



Scientific Report No. 17-2007

The environmental sustainability of household food consumption in Austria: A socio-economic analysis

Alexandra Pack

October 2007



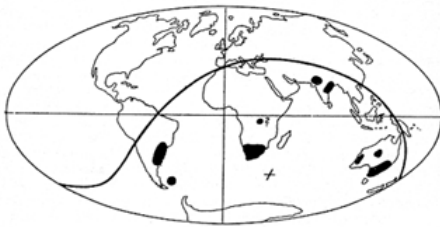
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The present report is the result of a Master thesis work completed in July 2006. The work was supported by the Global Change Programme of the Austrian Academy of Sciences (Project SUFO:TROP).



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Wegener Center Verlag • Graz, Austria

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ISBN-13 978-3-9502308-3-3

October 2007

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DIPLOMARBEIT

Zur Erlangung des akademischen Grades einer
Magistra
an der Naturwissenschaftlichen Fakultät der
Karl-Franzens-Universität Graz

Eingereicht bei:
Ao. Univ.-Prof. Dr. Karl W. Steininger
Institut für Volkswirtschaftslehre und
Wegener Institut für Klima und globalen Wandel

Graz, im Juli 2006

Acknowledgments

This thesis was written as part of the SUFO:TROP Project (**S**ustainable **F**ood Consumption: **T**rends and **O**ptions) financed by the Global Change Programme of the Austrian Academy of Sciences and conducted by the Sustainable Europe Research Institute in Vienna, the Department of Economics and the Wegener Center for Climate and Global Change at the University of Graz.

During the course of my thesis, there were many people who were instrumental in helping me. I would like to take this opportunity to acknowledge some of them.

First, I would like to express my gratitude to my advisor, Ao. Univ.-Prof. Dr. Karl Steininger, for his guidance and support during the completion of this thesis. A very special thanks goes to Dr. Birgit Friedl for the opportunity to be part in the SUFO:TROP project and to write this thesis. Her expertise, understanding and patience added considerably to this work. I also would like to thank the other members of the project team, namely Dip.-Vw. Dipl. Ökotrophologin Sylvia Lorek, Dr. Jill Jäger and Dr. Ines Omann for the assistance they provided at all levels of this work.

I would like to also acknowledge the students and other staff members of the Wegener Center at University of Graz, especially Mag. Brigitte Gebetsroither for her assistance in SPSS 13.0. The Wegener Center provided me an excellent surrounding for writing my thesis.

Most of all, I would also like to thank my family for the financial and emotional support they provided me throughout my entire life. Thanks also to my friends for their encouragement.

Finally but not least, this research would not have been possible without financial assistance of the Austrian Academy of Science for which I express my gratitude.

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1 Introduction

The importance of nutrition in achieving environmental sustainability is beyond question. According to the EIPRO¹ study (Tukker et al., 2005) approximately one third of total environmental impacts within the EU-25 are related to food and beverage consumption. In fact, the environmental impact of consumed foods and beverages exceeds the impacts of all other investigated consumption domains, even transport (17% of measured impacts) and housing² (7% of measured impacts). Figures of environmental impacts of food and beverage consumption, however, neither include the environmental affects of storing and preparing meals (e.g. energy requirements for heating, cooling, washing, etc.), which is included in another category, nor of the impacts related to out-of-home consumption (e.g. eating in restaurants or hotels). By including the impacts of out-of-home consumption, figures for food-related impacts rise to more than 40% of the total. In order to reduce environmentally detrimental impacts, food consumption patterns must be modified in favour of sustainability.

This thesis deals with the research field of sustainable food consumption in Austria on a household basis. Thus, the aim of this thesis is to identify differences across socio-economic groupings with respect to sustainability. Due to the lack of adequate surveys, especially on a socio-economic basis in Austria, the present thesis contains an analysis of household food (inclusive of beverages) expenditures, consumed quantities and selected socio-economic characteristics of the sample households based on the Household Budget Survey conducted by Statistik Austria in 1999/2000.

1.1 The concept of sustainable (food) consumption

For the development of sustainable food consumption, two concepts were essential: sustainability and its relation to consumption.

The concept of sustainability attracted worldwide attention in 1987 with the publication of the report of the World Commission on Environment and Development (WCED) titled *Our Common Future*. The WCED report, often referred to as *the Brundtland report*, named after the WCED chairperson, defines sustainable development as development that "...seeks to

¹ Environmental Impact of **P**roducts

² The term *housing* includes water, electricity, gas and other fuels but excludes furnishings, household equipment and routine maintenance of the house which is a separate category and contributes with 14% to total EU-25 environmental impacts.

meet the needs and aspirations of the present [generation] without compromising the ability to meet those of the future” (Brundtland, 1984, p.24).

The relation of sustainability to the area of consumption was first stressed in Agenda 21³. Chapter four of the Agenda 21 document deals with changing consumption patterns and declares that unsustainable consumption and production patterns are the main cause for global environmental deterioration. In order to improve environmental quality and encourage sustainable development, increases in production efficiency and changes in consumption patterns are required. Particular attention is paid to the role of households as consumers and the consequences of the choices they make. In addition, Agenda 21 postulated that sustainable development means advancements in the areas of economic growth, social progress and environmental protection (UNSD, 2006). In this context, physical and mental well-being is assigned to the area of social progress, however several authors argue that human health and a high quality of life with respect to sustainable development is of utmost importance, and therefore must be discussed separately (Brunner und Schönberger, 2005; Erdmann et al., 2003; Herde, 2005; Hofer, 1999; Koerber et al., 2000).

Building on these general considerations, (inter)national organisations and individual research groups have attempted to define the term *sustainable (food) consumption*, but have not yet reached a consensus.

One of the first and most commonly accepted definitions of *sustainable consumption* was given by the Norwegian Ministry of Environment (1995) at the conference on sustainable production and consumption in Oslo 1995 (Oslo round-table). During the conference, the term *sustainable consumption* was defined as “the use of goods and service that respond to the basic needs, bringing better quality of life, while minimising the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardise the needs of future generations.” (International Institute for Sustainable Development, 2006)

While the first definition refers only to the term *sustainable consumption* from an environmental perspective, the following publications attempt to define *sustainable food consumption* by referring to all sustainability dimensions.

Erdmann et al. (2003) indicate a number of economic, social, health-related and ecological criteria which a sustainable diet should meet. Those criteria are summarised in Table 1.

³ Agenda 21 is a document that includes specific programmes for the attainment of global sustainable development. It was one of the main outcomes of the conference on sustainable development in Rio organised by the United Nations Commission on Environment and Development (UNCED) in 1992.

economic dimension	social dimension	health dimension	ecological dimension
global food security	job security	human health	conservation of natural resources
guaranteeing economic competitiveness of private firms and enterprises	international justice	changing of consumption patterns	maintaining of ecological resilience
stable and efficient markets	reinforcement of consumer interests	eating should be enjoyable	improvement of biodiversity

Table 1: Sustainability goals for the food system

Source: Erdmann et al., 2003 (translated into English)

However, the authors make no statement about the weight of above mentioned dimensions. They leave it open to the reader to decide about the importance of each criterion.

The German Council for Sustainable Development in collaboration with the Institute for the Market-Environment Society (IMUG) developed a *sustainable shopping basket* which contains sustainable food products and services taking all four dimensions into consideration. The basket should help consumers to be aware of sustainable alternatives and suggests sustainable consumer behaviour. The recommendations of the council are as follows: in general, sustainable consumer behaviour encourages the purchase of products which are socially (e.g. fair trade products) and environmentally (e.g. organic products) compatible. Furthermore, consumers should opt for foods in reusable packaging (e.g. glass), for less packaged or even unpacked foods. The purchase of convenience or other highly processed products should be reduced, because less processed foods are less energy and resource intensive, have less impact on the environment and encourage creativity in cooking. Moreover, the aspect of locally and regionally grown foods plays an important role in becoming a sustainable consumer. Another important criterion is the reduction of food from animal origin and the increasing consumption of foods from plant-origin provided that it is seasonal. Concerning meat consumption, if meat is consumed at all, people should not only opt for regional and organic products but also pay more attention to responsible animal husbandry practices (German Council for Sustainable Development, 2006).

Both definitions imply that consumption patterns are economically, socially, health and environmentally compatible in all areas of the food system, starting from food production, processing, distribution to food purchases of consumers and waste disposal. Due to this comprehensive concept, the practical implementation in all areas is nearly impossible. Therefore, this thesis restricts the concept of *sustainable food consumption* to the ecological dimension referring to the work of the Wuppertal Institute for Climate, Environment and Energy (1996) in which it is argued that the ecological aspect is predominant on the grounds that the protection of the natural ecosystem is essential for human existence and has priority over the social and economic aspects. Thus, drives for ecological sustainability must be

implemented as socially and economically feasible as possible (Wuppertal Institute for Climate, Environment and Energy, 1996). The following definitions are restricted to the ecological aspect and describe a sustainable ecologic diet by different criteria such as resource, energy (emissions) or land use, waste management or biologic diversity.

Hoffmann (2005) writes that from an environmental perspective, *sustainable nutrition* implies a preference for foods of plant origin (fruits and vegetables) and a reduction in the consumption of highly processed foods. Wallén et al. (2004) define *sustainable food consumption* from an energetic viewpoint, and call for low energy input per food item. Analogously, the authors agree that energy efficient foods could only be regarded as sustainable if they also provide the required amount of nutrients and energy to maintain good health. Diets that are environmental compatible but are sparse from the nutritional viewpoint lead to malnutrition and deficiencies and could therefore not be called sustainable. For Tanner and Kast (2003), the term *sustainable food consumption* means *green products*. The authors point out that green food products are not solely organically grown. The term *green* should also imply domestically cultivated, seasonal, fresh, less wrapped food as well as food from fair trade.

Related expressions are *green consumption*, *sustainable diet*, *sustainable nutrition behaviour*, and finally, *sustainable products*. *Green consumption* and *green diet*, for example, are defined by Alfredsson (2002) and used as a label for commodities and consumption patterns that have a low energy demand and a low CO₂ output. The term *sustainable diet* mentioned by Duchin (2004) and Dahlin and Lindeskog (1999) refers to a diet that protects health and has relatively low environmental impacts. According to Hayn et al. (2005), a *sustainable diet* should not only focus on the positive effects on health and environment, but also take into account the practical application in every day life, as well as socio-cultural diversity. Leitzmann (2003) defines *sustainable nutrition behaviour* using seven food characteristics: predominantly plant derived, originating from organic farming, produced regionally and seasonally, minimally processed, ecologically packaged, tastefully prepared and traded fairly. Vermeir and Verbeke (2004) claim that *sustainable or ethical products* stem from organic farming and fair trade and must be animal friendly products.

On the basis of this variety of definitions, it is necessary to give a definition for *sustainable food consumption* within this thesis. Before being able to define sustainable food consumption in general and to distinguish across different types of foods, it is necessary to identify environmental impacts along the food chain, which is done in the following subsection.

1.2 Environmental impacts of food consumption

1.2.1 Impacts along the food chain

EEA (2005) and OECD (2002) stress the complexity of the interactions between food consumption/production and the environment. The studies agree that current eating and drinking patterns lead to great environmental pressures, especially when considering that approximately one third of total environmental impacts from households can be related to food and drink consumption (Danish EPA, 2002). This estimate is based on life-cycle analysis and includes effects of both production and consumption.

The scale of environmental impacts from food consumption depends on where and how food is produced, processed, packaged, preserved, distributed, prepared and disposed of. The most significant environmental impacts occur at the beginning of the production chain, in the area of food production (Goodland, 1997; Hofer, 1999; OECD, 2002). However, consumers could influence trends in these areas from the demand side. Figure 1 shows a qualitative approach to describe the environmental impacts along the food system. The figure starts its description with agricultural production and ends with (household) consumption by listing all relevant inputs in food production, processing, retailing, consumption and harmful outputs from these areas to the environment (EEA, 2005; OECD, 2002).

The impact of the **agriculture sector**, which is characterised by a high need for land and arable pasture, exceeds those of other sectors in the food chain, even food processing and packaging (Goodland, 1997). Agricultural and livestock production are both responsible for global deforestation and loss of biodiversity. Currently, nearly 28% of the global land surface is covered by cropland and managed pasture, and given current trends that figure will grow by about 2% annually. By considering this growth rate on the global scale, the implication is that every year large areas are removed from wild habitats (Massari, 2003). Biodiversity loss is not only driven by destruction of wild habitats, but also by global homogenisation of crops and contamination of natural resources through manure accumulation, organic waste, usage of transgenic crops, herbicides, pesticides and fertilisers (Hofer, 1999; Massari, 2003). Between 60% and 75% of fertilisers produced are used for grain production. The rest is applied to legumes, vegetables, fruits, cotton and other fibres. Another problem in agriculture production is topsoil erosion. During the last 40 years, nearly one-third of the world's arable land has been lost to erosion and continues to be lost at a rate of more than 10 million hectares per year. Within agriculture production, cattle raising is responsible for the most environmental damage (overgrazing, soil erosion, desertification and tropical deforestation) (Goodland, 1997).

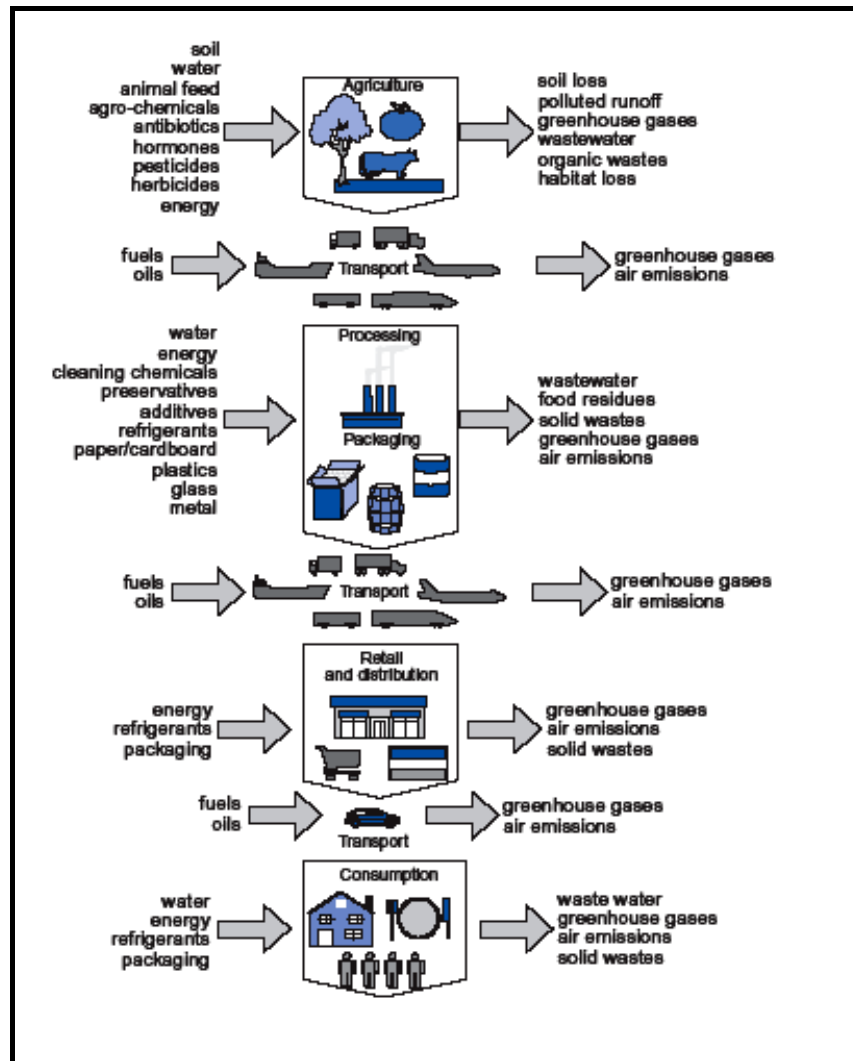


Figure 1: Inputs in and environmental impacts from the food sector

Source: OECD, 2002, p.25

Additional environmental problems are greenhouse gas emissions, fertility loss of soils, eutrophication and acidification of water bodies. Greenhouse gas emissions are related to agricultural machines, stables, greenhouses, production of chemical substances for crop and livestock production (synthetic fertiliser, pesticides, herbicides, antibiotics, hormones) (Herde, 2005; Massari, 2003). While fuel combustion is the main source for CO₂ emissions, there are also other greenhouse gases that are emitted in great quantities during food production and consumption. Methane (CH₄), for example, has its source in animal husbandry, waste and rice planting. High amounts of nitrous oxide (N₂O) emitted from industry and farm soils have to also be taken into account (Carlsson-Kanyama, 1998). Fertility losses in soil are caused by soil erosion, nutrient depletion and inefficient irrigation practices in subtropical regions which lead to soil salinisation (Massari, 2003). Finally, agricultural production also contributes to fresh water scarcity through pollution, salt intrusion or overexploitation for irrigation. In particular, meat production uses high amounts of water. The production of one kilogram of

beef requires about 22,450 litres of water, whereas one kilogram of grain production uses less than 1,660 litres and vegetables about half that (Goodland, 1997). According to the World Resource Institute (2006), the agriculture sector accounts currently for 70% of the world's use of water, around 33% in Europe.

Although it is commonly accepted that agricultural production accounts for most of the environmental impacts in the food production cycle, the use of energy and water as well as waste production in **food processing and packaging** play a significant role. Energy, for example, is used for the production of preliminary products like food additives and packaging material (paper, cardboard, plastic, glass, metal, etc.), for heating, cooling or drying operations and related machinery. Water, the second input in food processing, is used in many different phases of the food processing cycle, and also for cleaning equipment and work areas. Besides water consumption, the environmental impacts of the food processing stage can be summarised to greenhouse gas emissions and the production of liquid (effluent) and solid (organic waste from food residues or packaging waste) waste. The amount of energy consumed and waste generated depends on the efficiency of production technologies and the work methods used in food processing (OECD, 2002).

After the food is processed, it is transported to **retailers**, who distribute it to the final consumers. The retailers themselves contribute to environmental deterioration through greenhouse gas emissions (transportation, energy used for refrigerants or heating, etc.) and waste generation (packaging, spoilage of foods). **Transportation** links processes and includes transport of raw materials from agricultural production to the food processor or directly to retailers and from retailers (supermarkets, hypermarkets, etc.) to households. The detrimental impact of transportation on the environment differs with the mode of transport and loading capacity. Within the mode of transport, airfreight is presumed to be the most energy intensive (OECD, 2002). The rising amount of food transportation is the result of consumer demands for year-round availability of fresh vegetables and fruits, ethnic and exotic foods (Herde, 2005). On a household basis, the increasing use of automobiles for shopping due both to the disappearance of local food stores and simple convenience, as well as the trend toward eating out-of-home (restaurants, bars, cafés, etc.), contributes greatly to direct environmental impacts from food consumption. However, these impacts have not yet been quantified (Herde, 2005; OECD, 2002). The quantitative relevance of food transport with respect to the environment is controversial. Whereas some studies claim that food transports contribute significantly to environmental problems (Brunner, 2005; Massari 2001), others state that transportation plays no significant role compared to other food-related activities (Carlsson-Kanyama, 1998; Hofer, 1999). Indeed, the German Enquete-Commission

estimated that food transports account roughly for 9% of total greenhouse gas emissions in the German food system (Wuppertal Institute for Climate, Environment and Energy, 1996).

The environmental pressure of **household food consumption** can be differentiated into direct and indirect impacts. Direct impacts describe environmental consequences of activities like transport, cooking, dish washing and waste disposal (Payer et al., 2000). The energy efficiency of home cooked meals is dependent on the cooking method, cooking time, specific appliances used and the number of portions cooked (Herde, 2005). Water consumption for vegetable washing, cooking and dish washing are also important factors. Finally, household waste production must also be considered. Waste generated through food consumption can be divided between food waste and inorganic waste. Whereas food waste results from overstocking, over-preparation, plate waste, cooking losses and quality defects, inorganic waste occurs because of increased packaging (smaller packaged units) and pre-packaged foods. In particular, plastics, which have a detrimental impact on environment because of their low recovery rate, have replaced other forms of packaging like paper, cardboard, glass and aluminium (OECD, 2002). A German study found out that food packaging material makes up for almost 27% of total weight of household garbage and nearly 50% of total garbage volume. This is equivalent to 100 kg of food related packaging material per person per year (Koerber et al., 1999). Indirect impacts of household food consumption refer to individual consumption choices and their impact on the entire production chain. In other words, consumers can influence sustainability in the food chain by an environmentally conscious choice of food products and contribute to energy, water and waste saving throughout the whole system (Massari, 2003; OECD, 2002).

1.2.2 Environmental impacts across food categories

From the above it can be said that consumers are not only responsible for direct environmental impacts, which refer to energy, water use and waste production in households, but also for indirect impacts through their choice of food. Purchasing patterns of consumers determine the food produced. That means that consumer decisions affect other parts of the whole (food) system. If consumers choose less environmental harmful food products, environmental impacts could undoubtedly be lowered. The environmental significance of different food products is investigated by several researchers using a broad range of analytical tools.

Environmental impacts of several products including foods and beverages consumed within EU-25 countries are the focus of the EIPRO (**E**nvironmental **I**mpact of **P**roducts) study (Tukker et al., 2005). The model covers the impact of products over their entire life cycle which were purchased by private households and the public sector within the EU-25

countries, irrespective of product origin⁴. Environmental impacts are divided into eight categories: abiotic depletion, global warming, ozone layer depletion, human toxicity, ecotoxicity, photochemical oxidation, acidification and eutrophication. As already mentioned, food and beverage consumption within the EU-25 are responsible for 30% of total environmental impacts (averaged across all impact categories) in Europe, and with the inclusion of out-of-home consumption, this figure rises to more than 40%.

