central nervous system, antioxidant functions, nutrient--nutrient interactions, etc. Clinically evident or frank cooper deficiency is relatively uncommon. One of the most common clinical signs of cooper deficiency is anaemia. Less common features of cooper deficiency include loss of pigmentation, neurological symptoms, and impaired growth. A variety of indicators were used to establish the recommended dietary allowance (RDA) for cooper (FNB, 2001). The RDA for copper is based on the prevention of deficiency. For Belgian adults older than 19 year the RDA is 1.1 mg per day (NUBEL, 2004). Copper occurs in liver (beef), oysters, crab, nuts, almonds, lentils, chocolate and other products. Low-income respondents in the Flemish sample do not have deficiency of copper. On contrary, both BMI groups consume more than 1.1 mg of cooper per day. Several epidemiological studies have found that increased serum copper levels are associated with increased risk of cardiovascular disease (Ford, 2000).

5. Conclusions

The following conclusions are made from the current research:

1. The sample of low income respondents in Belgium consists of old people living alone who are mostly unemployed or retired. The vast majority of them have primary or secondary education. About half of these people are unsatisfied about their financial situation, which corresponds to their earnings ranging from 200 € to 700 € per person per month.

2. The low income people frequently consume: mineral water, coffee, boiled potatoes, margarines and mixed fats, liquid milk, brown bread, soups, potato meals, jam and honey. The majority of these products provide cheap energy and limited nutrients, minerals and vitamins. A 24 h Recall Method shows consumption deficiency of calories, water, calcium, magnesium and some vitamins. Levels of phosphorus, zinc and copper are higher than recommended.

3. There are not many people strictly classified as underweight or obese in the current low income Belgian sample. Therefore, the following conclusions are drawn for two BMI groups.

4. Food Behaviour Survey does not reveal many variables that differentiate the two BMI groups. Contrary to expectations, nutritional knowledge of respondents is similar regardless BMI. In the Physical Activity and Health Survey, the statements about age, social involvement, self-stated weight, risk of obesity told by the doctor, are good indicators of the body mass index.

5. Food Frequency Questionnaire does neither show many differences between two BMI groups. Only three products (yoghurt, coffee, margarine plus mixed fats) differentiate consumption habits of underweight and overweight respondents. The findings from 24 h Recall Method confirm that there are no significant differences in consumption of nutrients, minerals and vitamins between BMI groups.

6. The differences in intake of some nutrients, minerals and vitamins exist between males and females belonging to low income group in Belgium. Lower consumption levels of dietary indicators indicate that females are more prone to diet-related diseases.

Charter VII

COMPARISON OF FOOD CONSUMPTION AND NUTRITIONAL BEHAVIOUR OF LOW INCOME GROUPS IN POLAND AND BELGIUM

Krystyna Rejman, Renata Januszewska, Ewa Halicka, Barbara Kowrygo

1. Comparison of the results

1.1. Introduction

The results of comparative research presented in chapters V and VI are summarized and analysed in relation to the framework developed by Diderichsen (1998) and refined by Whitehead and colleagues (2000). The framework is used for mapping the impact of policies on the social pathways to health inequalities and the pathways leading to ill-health are approached from the perspective of the individual or the society, as it was described in chapter III.

The results are presented for Poland and for Belgium taking into account the individual. Socio-economic characteristics, differential vulnerability and differential consequences of disease are compared in four steps. The aim is to compare the findings in both countries and to present the existing policies corresponding to the framework of Whitehead and colleagues (2000).

1.2. Socio-economic characteristics of low income groups

The sample of the Polish low income households is different from the Belgian one (Table 1). The Polish poor households consisted of young families with children and the Belgian poor households are mostly older and living alone persons.

TABLE 1. Comparison of socio-economic characteristics of low income groups

Poland	Belgium
47% between 36–50 years old 75% primary or secondary education 43% white collar workers 72% households with 1–4 children 7% households of unemployed people 20% retired Average monthly income per person 800 PLN (household with ≥ 2 persons), 1100 PLN (one person household)	47% older than 50 years 90% primary or secondary education 80% single person household 40% unemployed, 30% retired Average monthly income 200–700 € per person

1.3. Differential (specific) exposure of low income groups

The results of the Food Behaviour Survey show that the younger Polish households try to support themselves by finding additional sources of food or self processed foodstuffs that can be stored for the winter (Table 2). Food self-provision is done by growing fruit, vegetables and producing eggs in the countryside areas or small green plots/houses in the cities.

TABLE 2. Comparison of differential specific exposure variables of low income groups

Poland	Belgium
Food Behaviour Survey	
60% do not provide food self-supply, 95% do not exchange food 74% process themselves food items for out of season consumption (fruit, vegs, mushrooms) 68% have basic positive knowledge about health-diet links (fruit, vegs, fish, whole grain bread, olive oil, veg. oils) 82% buy food at supermarkets and 87% at market place Food choice influenced by habits (75%), finances (57%) and convenience (52%)	70% do not self-produce/exchange foodstuffs 60% have positive knowledge about link health and diet 65% do not read nutritional labels Show a mixture of positive/negative dietary practices or intentions 32% buy at large self-service shops Food choice influenced by finances (40%) or habits (25%)
Food Frequency Questionnaire	
48% drink daily at least 2 litres of liquid 50% eat only up to 2 portions of fruit and vegs daily 4% don't eat fruit and vegs everyday Daily diet composed of: white bread, fresh apples, tea, coffee, boiled potatoes and soup, butter, margarine/mixed fats, fresh vegetables, milk, cakes, sweets and juices Diet very low in lard, potato fries, olive oil, legumes, fish, grits and grain flakes	60% drink daily at least 2 litres of liquid 66% eat only up to 2 portions of fruit/ /vegs per day 25% don't eat fruit/vegs everyday Daily diet is not varied and mostly composed of: boiled potatoes, margarines and mixed fats, brown bread, soups, jam, honey, milk, and coffee Diet very low in fish (omega fatty acids), olive oil (MUFA), yoghurt (probiotics), tea (active polyphenols)
24 hours Recall Method	
Deficiencies: energy, total fat (lightly), minerals: copper, calcium, iron, potassium, zinc, magnesium, vitamins: thiamine and riboflavin Over consumption: protein, sodium, phosphorus, vitamins: A, C, niacin, B_6 45% of daily energy comes from fat (32%) and added sugar (13%) Levels of cholesterol, % of PUFA and protein follow recommendations Too little intake of dietary fibre	Deficiencies: calories, water, calcium, magnesium, vitamin C Over consumption: fats, proteins, zinc Levels of sodium and cholesterols lower than recommended Too little intake of dietary fibre
Physical Activity and Health Survey	
25% state low physical activity 20% high smoking 6% drink alcohol regularly and a lot	70% state low physical activity 42% high smoking habits 25% drink alcohol regularly and a lot

Additionally, the results of Food Frequency Questionnaire show that there is generally a higher frequency of consumption of all foodstuffs in Poland than in Belgium. In both countries, about the same main diet is used by poor people including bread, potato, soups, milk and coffee. For both countries, there is deficiency in consumption of fish, whole grain (brown bread, grits) and pro-biotic milk drinks. Specific for Poland is the more frequent declared consumption of vegetables, apples, juices, tea and butter.