The environmental significance of single food categories according to COICOP⁵ nomenclature (discussed in more detail in Section 3.2) is investigated for the impact categories of global warming (GWP), photochemical oxidation (POCP), acidification and eutrophication (table 2). When interpreting the data, it should be kept in mind that the scores indicate the combination of the volume of expenditure in Euros, and the environmental impacts per Euro. Therefore, higher product scores may come from high expenditure figures, from high scores per Euro or from both causes combined. Meat and meat products are especially identified as one of the most environmental significant sub-categories for all impact categories in the study. Contributions are between 9% and 14% to GWP, POCP and acidification, whereas the contributions to total eutrophication within EU-25 are higher, around 24%. The second important group of food products are the aggregate of milk, cheese and all kinds of dairy products, the aggregate of bread and cereal products as well as non alcoholic drinks, which contribute between 1% and 2% each to GWP, POCP and acidification. These food categories are also highly significant for eutrophication, as milk, cheese and dairy products contribute 10%, bread and cereals 6%, and beverages 2%. The contribution of other food and beverage categories (vegetables, fruits, etc.) remains below the 1% level within all considered impact categories.

⁴ In the strict sense, only goods that are produced locally or abroad and consumed within EU-25 countries are taken into account, whereas the impacts of products produced in Europe for exports are excluded.

⁵ The term *COICOP* (Classification of Individual Consumption by Purpose) refers to a recognised international list of classifications which group individual consumption expenditures by purpose.

single food categories	GWP	POCP	Acidification	Eutrophication
total food and beverages	29.3	25.5	29.7	58.1
meat and meat products excl. poultry	11.9	9.2	13.8	23.9
poultry and eggs	0.5	0.4	0.5	0.9
fresh or frozen fish and seafood	0.6	0.4	0.5	0.5
bread, cake, cereals and related products	1.4	1.4	1.2	5.6
vegetables	0.7	0.5	0.5	0.4
fruits	0.5	0.4	0.3	0.8
frozen fruits, fruit juices and vegetables	0.7	0.8	0.6	0.7
milk, cheese and dairy products	5.1	4.4	5.5	10.3
fats and oils	1.3	1.2	1.0	1.8
candy and other confectionary products	0.5	0.6	0.5	0.9
bottled and canned soft drinks, roasted coffee	1.6	1.9	1.4	2.4
other	4.5	3.3	8.8	9.9

Table 2: The contribution of various food categories to total global warming potential (GWP), photochemical oxidation potential (POCP), acidification and eutrophication within Europe in percent.

Source: Tukker et al., 2005

The environmental significance of meat and meat products from the aspect of energy demands is confirmed by Carlsson-Kanyama and Faist (2001). Based on a life cycle assessment (LCA) method that evaluates energy demands that occur in the entire life cycle of a product including agricultural production, storage, transportation, processing to preparation and waste disposal, they point out that meat has in general higher energy requirements than vegetables (Carlsson-Kanyama and Faist, 2001). An exception to this rule, where a vegetarian diet is more environmental harmful than a meat based one, is singled out in an earlier study by Carlsson-Kanyama (1998). By using a greenhouse gas approach, the author compares the environmental compatibility of four meals with the same amount of energy and protein, two vegetarian and two meat based diets, with exotic and domestic products in each case. The term exotic refers to foods which do not grow domestically and must be imported (rice, dry peas, tomatoes⁶, etc.). The author comes to the conclusion that in some cases, when the vegetarian diet consists of exotic foods, it may pollute much more than a meat based diet (Carlsson-Kanyama, 1998). In addition, Carlsson-Kanyama and Faist (2001) state that from an environmental perspective, open air cultivation is preferable to greenhouse cultivation.

⁶ Carlsson-Kanyama (1998) argues that "tomatoes are considered exotic because either they have to be imported from Southern Europe or else grown in greenhouses." (Carlsson-Kanyama, 1998, p. 228).

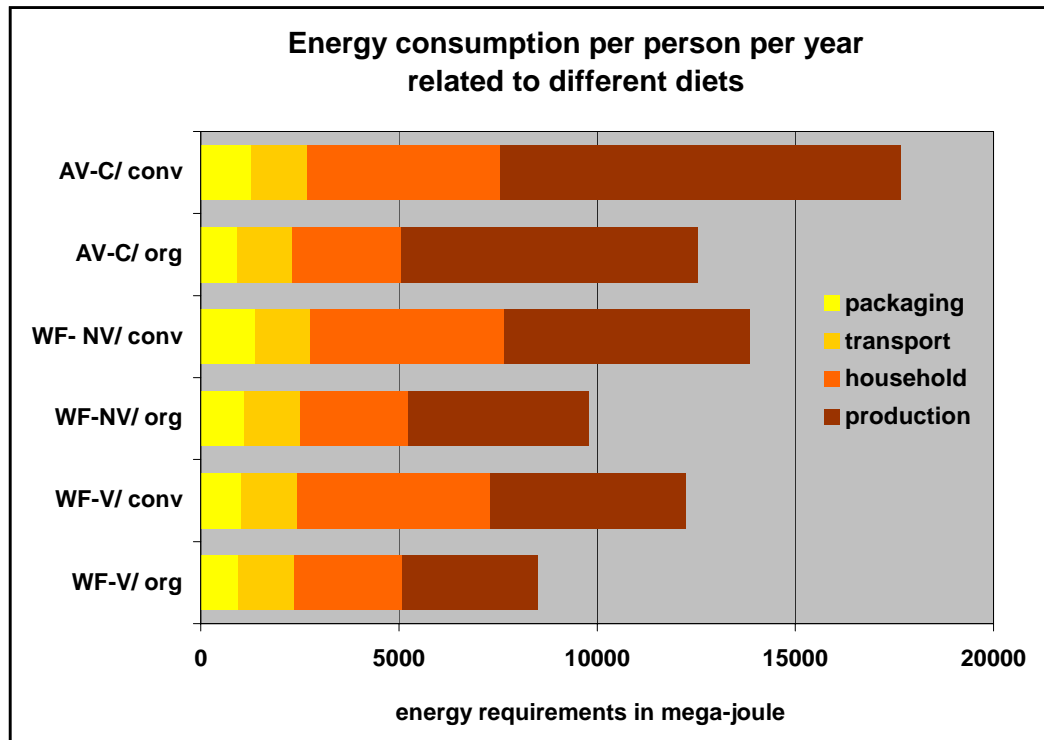
Another analysis of greenhouse gas impacts is carried out by Kramer et al. (1998), who calculate estimates for the amount of CO₂, NH₄ and N₂O emissions in kilograms per monetary unit for several food categories in the Netherlands. According to their results, rice, salad, and tomatoes turn out to have much higher CO₂ emissions than other vegetables, due to greenhouse production and long distance transportation. In general, fresh vegetables have lower emissions than processed ones. Likewise, meat products emit more CO₂ per monetary unit than vegetables. Rice performs worst in terms of methane emissions, while other relatively high methane emissions can be observed for dairy products like milk, butter and cheese. Nitrous oxide is highest for processed foods in categories like fish, sugar, pastry, rice, bread, oil and fats.

Another prominent author in the impact of food products is Jungbluth (2000). In his doctoral thesis he compares the environmental significance of vegetables and meat, on the one hand, and product attributes of these foods (mode of production, origin, mode of transport, level of processing) on the other, by making use of the so called Eco-indicator. The Eco-indicator⁷ is an abstract value which is used to assess the environmental impacts of the whole life cycle of a product by using one single, simple score. Jungbluth confirms the hypothesis that compared with vegetables, meat causes in general higher environmental impacts. Within the category of meat, pork and poultry are from an ecological point of view more sustainable than lamb, beef or veal, which cause the worst damage. As far as product attributes are concerned, greenhouse products have, in general, considerably higher environmental impacts than open-ground production, whereas organically grown foods have the lowest impact. As far as origin is concerned, he confirms that highest environmental impact is caused by imported fresh overseas vegetables, for which air transport is assumed. By contrast, locally produced vegetables (from the authors viewpoint), in this case Bern in Switzerland, seem to be the most environmental friendly. The influence of packaging material is compared to other categories of minor importance. With respect to level of processing, chilled and fresh vegetables are assumed to have less impact than frozen or heated ones.

Energy requirements (in mega-joule per person per year) of six different diets are investigated by Taylor (2000) in order to determine the energy savings potential if consumers chose a more ecological consumption pattern. She compares average German consumption habits (AV-C), a vegetarian whole food diet (WF-V) and a non vegetarian whole food diet (WF-NV). The organic (org) and conventional (conv) version of each is considered. A simple description of these three diets is as follows: the average German consumer has a mixed

⁷ The concept and methodologies behind the indicator are quite complex and not discussed in detail in this thesis. For further information see Goedkopp (1995) and Goedkopp and Spiensma (2001).

diet consisting of cereal products, fish, meat and other animal products and a low intake of fruit, vegetables and legumes. Consumers who adhere to whole food diet consume more fruits, vegetables and legumes, mainly fresh and not heated, whereas vegetarians show the highest consumption of these food groups. Results of the investigation are summarised in Figure 2.



AV-C: average German consumption habits

WF-V: vegetarian whole food diet

WF-NV: non vegetarian whole food diet

conv: conventionally produced food

org: organically produced food

Figure 2: Comparison of energy requirements (in mega-joule per person per year) for food consumption of six different diets

Source: Data from Taylor, 2000

The most ecological compatible diet is the whole food diet of vegetarians, followed by the non-vegetarian type. The organic version is always more positive than the conventional one. By considering the contribution of each stage of food life cycle to total energy use, food production and household consumption require the majority of energy within the food system. Figure 2 shows that energy requirements for organic diets are significantly lower than for conventional diets. The author has given no explanation concerning this phenomenon. Perhaps it is assumed that preference for organic products suggests an overall green behaviour, wherein people purchase less frozen products and consume mainly fresh foods.

Environmental impacts of various food products are also estimated by focusing on land requirements due to food consumption. Gerbens-Leenes and Nonhebel (2002) conclude that in particular the production of meat, fats and beverages (beer, wine, coffee and tea) have

higher land requirements. White (2000) uses a different approach to connect high land requirements with meat based diets. He compares the ecological footprint for vegetable and meat consumption for several regions (Africa, Asia, South and Central America, Oceania, Europe, North America) and comes to the conclusion that the ecological footprint triggered by meat consumption is higher than by vegetarian consumption.

1.3 Definition and outlook

While all the studies reviewed consider the sustainability of food consumption from a different point of view, they agree that of all stages in a food product's life cycle, agriculture production is responsible for the highest environmental impact and that this can be influenced by consumption patterns (EEA, 2005; Goodland, 1997; Massari, 2003; Taylor, 2000; OECD, 2002). The influence of packaging material (Jungbluth, 2000; Taylor, 2000) and transport are of only minor importance (Carlsson-Kanyama, 1998; Hofer, 1999; Wuppertal Institute for Climate, Environment and Energy, 1996).

As far as the environmental significance of specific food traits is concerned, the preference for domestic over imported products, open-ground produced foods to greenhouse production and organically to conventionally grown foods is less harmful to the environment (Carlsson-Kanyama, 1998; Jungbluth, 2000; Kramer et al., 1998). By focusing on specific food groups, meat is undoubtedly responsible for the highest negative ecological impact (Carlsson-Kanyama and Faist, 2001; Gerbens-Leenes and Nonhebel, 2002; Kramer et al., 1998; Tukker et al., 2005; White, 2000). Therefore, the authors propose that consumers should reduce the amount of meat in their diets, in so far as the production of vegetables requires less energy and arable land, causes less greenhouse gas emissions, are better rated by the Eco-indicator and therefore contribute less to global warming, photochemical oxidations, acidification and eutrophication. According to Carlsson-Kanyama (1998), this might differ if the vegetarian diet consists of exotic foods, which may yield much more emission than a meat based diet. Apart from meat, other foods from animal origin (dairy products, animal fats) as well as many beverages have been identified as environmentally harmful (Gerbens-Leenes and Nonhebel, 2002; Tukker et al., 2006).

One further characteristic sometimes identified is the opting for fresh foods over frozen foods (Brunner, 2005). However, the ecological significance of frozen products, especially their energy efficiency, is controversial. The author argues that long distance transports, packaging and storing in refrigerators or freezers have high energy requirements. On the other hand, highly efficient and large scale production of frozen products could contribute to a reduction in the volume of transportation, water and energy consumption and in waste

production compared to home made meals as single units. Due to these unclear composite effects, frozen foods will not be considered as a prerequisite for sustainable food consumption.

On the basis of these key results, *sustainable food consumption* can be defined as the preference for:

- foods that have a higher resource efficiency (e.g. open-ground irrigated vegetables instead of greenhouse production)
- regional instead of imported foods
- organically produced foods instead of conventionally produced foods
- lower amounts of bottled beverages and
- meatless or reduced meat diets

The remainder of this thesis is organised as follows. Section 2 analyses international food consumption trends and shows which food categories in household consumption have increased and which have declined in the last 50 years. Socio-economic and demographic factors in food consumption are also taken into account. Since the contribution of this thesis is to identify current consumption trends in Austria, the Austrian Household Budget Survey (1999/2000) is analysed across socio-economic factors and food categories. In order to compare Austrian with international patterns, the analysis starts with the investigation of food expenditures and consumed quantities by averaging across all Austrian households (Chapter 3). The socio-economic determinants (household size, age, income, educational level and labour force status) of household food consumption are covered in Chapter 4. The concluding section compares results obtained for Austria with observed international consumption patterns, evaluates identified consumption trends in Austria with respect to environmental sustainability, and gives recommendations that could bring more sustainability to food choices.

2 International food consumption patterns

In Chapter 1, the environmentally relevant food groups necessary to evaluate food consumption patterns have been identified. This section discusses international consumption patterns and summarises socio-economic differences in dietary habits.

2.1 Past, present and future trends

Past and present trends

Regarding household-specific food consumption patterns, two international papers are noteworthy. OECD (2002) outlines the trends (1960/70-1998) in its member countries related to food consumption patterns, but detailed figures are only available for four case study countries: Austria, Poland, Sweden and the US. The second important paper dealing with the topic is a report published by the European Environment Agency (EEA, 2005), which investigates the same subject (period from 1970-2002), but narrows the focus to Europe.

Both reports state clearly that the money allocated to food as a percentage of total household budget has been on the decline for the last few decades; i.e. food expenditures have been growing more slowly than household income. Actual household food expenditure as percentage of household total expenditure ranges between 10% and 20% across OECD countries (OECD, 2002). In addition, EEA (2005) indicates that the average figures are higher for New Member States (35%) than in the EU-15 with an average of 10%. This trend of declining food expenditures as a share of total household budget is widespread, as it has been verified by several other national and international studies. One example is Regmi et al. (2001), who discuss the disparities of budget spent on food in high and low income countries. They point out that high income countries spend only 16% of their expenditures on food while low income countries spend 55%. This phenomenon is also explored by Birch (2004). Although the author focuses on consumption in general in the UK, she concludes that despite income doubling between 1954 and 1994, the share of food expenditures in absolute figures remained constant.

In order to determine whether household food consumption patterns are sustainable and to what extent, it is necessary to analyse the consumption trends of consumers in food categories. As a primary example, OECD (2002) uses the following food categories: meat (poultry, pork and beef), vegetables, fruits, fats and oils, flour and cereals, soft drinks,

mineral water, sweeteners, milk, cheese and potatoes. On the basis of household expenditures on these food categories, the per capita consumption in kilograms (or litres) per year is determined for each category.⁸ Although the total energy input and total food intake differs across the four case study countries, a general trend is that meat consumption overall is on the rise, specifically pork and poultry, although beef consumption is on the decline. An increase in vegetable and fruit available in supermarkets, due both to more imports and to increasing agriculture productivity, cyclically induces a higher demand for vegetables and fruits. However, much of that increase has been in frozen vegetables; moreover, a decline in home growing took place, yielding higher sales numbers. Additional increases can be seen in flour and cereal products as a result of higher consumption of fast food, pizzas and pasta, as well as in bottled beverages including fruit juice, mineral water and carbonated soft drinks, and in sweeteners, an essential ingredient of carbonated soft drinks. As far as fats and oils are concerned, households begin use more vegetable oils and to avoid animal fats. Furthermore, a strong decline in the consumption of potatoes and dairy products is observed, with the exception of cheese which is rising (OECD, 2002).

It is generally accepted that these trends are not only valid for industrialized countries like the European Union or OECD countries, but are worldwide trends. For instance, the FAO and WHO (2003) investigate the impact of diet and nutrition on the prevention of chronic disease, based on global and regional food consumption trends between 1967-69, 1977-79, 1987-89 and 1997-1999. The authors take a somewhat different approach in determining consumption trends by using not only data on per capita food consumption (demand side) but also on per capita food availability, in particular of fats, animal products, fish and vegetables (supply side).⁹ Their key results are that (i) food consumption, expressed in kilocalories (kcal) per capita per day, has been rising both in industrialized and developing countries, (ii) the shift in diets towards more livestock products and vegetables can be recognized worldwide, (iii) the supply of vegetables per capita has increased from 1979 to 1999 by about 54% worldwide and has almost doubled in developing countries, and (iv) the per capita consumption of meat and milk in kilograms per year has risen in both developing and industrialized countries, somewhat in contradiction to the OECD results.

⁸ EEA (2005) also includes a chapter on changing food consumption in several food groups (in kilogram or litre per person per year). However, the report gives only a short and rough overview for the European Union. The food groups used are more or less the same as in the OECD report and the trends are roughly the same.

⁹ Average food available for consumption is used as an approximation for average food intake.

Future trends

When analysing the sustainability of food consumption patterns, one ought not only be interested in past and present figures, but also in future trends. For that reason, several reports contain information on the outlook for future food consumption. OECD (2002) estimates that the total household caloric intake (in kilocalories per person per day) will go up in the period through 2020: an increase of 7% (from 1995/97 levels) in meat, milk and egg products, and a 13% increase in vegetables, oils, oilseeds and related products. In particular, the FAO and WHO (2003) predicts that from 1997/1999 to 2030 per capita consumption of livestock products will rise by a further 24% (worldwide) and by 14% in industrialized countries. Poultry consumption is predicted to grow fastest. OECD (2002) also predicts an upward trend in the demand for foods that are believed to have positive health effects, especially organic foods, functional or nutrient-fortified foods and foods prepared or conserved in a particular way.

While the global demand for food is rising, Payer et al. (2000) show that locally the trend may be downward. The Austrian Case Study argue by an aging population: Due to the fact that the share of people over 60 will increase in future, the demand for food will decline, because older people have lower energy requirements.

Trends in food-related activities

In order to investigate the sustainability of food consumption patterns, analysing solely the changes in food categories is not sufficient. Food consumption related activities, such as shopping, storing, preparing and cooking should also be taken into account. Several reports (BMLFUW, 2003; EEA, 2005; OECD, 2002; Payer et al., 2000) conclude that today's household spends less time on meal preparation compared to households 40 or 50 years ago. This trend can be seen in the preference for *quick-to-prepare foods* like pre-cut and/or pre-prepared meat, fruits and vegetables, or frozen foods. In particular, the demand for frozen foods must be recognized as an important factor, because they are less time consuming, easier to store and not dependent on the season. The demand for instant meals and canned foods, however, is rather small (BMLFUW, 2003).

Another important issue is the increase in out-of-home consumption. Meals taken away from home can be divided into two groups, namely eating in communal settings (kindergartens, schools, hospitals, work canteens, barracks and jails) and gastronomic establishments (cafés, restaurants, snack bars, fast-food chains, catering services, etc.). According to BMLF (1997) the trend of out-of-home consumption is mainly driven by income, growing numbers of single households, increasing distance between working place and place of residence, and a

higher number of women in the labour force. Taking Austria as an example, the frequency as well as the share of food expenditure on out-of-home consumption is rising. According to the Consumer Survey from 2001/02 conducted by Fessel-GfK¹⁰, 43% of Austrians take their lunch outside the home (BMLFUW, 2003). Out-of-home consumption is considerable, especially for people in the labour force. 59% of the working population have their lunch either at the workplace, in communal settings or in gastronomic sites (BMLFUW, 2003). Furthermore, out-of-home consumption is more popular among younger and middle aged groups (BMLF, 1997; BMLFUW, 2003). With respect to expenditures, in 1984 21% of the total food budget was spent on out-of-home food (28% in 2000) and this figure is expected to rise. Payer et al. (2000) estimate that this share would reach 30-40% in the future. The total economic revenue of the out-of-home food market is estimated to be about 11.2 billion Euros. Gastronomic sites make up two thirds (7.4 billion Euros) and communal settings one third (3.8 billion Euros).

2.2 Socio-economic determinants of food consumption

Another approach to the examination of food consumption patterns is to focus on disparities in food habits. Instead of analysing time series data, the emphasis here is on the effects of socio-economic and demographic factors on food consumption patterns. This is a very important approach, because it helps to identify main drivers of food consumption. This field of research is relatively new, because for the most part information on dietary habits was and partly still is based on household expenditure. In the past, the availability of dietary data on an individual basis was limited and relied on independent initiatives. Today, individual based consumption data are collected by both public and private institutions. This section starts with the presentation of papers that have identified the relevant socio-economic and demographic features. Thereafter, the impact of socio-economic determinants on food consumption in general but also on specific food groups is presented.

Seven major socio-economic factors leading to food consumption disparities can be identified: age, social class (determined by income or occupation), education, gender, location of residence, ethnic affiliation and individual lifestyle (BMLFUW, 2003). According to Hayn et al. (2005)¹¹ one of the most investigated areas is age differences and the related differences in preferences for food, in particular for fast food, ready-to-serve meals and frozen products. The second most analysed factors are social class and gender disparities. In contrast, the influence of location of residence on dietary habits has not yet been

¹⁰ FESSEL-GfK (Growth from Knowledge) is a market research Institute in Austria.

¹¹ The literature research of Hayn et al. (2005) is mainly based on German literature.

investigated in detail. Only a few studies have focused on the comparison of dietary habits of different provinces or regions such as the UK National Statistics of family food consumption, which distinguishes regions in England (National Statistics, 2004). Hayn et al. (2005) point out that several German studies address dietary disparities between West and East Germany or among federal provinces. For the purpose of this thesis, food disparities caused by regional distinction are of less importance when it comes to the sustainability issue, in so far as it is assumed that regional differences predominantly depend on local agricultural production and cultural aspects. More interesting, however, is the comparison of consumption patterns between urban and non-urban residents. Major impediments to this analysis are the lack of data availability and problems in defining what is urban and what not¹². Thus, studies concerning the issue of place of residence are still lacking. Some studies investigate also different consumption habits of ethnic groups. However, it is not the focus of this work to identify different consumption habits according to ethnic affiliation, as in Austria only 9.6% of the total population are not Austrian citizens (Statistik Austria, 2006^c). This approach would be more suitable for more ethnically diverse nations like the United States.

Finally, to focus on all relevant socio-economic and demographic factors and their effects on food consumption is not feasible. Therefore, many studies select specific factors and investigate their effects on food consumption in general or on specific food categories.

Age

The exploration of age groups and their preference for several food groups is one focus of several studies surveyed. However, differences can be found mainly for food related activities like the frequency of out-of-home, fast food or frozen dinner consumption, than for food demand per se. According to Hayn et al. (2005), younger people more often make use of ready-to-serve meals and fast food than the elderly, whereas the use of frozen foods is largely independent of age. At the same time, the elderly pay more attention to health in their diets and usually have more knowledge about nutrition than the young. Middle-age people are interested in food that can be quickly prepared, whereas children are only interested in taste and have no awareness of health-related issues (Hayn et al., 2005).

Income

The fact that lower income households on the one hand respond mainly to price and on the other hand prefer filling food such as noodles, potatoes, bread and rolls is confirmed by

¹² Furthermore, such approaches should also distinguish between people living in non-urban areas but working in the city and people who live and work in non-urban areas.

several studies (Hayn et al., 2005; Trichopoulou et al., 2002). Fast food consumption, however, is more or less independent of income (Hayn et al., 2005).

Education

The influence of the educational level on food consumption in several European countries is the focus of Trichopoulou et al. (2002). By using data from the national household budget surveys, they estimate the daily average food availability in grammes or millilitres per capita. Due to lacking information on the educational level of the head of the household for several European countries, they concentrate their analysis on Greece, Norway, Portugal and Italy. Greek and Norwegian households show a connection between higher educational levels and lower consumption of cereals, meat products, fish, potatoes and legumes, but a higher consumption of low fat milk, fresh fruits, vegetable oils and animal lipids. Only in Portugal meat consumption increases with educational level, whereas in Italy an overall lowering of consumption of all food items could be observed in those with more education. The authors claim that this trend can be explained by the fact that more educated households tend to adopt healthier lifestyles. While agreeing that also other factors like income, age and gender have significant effects on peoples' diet, the educational level is seen as the strongest determinant, because education is a precondition for the understanding of health and environmental related information.

The influence of the educational level, especially on the consumption of fruits and vegetables, in several European countries is investigated by Irala-Estevez et al. (2000) and Roos et al. (2001). Both reports cite the difficulty in analysing individual food consumption patterns, because most of the data is based on household budget surveys but does not connect the food habits of individuals to their socio-economic characteristics. The observed time period is nearly the same for both reports, 1985-1999 for Irala-Estevez et al. (2000) and 1985-1997 for Roos et al. (2001). Irala-Estevez et al. (2000) observe a positive correlation between a higher level of education and a greater consumption of both fruits and vegetables in Belgium, Denmark, Estonia, Finland, Germany, Lithuania, Norway, Spain, Sweden and UK. Roos et al. (2001) come to different results: while a higher educational level can lead to higher amounts of vegetable and fruit consumption in Western, Central and Northern Europe the opposite tendency is found in Southern and Eastern Europe. However, the absolute level of fruit and vegetable consumption is still higher in Southern and Eastern Europe than in the rest of Europe. Therefore, the study concludes that inverse trends of fruit and vegetable consumption with rising educational level is found especially in regions where consumption of those foods is more common and builds an essential part of the traditional diet.

Gender

Gender and food consumption disparities are quite well investigated but straightforward: women consume more vegetable, fruits and cheese, whereas men's diets are more concentrated on meat (Hayn et al., 2005; BMLFUW, 2003; OECD, 2002; Payer et al., 2000).

Combining determinants

One of the studies that focus on more than one socio-economic determinant is the study by Gossard and York (2003). Due to the general consent that meat production leads to extensive environmental problems, they explore the effects of education, age, social class, race, gender and location of residence on meat consumption in the US. Similar to the above mentioned studies, the authors come to the conclusion that men consume more meat, beef in particular, than women. Higher educational level, age and social status result in less meat intake. Income, however, has no influence on total meat consumption, but only on the consumption of beef. The higher the income the higher is the level of beef consumed.

2.3 The central drivers of food consumption

The literature survey in Section 2.1 on household food consumption has shown several key results: firstly, household budget spent on food has been declining, especially in high income countries, whereas the share of the food budget spent on out-of-home consumption has increased (OECD, 2002; Regmi et al., 2001). In particular, people in the labour force show high expenditures on out-of-home consumption (Payer et al., 2000). Secondly, dietary habits worldwide are shifting to more vegetables, fruits, meat (especially pork and poultry) and bottled beverages, with a decline in potato and dairy product consumption, with the exception of cheese which is rising (EEA, 2005; FAO and WHO, 2003; OECD, 2002). As far as fats and oils are concerned, households begin use more vegetable oils and to avoid animal fats (OECD, 2002). In industrialized countries the convenience factor influences peoples' diet significantly and results in a higher demand for *quick-to-prepare foods* (BMLFUW, 2003; EEA, 2005; OECD, 2002; Payer et al., 2000).

As far as socio-economic differences in food consumption are concerned, four findings could be made from the literature research in Section 2.2. Concerning age, it can be stated that middle-aged people are more interested in food that can be quickly prepared and eat out-of-home more often, whereas the elderly pay more attention to healthy food and generally have more knowledge of nutrition (BMLF, 1997; BMLFUW, 2003; Hayn et al., 2005). In addition, Gossard and York (2003) argue that higher age results in less meat intake. Gender accounts for a higher intake of vegetables, fruits and cheese by women, whereas men's diets are more concentrated on meat (BMLFUW, 2003; Gossard and York, 2003; Hayn et al., 2005; OECD

2002; Payer et al., 2000). As the influence of gender shows less significant results, differentiation in food consumption between men and women are not investigated further. The impact of higher educational level is a reduction in the consumption of meat, potatoes and cereals but a higher intake of fruits and vegetables (Gossard and York, 2003; Irala-Estevez et al., 2000; Trichopoulou et al., 2002). Analysis with regard to income shows that low income households respond mainly to price but also seek filling foods (Hayn et al., 2005; Trichopoulou et al., 2002). Furthermore, income has no influence on total meat consumption overall but only on the consumption of beef (Gossard and York, 2003).

On the basis of these key results, the primary focus of Chapters 3 and 4 is to analyse Austrian consumption patterns, to investigate the validity of the conclusions noted above for Austria and, if possible, to come up with new findings.

3 Patterns of Austrian household food consumption

3.1 An overview of nutrition related literature in Austria

While the empirical part of this thesis uses the data on consumption quantities and expenditures provided by the Austrian Household Budget Survey 1999/2000 [discussed in more detail in Section 3.2], some sources are available containing nutrition data for Austria. These will be briefly reviewed here.

Since 1947, the Bureau of Statistics commissioned by the Austrian Federal Ministry of Agriculture and Forestry has recorded data on food consumption, derived from agricultural production and foreign trade statistics which were available in terms of *nutrition balance sheets*. After Austria's EU accession in 1995, the entire statistical system of nutrition data sampling was reorganised and adjusted to the European system in order to make possible international comparisons. Consequently, nutrition balance sheets were replaced by *food supply sheets*, which describe the quantity and utilisation of agricultural products (including foods from home-production) and translate them into consumption data. Because of this change in data sampling methods, interpretation of developments in food consumption before 1995 differs from interpretation from 1995 onwards.

Agriculture and production statistics (presented in nutrition balance and food supply sheets), however, collect data with respect to food supply (production, stock in inventory, food imports and exports), which does not reflect actual food intake. In order to provide realistic figures, differences between food consumption and food intake were estimated by using food-group specific correction factors. Those correction factors take into account losses due to spoilage, processing in the kitchen, leftovers and pet feeding. Furthermore, the data compilation only notes changes in food supply over time in order to compare it with international trends, but provides no information concerning food-related activities or socio-economic differences in food consumption (gender, age, location of residence, educational level, income, etc.) (Department of Nutritional Science of the University of Vienna, 1998).

In Austria, two periodical publications offer, apart from consumption data, information on food-related activities and socio-economic differences: the *Austrian Nutrition Report (Ernährungsbericht)* and the *Austrian Food Report (Lebensmittelbericht)*. The former was first published in 1998 by the Department of Nutritional Science of the University of Vienna, the second report followed in 2003. The main focus of the publication is to report on the nutritional state of different population groups in Austria (children and adolescents, adults,

elderly people, pregnant women), the aspects of food quality and safety and at last on the association between nutrition and certain chronic diseases (Department of Nutritional Science of the University of Vienna, 1998; Department of Nutritional Science of the University of Vienna, 2003). The *Food Report* is a periodical report, which is published every five year, started in 1997, by the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management. The report monitors current trends and observes changes in both, the food sector (agricultural production, processing, distribution) and consumption patterns (consumption data in quantities). Furthermore, it contains also information concerning food related activities, out-of-home consumption and socio-economic disparities in food consumption (BMLF, 1997; BMLFUW, 2003).

Finally, private market research done by institutes like Fessel-GfK (e.g. *Österreichische Ernährungsstudie 2002, Food Trends 2001*) in Vienna or the international AC-Nielsen institute (e.g. *Gastronomie-Studie 1996*), offer nutrition related investigations.

3.2 The Austrian Household Budget Survey

The Austrian Household Budget Survey contains a collection of data concerning total household income and expenditures of private households. The first survey in Austria was conducted 1954/1955 and contained 4039 households. The inquiry was repeated at intervals of ten years (1964, 1974/75, 1984/85, 1993/94) before 1999/2000, and has been conducted at intervals of five years thereafter. At the time when this thesis was written, results of the Household Budget Survey from 2004/05 were not available yet. All results reported below refer to the 1999/2000 survey.

The survey from 1999/2000 is based on 7098 interviewed households, whereby each household included represents a given number of households in the Austrian population. The translation of sample households into the total number of households (3,241,303) is known as weighting. Several factors are involved in determining the weight for each household like the federal district and the level of urbanisation of the place of residence, type of household, the labour force status and social status of the household head, as well as the age and gender of household members.

The survey period was from 1st of November 1999 to 29th of October 2000, which eliminated seasonal influences (such as expenditures on heating) and included one-time expenditures like holidays (Statistik Austria, 2001).

Data availability and classification

The 1999/2000 survey comprises the expenditure figures (in ATS) of private households according to the COICOP¹³ nomenclature (version from 1997) as prepared by the OECD after consultation with Eurostat, UNSD¹⁴ and National Statistical Agencies of its member countries (European Commission and Eurostat, 2006). This nomenclature refers to a recognized international list of classifications which groups individual (or household) consumption expenditures by purpose:

- foods and non-alcoholic beverages
- alcoholic beverages and tobacco
- clothing and footwear
- housing, water, electricity, gas, and other fuels
- furnishings, household equipment and routine maintenance of the house
- health
- transport
- communication
- recreation and culture
- education
- restaurants and hotels
- miscellaneous goods and services

Apart from expenditures, quantities consumed (in kilograms, litres or units) are available for the category of foods and beverages, both alcoholic and non-alcoholic. In addition to absolute household expenditure figures, the Austrian Household Budget Survey has also assigned each household an equivalence figure that enables the computation of equivalence expenditures. Equivalence expenditures are expenditures corrected for the size of the household and age of its members in order to make different household compositions comparable. A detailed description of this method can be found in Section 4.2.

Furthermore, the consumption survey collects information with regard to socio-economic and demographic characteristics of the household and the household head¹⁵. The following socio-economic and demographic characteristics are collected, where attributes from 1-4 and 12-14 refer to the entire household and 5-11 only to the household head (Statistik Austria, 2004):

¹³ Classification Of Individual Consumption by Purpose

¹⁴ United Nations Statistics Division (UNSD)

¹⁵ Statistik Austria (2004) defines the household head as the household member that contributes most to total household net income.

- (1) total household expenditures
- (2) total household net income
- (3) household size
- (4) number of children living in the household
- (5) age
- (6) educational level
- (7) labour force status
- (8) current participation in working life
- (9) sector of economic activity
- (10) labour time
- (11) sex
- (12) federal district
- (13) living space in square meters
- (14) population density

As the aim of this thesis is to find socio-economic and demographic differences in food expenditures and consumed quantities, this evaluation has taken the following characteristics into account: total household expenditures and net income, household size, age, educational level, labour force status and current participation in working life.

COICOP classification of the category foods and non-alcoholic beverages and restaurants and hotels

In this thesis data on the COICOP group **foods and non-alcoholic beverages** and food expenditures in **restaurants and hotels** will be analysed. Therefore, it is important to know about the sub-categorisation according to COICOP.

The category of **foods** consists of nine subcategories:

- bread and cereals
- vegetables
- fruits
- meat
- fish
- milk, cheese and eggs
- oils and fats
- candies and sweets
- other foods

The category of **non-alcoholic beverages** is divided into two groups:

- coffee, tea and cacao
- mineral water, soft drinks and juices

In order to understand which food products belong to which category, a short review is given for each sub-category. The following description is based on the official COICOP description offered by Eurostat (European Commission and Eurostat, 2006) and the Standard-Documentation of the Austrian Household Budget Survey from 1999/2000 (Statistik Austria, 2004).

The category *bread and cereals* is defined as rice, bakery products (different kinds of white or brown bread, rusk, crisp bread, rolls, cones, muffins, croissants, biscuits, cakes, tarts, crumpets, waffles, pies, quiches, etc.), different kinds of flour, pasta, pastry and other cereal products with maize, wheat, barley, oat, rye, etc. (including corn flakes, oat flakes, etc., malt, and starches).

The category *vegetables* is classified into fresh vegetables like leaf vegetables and herbs (salad, endive, etc.), brassicas (e.g. cauliflower), fruiting and flowering vegetables (tomatoes, sweet pepper, etc.), root vegetables (carrots, onions, radishes, etc.), potatoes and other tuber vegetables (manioc, sweet potatoes), and products from tuber vegetables (flours, flakes, purees, chips, etc.). Moreover, dried, preserved or frozen vegetables are included. Vegetable juices (included with non-alcoholic beverages), culinary herbs (parsley, rosemary, thyme, etc.) and spices (pepper, pimento, ginger, etc.), potato starch, soups, broths and stocks containing vegetables are excluded and belong to the category *other foods*.

The next food group, *fruits*, consists of fresh fruits (citrus fruits, banana, apple, pear, stone fruits, soft fruits and other fruits) and dried, preserved or frozen fruits. However, it does not include jams, marmalades, compotes, jellies, fruit purees and pastes (including those used in candies and sweets), fruit juices or syrups (which are included in non-alcoholic beverages).

Another large category is *meat*. It includes fresh or frozen meat from beef or veal, pork, poultry (chicken, duck, goose, turkey), sheep or goat, other meat (e.g. horse, camel, donkey, rabbit, game), different kinds of minced meat, edible offal and dried, salted or smoked meat (sausages, salami, bacon, ham, etc.). The sub-group of conserved or preserved meat refers to canned meat, meat extracts, meat juices or meat pies. The following products which are derivatives of meat are not included in this group: edible animal fats (belonging to *fats and oils*), soups, broths and stocks containing meat (in *other foods*).

Fish (and seafood) is a separate category. This group distinguishes fresh or frozen from smoked or dried and preserved or processed fish and seafood (crustaceans including land crabs, molluscs and other shellfish, land and sea snails, frogs). Again soups, broths and stocks containing fish are excluded.

The next class, *milk products and eggs*, is made up of raw, pasteurised, sterilised, condensed, evaporated or powdered milk, but excludes butter (included with *oils and fats*). Moreover, the term milk products summarises not only cheese, curd, yogurt, and other milk-based products like cream, milk-based desserts or beverages but also dairy products not based on milk such as soy milk.

The group *fats and oils* takes account of animal fats (butter, butter products and other edible animal fats like lard), vegetable fats (margarine, peanut butter), and other edible oils (olive oil, corn oil, sunflower-seed oil, cotton-seed oil, soybean oil, walnut oil, etc.).

The category *candies and sweets* consists of a large variety of sweet foodstuff: sugar (powered, crystallised or in lumps) and sweeteners (artificial sugar substitutes), honey, jam and marmalade (including compotes, jellies, fruit purees), chocolate, sweets (chewing gum, sweets, toffees, pastilles), ice cream and other confectionery products.

The last food category, *other foods*, is divided into seven subcategories, beginning with sauces (inclusive mustard, mayonnaise, ketchup, soy sauce, etc.), vinegar and culinary herbs (parsley, rosemary, thyme, etc.), salt and spices (pepper, ginger, etc.), culinary ingredients and soups (inclusive broth and stocks). It also contains frozen or chilled ready-to-eat-meals, other preserved convenience foods and baby food irrespective of its composition.

The non-alcoholic beverage category of *coffee, tea and cacao* includes coffee, whether decaffeinated or not (including instant coffee), tea, maté and other plant products for infusions and cacao (including chocolate-based powder). The group *mineral water, soft drinks and juices* encompasses mineral or spring water sold in containers, soft drinks such as sodas, lemonades and colas, fruit and vegetable juices (including syrups and concentrates for the preparation of beverages). Non-alcoholic beverages which are usually alcoholic such as non-alcoholic beer are generally excluded.

The COICOP category for **restaurants and hotels** (called **out-of-home consumption**¹⁶ within this thesis) refers to food that is prepared outside the home but is to be eaten at home (take-away and delivery services) and to food that is prepared and consumed away from home. According to the international classification, three categories are distinguished: *gastronomic sites*, *communal settings* and *hotels*. The first term summarises eating in cafés, bars, restaurants and fast food chains (including take-away and delivery services). *Communal settings* refer to eating in canteens of private (e.g. enterprises, firms) or public institutions (e.g. kindergartens, schools, hospitals, jails, etc.) on the one hand, and meals on

¹⁶ In the following chapters, the term out-of-home consumption excludes expenditures in hotels.

wheels on the other¹⁷. The last term, *hotels*, accounts for expenditure figures spent on staying and eating in *hotels* or similar accommodations. Concerning out-of-home consumption, the Austrian Household Budget Survey gives only information about monthly expenditures but does not specify amounts or kind of meals consumed. In other words, the reader is not able to relate whether high expenditure figures on out-of-home consumption result from a higher frequency of eating out or from a higher quality of consumed meals.

3.3 Analysing food consumption patterns

Based on the original data sets provided by Statistik Austria, a consistent data set was created, linking expenditures, quantities consumed and socio-economic characteristics of the sample households. All types of statistical analysis (grouping variables into class intervals, frequency analysis, measures of central tendency, correlation and regression analysis) were conducted in SPSS 13.0, the figures had to be transformed from ATS into Euro (EUR-ATS). Results are presented in tables and figures in the corresponding sections.

In this section, a detailed description of household food expenditures (on out-of-home consumption and in-home consumption) and on consumed food and beverage quantities (purchased for consumption at home) by an average Austrian household is given. The average Austrian household is characterised by two household members with 0.5 children and a 50-year-old household head. The annual net household income is € 28,754 and total monthly household expenditures are about € 2,437.

Before focusing on food-related expenditures, a short overview of the allocation of € 2,437 across COICOP expenditure categories is given (Figure 3). The highest share of total household budget is spent on housing, water, electricity, gas and other fuels (24%), followed by transport which constitutes a share of 15%. In line with the trend of declining household expenditures on nutrition in high income countries (OECD, 2002), Austrians spend a rather low percentage of their total household budget on foods and beverages (13%). By including expenditures on eating in hotels or restaurants (out-of-home consumption expenditures), the share rises by 6% to 19%. The category of recreation and culture is in the fourth position, with 12%. Expenditures on clothing and footwear and on furnishings, household equipment and routine maintenance of the house each account for 7%. The category miscellaneous goods and services, at 9%, summarises expenditures on body care, personal spending on luxury goods (jewellery, handbags, etc.), on social services such as child care or on

¹⁷ The project *meals on wheels* refers to home delivery services for homebound, frail or disabled people, who are unable to purchase and prepare foods on themselves. The participation of numerous volunteers and the preparation of larger quantities make it affordable even for low income households.

insurance services. The remaining categories (alcoholic beverages and tobacco, health, communication and education) contribute between 3% and 0.3% to total household expenditures.

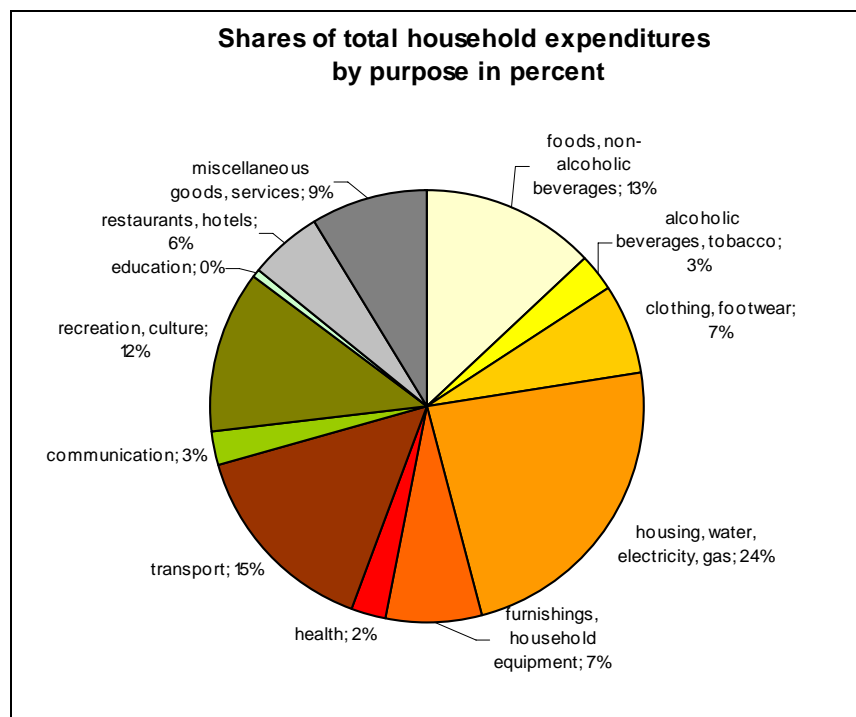


Figure 3: Shares of total household expenditures by purpose (COICOP categories) in percent

Source: Data from STAT, 2001

3.3.1 Expenditures on foods, beverages and out-of-home consumption

The total household food budget, which is defined as expenditures on the aggregate of foods, beverages (purchased for consumption at home) and out-of-home consumption, in an average Austrian household amounts to € 452 monthly. € 321 of it (70% of total food budget) is spent on foods (€ 289) and beverages (€ 32). Details about household expenditures on eating out are discussed at the end of this section.