The data gathered through 24 hours Recall Method are quite different in both countries. While the Polish low income group consumers have too much sodium but slightly too little fat, the Belgians consume too much fat and their sodium intake is lower than recommended. In the case of Poles it must be stressed that the share of daily energy coming from fat and added sugar is too high in comparison to international recommendations. Deficiencies of calcium, magnesium and dietary fibre are common for both low income groups. The current intake of sodium/salt in the Polish population exceeds the WHO recommendation by 50% (Ołtarzewski and Szponar, 2006). This study estimates that high consumption of salt increases the risk of high blood pressure and is linked to osteoporosis and some cancers, especially those located in the stomach.

The Physical Activity and Health Survey shows that low income Poles are more involved than Belgians in physical exercises, they smoke less and also consume less alcohol. Research in Belgium indicates that about 30% of low income group smokes and the physical activity of 60% of this group are low (Vranken et al., 2004).

1.4. Differential vulnerability: disease/injury of low income groups

Table 3 shows specific variables indicating problems related to disease or injury of low income groups in both countries. There is a similar distribution of obese and overweight people: 38% of the total sample in Poland and 36% of the total sample in Belgium.

It is typical for today's societies that overweight and obesity are markers of low income or poverty. Very often these conditions are associated with growing levels of diabetes, heart disorders and other diet-related diseases. Health inequalities among low income consumers are caused by nutritionally imbalanced diets. As Drewnowski (2006) stated, diets high in refined grains, added sugar and fats cost less, whereas the recommended diet of low energy density and high nutrient content are likely to cost more. The obesity and overweight epidemic may be causally driven by the high palatability and very low cost of energy dense foods (MacAulay and Newsome, 2004).

TABLE 3. Comparison of differential vulnerability variables of low income groups

Poland	Belgium
Physical Activity and Health Survey	
58% normal weight, 3% underweight, 31% overweight, 7% obese	49% normal weight, 7% underweight, 26% overweight, 10% obese
80% do not follow any special diet	90% do not follow any special diet
48% thinks they are overweight	30% thinks they are overweight
76% no specific medical consultation/treatment regarding diet	80% no specific medical consultation/ /treatment regarding diet
80% no intake of supplements	80% no intake of vitamins/supplements
Quite frequent medical checks, per year: blood pressure (44%), glucose (33%), cholesterol (27%)	Quite frequent medical checks, per year: blood pressure (45%), glucose (30%), cholesterol (29%)
30% informed about actual/at risk of high blood pressure, 25% of heart disease, 25% high blood cholesterol	30% informed about actual risk of high blood pressure
80% state good health condition	75% state good health condition

The low income groups in both countries show very similar behaviours such as: avoidance of food supplements, lack of the follow up of any special diet, lack of medical consultation or treatment regarding diet. Thus, both groups are more prone to health risks related to overpressure, heart and cardiovascular diseases. It has to be remembered that about 30% of the people in both countries were already informed about these health risks.

1.5. Differential (social) consequences of disease of low income groups

Table 4 indicates some elements related to differential social consequences of disease of low income groups in Poland and Belgium. The study shows that social policy activities reach more low income people in Belgium than in Poland. The subsidised meals program is only one of many Belgian government initiatives targeting poor people. In Poland such programmes are financed by local commune government and state budgets. The administration of meals for the needy is the local authority's mandatory activity, so the scale of food support depends on its involvement. In both countries food bank networks enlist food and distribute to low income consumers through different NGOs.

Another aspect is the self-assessment of health and psycho-social well--being, which is typically high, because the majority of poor people do not like to complain openly about their life situation. Fear of stigmatisation is one of the reasons of these attitudes as lack of money for food is shameful for these people. This probably explains the high share of stressed people in both populations. The questions testing the state of stress of respondents

TABLE 4. Comparison of differential consequences of disease of low income groups

Poland	Belgium
Social Functioning Survey	
Very few (mostly respondent's children) get subsidized meals 15% different social problems 57% never worked for local community 68% stated good emotional health/psycho-social well-being 75% are stressed due to work problems (33%), situation at home (25%), finances (15%) 10% have some health disability preventing from working; here 3% benefit social support	40% depend on subsidized meals 75% never worked for local community 75% say they have good emotional health/ /psycho-social well-being 60% say are stressed due to finances (30%), home (20%) or work problems (10%) 25% have some health disability preventing from working: here 7% have social institution support, 18% family support

show that about 75% of Poles are stressed and in majority they worry about their jobs. In comparison, about 60% of Belgians are stressed; they are unemployed or retired and worry mainly about their financial situation. The low income respondents did not engage in any kind of social work either in Poland (60%) or in Belgium (75%), but on the base of this research it is impossible to quantify to what a degree this behaviour makes them feel socially excluded.

2. Policy implications

2.1. Introduction

Low income and other needy people are supported mainly in the frame of social policy undertaken on the level of each EU member country and on European Union level in the frame of Common Social Policy (Fig. 1). The scope of support include different and difficult issues combating the reasons of poverty as well as activities aimed at minimising poverty results, in the form of direct support, which is a little bit easier to give.

The suggestions to improve the existing situation of the low income groups in both countries are made from the point of society context, according to Figure 2 in chapter III.

2.2. Policies influencing the "social position" individuals occupy in society

The modifying effect of social policy on population social stratification can be realized through various actions and programs taking place in the frame of social policy at international, national or local level. At the international

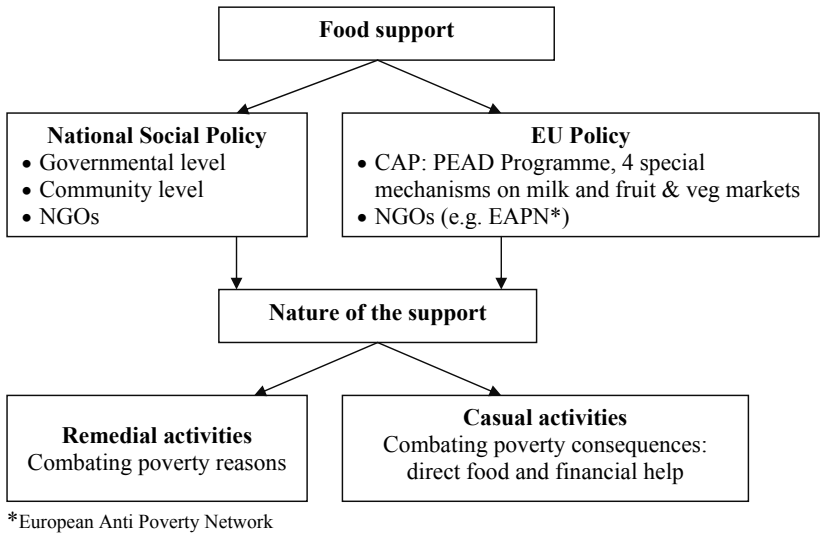

FIGURE 1. Food support in EU in the frame of social policy
Source: Own elaboration.

level, the EU Cohesion Policy activities are oriented towards disadvantaged groups, such as unemployed, young people and women in order to help them upgrade their professional qualifications, re-orientate in training and education. Two new priorities of Cohesion Policy are adjusted towards vulnerable people, namely:

– "Convergence", biased on support for growth and job creation in the least developed member states (e.g. Poland) and regions;
– "Competitiveness and employment", designed to help the richer member states deal with economic and social change, globalisation and the transition to the knowledge society; employment initiatives focusing on an adaptability of the workforce, job creation and accessibility to the labour market for vulnerable persons.

These activities are financed by the European Social Fund and European Regional Development Fund and targeted to all EU countries, including Belgium and Poland.

Conditions of living are linked to health therefore in the 1980s the Belgian government developed the first "Poverty Atlas" that is considered as the working instrument to provide subsidies or investments to the most needy neighbourhoods (Stadsnieuws, 2006). Re-development of the regions in which the lowest social population lives is believed to bring necessary empowerment and new chances to be engaged in the local communities. Belgium carried out the first Action Plan for Social Exclusion between 2001

and 2003. In Poland, such countrywide governmental programmes have not been carried out thus far. Any public debate on economically threatened population groups and poverty phenomenon is taking place. The findings of country-wide research shows (Tarkowska, 2007) that only 5% of the Polish population perceive poverty among children, numerous families, farmers and former workers of state farms (liquidated at the beginning of socio-economical transformation).

2.3. Policies influencing "exposure to health hazards" by poor people

People in different social positions are exposed to health hazards in various ways and degrees. In 17 European countries there are food banks through which poor people can gain access to basic food commodities. It is worth mentioning that Belgium was the second country following France which engaged the food bank idea in 1985. The food bank network in Poland was established in 1992 and has now 30 units. NGOs, school canteens, orphanages, local commons for children and other institutions of social care are beneficiaries of food banks' support. The Federation of Polish Food Banks (FPBŻ) together with other institutions and NGOs organises two special programmes to tackle food poverty among children: "Filling Plates" and "Share Meal with Others". These operations are a response to the growing problem of malnutrition among children and young people of school age. FPBŻ encourages schools in which such a problem is prevalent to submit an application to the Food Banks nearest them. In the frame of the first action FPBŻ undersigns agreements with food companies which want to supply meals to indicated schools. In this programme 500 participating firms deliver food to 2.5 thousands schools. Food banks also carry out educational and training campaigns regarding not wasting food, proper nutrition and moulding good social attitudes.

The European food provision projects focus especially on disadvantaged groups. The program PEAD (Programme Europeen d'Aide aux plus Demius / / The European Programme of Aid to the Most Needy) was established on the EU level in 1987 in the frame of Common Agricultural Policy to manage the intervention surplus of food staples for the purposes of social welfare and to provide support in the form of food to those most in need through accredited charity organisations (including Food Banks). Poland was the only country among new EU members which introduced this unsolicited/voluntary programme in 2004 and has since received over 40 thousands tonnes of food each year. In 2007 additionally Czech Republic and Estonia take part in the programme.

In Poland some charitable organisations and the Catholic Church first began delivering meals for the poorest in the nineties. "Supporting communes in delivering meals for children" was the only government programme. The first country-wide government program "Meals for needy" in 2005 was addressed to children and young pupils, elderly, ill and handicapped, people achieving lowest revenue and in difficult life situation. A new program "State support in delivering meals" started in 2006 and will last till 2009. The communes and government will assign to this purpose 2.9 billions PLN and each year the State budget's participation totals minimum 500 mln PLN.

Health promotion in Flanders is supported by a number of institutions including: Flemish Institute for Health Promotion (VIG), local health networking (LOGO's) and Welzijnszorg. The aim of VIG is on one hand to advise and inform about the best options to maintain health, to coordinate between other institutions such as insurance companies and Red Cross. On the other hand the organization is involved in the projects such as "Poverty and Health Promotion" organized in 2001 or development of methodology focusing on the best ways to reach the poorest and improve their health. The major actions of LOGO's are inventory of local health indicators and responsibility for efficient implementation of methods and instruments related to health promotion in their regions. The organization Welzijnszorg is involved in subsidising the welfare initiatives and the sensitisations campaigns, in which Flemish citizens and the local governments are up-dated about the social exclusion problems and are presented with specific solutions. The other socio-economic policy tools helping the poorest include: the repayment for the basic necessary medical care, special solidarity funds for payment of prolonged illnesses and the obligatory insurance.

Some of the leading food companies create their CSR (Corporate Social Responsibility) image through joining in food aid actions, both of repair and relief nature. The newest initiative of two leading Polish companies (Danone and Maspex) together with the biggest network of discount store is selling fortified milk-cereal meals in one-portion packaging at production cost as a proposal of nutritive breakfast for children. Another big company from the beer industry assigned 1.5 mln PLN for nine NGOs acting for small communities. This social campaign enables creating new workplaces, obtaining professional qualifications and food support for low income and poor people. One of the leading internationals catering companies delivers hot meals for school children in chosen Polish educational centres in the frame of worldwide programme "Stop Hunger".

The foundation Polish Humanitarian Organisation within nation-wide aid campaign "Puppet" (Pajacyk) collects a symbolic part of price of FMCG

items produced by firms taking part in the program to finance meals for the poorest children in schools from the regions of very high unemployment rate. Within the CAP mechanism milk has been subsidised in more than 5.5 thousand schools since 2004. In 2006 about 772 thousand children (11% of total number) participated in the programme.