While the detailed allocation of € 321 spent on different food and beverage categories is compared with consumed quantities in the following section (3.3.2), this section is limited to a general overview of relative household expenditures (Figure 4) in the main food and beverage categories.

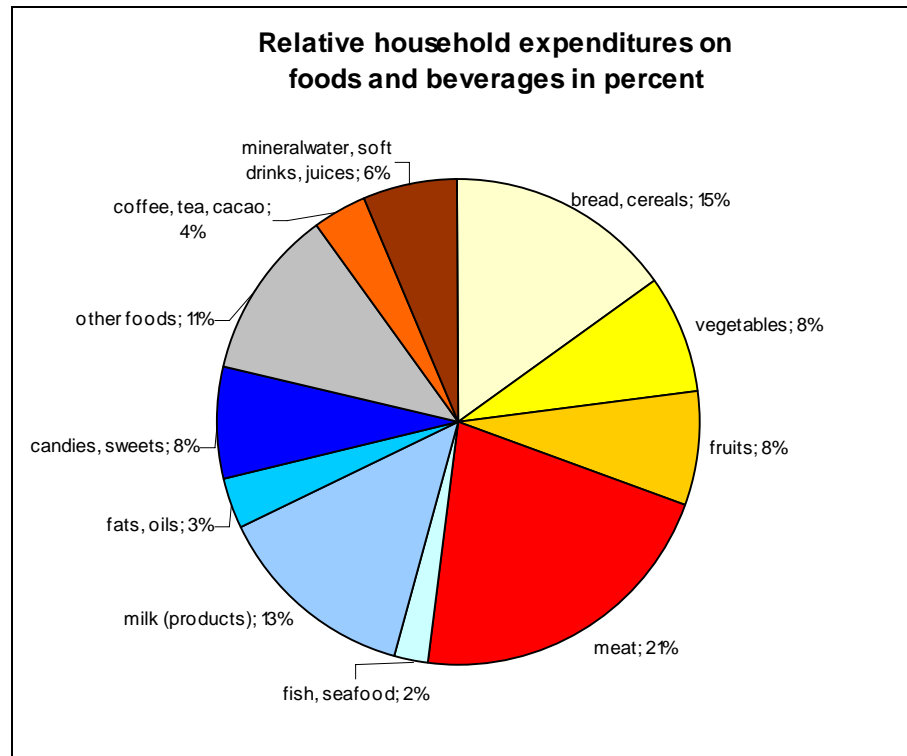


Figure 4: Relative household expenditures on foods and beverages purchased for consumption at home (COICOP categories) in percent

Source: raw data from Statistik Austria, 2002; own calculation

About one fifth of total household expenditures on the aggregate of foods and beverages is attributable to meat expenditures (22% or € 70). Bread and cereals account for 15% (€ 49), milk and milk products for 13% (€ 43), whereas expenditures on fruits and vegetables each constitute a share of 8% (€ 24 and € 25, respectively). Relative expenditures on candies and sweets (8% or € 25) are as high as on vegetables or fruits. The category other foods (explained in Section 3.2) contributes 12% (€ 37) to the total household expenditures on foods and beverages. Lowest relative figures are seen in the categories of fish (2% or € 7), and fats and oils (3% or € 11). Considering non-alcoholic beverages, households allocate a share of 4% on coffee, tea and cacao (€ 12), 6% on mineral water, soft drinks and juices (€ 20). Within the category of hot drinks, coffee (3%) seems to be the most favoured beverage, whereas cacao (0.2%) and tea (0.7%) play only a minor role. Looking at the numbers for bottled beverages, we find mineral water, soft drinks and fruit juices each contribute 2%, and vegetable juices only 0.1%.

It should be noted that high (or low) expenditure figures are not necessarily associated with high (or low) quantities consumed. In general, the author points to two factors that determine expenditure figures: the consumed quantity and the price per unit. The price itself is then determined by food item (meat is more expensive than a comparative amount of bread and cereals) and quality (foods from organic farming are usually higher priced than conventionally

produced food items). A detailed comparison of consumption and expenditure figures is given more attention in Section 3.2.2.

So far, the analysis has concentrated on foods and beverages purchased for preparation and eating at home. Next, the focus turns to out-of-home consumption. Payer et al. (2000) and BMLFUW (2003) already stressed the importance (in terms of expenditure figures) of this sector. Indeed calculations come to the conclusion that a typical Austrian household spends € 131 (30% of total food budget) monthly on eating out-of-home. Restaurants, cafés and bars are, according to expenditure figures, the most prevalent: 77% (€ 104) of total household expenditures on out-of-home consumption is spent on this category. Apart from restaurants, cafés and bars as well as eating in fast food chains and canteens seem to be quite popular in Austria (8% or € 11 for each category). Expenditures on meals on wheels are very low and contribute only with 1% (€ 2). The remaining 2% (€ 3) is not defined by households.

3.3.2 Comparing consumed quantities with expenditures for selected categories

In order to compare international food consumption trends, discussed in Section 2.1, with Austrian patterns, it is necessary to focus on different food and beverage categories. This section covers the allocation of the € 321 spent on single foods and beverages in more detail. Expenditure figures are compared with quantities consumed on a monthly basis.

Bread and cereals: rice, bread, flour, pasta, other bakery products, other cereal products and pastry

The consumption of **rice, bread, flour and pasta** amounts to 12 kg monthly. Within this category, bread accounts for more than 50% (7 kg). Especially brown bread seems to be favoured by Austrians who consume 5 kg of it monthly as opposed to 2 kg of white bread. In this context, the preference for brown bread could reflect deep-rooted Austrian consumption habits on the one hand, and a continuing trend toward greater health awareness on the other hand. The consumption of rice is, compared to other cereal products, of only minor importance (1 kg). The quantity of pasta is similar low: 1 kg per month. Average monthly flour consumption, in contrast, makes up about 3 kg.

The quantities consumed of rice, bread, flour and pasta are translated into expenditures as follows: in general, Austrian households spend monthly € 21 on those food items, whereby most of the money (€ 15) is spent on bread, especially on brown bread. Expenditures on rice and pasta (€ 2 and € 3, respectively) are similarly low. For flour, it should be noted that although household consumption is twice that of pasta, expenditure figures for both categories do not differ significantly from each other: € 2 flour and € 3 for pasta. The reason

for this disparity is probably the price effect: one kilogram of flour is cheaper than one kilogram of pasta products.

Whereas expenditure figures are available for all food groups, some categories lack information on consumption data (kilograms, litres). Within the category of bread and cereals, this is the case for the subcategories of **other bakery products, other cereal products and pastry**. Expenditures on *other bakery products* (€ 16), which refer to rolls, cones, biscuits, cakes, tarts, etc., are slightly higher than that on bread. The unaccounted-for € 11 is spent on pastry (€ 8) and other cereal products (€ 3).

Vegetables: fresh, dried, preserved and frozen

An average Austrian household consumes 14 kg of **fresh vegetables** per month, which accounts for € 18. Figure 5 demonstrates how households spend their income on different fresh vegetable categories and compares it with corresponding quantities. Despite declining potato consumption in developed countries for 50 years, discussed in Section 2.1, potatoes still amount to 46% (7 kg) of total fresh vegetable consumption. Other important consumption categories in terms of consumed quantities are fruiting and flowering vegetables (22% or 3 kg), followed by root (14% or 2 kg) and leaf vegetables (11% or 2 kg). The category of brassicas has the lowest share of total fresh vegetable consumption (6% or 1 kg).

By comparing consumed quantities with expenditure figures, it is evident that potatoes play only a minor role in total vegetable expenditures (19% or € 4) due to the low price. In contrast, expenditures on fruiting and flowering vegetables (€ 6) and leaf vegetables and herbs (€ 4) account for more than 50% of total household expenditures on fresh vegetables. Similarly, expenditures on brassicas (€ 2) and root vegetables (€ 3) are slightly higher than relative consumption figures.

For the category of **dried, preserved and frozen vegetables**, only expenditure figures are available. Expenditures on this category (€ 5) are less than a quarter than on fresh vegetables, whereas the majority (€ 4.8) is spent on the aggregate of preserved and frozen products.

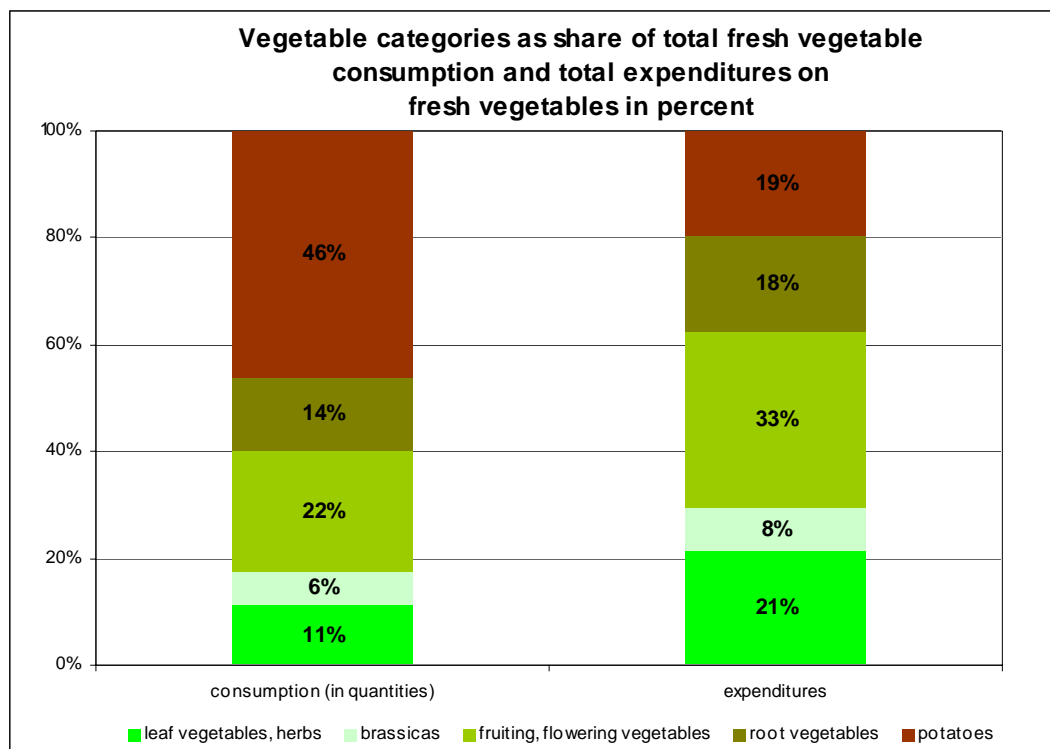


Figure 5: Vegetable categories as share of total fresh vegetable consumption (in quantities) and total expenditures on fresh vegetables in percent

Source: raw data from Statistik Austria, 2002; own calculation

Fruits: fresh, dried, preserved and frozen

Total household **fresh fruit** consumption by quantity is slightly lower and total fresh fruit expenditures are slightly higher than that of vegetables: 13 kg or € 21. By focusing on consumed quantities of fresh fruits, apples account for 37% (5 kg), followed by citrus fruits and bananas, which contribute each with 16% (2 kg). All three categories together represent a share of 69% of total fresh fruit consumption (in quantities), but only 52% of total expenditures on fresh fruits (Figure 6). The category of soft and stone fruits is a different picture: household consumption in quantities accounts for 22% (3 kg) but expenditures are 35% (€ 7) of total fresh fruit expenditures.

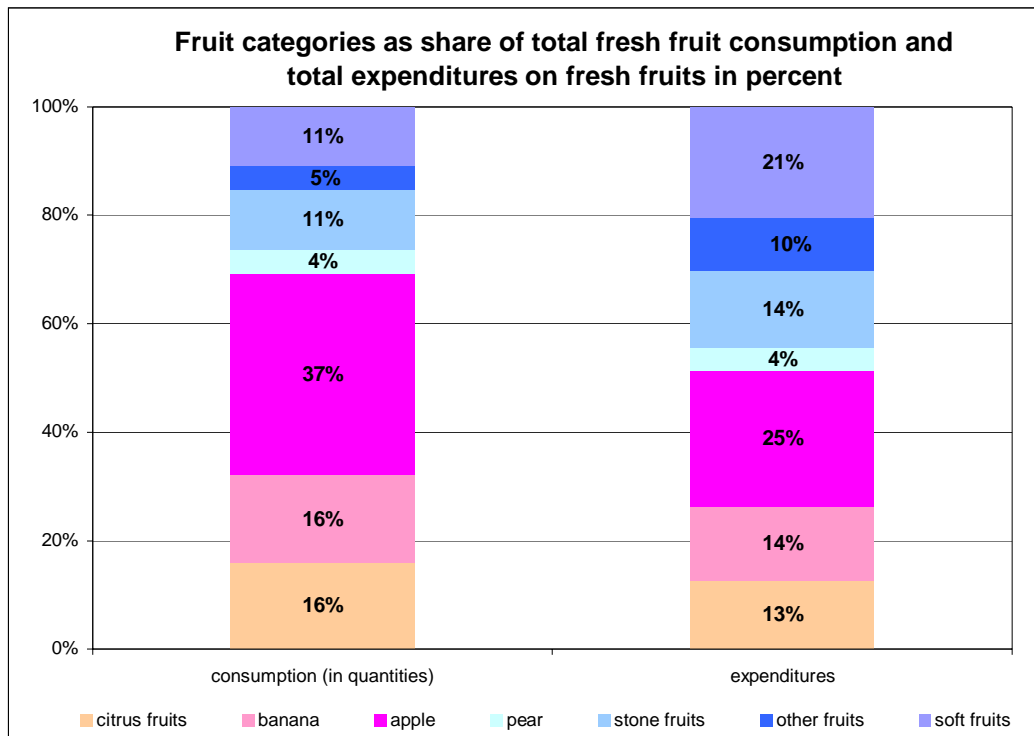


Figure 6: Fruit categories as share of total fresh fruit consumption (in quantities) and total expenditures on fresh fruits in percent

Source: raw data from Statistik Austria, 2002; own calculation

As it is the case with dried, preserved and frozen vegetables, numerous households have not indicated consumption data with regard to **dried, preserved and frozen fruits**, but only expenditure figures. Expenditures on this category (€ 3) are less than a tenth of those on fresh fruits. By taking a closer look on the category of dried, preserved and frozen fruits, it is evident that, in terms of expenditure figures, dried fruits (€ 2) are preferred to preserved or frozen ones (€ 0.6)

Meat: fresh, frozen, preserved and conserved

Total **fresh or frozen meat** consumption in quantities and expenditures by an average Austrian household amounts to 10 kg or € 66 monthly. Relative consumption of and expenditures on selected fresh and frozen meat categories are depicted in Figure 7.

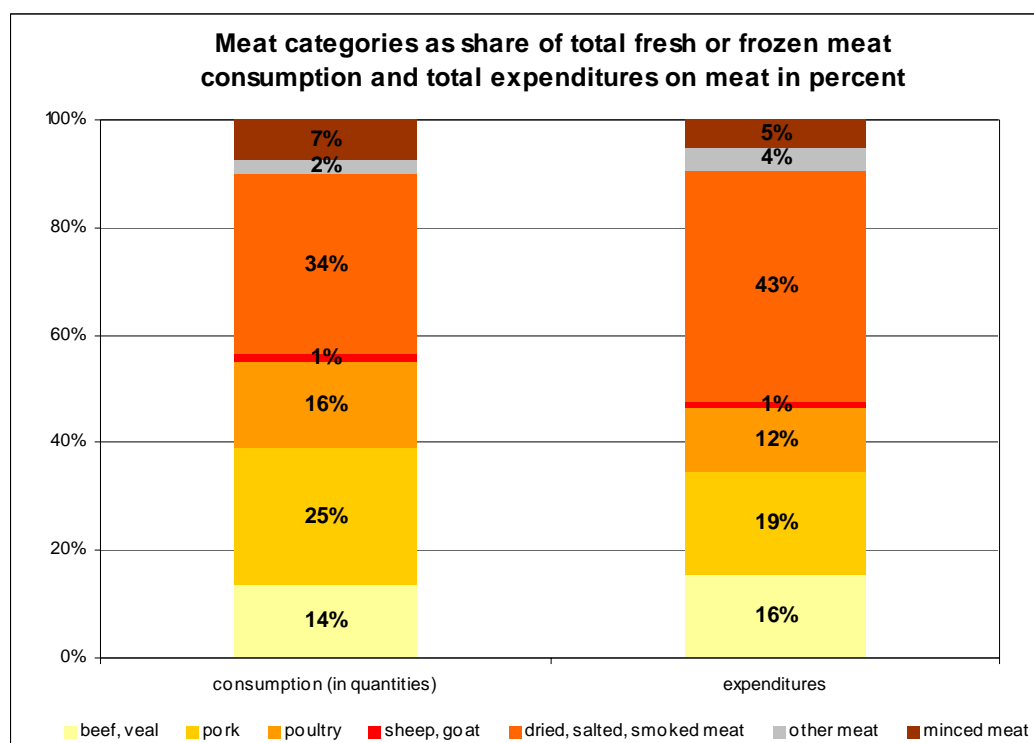


Figure 7: Meat categories as share of total fresh or frozen meat consumption (in quantities) and total expenditures on meat in percent

Source: raw data from Statistik Austria, 2002; own calculation

A typical Austrian household allocates a share of 43% (€ 29) of total expenditures on fresh or frozen meat to the group which includes dried, salted or smoked meat, which is equivalent to 34% (3 kg) of total (fresh or frozen) meat consumption. The high consumption figures for this category can be indications for a decrease in hot meal preparation in Austrian households, and an increase in snack consumption. By considering single meat categories, pork consumption dominates the menu of an average Austrian household. At 3 kg it accounts for one quarter of total fresh or frozen meat consumption (in quantities). The second most preferred meat category is poultry (16% or 2 kg) followed by beef and veal (14% or 1 kg). Figures for relative meat expenditures are moderately lower for pork (19% or € 13), poultry (12% or € 8) and minced meat (5% or € 4), but slightly higher for beef and veal (16% or € 10) than the relative consumption figures for the same food items due to the fact that prices per unit of purchased meat of the first three mentioned categories are cheaper than for beef and veal. Total sheep or goat consumption in quantities and expenditures (0.1 kg or € 1) is, as a matter of traditional Austrian dietary habits, of minor importance. The last category which should be mentioned is the category other meat, which encompasses meat from other animals (rabbit, game, horse, etc.) and edible offal. On average, Austrian households allocate a share of 4% (or € 3) of total fresh or frozen meat expenditures on this category. Consumption figures are slightly lower at 2% (0.2 kg), which is attributable to the price effect: game meat is often more expensive relative to pork or poultry.

The category of **preserved or conserved meat** (canned meat, spread, etc.), which is not included in Figure 7 as it lacks of adequate consumption data, has very low figures. On average € 3 is spent on this category monthly.

Consumed quantities of the following categories are indicated in different units (kilograms, litres, units) so they cannot be consolidated into main categories: fish, yogurt, cheese, curd, fats, coffee, cacao, tea, eggs, milk, candies and sweets. Therefore, they are treated as single categories. Absolute expenditures are directly compared with consumed quantities, however shares are not available.

Fish: fresh, frozen, dried, smoked, preserved and processed

In contrast to meat, fish and seafood seem to be not so important in the Austrian diet. On average, Austrian households consume monthly 0.7 kg of **fresh, frozen, dried or smoked fish and seafood**, which is 15 times less than that of meat consumption. Expenditures on the same group amount to € 7 which is one tenth that spent on meat. The category of **preserved and processed fish products** does not offer representative consumption figures. Expenditure figures, however, indicate that preserved and processed fish and seafood products are of minor importance (€ 0.6).

Yogurt, cheese, curd, fats, coffee, cacao and tea, eggs and milk

The remaining food categories considered in the analysis are yogurt, cheese and curd, animal and vegetable fats, coffee, cacao and tea, eggs and milk. **Yogurt** consumption (3 kg) is slightly higher than that of **cheese and curd** (2 kg), whereas expenditures on the category cheese and curd are two times higher than those on yogurt, € 14 versus € 7. Again the price effect plays a decisive role. Similar effects can be observed with animal and vegetable **fats**. By considering consumption figures, animal fats (0.9 kg) exceed vegetable fats (0.7 kg) only by 0.2 kg, whereas expenditures on animal fats are two times higher than that on vegetable fats, € 4 versus € 2, respectively. Household expenditures on **coffee and cacao** amount to € 9 monthly or 2 kg. Monthly expenditures on tea are € 2; consumption figures are missing. **Milk** consumption is indicated in litres per month. An average Austrian household consumes 14 litres (or € 11) of milk monthly, which confirms the trend to decreasing milk consumption mentioned by the OECD study (2002). **Egg** consumption is registered in numbers of eggs consumed each month. Households spend on average € 6 monthly on eggs, which is equivalent to around 37 units.

Candies and sweets

Within the category of candies and sweets, consumption and expenditure values are only available for the group of **candies** (sugar, sweetener, jam and honey), which show according to consumed quantities the fifth highest numbers (5 kg). Sugar and sweeteners amount to 4 kg, whereas jam and honey show very low quantities, only 1 kg. Expenditures on sugar and sweeteners on the one hand, and jam and honey on the other hand, contribute € 3 each. Consumption data for **sweets** like chocolate, ice cream and other confectionery goods are missing. Total expenditures on sweets amount to € 18 per month, which is only slightly lower than that on fresh vegetables or fruits. € 7 is spent on chocolate, € 6 on sweets, € 5 on ice cream and the remaining € 1 on other confectionery goods.

Other food groups

The category **other foods** is comprised of food items for which the vast majority of households have not indicated any consumption data. Households spend around € 37 monthly on this category, with the majority (€ 20) spent on food items that were not specified by households. Contrary to expectations, expenditures on convenience foods like frozen or chilled ready-to-eat meals or other preserved convenience foods (instant, canned) are rather low at € 6 per month. The remaining € 9 are spent on the aggregate of condiments used for flavouring meals during or after preparation like sauces, vinegar, spices, other culinary ingredients and on baby food.

Bottled beverages: mineral water, soft drinks and juices

On average, an Austrian household purchases 29 litres of mineral water, soft drinks and juices, which amounts to € 20. In terms of consumed quantities, mineral water shows the highest figures (14 litres). Second are soft drinks (9 litres), followed by fruit juices (6 litres). In terms of expenditures, mineral water accounts € 5 of total expenditures on bottled beverages, whereas soft drinks and fruit juices contribute € 8 and € 7, respectively. This fact can be explained by the lower price of mineral water compared to soft drinks or fruit juices. Vegetable juices seem to be less popular: this category shows the lowest consumption (0.1 litre) and expenditure (€ 0.3) figures.

4 Socio-economic determinants of food consumption

4.1 Household food expenditures

Chapter 3 dealt with average total household expenditures on and consumption of foods and beverages (in quantities), and gave an overview of expenditures on out-of-home consumption. While this analysis showed the general trends, we will now investigate the consumption differences across household groups. Thus this chapter focuses on socio-economic determinants of (monthly) household expenditure figures (Section 4.1) and consumed quantities (Section 4.2). The following socio-economic and demographic characteristics will be analysed:

- household size (persons)
- age of the household head
- total household net income
- educational level of the household head
- labour force status of the head of household

4.1.1 Household size

It is generally acknowledged that the household size is the determining factor for household food consumption because needs for nutrition increase with each additional member. In order to investigate the influence of household size on food expenditures, households are grouped according to the number of household members. The household size of surveyed households ranges from single-person households to twelve-person households. Because of their low prevalence, households with five to twelve members are placed into one group, namely five or more.

Total food budget

Table 2 summarises monthly household expenditures on foods and beverages (purchased for consumption at home), out-of-home consumption, total household expenditures and income as well as shares of total household expenditures and total food budget.

household size (persons)	1	2	3	4	5 or more
number of households (in 1,000)	976.4	974.2	541.1	481.0	267.4
total household net income	1353.0	2398.6	2933.9	3111.0	3813.9
total household expenditures	1565.0	2381.1	2914.3	3135.9	3604.5
total food budget	272.3	438.6	541.9	589.9	761.6
% ^a	17.4	18.4	18.6	18.8	21.1
foods and beverages	167.6	302.8	397.2	436.1	613.2
% ^b	61.6	69.0	73.3	73.9	80.5
(only beverages)	19.0	29.6	44.4	46.4	60.7
out-of-home consumption ^c	104.6	135.8	144.7	153.8	148.3
% ^b	38.4	31.0	26.7	26.1	19.5

^a shares of total household expenditures

^b shares of total food budget

^c exclusive expenditures on hotels

Table 3: Mean monthly household expenditures on foods, non-alcoholic beverages, out-of-home consumption, total household expenditures and household net income (monthly) in Euro (EUR-ATS) and shares of total household expenditures (%^a) and total food budget (%^b) by household size

Source: raw data from Statistik Austria, 2002; own calculation

As expected, total food budget rises with household size. In general, the food budget of single-person households amounts to € 272, whereas two-person households spend € 439 on the aggregate of foods, beverages and out-of-home consumption. Three and four-person households spend € 542 and € 590, respectively. Maximum food budget is observed within five (or more) person households, € 762.

Together with rising absolute expenditures, relative figures such as share of total household expenditures also grow (from 17% - 21%), however less dynamically. In this context it should be explained which factors influence relative figures: amounts of relative expenditures are closely linked to total household expenditures that rise as household size increases. The linear regression model calculated a coefficient of 513 so that on average total monthly household expenditures rise by € 513 per additional household member ($R^2 = 0.4$). The coefficient is significant at the 95% level. Therefore, the less dynamic behaviour of relative figures derives from an increase of total household expenditures by household size.

Expenditures on foods, beverages and out-of-home consumption

As household size increases, people generally tend to spend more on foods and beverages. Single-member households, for instance, spend € 168 per month on foods and beverages whereas two-person households spend nearly twice as much (€ 303). Three-person households spend € 397 on foods and beverages, which is about € 94 more than that of two-

person households but only € 39 less than that of four-person households. The difference between food and beverage expenditures of households with four members and households with five or more members is comparatively huge. Five or more person households spend about € 613 on foods and beverages, one and a half times more than four-person households. The large gap between those two groups can be explained by the structure of households with five (and more) persons: 66% of all households in this group are five-person households, 22% are six-person, 7% are seven-person and the remaining 5% are eight, nine, ten, eleven and twelve-person households.

It is a fact that food expenditures increase with additional household members, but on closer examination it becomes clear that figures do not rise proportionately. This fact is due to economies of scale in consumption, which is explained at the beginning of Section 4.2.

Analogous to food consumption at home, absolute household expenditures on out-of-home consumption also increase with additional people living in the household, however only moderately. Households with five or more members, for example, spend only one and a half times more on eating out-of-home than single-person households, € 148 versus € 105. In other words, per capita spending on out-of-home consumption declines as household size increases. Another difference worth noting between expenditures on food consumed at home and food consumed out-of-home can be observed with relative figures (see Table 2). One-person households, for instance, spend a much larger share of total household food budget on out-of-home consumption than larger sized households with five or more members, 38% versus 20%. These results are in accordance with BMLF (1997) which argues that the higher trend of out-of-home consumption is driven by small sized households (single-person and two-person households). This can be traced to the fact that for small sized households cooking is less efficient from both the aspect of time and money

4.1.2 Age

This section investigates the hypothesis by Payer et al. (2000) that the higher the age the lower food requirements and on the other hand that younger and middle aged people eat more often out-of-home than older people (BMLF, 1997; BMLFUW, 2003). Age groups were broken down in such a way as to gain an equal number of representations across all groups. This yields five age groups according to the age of the household head. The youngest group, those aged 29 and younger, consists of households with heads between 17 and 29 years old. The next three age groups follow in steps of 10 years: the group of 30-39, 40-49 and 50-59 year old heads. The last group, 60 and older, refers to households with heads between 60 and 94 years.

Total food budget

First the correlation between mean expenditures on foods and beverages consumed at home, out-of-home consumption and the age of the household head is investigated, as shown in Table 3.

age groups	29 and younger	30-39	40-49	50-59	60 and older
<i>number of households (in 1,000)</i>	326.8	718.1	625.7	577.3	992.2
household net income	1871.8	2527.0	2842.4	2862.6	1919.1
total household expenditures	1961.4	2770.5	3077.7	2626.0	1839.0
total food budget	378.3	485.5	563.2	497.3	364.7
% ^a	19.3	17.5	18.3	18.9	19.8
foods and beverages	239.2	329.9	386.9	368.0	280.6
% ^b	63.2	67.9	68.7	73.9	76.9
(only beverages)	29.2	36.3	44.1	37.2	25.5
out-of-home consumption ^c	139.1	155.6	176.3	129.4	84.1
% ^b	36.7	32.1	31.3	26.0	23.1

^a shares of total household expenditures

^b shares of total food budget

^c exclusive expenditures on hotels

Table 4: Mean monthly household expenditures on foods, non-alcoholic beverages, out-of-home consumption, total household expenditures and household net income (monthly) in Euro (EUR-ATS) and shares of total household expenditures (%^a) and total food budget (%^b) by age groups

Source: raw data from Statistik Austria, 2002; own calculation

Table 3 demonstrates clearly that the absolute household food budget increases with the age of the household head, peaking with the 40 to 49 age group (€ 563) and declines thereafter. The lowest expenditures are observed within the age group 29 and younger and the group of 60 and older, which spend monthly € 378 and € 365 respectively. Relative figures as share of total household expenditures do not change significantly from the youngest class to the group aged 60 or older. They vary between 18% and 20% of total household expenditures. The dynamic of relative figures can be explained by the variability of total household expenditures with the age of the household head. Total household expenditures increase with the age of the household head, reach the maximum at age group between 40 and 49 (€ 3078) and then decline again.

Expenditures on foods, beverages and out-of-home consumption

Expenditures on foods and beverages purchased for storing, preparing and consuming at home reflect a similar trend to total food budget: they increase with the age of the household

head, reach their maximum within the 40 to 49 age group (€ 387) and then decline. Again, the lowest expenditures are observed within the age group 29 and younger (€ 239) and the group of 60 and older (€ 281).

Similar to household spending on foods and beverages, expenditures on out-of-home consumption increase according to the age of the household head, and reach a maximum within middle aged households (40-49) and then decline again. Households with heads who are 29 or younger, for example, spend on average € 139 on eating out-of-home, whereas middle aged households spend around € 40 more, or € 176 monthly. The age group between 50 and 59 expend significantly less than the preceding group, only € 129 per month. The lowest out-of-home consumption expenditures are in households with heads aged 60 or older that spend € 84.

Relative out-of-home expenditures as share of total food budget show a well defined trend since they decrease as the household head becomes older. Whereas the age group 29 and younger allocates a share of 37% of total food budget on out-of-home consumption, middle aged households, between 30 and 49, allocate around 32%, although absolute expenditures within middle-aged groups reach a maximum. It is the higher food budget of both middle-aged groups that keep relative figures moderate. Those over 60 spend the lowest share of total food budget on out-of-home consumption (around 23%).

These results cannot be explained by different needs for nutrition according to the age of a person, rather it is a factor of household size. Accordingly, the fact that households with both younger (under 29) and older (60 and older) heads spend less on foods and beverages can be partly explained by the smaller household size of both age groups (Table 4). Strictly speaking, 76% of household with heads younger than 29 and 87% with heads over 59 live alone or in two-person households. On the other hand, in the group of middle aged household heads (40-49) more than 60% live in three, four, five or more-person households. Due to the fact that households with more members have higher needs for foods and beverages, absolute figures rise through the 40 to 49 age group and then decrease again.

age groups	household size	1	2	3	4	5 and more
29 and younger		36.1%	39.6%	12.8%	10.3%	2.2%
30–39		20.4%	19.2%	20.8%	26.8%	12.7%
40–49		21.5%	16.2%	21.3%	24.5%	16.6%
50–59		22.2%	34.0%	20.8%	13.6%	9.4%
60 and older		45.3%	41.6%	9.8%	2.3%	1.1%

Table 5: Percentage distribution of the household size for each age group (shares added up by line)

Source: Data from Konsumerhebung 1999/2000; own calculation

Another important factor especially effecting the out-of-home consumption figures is participation in working life. In order to confirm this hypothesis, one should compare the group of household with heads younger than 29 with the group aged 60 or older. As mentioned before, both groups tend to live predominantly in single or two-person households. Nevertheless, the youngest age group spends about € 55 more on eating out than the eldest, € 139 versus € 84. Table 5 shows what percent of household heads of each age group are in the labour force, retired or doing something else (other) like being housewives or househusbands, doing military service, going to university or taking maternity leave.

age groups	labour force	retired	other ^a
current participation in working life			
29 and younger	75.3%	0.0%	24.7%
30–39	93.5%	0.6%	5.9%
40–49	94.7%	2.5%	2.8%
50–59	67.5%	29.7%	2.8%
60 and older	2.3%	96.2%	1.5%

^a The category other summarises households with the following participation in working life of the household head: maternity leave, housewives or -husbands, military service, civil serves and students.

Table 6: Percentage distribution of current participation in working life for each age group (shares are added line-by-line)

Source: raw data from Statistik Austria, 2002; own calculation

Heads aged 29 or younger are predominantly members of the labour force. In other words, 75% of them are either employed (74%) or unemployed (1%). Since this group spends much of the time on their place of work, preparing and eating meals at home is not generally possible during the day. Furthermore, many firms and public institutions have canteens which offer their employees meals at low cost. According to BMLF (1997) 57% of employees in Austria take their main meal at work during the lunch break instead of spending extra time on preparing and cooking meals in the evening. The group of households with heads aged 60 or older, on the contrary, has for the most part already left the labour force. 96% of this group are retired. As time is no longer such a limiting factor, these households seem to prepare and eat meals more often at home and spend less on eating out. It may also be added that out-of-home consumption in general is less common among older people, which can be traced back to deep-rooted, traditional reasons like the distribution of roles between men and women. BMLF (1997) points out that in the past, a smaller number of women worked outside the home than today, and they were expected to do the housework and prepare the meals. In 1951, the share of men in the labour force amounted to 61%, and 39% of women (Statistik Austria, 2006^a). Today, the ratio of men and women belonging to the

labour force is more equal. In the third quarter of 2005, 55% of men and 45% of women were registered as members of the labour force (Statistik Austria, 2006^b). Therefore, the author assumes that in households with older members, women still prepare meals at home so that expenditures (relative and absolute) on out-of-home consumption are lower than in younger households, although they both live predominantly in small sized households.

4.1.3 Household net income

It was already mentioned in Chapter 2 that food expenditures as share of total household expenditures decline with increasing income. In order to investigate the influence of household income (total net income of all members) on food expenditures for Austrian households, they are divided into different income groups. A quite popular method to calculate income groups is to compute income quartiles. Thereby data is ranked in ascending order and then divided into four groups of equal size, so that each group contains 25% of total representatives. Values that serve as dividing lines between the groups are called quartiles: first, second, third and fourth quartile. The value which separates the second from the third quartile is called the median (Bortz, 2005). In this case, quartiles were not calculated from total household net income but from total household equivalence net income. A detailed description of the concept of equivalence scales will be given in Section 4.2. For our purposes, it is more than adequate to understand that the advantage of household equivalence net income is that the influence of household size can be eliminated. In summary, the concept of equivalence income takes into consideration both income level and number of people living in the household by dividing net income by a specific factor depending on household size and age of its members. As a result quartiles calculated from total household equivalence net income divide households who are worse off from households who are better off independent from household size.

Total food budget

Table 6 shows the mean values on total household expenditures, net income and expenditures on foods, beverages and out-of-home consumption by quartiles of monthly household equivalence net income. It is apparent that both mean total household expenditures and net income rise steadily as household equivalence net income grows. Households belonging to the fourth quartile earn more than twice as much than those within the first quartile, € 3474 versus € 1395. Likewise, total household expenditures of affluent households (fourth quartile) are one and a half times that of the first quartile, € 3045 versus € 1883. As expected, the linear correlation between total household expenditures and household net income is rather high. Calculations produced a correlation coefficient

(Pearson) of 0.52 between total household expenditures and net income that is significant at the 99% level.

income quartiles	1 st (under € 870)	2 nd (€ 870 - € 1,172)	3 rd (€ 1,173 - € 1,549)	4 th (over € 1,549)
<i>number of households (in 1,000)</i>	811.3	811.3	811.3	811.3
total household net income	1395.4	2103.6	2607.7	3474.2
total household expenditures	1882.5	2284.3	2536.9	3044.6
total food budget	402.5	456.5	463.0	497.8
% ^a	21.4	20.0	18.3	16.4
foods and beverages	328.8	338.8	325.0	301.3
% ^b	81.7	74.2	70.2	60.5
(only beverages)	33.2	35.8	35.2	31.6
out-of-home consumption ^c	73.7	117.7	138.0	196.5
% ^b	18.3	28.8	29.8	39.5

^a shares of total household expenditures

^b shares of total food budget

^c exclusive expenditures on hotels

Table 7: Mean monthly household expenditures on foods, non-alcoholic beverages, out-of-home consumption, total household expenditures and household net income (monthly) in Euro (EUR-ATS) and shares of total household expenditures (%^a) and total food budget (%^b) by quartiles of monthly household equivalence net income

Source: raw data from Statistik Austria, 2002; own calculation

Apart from income and total household expenditures, total food budget rises from the first to the fourth quartile by around € 100, from € 403 to € 499. Relative figures (as share of total household expenditures), on the contrary, show a well-defined trend since they decline with increasing equivalence income from 21% to 16%.

Expenditures on foods, beverages and out-of-home consumption

Absolute expenditure figures on foods and beverages purchased for consumption at home do not correlate with a higher income level. In the strict sense, there is only minimal difference in household spending on foods and beverages by quartiles of household equivalence net income. As shown in Table 6, the first three quartiles do not differ significantly from each other. They spend monthly between € 325 and € 339. Only households belonging to the highest income level spend slightly less on foods and beverages than all other income groups, € 301 monthly.

Mean household spending on eating out, however, increases continuously as income grows. Households in the lowest income group, for example, spend around € 74 monthly on out-of-

home consumption compared with € 197 spent by the highest income group. Analogously, the share of food budget spent on eating out varies from 18% for the lowest income group to 40% for the wealthiest. The trend of increasing out-of-home expenditures with higher income explains the low food and beverage expenditures (purchased for consumption at home) by the fourth quartile mentioned before. More precisely, the highest income group spends less on food prepared and consumed at home than all other income groups, but in return it shows the highest figures with regard to out-of-home expenditures. Here it should be taken into consideration that higher expenditure figures are not equated with actual higher consumption in quantities. As income increases households may allocate a higher share of their food budget on gastronomic sites of higher quality than on communal settings which offer meals at inexpensive prices.

Again the factor of household size and the current participation in working life may influence the minimum absolute expenditures on eating at home and maximum expenditures on eating out-of-home of the highest income group. This group lives predominantly in single or two-person households (77%), whereas households belonging to the first, second or third income quartile show a lower percentage of single or two-person households, between 49% and 59%, but a higher share of large-sized households. In addition, the share of people in the labour force increases, whereas the share of retired people falls as income rises [see Table 14, Section 4.2.3]. It has already been argued that for singles and people in the labour force it is less efficient to cook meals for themselves.

4.1.4 Educational level

In Section 2.2 it was argued that a higher educational level correlates with higher health and environmental awareness. A first indicator of this factor can be found by analysing differences in food expenditures by educational level. For this purpose, households are grouped by the educational level achieved by the household head, coded from A to D. Heads belonging to group **A** have maximally attained a secondary school qualification. Group **B** refers to heads that have attended vocational school or have done an apprenticeship. Finally, household heads with high school diploma (AHS¹⁸, BHS¹⁹) belong to group **C** and with college or university degree to group **D**.

Before discussing the influence of education on food consumption, it is important to be aware that there is a positive linear correlation between educational levels and income and total household expenditures respectively. Using educational level as independent variable, we

¹⁸ Allgemeinbildende höhere Schule

¹⁹ Berufsbildende höhere Schule

get a correlation coefficient (Spearman) of 0.23 for explaining household net income and a coefficient of 0.24 for total household expenditures. Results are significant at the 99% level. Thus, household net income and total household expenditures increase with higher educational level.

Food budget

Absolute expenditure figures by educational achievement are shown in Table 7. Expenditures on the aggregate of foods, beverages and out-of-home consumption show a well-defined trend: they rise with the level of education by around than € 90, from € 406 to € 492. Relative figures as share of total household expenditures, on the contrary, show clearly a downward trend. Households with heads who have attained at most secondary schooling spend 22% of total household expenditures on food (total food budget), whereas college- and university-educated households need only 15%. Again the upward movement of relative figures is weakened by an increase of total household expenditures and net income by educational level.

educational level	maximum secondary school (A)	vocational school/ apprenticeship degree (B)	high school degree (C)	college/ university degree (D)
<i>number of households (in 1,000)</i>	829.1	1,640.2	482.0	282.6
total household net income	1912.4	2473.9	2524.0	3098.8
total household expenditures	1868.2	2511.2	2636.6	3248.0
total food budget	405.5	472.1	452.1	491.8
% ^a	21.7	18.8	17.1	15.1
foods and beverages	317.3	338.0	293.0	302.6
% ^b	78.2	71.6	64.8	61.5
(only beverages)	31.2	36.2	31.3	32.9
out-of-home consumption ^c	88.2	134.1	159.1	189.2
% ^b	21.8	28.4	35.2	38.5

^a shares of total household expenditures

^b shares of total food budget

^c exclusive expenditures on hotels

Table 8: Mean monthly household expenditures on foods, non-alcoholic beverages, out-of-home consumption, total household expenditures and household net income (monthly) in Euro (EUR-ATS) and shares of total household expenditures (%^a) and total food budget (%^b) by educational level

Source: raw data from Statistik Austria, 2002; own calculation

Expenditures on foods, beverages and out-of-home consumption

Expenditures on foods and beverages (consumed at home) only change modestly with educational level. The highest absolute expenditures, € 338 (71% of total food budget) monthly, have households with heads who have completed an apprenticeship or vocational school (B). Conversely, expenditures reach a minimum within the group of high-school-educated heads of household (C) who spends around € 293 (64%) monthly.

Household expenditures on eating out-of-home by educational level show a similar dynamic behaviour as out-of-home expenditures by household equivalence net income quartiles: absolute and relative (as share of total food budget) expenditures rise considerably. Household heads that have attained maximum secondary school spend only € 88 (22% of total food budget) on eating out-of-home, whereas households with university or college-educated heads of household spend € 189 (39%).

These results can be explained by three factors: household size, participation in working life and income. The first factor, the household size, is responsible for high out-of-home expenditure figures within group C and D but maximum expenditures on foods and beverages consumed at home within group B: 54% of households belonging to group B are single or two-person households, 19% are three-person, 19% are four-person and 9% five or more-person households. Households belonging to group A, C or D are predominantly single or two-person households (more than 60%). As these groups consist mainly of single and two-person households, people may switch from self-preparation to out-of-home consumption. The second factor, participation in working life, is responsible for high out-of-home consumption figures of higher educated households: more than 70% of households with heads in group C and D belong to the labour force, whereas 62% of household heads in group A are retired (Table 8).

educational level current participation in working life			
	labour force	retired	other ^a
maximum secondary school (A)	33.4%	61.5%	5.1%
vocational school/apprenticeship degree (B)	65.9%	29.8%	4.4%
high school degree (C)	70.4%	20.5%	9.1%
college/university degree (D)	78.7%	16.5%	4.8%

^a The category other summarises households with the following participation in working life of the household head: maternity leave, housewives or -husbands, military service, civil serves and students.