2.4. Policies influencing the "effect of being exposed" to a hazardous factor

The majority of low income people are exposed to hazardous factors including poor nutrition. Various policy tools are developed to minimize the effects of malnutrition.

At the European level, the following activities are recognized:

- "European Technology Platform 2020 and Beyond: Food for Life" aims to design foodstuffs taking into account their functional and nutritious properties;
- "European Platform on Diet, Physical Activity and Health" organized by Directorate General Health and Consumer Protection (SANCO);
- Limitation of diet-related diseases through engagement of European food and drink industry represented by Confederation of Food and Drink Industries of the EEC (CIAA); the practical actions focus on self-regulated prohibition of junk food commercials addressed to children or identification of the products in which the actual levels of nutrients or other compounds are above the ones stated on the packaging.

CIAA currently implements in Europe a universal voluntary program of graphic labelling related to GDA (Guideline Daily Amount) values for basic nutrients of foodstuffs. The symbolic and luminous design of GDA should help each consumer to make a nutritionally proper choice on the food market. Other business (corporate-based) educational involvement is the Unilever's international action entitled "My Choice". The foodstuffs produced by Unilever containing low levels of sodium, trans-fatty acids and sugar are labelled with a special logo ("My Choice" programme is already introduced in the Netherlands, Belgium and Canada). In Sweden and other Scandinavian countries similar nutrition information is brought by "The Keyhole" symbol.

Different actions dissemination knowledge on nutrition, health and disease prevention are realised by international scientific institutions, such as: Danone Institute, Nestle Institute, Kraft Cares. There is however concern that their actions do not reach low income consumers.

In Poland different educational actions are undertaken, mostly voluntary, on a small, local scale. They are perhaps less effective but still popular,

especially if they follow regular schedules. These courses are free of charge but catch limited audiences, as they are organised usually in big cities. For example the Warsaw School of Health leads regular courses; Warsaw Agricultural University organises monthly lectures on diet-health relationships entitled "Nutrition Forum" (Wszechnica żywieniowa). The University of Third Age organises weekly lectures for elderly people who display a rising interest in the subject of malnutrition prevention. The actions related to minimizing the hazards of malnutrition include the free of charge testing of blood pressure, cholesterol level and calcium content in the bones.

During this decade two important EU regulations on food labelling as a source of nutritional and educational information as well as consumer protection were released, namely Directive 2000/13/EC of the European Parliament and of the Council of 20 March 2000 on the approximation of the laws of the Member States relating to the labelling, presentation and advertising of foodstuffs, and Regulation (EC) No 1924/2006 of the European Parliament and of the Council of 20 December 2006 on nutrition and health claims on foods.

The Directive prohibits the use of information that could mislead the consumer or attribute medicinal properties to foodstuffs, both in presentation and advertising of foodstuffs. The second Act is the European authorities' reaction to an increasing number of foods labelled and advertised with nutrition and health claims. It specifies the rules of nutritional marketing applying in order to ensure a high level of protection for consumers and to facilitate their food choice. This act defines nutrition, health and reduction disease risk claims and specifies the rules of applying them. These regulations are most important for people with low level of nutrition-health links' awareness, e.g. low income or low educated consumers.

2.5. Policies influencing the "impact of being ill"

Poor people are especially vulnerable to the social consequence of disease. A number of policy tools help people who lost jobs or who are chronically ill. One of them is the European Social Fund that co-finances creation of employment and training courses for disabled people. Another policy tool relates to discounts on taxes for firms that employ disabled people. The authorities of the European countries organise meetings with local communities represented by low income or disadvantaged groups. During these meetings, the topics related to increasing engagement in local activities, improving housing and nutrition are discussed.

3. Conclusions

In order to prepare and implement actions in the field of nutrition policy it is essential to study the food consumption trends of the particular population group. The current desk and field research results as well as monitoring of trends of food consumption patterns of low income consumers in Poland and Belgium are a base for more effective policy measures in both countries.

Although the nutritional status of Polish and Belgian populations is not reflected in the 'average' descriptions in the statistical databases, the FAO Food Balance Sheets are a valuable source to compare consumption trends between countries. The result of presented research indicates that food policy measures are important to redirect some of the negative (unhealthy) trends in food consumption. According to the basics of communication with consumers the goals has to be precise and message short and clear. Focus should be on the increase of fruit and milk/dairy products consumption in Poland and reduction of fats and sugar consumption in Belgium.

Charter VIII

FOOD POLICY PROGRAMMES FOR LOW INCOME GROUPS

Ewa Halicka, Renata Januszewska, Krystyna Rejman

1. Introduction

In 1992, in the World Declaration and Plan of Action for Nutrition, following the International Conference on Nutrition (ICN), nutritional well-being was acknowledged as a crucial measure of "the development of societies" and of "progress in human development". It was agreed upon that poor nutrition, foodborne diseases and lack of secure access to good food make an important contribution to the burden of disease and death (WHO, 2002).

Due to the fact that food availability, accessibility and consumption are shaped by policies in many sectors (including agriculture, food processing, manufacturing, retailing and advertising) coordination of policy-making to ensure that proper priority is given to public health is crucial for achieving the ICN goals. The main elements identified as essential to balance competing interests in the food chain in favour of nutritional well-being are institutions, policy instruments and information (Tansey and Worsley, 1995).

2. Global strategies in the field of food and nutrition policy

One of the most important international institutions involved in the fight against malnutrition and the improvement of food consumption patterns is WHO, which also provides technical and financial support for the development of nutritional policies. In September 2000 the WHO Regional Committee for Europe endorsed the first Action Plan for Food and Nutrition Policy in which it called for interrelated strategies in Member States for three areas: nutrition, food safety and sustainable food supply (food security). A comprehensive three-pillar scheme of policy on food and nutrition is presented in Figure 1.

Despite the development of food policy programs in many countries in the last decade, the nutrition goals set in 1992 have yet not been achieved and diet-related diseases still represent a considerable public health problem

FIGURE 1. A comprehensive policy on food and nutrition
Source: WHO, 2001.

(WHO 2006: European Ministerial Conference on Counteracting Obesity). International agreements indicating guiding principles and nutrition--oriented strategies should be now translated into more coherent and explicit action plans. Multi-partner commitments made in the last years, including the Global Strategy for Food Safety (2002), Global Strategy on Diet, Physical Activity and Health (2004) and European Strategy for the Prevention and Control of Noncommunicable Diseases (2006) build the strategic background for the Second Action Plan proposed in November 2006.