Table 9: Percentage distribution of current participation in working life for each educational level (shares are added line-by-line)

Source: raw data from Statistik Austria, 2002; own calculation

Finally, increasing income with more education may also be responsible for the higher expenditures on out-of-home consumption as people may allocate their money to higher quality restaurants. To sum up, calculations have verified that time restrictions (due to the increasing number of employed people), decreasing household size (from B to D) but increasing income by those with more education determine expenditures on foods, beverages and out-of-home consumption.

4.1.5 Labour force status

The determinant of labour force status has not been investigated intensively before. Based on the argument of Payer et al. (2000) that farmers, blue-collar workers and managers show the highest meat intake, the author seeks to find out how different labour force status affect people's diet. Again, details concerning the labour force status refer only to the household head but are adopted to characterise the entire household. Altogether, data evaluation has considered five different employment statuses:

- farming households
- self-employed households
- households headed by worker and employees (including public servants or clerks) in low positions
- ...middle positions
- ...high positions

Total food budget

Total food budget of self-employed is highest (€ 517; 18% of total household expenditures) followed by group of workers and employees in high positions, € 503 (16%). Farming households are in the third position. They spend around € 488 monthly on the aggregate of foods, beverages and out-of-home consumption, which constitutes a share of 22% of total household expenditures. The remaining groups, workers and employees in low and middle positions spend around € 442, monthly.

It should be noted that relative figures reflect both absolute value of food budget and total household expenditures, which are determined by income. Farming households, for example, reach a maximum in relative expenditures (22%), due to high absolute figures of food budget but low total household expenditures (€ 2254). Conversely, self-employed households and households headed by workers and employees in middle or high positions allocate a low share of total household expenditures on the aggregate of foods, beverages and out-of-home consumption, between 16% and 20%, due to high total household expenditures (between € 2373 and € 3168) which keep relative figures low.

income quartiles	Farmers	Self-employed people	Workers and employees in low positions	...middle positions	In high positions
number of households (in 1,000)	162.1	279.5	1141.1	920.3	570.1
total household net income	2658.0	2824.8	2112.7	2330.6	3108.7
total household expenditures	2254.0	2926.7	2174.2	2373.0	3168.2
total food budget	487.4	517.9	442.9	441.5	503.3
% ^a	21.6%	17.7%	20.4%	18.6%	15.9%
foods and beverages	404.6	353.5	331.9	313.7	309.3
% ^b	83.0%	68.2%	74.9%	71.1%	61.4%
(only beverages)	33.8	35.1	35.7	34.1	32.4
out-of-home consumption ^c	82.9	164.6	111.0	128.1	194.2
% ^b	17.0%	31.8%	25.1%	29.0%	38.6%

^a shares of total household expenditures

^b shares of total food budget

^c exclusive expenditures on hotels

Table 10: Mean monthly household expenditures on foods, non-alcoholic beverages, out-of-home consumption, total household expenditures and household net income (monthly) in Euro (EUR-ATS) and shares of total household expenditures (%^a) and total food budget (%^b) by labour force status)

Source: raw data from Statistik Austria, 2002; own calculation

Expenditures on foods, beverages and out-of-home consumption

By considering only expenditures on foods and beverages consumed at home, farming households are highest at € 405 due to their tendency to live in multi-person households. In other words, the percentage of farmers living in single or two-person households is compared to employees independent of their position rather low, 45% versus more than 60%. 14% of farmer households have three household members, 15% have four and 26% have five or more. Households headed by workers and employees, independent of their position, spend less on foods and beverages consumed at home than all other groups, between € 309 and € 332. Self-employed households spend around € 354, which is more than the groups of workers and employees, but less than farming households.

Household expenditures on out-of-home consumption (exclusive expenditures on hotels) are lowest in farming households with € 83 monthly, which accounts for 17% of the total food budget. Conversely, higher absolute expenditures are expended by self-employed households (€ 165), who allocate a share of 32% of total food budget on eating out. Further groups that allocate more than one fourth of total food budget on out-of-home consumption are workers and employees. As they become more successful, absolute and relative expenditures increase. Whereas workers and employees in low positions spend only € 111

on food consumed away from home, workers and employees in high positions spend € 194 on the same item which constitutes a share of 39% of total food budget. Maybe such things as business lunches, travel (day trips or longer) and time scarcity determine high out-of-home expenditures of those who are self-employed and workers/employees.

4.2 Household food consumption in quantities

Thus far, this analysis has concentrated on expenditure figures on the aggregate of foods and beverages on the one hand, and out-of-home consumption on the other. In order to evaluate the sustainability of food consumption, it is necessary to differentiate the food groups and categories. Before investigating the differences across socio-economic and demographic groups, selected food and beverage categories and applied methods are presented.

Selected food and beverage categories

It is important to first note that some food and beverage categories lack representative consumption figures (in quantities). In other words, only a low percentage of households taking part in the survey indicated consumed quantities for these categories. The factor of convenience for the recording person or a lack of adequate quantity information on packaging material may be reasons for this limited data availability. Another reason could be the fact that households simply did not purchase some products.

Since data availability is limited for several food categories, the following analysis is restricted to the following categories, which are well represented:

- rice, bread, flour and pasta
- vegetables (fresh)
- fruits (fresh)
- meat (fresh or frozen)
- fish and seafood (fresh, frozen, dried and smoked)
- yogurt
- cheese and curd
- animal fats
- vegetable fats
- candies (sugar, sweetener, jam, honey)
- coffee and cacao
- mineral water, soft drinks and juices

Average consumption figures (in quantities) are listed in each sub-section. Corresponding expenditure figures are determined by price. These figures depend on food origin (domestic

versus overseas production, for example) and quality (organic versus conventionally farming, etc.). In general, expenditure figures of food categories correlate well with trends in consumption and therefore are not discussed separately.

Concerning out-of-home consumption, Statistik Austria offers data covering monthly expenditures, but does not indicate the amount or the nature of meals consumed. Therefore, further analysis in the area of out-of-home consumption is not feasible. The trends in out-of-home consumption by socio-economic characteristics covered in Section 4.1 should be kept in mind, since they explain the absolute high/low consumed quantities of households having different structures. In the strictest sense, it is assumed that high expenditures on out-of-home consumption result in a lower need for foods and beverages purchased for consumption at home and vice versa.

Equivalence scale

As the aim of Section 4.2 is to compare socio-economic characteristics of households and their preference for food and beverage categories purchased for consumption at home, it is necessary to eliminate the influence of household size. A simple adjustment might be to divide expenditure and consumption figures by the number of people living in the household and to calculate per capita figures. However, this method ignores the impact of economies of scale in consumption. In other words, it is true that household needs grow with additional members, however not in a proportional way. A two-person household, for example, cannot live as cheaply as a single-person household, but two people living together are likely to spend less (e.g. larger households could benefit from purchasing in bulk) than if they lived separately in order to attain the same standard of living. However, not only the number of people living in the household is considered but also their age. It seems reasonable to postulate that a three-adult household has higher needs than a two-adult and one-child household. Equivalence scales assign each household type a value in proportion to its needs. Standardised figures are obtained by dividing expenditure and consumption figures of each household by the corresponding equivalence value. Thus, the basis of standardisation is the one-person household (Statistik Austria, 2004).

As mentioned above, the factors taken into account are household size and the ages of its members. While a variety of scales exist, for example the OECD Scale or the EU Scale (see Table 9), the Statistik Austria standard scale is used in this analysis.

	EU Scale	OECD Scale	Statistik Austria Scale
first adult person	1.0	1.0	1.0
additional adults	0.5	0.7	0.7
children ...			
aged 20 - 27	0.5	0.7	0.7
aged 19 - 21	0.5	0.7	0.8
aged 16 -18	0.5	0.7	0.7
aged 14 -15	0.5	0.7	0.65
aged 11 -13	0.3	0.3	0.65
aged 7-10	0.3	0.5	0.55
aged 4 - 6	0.3	0.5	0.38
aged 0 - 3	0.3	0.5	0.33

Table 11: Comparison of three equivalence scales: EU Scale, OECD Scale and Statistik Austria Scale

Source: Statistik Austria, 2004

The Statistik Austria Scale assigns a value of 1 to the first household member, of 0.7 to each additional adult and values of 0.33 to 0.8 for children according to their age (Table 9). A household with 2 adults and 2 children aged 16 and 7 is thus assigned a value of 2.95 ($1+0.7+0.7+0.55$).

Section 4.2.1 starts with the demonstration of total consumption figures (not equivalence figures) by household size in order to stress the influence of number of household members on consumed food and beverage quantities. The following sub-sections (4.2.2 – 4.2.6) present a detailed description of equivalence consumption figures of selected food and beverage categories by various socio-economic and demographic household characteristics.

4.2.1 Household size

The fact that household size determines consumed food quantities is beyond question. Absolute quantities of selected foods and beverages consumed by households of different sizes are given in Table 10. As expected, quantities increase with each additional member living in the household, however not in a proportional way. In a strict sense, total consumption increases but per capita food consumption declines slightly, so that food does not have to be replaced in proportion to the number of household members. This effect can be explained by the different structure of households (number and age of household members), discussed in the preceding section.

household size (persons)	1	2	3	4	5 and more	units
number of households (in 1,000)	976.4	974.2	541.1	481.0	267.4	
FOODS						
rice, bread, flour, pasta	6.9	10.7	13.7	14.9	25.5	kg
vegetables (fresh)	7.1	14.5	16.0	17.9	24.7	kg
fruits (fresh)	7.7	13.2	14.0	16.0	24.1	kg
meat (fresh, frozen)	4.2	9.1	12.2	12.8	21.7	kg
fish (fresh, frozen, dried, smoked)	0.3	0.8	0.9	0.7	1.3	kg
yogurt	1.6	2.4	3.1	3.9	4.7	kg
cheese and curd	1.1	1.9	2.4	2.7	3.9	kg
milk	6.8	11.2	17.0	18.8	32.0	litre
eggs	19.5	33.7	43.5	48.8	74.6	units
animal fats	0.5	0.9	1.0	1.0	1.8	kg
vegetable fats	0.4	0.7	0.8	1.0	1.3	kg
candies	2.5	4.4	5.1	5.3	8.6	kg
NON ALCOHOLIC BEVERAGES						
coffee, cacao	1.0	1.4	2.0	1.9	2.9	kg
mineral water, soft drinks, juices	14.6	25.4	37.7	44.0	50.7	litre
mineral water	7.4	13.6	17.7	18.8	24.3	litre
soft drinks	4.1	6.7	11.3	14.6	15.3	litre
fruit juices	2.9	5.0	8.5	10.5	10.9	litre
vegetable juices	0.2	0.1	0.2	0.1	0.2	litre

Table 12: Monthly household consumption of selected foods and non-alcoholic beverages in kilograms, litres and units by household size

Source: raw data from Statistik Austria, 2002; own calculation

Increases in consumption figures of food and beverage categories occur in differing amounts. The consumption of **rice, bread, pasta and flour** products, for example, nearly quadruples from single-person households to five or more-person households, 7 kg versus 26 kg. The consumption of **vegetables** increases steadily with each additional household member. A five or more-person household consumes three and a half times more vegetables (25 kg) than a single-person household (7 kg). Within the category of vegetables (Figure 8), potato consumption, which accounts for 45% to 47% of total fresh vegetable consumption, dominates irrespective of household size. Fruiting and flowering vegetables are slightly below one quarter of total fresh vegetable consumption. The consumption of leaf vegetables and herbs is about 11%, the consumption of root vegetables around 14%. Only households with five or more members have higher figures in relative leaf vegetable (14%), but consequentially have lower figures in root vegetable (12%) consumption.

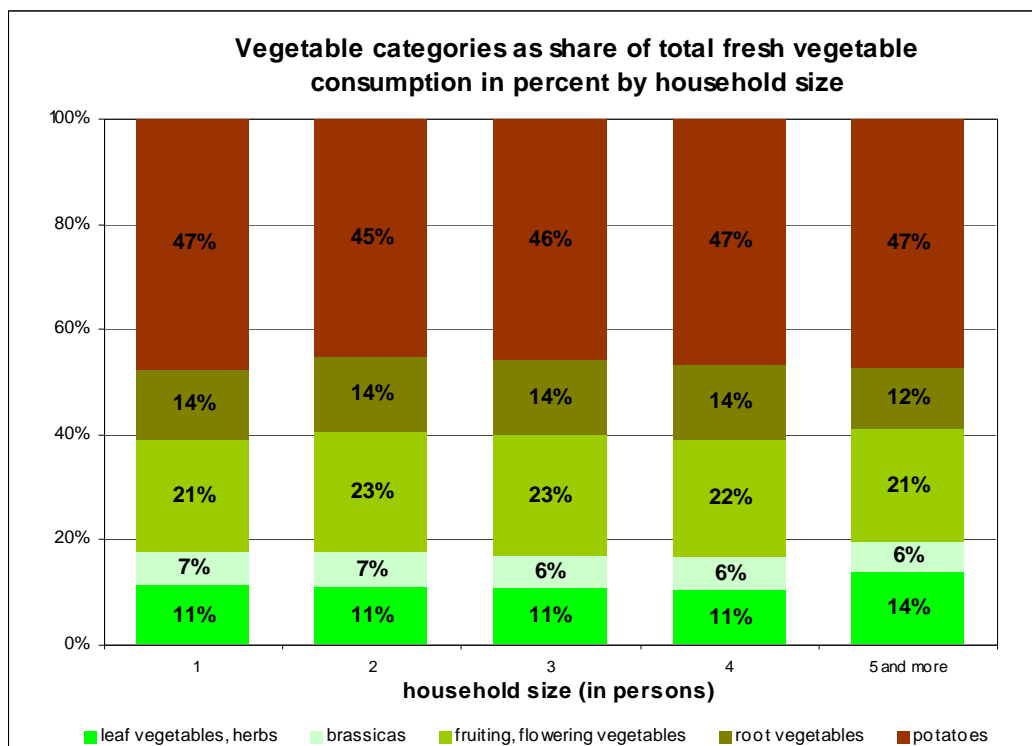


Figure 8: Vegetable categories as share of total fresh vegetable consumption (in quantities) in percent by household size

Source: raw data from Statistik Austria, 2002; own calculation

Fruit consumption increases from 8 kg in single-member households to 24 kg in households with five or more-persons. By focusing on the consumption of single fresh fruit types (Figure 9), it can be stated that one-person, two-person and five or more-person households consume more apples, between 39% and 40% of total fresh fruit consumption, than three or four-person households (33% each). The latter groups instead consume more bananas, around 20% in each case. The highest intake of exotic fruits (sum of citrus fruits and bananas) can be observed in larger households (three-, four- and five or more-person households).

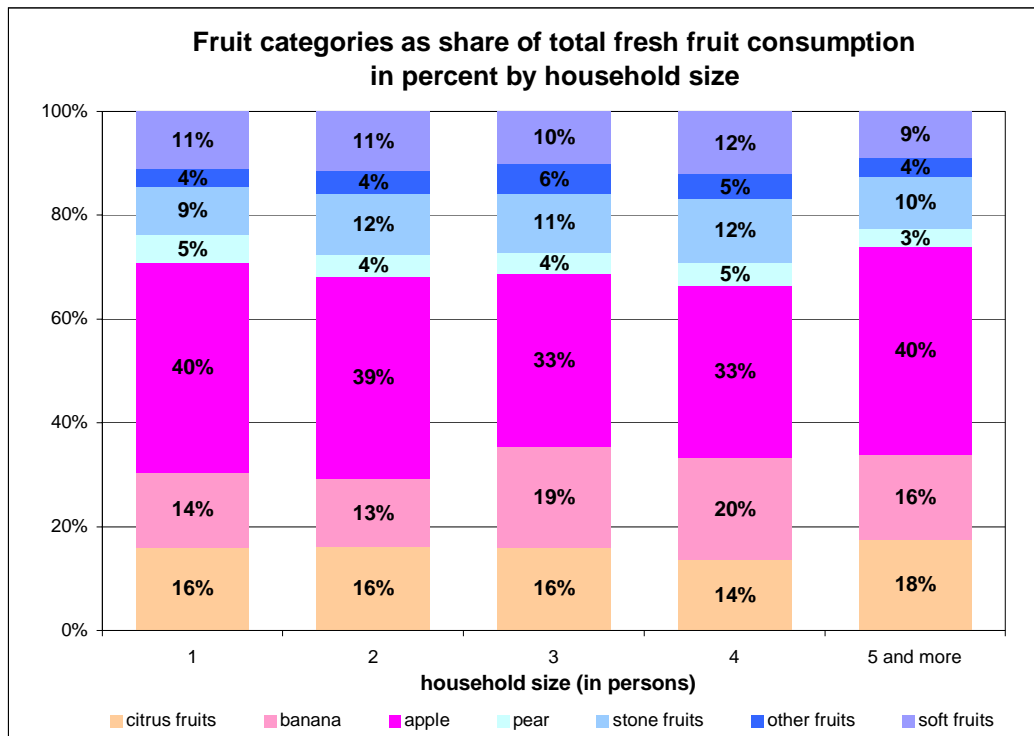


Figure 9: Fruit categories as share of total fresh fruit consumption (in quantities) in percent by household size

Source: raw data from Statistik Austria, 2002; own calculation

Maximum differences in consumption figures are observed within the **meat category**, which nearly quintuples from 4 kg (single-person households) to 22 kg (five or more-person households). Apart from the observation of total meat consumption, it is also the focus of this thesis to identify trends within the category of meat, provided that any exist. Figure 10 shows the relative consumption of various meat categories (beef, pork, poultry, sheep, goat, dried, salted and smoked meat, minced meat and other meat) as share of total fresh or frozen meat consumption by household size. The consumption of beef and veal, which varies between 13% and 14%, does not change significantly according to household size. A well defined trend can be identified with pork as well as with dried, salted and smoked meat consumption. As household size increases, relative figures of pork consumption grow, from 20% to 31%, but at the same time the category of dried, salted and smoked meat declines by 5%, from 36% to 31%. A slight downward trend can be observed in poultry: numbers fall from 17% (single household) to 14% (five or more-person household). The category of sheep and goat, which varies between 1% and 2%, plays only a minor role in Austrian diets.

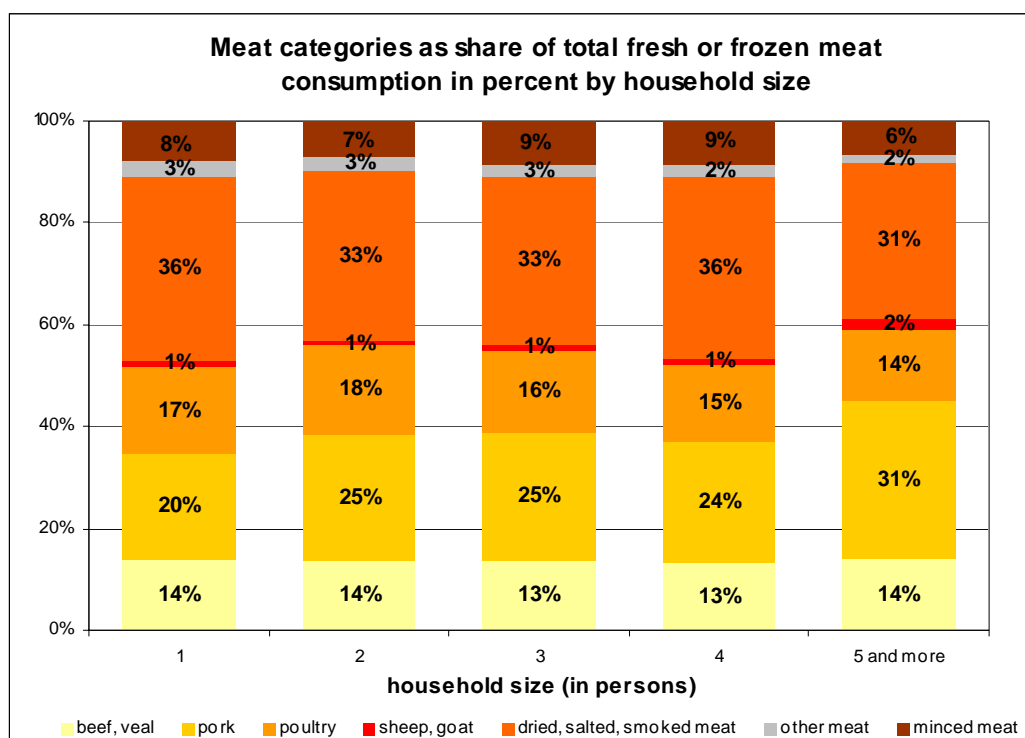


Figure 10: Meat categories as share of total fresh or frozen meat consumption (in quantities) in percent by household size

Source: raw data from Statistik Austria, 2002; own calculation

Another category on the increase is the **fish**. Although absolute quantities of fish consumption are comparatively quite low, the category of fish increases by 1 kg from single-person to five- (or more) person households. Higher increases are noticed with the consumption of **milk**, which goes up by 4 litres from single-person to two-person households, and by 6 litres from two-person to three-person households. Milk consumption of three- and four-person households differs only by 2 litres, 17 versus 19 litres. However, between four-person and five or more-person households, the consumption of milk rises considerably, from 19 to 32 litres. A quadrupling in consumption from single-member households to five or more-person households can also be observed in the categories of **cheese**, **curd**, **eggs**, **animal** and **vegetable fats**. Lower increases can be found with **candies**, followed by **yogurt** and hot infusion drinks like **coffee** and **cacao**.

Comparing absolute consumption of **bottled beverages** with milk, mineral water exceeds milk consumption irrespective of household size. In single- and two-person households mineral water consumption out-paces milk consumption by only a few litres. In five or more-person households, milk consumption is only two thirds that of mineral water, in four-person households only half that of mineral water. The consumption of soft drinks and fruit juices increases continuously from single- to four-person households, but remains constant

between four and five- (or more) person households. The consumption of vegetable juices plays only a minor role.

4.2.2 Age

The literature survey in Chapter 2 on the impact of age on food choice has identified older people as being more health orientated whereas younger people adjust their diet more to time constraints (Hayn et al., 2005). This section further investigates that issue by focusing on consumed quantities of several food and beverage categories. Table 11 presents equivalence consumption figures of food and beverage categories by age groups. Consumption figures of the main food categories, namely rice, bread, flour and pasta, vegetables, fruits and meat respond positively as the age of the household head increases.

age groups	29 and younger	30-39	40-49	50-59	60 and older	units
<i>number of households (in 1,000)</i>	326.8	718.1	625.7	577.3	992.2	
FOODS						
rice, bread, flour, pasta	3.8	4.2	5.0	4.8	5.5	kg
vegetables (fresh)	3.9	5.3	5.9	8.2	10.0	kg
fruits (fresh)	4.6	5.3	5.9	7.6	9.5	kg
meat (fresh or frozen)	2.8	3.9	4.6	6.1	5.8	kg
fish (fresh, frozen, dried, smoked)	0.2	0.3	0.3	0.4	0.4	kg
yogurt	1.6	1.6	1.5	1.5	1.3	kg
cheese and curd	1.0	1.0	1.1	1.1	1.1	kg
milk	6.1	6.2	6.6	6.9	8.2	litre
eggs	11.4	14.9	17.2	22.0	24.4	units
animal fats	0.3	0.3	0.4	0.5	0.6	kg
vegetable fats	0.2	0.3	0.3	0.4	0.5	kg
candies	1.2	1.7	1.8	2.6	3.3	kg
NON ALCOHOLIC BEVERAGES						
coffee, cacao	0.6	0.8	0.9	0.9	0.9	kg
mineral water, soft drinks, juices	14.9	15.3	16.8	16.2	13.2	litre
mineral water	4.7	6.3	7.8	9.2	7.9	litre
soft drinks	5.6	5.1	5.5	4.1	2.8	litre
fruit juices	4.5	3.8	3.4	2.8	2.4	litre
vegetable juices	0.1	0.1	0.1	0.1	0.1	litre

Table 13: Monthly household equivalence consumption of selected foods and non-alcoholic beverages in kilograms, litres and units by age groups

Source: raw data from Statistik Austria, 2002; own calculation

The consumption of **rice, bread, flour and pasta**, for instance, increases from households with heads aged below 30 to those with heads aged 60 or older, from 4 kg to 6 kg.

Similarly, **vegetable** consumption of the oldest age group is more than twice that of the youngest age group, 10 kg versus 4 kg. The preference for different vegetable categories (in relative figures) is shown in Figure 11.

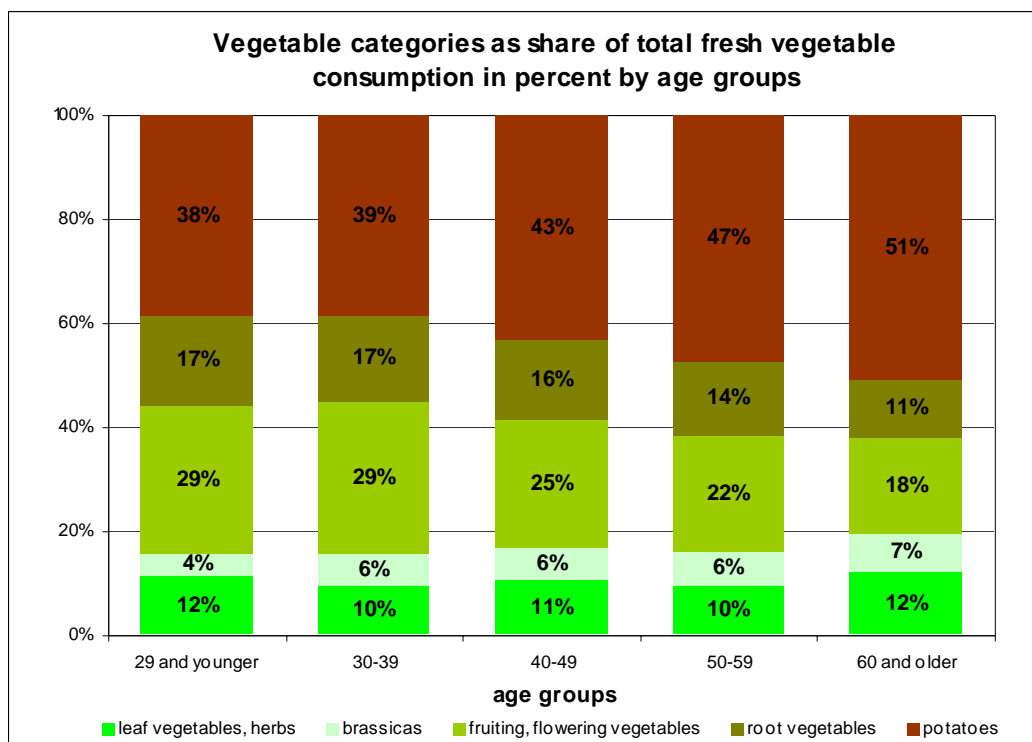


Figure 11: Vegetable categories as share of total fresh vegetable equivalence consumption (in quantities) in percent by age groups

Source: raw data from Statistik Austria, 2002; own calculation

In fact, a strong tendency towards higher potato consumption with increasing age can be observed. Fresh vegetable consumption of the oldest age group is dominated by potatoes (51%). In contrast, potato consumption of household with heads aged 39 and younger amounts roughly to 39% of total fresh vegetable consumption. Low relative potato consumption in younger age groups is compensated for by higher relative figures for fruiting and flowering vegetables (29%) and root vegetables (17%). The preference for fruiting and flowering vegetables instead of potatoes within younger age groups can be explained by the time consuming preparation needed for potatoes, as younger age groups demand more foods which can be quickly prepared. Older consumers adhere more to traditional eating habits, which are characterised by a high relative intake of potatoes due to low price, nice taste and their satiating character.

Similar to vegetable consumption, fruit consumption responds positively with increasing age: consumed quantities of fruits rise from 5 kg to 10 kg. The relative consumption of fresh **fruit** categories by age groups is presented in Figure 12. Clearly, older age groups have maximum relative figures in the consumption of apples and pears, around 50% of their total fresh fruit consumption, whereas younger groups have only a share value of 34%. Lower relative consumption figures of apples and pears in younger age groups are compensated for by higher values in exotic fruit consumption. Strictly speaking, exotic fruit consumption within the 29 and younger age group constitutes a share of 45% of total fresh fruit consumption. The elderly, with heads of household aged 60 or older, consume only 23% exotic fruits. The preference for apples and pears in older age groups can again be explained by tradition. As the diet of the older population is mostly closely tied to traditional, deep-rooted eating habits, apples and pears play a major role in fruit consumption. Younger age groups, on the contrary, may prefer more diversity in their diets. As exotic fruits have become less expensive and are at the same time very sapid, younger age groups prefer them to apples.

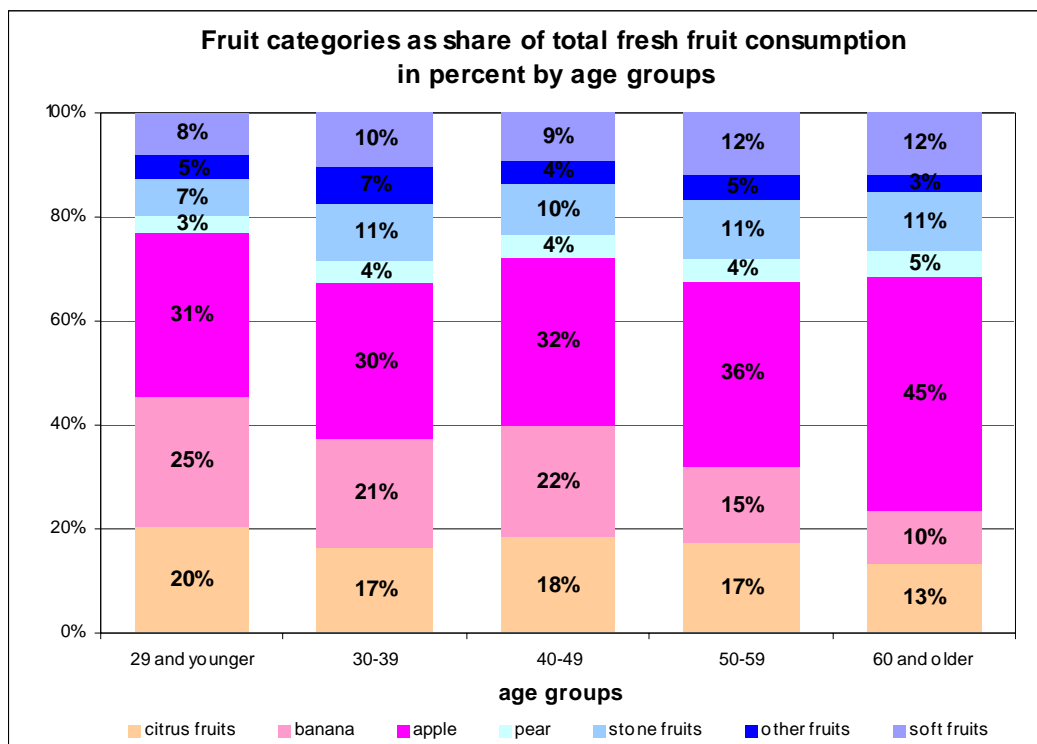


Figure 12: Fruit categories as share of total fresh fruit equivalence consumption (in quantities) in percent by age groups

Source: raw data from Statistik Austria, 2002; own calculation

Meat consumption varies from 3 kg in the youngest age group to 6 kg in the oldest. The (relative) preference for different meat categories is shown in Figure 13. Pork consumption responds positively to increasing age, and constitutes a share of 26% in the 60 and older group. The youngest age group, on the contrary, has only a share of 20%. Negative trends

can be observed with dried, salted and smoked meat. Of their total meat consumption, the youngest age group consumes more than 40% of meats from this group, whereas the oldest group consumes only 32%. Relative consumption of poultry, on the contrary, declines only slightly with increasing age of the household head, from 18% (29 and younger) to 17% (60 and older).

High relative figures of dried, salted and smoked meat and lower values for pork within younger age groups may be attributable to time restrictions. As the majority of members in younger households are employed [see Table 4, Section 4.1.2], time for hot meal preparation is restricted. Therefore, it could be assumed that the preference for dried, salted and smoked meat within the younger age group results from an increase in snack consumption. Interestingly, the consumption of minced meat accounts for 12% of total meat consumption within the youngest age group, which is more than 5% higher than in all other age groups. Again low prices as well as the easy preparation of minced meat may address the needs of younger age groups. Beef and veal consumption is more or less balanced between all age groups. Only households with young heads (29 and younger) show very low figures, 7% of total meat consumption. It may be that the high prices of beef and veal are responsible for this low share.

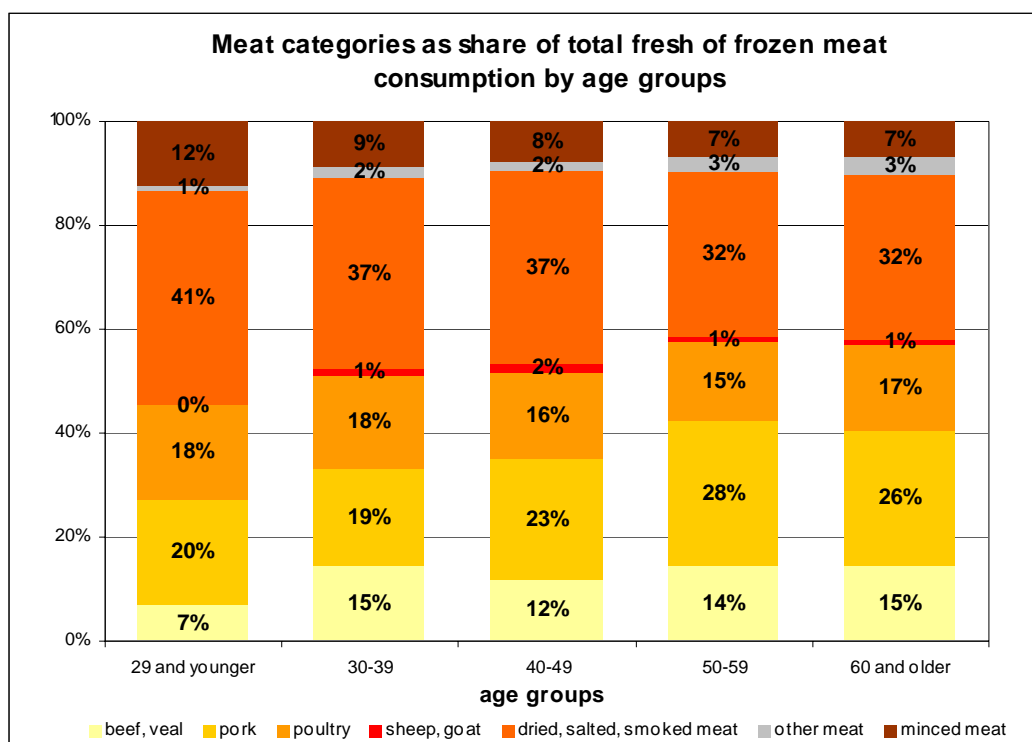


Figure 13: Meat categories as share of total fresh or frozen meat equivalence consumption (in quantities) in percent by age groups

Source: raw data from Statistik Austria, 2002; own calculation

Egg consumption appears to respond extremely positively with age. The age group over 60 consumes more than twice as many (24 eggs) than the youngest age group (11 eggs). Additional increases can be observed with **candies, fats, fish, coffee and cacao**. The categories of **yogurt, cheese and curd** seem to be mostly independent of age. Also, the consumption of **milk** seems to be relatively stable across age groups. Only the oldest group consumes on average 2 litres more monthly than all other groups.

Concerning **bottled beverages**, mineral water consumption increases from the youngest age group to the age group between 50 and 59, from 5 to 9 litres, but then declines again. The mature age group consumes on average 8 litres monthly. The consumption of soft drinks and fruit juices decreases as household heads become older, whereas age has no influence on vegetable juice consumption which shows very low figures across all age groups.

In order to verify the validity of the supposition that health awareness increases in older people, ratios are calculated by dividing consumed quantities of carbohydrate products (rice, bread, flour and pasta), vegetables and fruits by meat quantities. Table 12 shows the carbohydrate-meat ratio, vegetable-meat ratio and fruit-meat ratio, which indicates the amount of consumed carbohydrates, vegetables and fruits (in kilograms) in proportion to one kilogram of meat.

age group	carbohydrate – meat ratio	vegetable – meat ratio	fruit – meat ratio
29 and younger	1.4	1.4	1.6
30-39	1.1	1.4	1.4
40-49	1.1	1.3	1.3
50-59	0.8	1.4	1.2
60 and older	0.9	1.7	1.6

Table 14: Ratios between carbohydrate, vegetable, fruit consumption and meat consumption by age groups

Source: raw data from Statistik Austria, 2002; own calculation

In fact, the vegetable-meat and fruit-meat ratio of the oldest age group is higher compared with middle or younger aged households. In other words, the age group including those 60 and older seems to have a more healthy diet, since this group also proportionately consumes more vegetables and fruits. Only the 29 and younger age group compares, also with a high fruit-meat ratio of 1.6. Conversely, the carbohydrate-meat ratio decreases from younger to mature age groups. That decrease may result from a preference of younger people for *quick-to-prepare foods* (rice, pasta products, bread).

4.2.3 Household net income

In this section the finding that lower income households respond more to price and the filling quality foods, made by Hayn et al. (2005) and Trichopoulou et al. (2002), is investigated for the case of Austria.

income quartiles	1 st (under € 870)	2 nd (€ 870 - € 1,172)	3 rd (€ 1,173- € 1,549)	4 th (over € 1,549)	units
<i>number of households (in 1,000)</i>	811.3	811.3	811.3	811.3	
FOODS					
rice, bread, flour, pasta	6.8	6.6	6.0	5.6	kg
vegetables (fresh)	7.8	7.5	7.3	6.6	kg
fruits (fresh)	7.7	6.9	6.4	7.2	kg
meat (fresh or frozen)	5.3	5.2	4.7	4.5	kg
fish (fresh, frozen, dried, smoked)	0.3	0.3	0.3	0.4	kg
yogurt	1.3	1.4	1.5	1.6	kg
cheese and curd	1.0	1.1	1.1	1.1	kg
milk	8.0	7.7	6.6	5.6	litre
eggs	20.9	21.4	17.4	17.1	units
animal fats	0.5	0.5	0.4	0.5	kg
vegetable fats	0.4	0.4	0.4	0.3	kg
candies	3.0	2.3	2.0	2.0	kg
NON ALCOHOLIC BEVERAGES					
coffee, cacao	0.8	0.9	0.8	1.0	kg
mineral water, soft drinks, juices	15.0	15.2	14.9	15.4	litre
mineral water	7.1	7.4	7.3	7.9	litre
soft drinks	4.6	4.6	4.5	3.9	litre
fruit juices	3.2	3.1	3.0	3.5	litre
vegetable juices	0.1	0.1	0.1	0.1	litre

Table 15: Monthly household equivalence consumption of selected foods and non-alcoholic beverages in kilograms, litres and units by quartiles of monthly household equivalence net income

Source: raw data from Statistik Austria, 2002; own calculation

The consumption of **rice, bread, cereals and flour** declines by one kilogram, from 7 kg to 6 kg, from the lowest to the highest income group. The consumption of **vegetables** shows a similarly low decline as household net income rises. Households belonging to the first quartile purchase 8 kg per month whereas households in the highest income group buy 7 kg. Changes in consumption within the category of vegetables are shown in Figure 14.

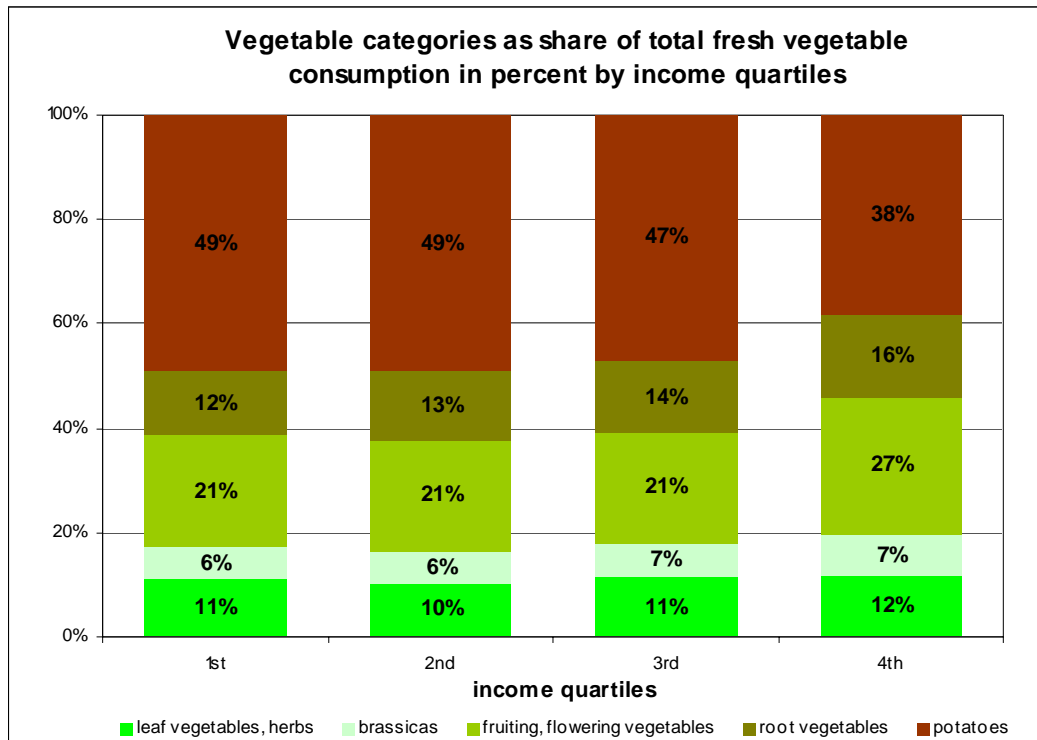


Figure 14: Vegetable categories as share of total fresh vegetable equivalence consumption (in quantities) in percent by quartiles of monthly household equivalence net income

Source: raw data from Statistik Austria, 2002; own calculation

Two trends can be identified. First, relative consumption of potatoes as share of total fresh vegetable consumption decreases considerably as income grows. Potato consumption of low income households constitutes a share of 49% of total fresh vegetable consumption, whereas high-income households consume only 38%. Second, relative figures of fruiting, flowering, leaf vegetables and herbs (as share of total fresh vegetable consumption) become higher as income increases. Maybe this trend is determined by both the price and time effect: potatoes are inexpensive and satiating, but require costly preparation time in comparison to fruiting, flowering and leaf vegetables, which can be consumed cold as snacks and in salads. These assumptions are confirmed when analysing household equivalence net income quartiles by current participation in working life of the household head (Table 14).

In the first quartile, 39% of household heads are retired (as opposed to 47% being in the labour force), and thus have more time available to prepare meals by themselves. 14% belong to the category other (maternity leave, housewives or –husbands, military service or civil serves and students). Relative shares of both households with retired heads and with heads belonging to the category other decline as income grows. The fourth quartile has only 33% retired household heads, but 67% heads in the labour force. Therefore, the time factor in combination with the price factor can explain why high income households prefer to eat fewer potatoes.

income quartiles / current participation in working life	labour force	retired	other ^a
1 st quartile (under € 870)	47.1%	39.1%	13.7%
2 nd quartile (€ 870 - € 1,172)	57.8%	37.6%	4.6%
3 rd quartile (€ 1,173 - € 1,549)	65.9%	32.0%	2.2%
4 th quartile (over € 1,549)	66.6%	32.7%	0.7%

^a The category other summarises households with the following participation in working life of the household head: maternity leave, housewives or -husbands, military service, civil serves and students.