An important Community-based action aimed at fighting diet-related diseases is the Diet, Physical Activity and Health Platform which was set up by the European Commission in March 2005. The objective of this initiative, which involves experts on both nutrition and physical exercise, is to tackle the growing phenomenon of obesity in Europe in order to curb the trend. It is to catalyse voluntary action across the EU by business, civil society and the public sector as well as to provide an example of coordinated but autonomous actions. At the same time it can create input for integrating the responses to the obesity challenge into a wide range of EU policies. According to SANCO (Health and Consumer Protection Directorate General of the European Commission) reports circa 200 new voluntary actions by Platform members have been triggered (SANCO, 2006).

The Programme of Community Action in the field of public health (2003––2008) was prepared with a view to contribute to the achievement of a high

level of health protection in Europe. It focused on health information, the Community's capacity to react to health threats, and the prevention of diseases and illness. Its priorities were to reduce the high number of premature deaths and illnesses caused by major diseases such as cancer, and to tackle mental illness. Consequently, emphasis were placed on main factors associated with lifestyle, socio-economic situation and the environment, such as smoking, drinking, drug addiction, nutrition and stress. The 2007–2013 Health Program, with its budget of 365.6 mln €, prioritises promoting by focusing on health determinants such as nutrition.

In December 2005 the EU Commission triggered a debate on initiatives geared towards preventing overweight, obesity and chronic diseases. The primary objective of the Green Paper "Promoting healthy diets and physical activity" was to create conditions under which the best practices can be adopted throughout Europe. One of the main issues was the measures which could promote healthy eating and physical activity among population groups and households of certain lower-level socio-economic categories. In May 2007 the White Paper on the "Strategy for Europe on Nutrition, Overweight and Obesity related health issues" was adopted. In 2007 the Commission will finance a study looking at the relationship between obesity and socio--economic status with a view to considering the most effective interventions to tackle those in low socio-economic groups.

The proposed Second WHO European Action Plan for Food and Nutrition Policy (2007–2012) indicates that policy actions should account for gender, ethnic and social differences. Solidarity schemes must be considered in order to improve food security of disadvantaged population groups. According to policy priorities specific focus should be directed to activities addressing nutrition inequalities and wider socio-economic determinants as well as "clustering of bad habits" that is frequently seen in low income socio--economic groups. A high priority in the fight with the epidemic of obesity, which is one of the most serious problems in the WHO European Region, is to support lower socioeconomic population groups, who face more constraints and limitations on making healthy choices. Increasing the access to and affordability of healthy choices should be a key objective of policy measures. Specific actions should include establishing targeted programmes for the protection of vulnerable and low socioeconomic groups by providing food subsidies, distributing food commodities, providing free or subsidized access to catering establishments, and administrating meals at home or other forms of social support (www.euro.who.int).

3. Food assistance actions: improving food security in low income groups

In the European Union a program aimed at both improving market stabilization and achieving food security in low income households was implemented in 1987 in the framework of the Common Agricultural Policy Program PEAD (Programme Européen d'Aide aux plus Démunis). This CAP measure was aimed at distributing agricultural products (cereals, powdered milk, butter, olive oil, meat) from intervention stocks to the most deprived persons in the Community (according to Council Regulation No 3730/87). It was introduced in the wake of the exceptionally cold winter 1986/1987. Currently the PEAD distribution activities, established by the Commission, do not embrace meat and olive oils and take place through designated charitable organizations, such as Food Banks. The biggest beneficiaries of the PEAD program are: Italy, France and Spain. In 2006, the total yearly PEAD budget surpassed 259 mln €, including 43.0 mln € in Poland and 3.1 mln € in Belgium (bankizywnosci.pl). In Poland more than 77 thousand tons of food reached the storehouses of charity organizations in 2006, among which were wheat flour, pasta, cheese, UHT milk and rice.

Another CAP instrument aimed at increasing food availability among vulnerable population groups is the "buying in" of fruits and vegetables system from farmers integrated in producer groups. These products can be distributed free-of-charge among the needy through charity organizations. Due to very low level of consumption as well as seasonality, fruit and vegetable interventions have been proven most effective for low income individuals (Cash et al., 2005). However in Poland this CAP mechanism has not yet been introduced due to lack of interest among producer groups. The planned reform of the common fruit and vegetable market (CMO) will hopefully change this situation and allow surplus production to be distributed to educational institutions and children's holiday centres and ensure greater affordability of fruits and vegetables to encourage their consumption.

In comparison to EU federal funding for US food assistance and nutrition programs in 2005 reached 51 billion USD. The largest USDA coordinated activities, the Food Stamp and WIC (Women, Infant, Child) programmes aimed at reducing food insecurity also function as nutrition safety nets offering access to essential nutrients and minerals (LeBlanc et al., 2006). Using normal retail marketing channels the Food Stamp program provides qualified low income households with increased purchasing power to acquire food. It offers assistance on the basis of financial need only, irrespective of family

type, age or disability. For a typical low income family with children food stamps provide about 25% of the family's total purchasing power. According to studies conducted by the USDA Economic Research Service food assistance programs in the US not only increase food expenditure but also reduce overall economic vulnerability, child poverty and food insecurity. However the impact of food assistance programs on nutrition is less certain and suggests mixed nutrition results. Responding to findings in the early 1990s that the National School Lunch Program served lunches high in fat, saturated fat and sodium. USDA launched the School Meals Initiative for Healthy Children to bring in line the lunches with the Dietary Guidelines for Americans. Several studies show that monthly food stamp cycle, in which benefits are issued once a month, contributes to sporadic consumption of food. Food deprivation has been linked to binge eating when food later becomes plentiful, and further, binge eating has been linked to weight gain over time (Ver Ploeg et al., 2006).

4. National policies in European countries

Over the last few years several European governments started to implement nutrition measures, mainly aimed at raising consumer awareness, increasing consumption of fruit and vegetables, improving quality of school lunches and dietary education (Mazzocchi and Traill, 2005). As reported in the 1999 WHO Survey (WHO, 2003) only 25% of the Member States reported not to have adopted a national food and nutrition policy at the time of survey. However a notable number of countries lacked established advisory and administrative structures to ensure successful and sustainable implementation of national food and nutrition policies. According to WHO recommendations most of the European Member States at this time had yet to identify and monitor dietary intake patterns of vulnerable groups and develop programs targeting the disadvantaged consumers.

Many different EU initiatives are currently under way to improve the social environment. Among the most important are schemes to create more and better jobs, improve the health, safety and quality of working environments, ensure access to social benefits for people moving between countries, promote research and provide funding to develop the economies in poorer parts of the EU. Action to reduce health inequalities is an important objective of the EU Public Health Action Programme 2003–2008. The programme supports the development of strategies and measures focusing on socio-economic health determinants. The long term objectives are to

bring general levels of health closer to those of the most advantaged, ensure the health needs of the most disadvantaged are fully addressed accelerate improvements in public health in countries and regions with greater rates of sickness (http://ec.europa.eu/health-eu/my_environment/social_environment/index_en.htm).

According to SANCO efforts to promote healthy diets are likely to be spread across many areas. For each area concerned, the Commission sought the views of interested parties by asking a number of specific questions. Social status, income and level of education are the main determinants as regards the food which people choose to eat and the extent to which they engage in physical activity.

Promoting healthy diets and physical activity has potential for reducing not only obesity but also the risks related to hypertension, heart disease, diabetes and certain forms of cancer. More generally, healthy diets and physical activity considerably improve the quality of life. The EU Council calls upon the Member States and, where appropriate, the European Commission to conceive and implement initiatives aimed at promoting healthy diets and physical activity. The challenge is to enable all citizens, despite economical factors, to make healthy dietary choices, and ensure that healthy dietary options are available, affordable and accessible. It is essential to guarantee that consumers are not misled by advertising, marketing and promotion activities and also mainstream nutrition and physical activity into all relevant policies at local, regional, national and European levels.

The United Kingdom is the country with the most extensive range of policy actions (Mazzocchi and Traill, 2005). The majority of work on food and low income is developed by the local health sector, community groups and area-based initiatives (Watson and Williams, 2003). The community sector which plays a vital role in delivering food projects is often carried out by volunteers or by the beneficiaries of projects themselves.

Local food projects are set up in response to a variety of needs – directives from the local government, community requests, needs assessments and a growing awareness of food issues themselves. The pattern of inter-agency linkages is characterized by a number of strategic-level partnerships, completed by a range of cross-agency working at operational level. Comparative analysis shows that food policy actions focused on low income groups is most co-coordinated in Scotland where there is:

– recognition of the need to address food poverty at the highest level; most notably in the Scottish Diet Action Plan and subsequent Government strategies;

- the number of people involved in the development and delivery of food poverty policy is "manageable";
- a strong and diverse culture of logistics community food initiatives which is well networked and linked into regional and national policy debates.

It is a combination of an active grassroots movement, statutory support and a commitment to address long-term food insecurity, facilitated by a highly regarded national organisation that marks Scotland as having the most progressive environment supporting food poverty work. The Scottish Community Diet Project (SCDP) which was set up in 1996 is held up as a model for cross-sectorial working. The Food Poverty Project is a national organisation tackling the interrelated problems of poverty, poor food access, compromised diet and impaired health. Its approach is to link and support community food projects and to campaign for effective policies to end food poverty.

Many of the projects developed by local authorities and health boards focus on health awareness and behavioural change whereas projects initiated by communities themselves focus more on skill development, the issue of food access and affordability. In the UK there is a huge variation in the needs of low income consumers. A growing number of interagency links and partnerships at a local level are helping to address their specific needs. Health focused area based initiatives such as Healthy Action Zones, Sure Start and Healthy Living Centres enable and provide funding for a wide range of work to tackle food poverty.

A settings-based approach began to shape in the area of health promotion in the nineties. The settings most commonly considered are the workplace, schools, universities, prisons, cities and health care institutions. The health care sector is an essential partner in creating the right conditions for health in society and has an important leadership role in the society.

5. Conclusions

The development, implementation and coordination of nutrition policies are a very complex process and should consider not only the quantitative aspects (food security) but also quality and nutrition-related issues. The strategy: a combination of steps logically linked to reach a specified goal, is however most effective only if clear goals are set and performance options are limited to a reduced number of allowed alternatives.

The base for actions in the field of nutrition policy is monitoring of food consumption trends in population groups, including low income consumers.

Research shows that assistance programs should not be limited only to securing the appropriate level of intake. Obesity, as a growing problem in all communities has a multi-causal condition, and tackling it requires a comprehensive preventive approach, including multi-stakeholder efforts at local, regional, national, European and global levels.

Nutrition policy is not simply a matter of governments. According to gathered data it is often the non-governmental organisations, including public interest NGOs (PINGOs) and business and industry ones (BINGOs) as well as public-private partnerships that are most effective.

Conclusions

Renata Januszewska, Krystyna Rejman, Jacques Viaene

The differentiation of food patterns is determined by a complex variety of biological, economic and social factors which are present in the external and internal environments of consumers and households. Among them are those which stimulate the social stratification of populations. Social inequalities and multidimensional phenomena are often independent of general economic, social and demographic components. In countries such as Poland, in which specific socio-economic transformation takes place, these factors are also influenced by government policies regarding employment, income and social affairs.

Other factors influencing social inequities and food consumption is related to individual characteristics of consumers. Among them an important role is played by demographic features, especially number of people in the household, the family-generation structure, age, gender and level of education. Also illnesses, especially related to diet, handicaps or specific family situation lead to low-income, poverty risk and social exclusion.

The complexity of social inequality phenomena and the development of low socio-economic groups in rich societies of the XXI century, indicate that the diagnosis and subsequent resolution of these problems is very difficult. The Amsterdam Treaty talks about the necessity to fight against social exclusion, committing countries in the EU to prepare, every second year, national programmes on social inclusion. The first step in this direction should be to ensure that the poor have access to a sufficient amount of food of high nutritional value. Meanwhile food poverty, which Friel and Conlon (2004) defined as the inability to access a nutritionally adequate diet and the related impacts on health, culture and social participation, is becoming a structural constraint on food consumption and dietary intake among low income groups, and has multi-faceted consequences for health, education and social participation.

Food and nutrition policy should be a part of the European and national programmes against poverty and social exclusion. Therefore, in order to assist low income groups and prevent and fight social exclusion, it is essential to implement effective social, nutrition and health policies as well as education policies. Drewnowski (2006) argues if healthier diets cost more, then the answers are to be found at the level of food, agricultural and

economic policies. Social security of the nations is a fundamental element of economical development, as determined in the Lisbon Strategy II.

In the European Union it is essential to develop a system of information exchange on the activities undertaken on social and economic reform, in order to accelerate the processes of diminishing under nourishment among low income groups, increasing employment and preventing social exclusion. Ireland (Friel and Colon, 2004) and Great Britain (Watson and Williams, 2003) are positive examples of countries that implemented complex national programmes and conduct monitoring of their realisation and effects. For example, the Irish Combat Poverty Agency institutes a countrywide Crosscare Food Programme, which constitutes food banks, food centres, food-assurance services, and nutrition support for those helping the homeless (Dunphy, 2007).

For the policies aimed to reduce these unfavourable social phenomena to be successful, it is essential to include the specifics of low income and other threatened groups in both Poland and Belgium, the areas in which the research presented in the book was undertaken. Besides common features of investigated population groups, such as growing difference between rich and poor, and concentration of poor in certain regions and poverty heredity, there are also other distinct problems (Tarkowska, 2007). In Poland, poverty is concentrated mainly in the countryside, while in Belgium – as in many Western countries – poverty is more common in the cities. In Poland, there are no issues related to ethnic factors, however in Belgium, there is a greater prevalence of immigrants in lower socio-economic groups.

In Poland, it is young people, those in working age, and especially the families with many children that are the low income groups. Contrary to widespread stereotypes, it is not the elderly but children in Poland who, according to the poverty scale, are situated in the worst position among all developed countries (UNICEF, 2007). This trend differs in Belgium where, in most cases, poverty concerns older people. In both countries, multifaceted programmes should be introduced by government and nongovernmental institutions functioning in the area of policy development. Their role is to bring relief and education collectively in order to fight not only the outcomes but the causes of poverty.

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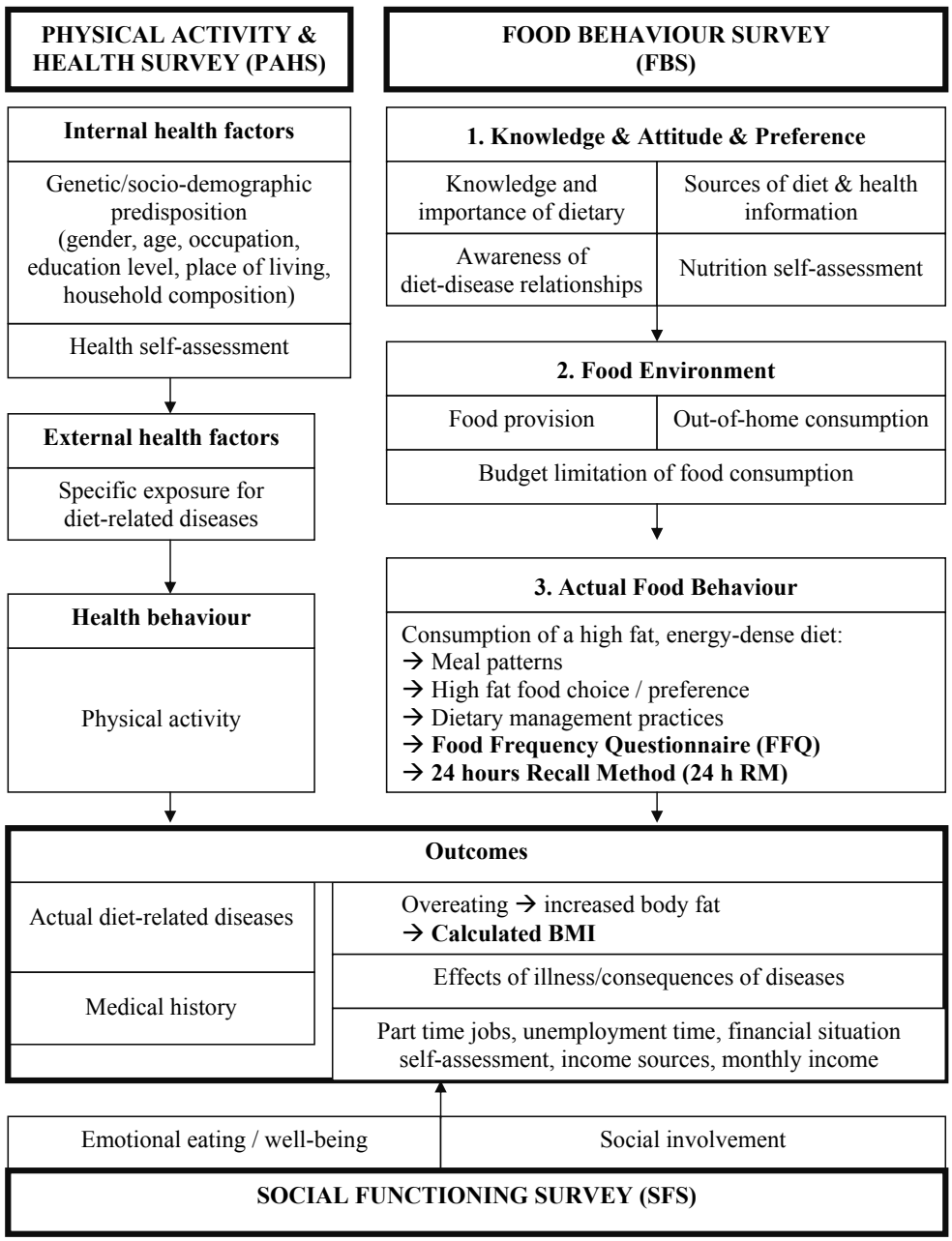
Annexes

ANNEX 1. Outline of the main research questionnaire: PAHS, FBS, SFS



ANNEX 2. Consumption of main vegetal products (average per capita supply) in Poland and Belgium, kg/person/year

Year	Cereals		Potatoes		Sugar	
	Poland	Belgium	Poland	Belgium	Poland	Belgium
1989	165.3	103.2	142.8	97.2	51.1	42.8
1990	144.8	102.3	143.8	105.5	48.1	44.9
1991	148.9	100.9	140.1	108.5	38.6	44.4
1992	150.9	103.7	144.3	110.8	39.6	45.4
1993	158.2	103.1	147.2	110.9	45.1	44.9
1994	151.2	101.0	136.4	107.7	42.8	45.9
1995	149.9	100.7	135.5	106.5	41.2	45.9
1996	151.4	103.6	135.2	105.2	42.9	48.5
1997	152.1	106.9	134.0	104.4	43.3	48.6
1998	150.2	107.1	135.0	101.7	43.5	51.9
1999	151.0	105.8	131.4	111.4	43.0	51.5
2000	154.6	107.0	132.2	95.3	45.1	59.3
2001	155.2	105.7	129.9	87.3	45.5	57.2
2002	152.6	109.6	132.1	91.9	45.2	54.6
2003	154.6	107.7	130.1	83.5	45.7	55.4

Source: FAO FBS data, 2006.

ANNEX 3. Consumption of vegetables, fruit and pulses (average per capita supply) in Poland and Belgium, kg/person/year

Year	Vegetables		Fruits		Pulses	
	Poland	Belgium	Poland	Belgium	Poland	Belgium
1989	118.9	93.9	31.6	112.5	2.7	2.4
1990	123.4	94.0	28.9	122.7	2.5	2.7
1991	129.7	106.1	38.8	136.8	2.6	2.8
1992	112.4	112.9	41.6	164.1	2.4	2.7
1993	126.7	118.8	44.6	105.9	1.8	2.8
1994	120.7	110.1	34.5	132.2	1.5	2.6
1995	128.5	124.2	41.9	114.1	2.3	2.6
1996	122.6	126.3	50.2	140.7	2.6	2.4
1997	122.1	134.4	45.7	112.7	2.2	2.3
1998	137.2	134.0	50.7	114.8	2.6	2.2
1999	120.1	147.0	53.0	114.3	2.5	2.4
2000	126.8	127.1	48.6	129.6	2.2	2.4
2001	117.3	119.8	57.4	125.6	2.0	2.4
2002	98.0	131.2	49.3	104.7	2.1	2.3
2003	100.3	130.7	47.6	109.5	1.5	2.1

Source: FAO FBS data, 2006.

ANNEX 4. Consumption of milk products, butter, cream and eggs (average per capita supply) in Poland and Belgium, kg/person/year

Year	Milk		Butter		Cream		Eggs	
	Poland	Belgium	Poland	Belgium	Poland	Belgium	Poland	Belgium
1989	248.9	197.3	8.8	8.2	8.0	3.3	10.8	10.8
1990	234.1	220.5	7.8	7.9	4.8	3.4	10.6	11.8
1991	227.0	193.3	5.7	8.0	4.4	3.9	9.8	12.5
1992	214.0	215.1	5.2	7.2	4.0	4.1	9.7	12.8
1993	206.6	202.7	4.5	7.0	3.8	3.9	8.8	13.3
1994	200.6	204.4	3.9	6.7	3.5	3.6	8.2	14.5
1995	194.9	200.9	4.0	6.2	3.0	6.6	8.6	13.9
1996	188.9	204.7	3.9	6.1	3.4	6.8	9.8	13.0
1997	186.3	229.3	4.3	6.4	3.6	6.7	10.5	14.1
1998	199.4	234.2	4.3	5.8	3.4	7.6	10.0	15.0
1999	191.8	226.5	4.4	5.1	3.7	6.7	10.3	14.5
2000	184.4	239.0	4.3	6.4	3.7	6.8	10.4	11.0
2001	175.1	244.7	4.4	6.3	4.1	6.9	11.0	13.0
2002	174.6	252.0	4.5	6.3	4.3	7.2	11.8	12.2
2003	173.4	256.3	4.5	6.1	4.3	7.2	11.6	11.8

Source: FAO FBS data, 2006.

ANNEX 5. Consumption of meat and fish products (average per capita supply) in Poland and Belgium, kg/person/year

Year	Meat		Meat and offal		Fish and seafood	
	Poland	Belgium	Poland	Belgium	Poland	Belgium
1989	73.7	90.6	76.1	97.4	12.7	18.6
1990	73.1	89.8	75.6	96.7	10.1	19.6
1991	78.0	95.1	80.6	102.6	10.3	19.2
1992	76.1	95.6	78.7	102.3	9.0	19.7
1993	73.4	98.2	76.0	104.0	10.9	19.0
1994	68.4	89.3	71.0	95.2	12.8	19.8
1995	69.0	88.7	71.7	94.1	13.2	21.0
1996	70.2	87.6	73.1	92.2	11.6	20.4
1997	65.5	79.5	68.3	84.3	14.5	20.4
1998	69.1	77.2	72.2	84.3	13.1	21.6
1999	71.8	84.0	74.5	91.8	11.3	21.8
2000	70.3	81.4	73.1	86.0	13.2	20.4
2001	70.3	86.3	73.2	90.6	13.0	18.8
2002	73.3	83.9	76.0	87.6	13.1	18.5
2003	76.0	80.3	90.7	82.5	13.1	19.4

Source: FAO FBS data, 2006.

ANNEX 6. Consumption of animal and vegetal fats (average per capita supply) in Poland and Belgium, 1989–2003

Year	Animal fats		Vegetable oils	
	Poland	Belgium	Poland	Belgium
1989	24.4	28.1	7.6	18.9
1990	20.3	26.7	6.6	18.9
1991	18.1	27.0	7.3	19.7
1992	17.6	26.2	9.0	20.0
1993	16.0	24.7	10.3	20.0
1994	14.2	24.8	11.2	21.6
1995	13.2	26.9	12.0	22.4
1996	13.3	26.4	12.1	23.3
1997	13.7	27.1	12.1	22.7
1998	13.7	26.7	12.2	22.9
1999	13.7	25.3	12.3	23.2
2000	13.8	25.7	12.2	23.3
2001	14.5	26.1	12.3	23.3
2002	14.9	26.2	12.4	22.9
2003	14.7	25.9	11.6	23.0

Source: FAO FBS data, 2006.

ANNEX 7. Daily energy, fat and protein intake in Poland and Belgium 1989–2003

Year	Energy (kcal)		Fat (g)		Protein (g)	
	Poland	Belgium	Poland	Belgium	Poland	Belgium
1989	3500	3520	118.9	157.4	104.9	102.2
1990	3343	3533	110.3	154.9	100.9	103.4
1991	3284	3563	110.6	157.8	102.4	104.9
1992	3356	3646	114.9	158.4	102.2	106.4
1993	3419	3589	112.9	158.3	101.0	106.4
1994	3287	3581	108.2	160.0	96.9	103.6
1995	3303	3560	110.2	160.0	97.9	102.4
1996	3325	3583	110.6	159.7	99.0	101.4
1997	3298	3646	109.0	160.3	97.8	101.6
1998	3356	3631	112.0	158.8	99.7	102.8
1999	3354	3645	112.6	158.4	99.5	104.9
2000	3382	3661	111.7	159.4	99.5	89.6
2001	3370	3625	111.4	161.3	98.7	91.8
2002	3374	3658	112.8	162.6	99.4	92.8
2003	3366	3634	111.4	162.6	99.4	90.6

Source: FAO FBS data, 2006.