Table 16: Percentage distribution of quartiles of monthly household equivalence net income by current participation in working life (shares are added line-by-line)

Source: raw data from Statistik Austria, 2002; own calculation

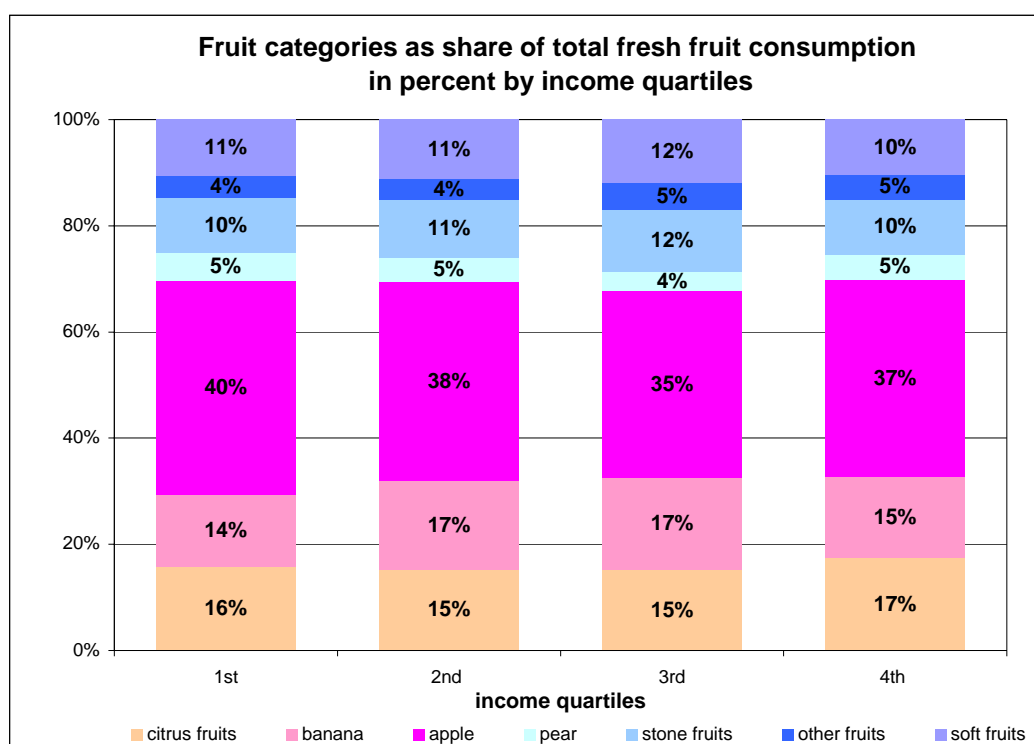


Figure 15: Fruit categories as share of total fresh fruit equivalence consumption (in quantities) in percent by quartiles of monthly household equivalence net income

Source: raw data from Statistik Austria, 2002; own calculation

Similar to vegetables, fresh **fruit** consumption decreases as household income grows, from 8 kg (first quartile) to 6 kg (third quartile). Between the third and the fourth quartile, however, fruit consumption increases by 1 kg, from 6 kg to 7 kg. The relative distribution of individual fruit types as share of total fresh fruit consumption shows two trends (Figure 15). First, the (relative) consumption of apples decreases from the first to the third quartile, from 40% to 35% and then grows moderately again, to 37% in the fourth quartile. Second, the consumption of exotic fruits (banana and citrus fruits) as share of total fresh fruit

consumption increases slightly with growing income, from 30% (first quartile) to 32% (fourth quartile).

Consumed quantities of **meat** are independent from income. Meat consumption reaches a level of 5 kg across all income quartiles. Again the analysis of meat consumption is focused on single meat categories as share of total fresh or frozen meat consumption (Figure 16). Beef and veal appear to respond positively to increases in household net income, as already argued by Gossard and York (2003) in Chapter 2. Low-income households consume only 13% beef and veal, whereas high-income households consume a share of 16%. Another meat category that rises considerably with household income is the category of dried, salted and smoked meat, again attributable to time scarcity. The consumption of this category amounts 37% of total meat consumption for the highest income quartile, but only 30% for the lowest income group. Conversely, the consumption of pork decreases from low-income households (first quartile: 28%) to high-income households (fourth quartile: 18%). Relative consumption of poultry, on the contrary, seems to be quite independent from income and varies between 16% and 17%. Somewhat surprisingly, the first quartile has high relative figures concerning sheep and goat consumption (2%), for which the author can give no explanation.

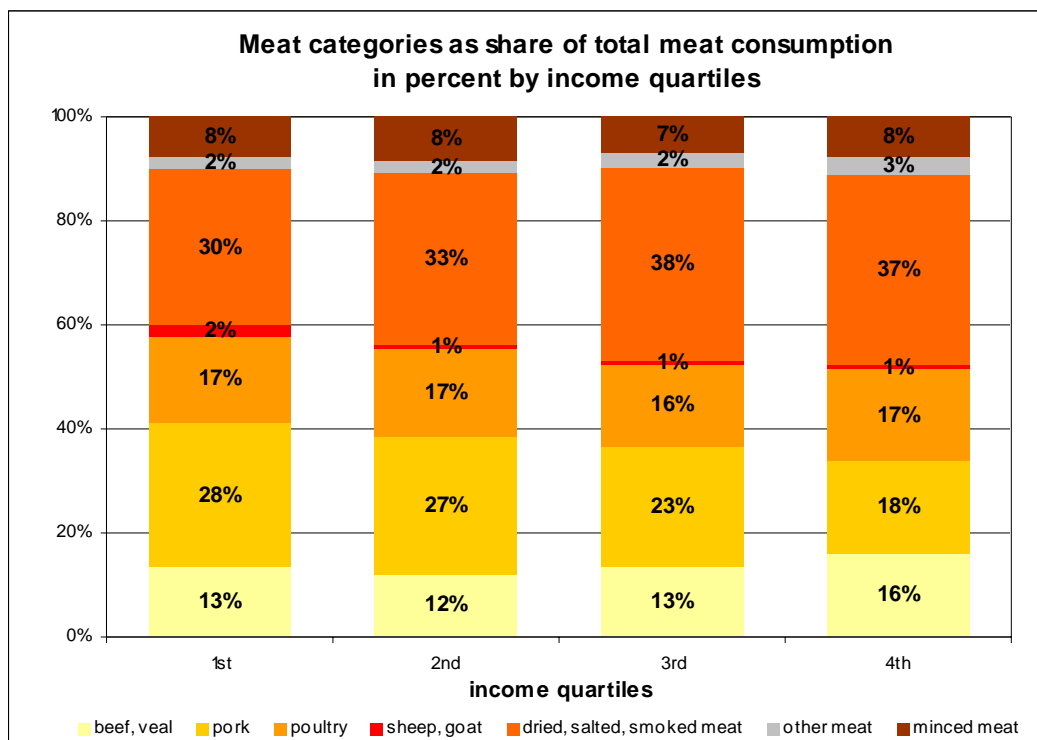


Figure 16: Meat categories as share of total fresh or frozen meat equivalence consumption (in quantities) in percent by quartiles of monthly household equivalence net income

Source: raw data from Statistik Austria, 2002; own calculation

Up to this point, food categories decreased with rising household income. However, the categories of **fish, yogurt, cheese and curd, coffee and cacao** grow slightly from the first to the fourth quartile. Except for fish, these categories are important ingredients in snack meals. Therefore, rising consumption figures of these categories result from the assumption that snack consumption increases (cold dishes) with income. The increase in fish consumption may derive from the price effect. The consumption of **fats** seems to be free from income effects.

The remaining categories to be discussed are bottled beverages and milk. Whereas the category of milk decreases by 2 litres from the lowest to the highest income quartile, income has no impact on the consumption of **mineral water, soft drinks and juices**. Differences of consumption figures stay below the one litre level.

4.2.4 Educational level

As argued by Trichopoulou et al. (2002), education is the strongest determinant which influences peoples' diet, because education is a precondition for the understanding of health and environmental related information. The validity of this finding for Austrian consumers will be examined carefully in this section by analysing the food categories consumed by different educational levels.

As it was the case with income, the categories of rice, bread, flour and pasta, vegetables, fruits, meat and eggs appear to respond negatively to increases in educational level of the household head. Table 15 presents absolute consumption figures for the main food categories.

Households with heads that have attained maximally secondary school qualification (A) consume on average 8 kg of **rice, bread, flour and pasta** products monthly. From those households with lowest educational level (A) to college/university-educated households (D), this category declines by 3 kg, from 8 kg (A) to 5 kg (C).

educational level	maximum secondary school (A)	vocational school/ apprenticeship (B)	high school degree (C)	college/ university degree (D)	units
<i>number of households (in 1,000)</i>	829.1	1,640.2	482.0	282.6	
FOODS					
rice, bread, flour, pasta	8.0	6.0	5.2	4.9	kg
vegetables (fresh)	9.1	7.1	5.7	5.8	kg
fruits (fresh)	8.2	6.8	6.3	6.3	kg
meat (fresh or frozen)	6.2	5.0	3.5	3.0	kg
fish (fresh, frozen, dried, smoked)	0.3	0.3	0.3	0.4	kg
yogurt	1.3	1.4	1.6	2.1	kg
cheese and curd	1.0	1.1	1.1	1.1	kg
milk	8.6	6.9	5.7	5.3	litre
eggs	23.4	19.4	15.9	11.5	units
animal fats	0.5	0.4	0.4	0.4	kg
vegetable fats	0.5	0.4	0.3	0.2	kg
candies	3.1	2.3	1.6	1.2	kg
NON ALCOHOLIC BEVERAGES					
coffee, cacao	0.9	0.9	0.7	0.9	kg
mineral water, soft drinks, juices	15.1	15.5	14.5	13.7	litre
mineral water	8.2	7.4	6.9	6.0	litre
soft drinks	4.4	4.7	3.9	3.3	litre
fruit juices	2.4	3.3	3.6	4.2	litre
vegetable juices	0.1	0.1	0.1	0.2	litre

Table 17: Monthly household equivalence consumption of selected foods and non-alcoholic beverages in kilograms, litres and units by educational level

Source: raw data from Statistik Austria, 2002; own calculation

Vegetable consumption of the lowest-educated households is about 4 kg higher, 9 kg, than that of high-school or college/university-educated households (5 kg). By concentrating the analysis on the level of single vegetable categories (Figure 17), trends identified in the preceding section appear again, however in a more pronounced manner. Clearly, the consumption of potatoes decreases dramatically with higher educational achievement, from more than 50% (A) to 31% (D) of total fresh vegetable consumption. More educated households substitute potatoes with higher relative amounts of fruiting and flowering vegetables on the one hand, 34% (D) versus 18% (A), and of root vegetables on the other hand, 20% (D) versus 11% (A).

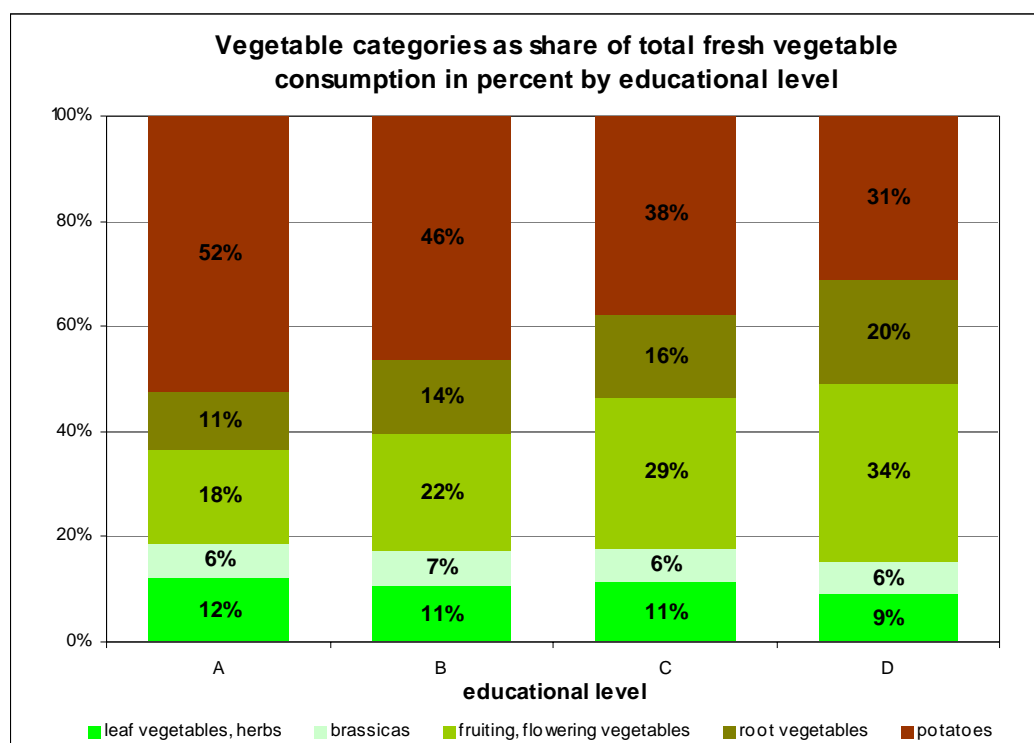


Figure 17: Vegetable categories as share of total fresh vegetable equivalence consumption (in quantities) in percent by educational level

Source: raw data from Statistik Austria, 2002; own calculation

The reasons for these consumption habits by educational level are again time and price effect. The categories of brassicas, leaf vegetables and herbs do not present a definite trend: brassicas consumption amounts between 6% (D) and 7% (B), leaf vegetables and herbs between 9% (D) and 12% (A) of total fresh vegetable consumption.

The consumption of fresh **fruits** decreases from lowest-educated households to highest educated household by 2 kg, from 8 kg to 6 kg. By focusing on relative consumption figures, it is clear that households with heads who attained maximum secondary school present the highest relative figures in apple consumption, 45% of total fresh fruit consumption. Between household heads who attained maximum secondary school (A) and high school-educated households (C), relative apple consumption decreases from 45% to 29% but then rises again to 36% (D). Furthermore, the higher educated households in the high school (C) or college/university-educated (D) groups consume a higher share of exotic fruits than lower educated households, 39% (C) and 35% (D) versus 26% (A). The category of soft fruits, stone fruits and pears decreases slightly (by around 2%) with increasing educational level.

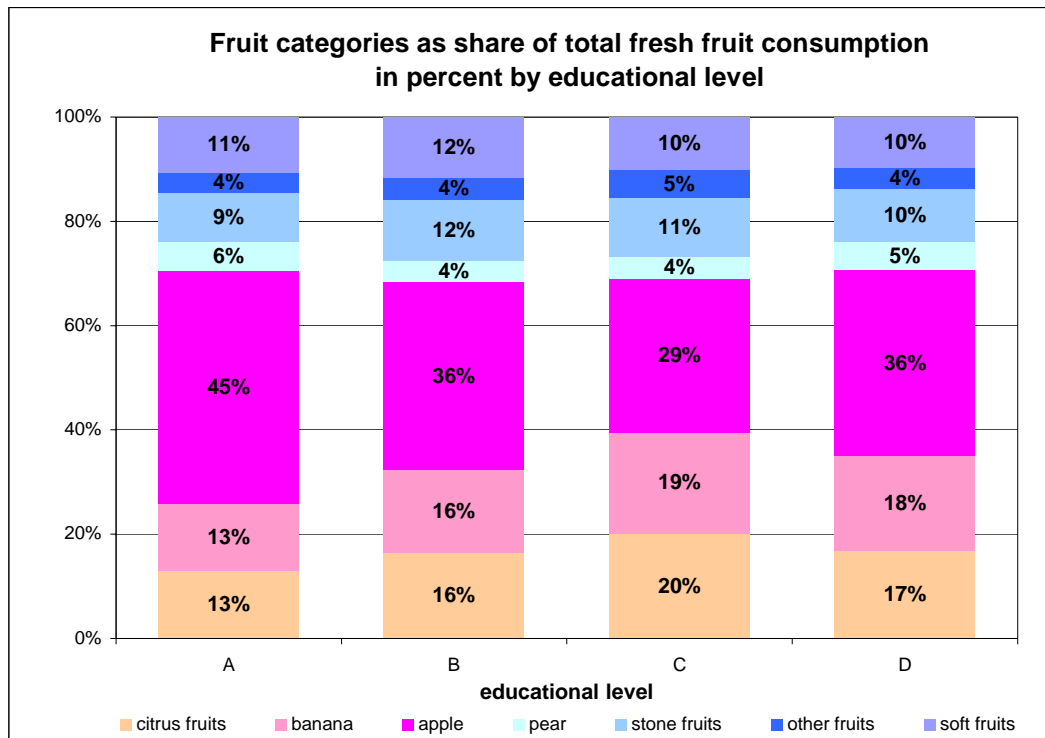


Figure 18: Fruit categories as share of total fresh fruit equivalence consumption (in quantities) in percent by educational level

Source: raw data from Statistik Austria, 2002; own calculation

The category of **meat** falls approximately by a half from lowest-educated with 6 kg to the highest educated households with 3 kg. The percentage distribution of total meat consumption on single meat categories is presented in Figure 19. At least three trends can be gleaned from this diagram. First, relative consumption of dried, salted and smoked meat rises dramatically from lesser (A), 31%, to higher educated households (C), 40%, but declines to 36% in college/university-educated households (D). Secondly, pork consumption declines by nearly a half, from 29% (A) to 16% (D). Thirdly, poultry consumption as share of total meat consumption rises with higher educational level of the household head. Beef and veal appear to not follow any trends. College/university-educated as well as low educated households have high relative beef consumption figures, 16% (D) and 15% (A) respectively. Only the household groups with heads who attained vocational school or an apprenticeship (B) and high school educated households (C) show lower values, at around 13% in each case. Whereas increases in dried, salted and smoked meat result from time constraints, higher shares of poultry consumption by educational level maybe due to higher health and environmental awareness.

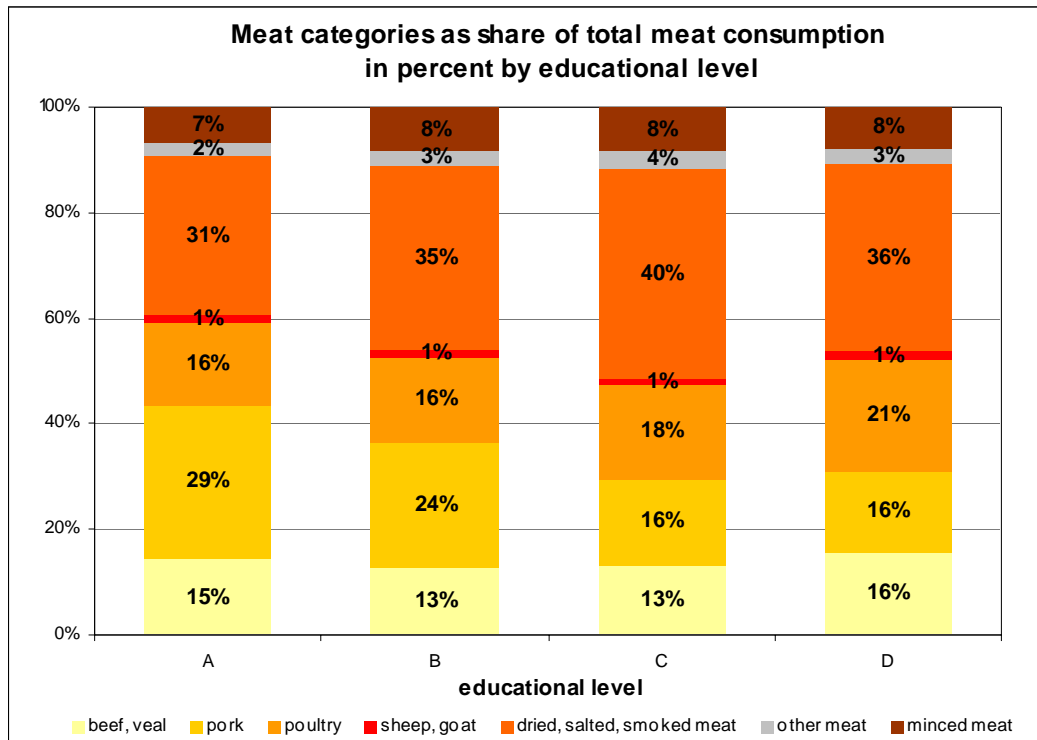


Figure 19: Meat categories as share of total fresh or frozen meat equivalence consumption (in quantities) in percent by educational level

Source: raw data from Statistik Austria, 2002; own calculation

Furthermore, educational level seems to have no influence on the consumption of **fish**, which varies between 0.3 kg and 0.4 kg. Also, the categories of **cheese, curd, coffee and cacao** are neutral. Increases in food categories can only be witnessed with **yogurt** consumption, which rises from 1 kg for low-educated households to 2 kg for high educated households. The consumption of **milk, egg and fat**, however, responds negatively to educational level.

Concerning bottled **beverages**, lower educated households consume 8 litres of mineral water, 0.4 litres less than milk. With increasing educational level the consumption of mineral water decreases from 8 (A) to 6 (D) litres, but always exceeds milk consumption. Similarly, the consumption of soft drinks declines by around one litre, from 4 (A) to 3 litres (D). Only fruit juice consumption increases, so much so that highest educated households consume nearly twice as much fruit juices, 4 litres monthly, than lowest-educated households, 2 litres.

Claims on rising vegetable and fruit consumption with higher educational level made in Chapter 2 can not be verified by analysis of absolute consumed quantities. Since higher educated households tend to spend more on out-of-home consumption, needs for food consumed at home are lowered, so that both vegetables and fruits decrease with higher educational level. Therefore, ratios between fruits, vegetables and meat and between bread, rice, flour and pasta (carbohydrates) and meat are calculated (Table 16).

educational level	carbohydrate-meat ratio	vegetable-meat ratio	fruit-meat ratio
maximum secondary school (A)	1.3	1.5	1.3
vocational school/ apprenticeship (B)	1.2	1.4	1.4
high school degree (C)	1.5	1.6	1.8
college/ university degree (D)	1.6	1.9	2.1

Table 18: Ratios between carbohydrate, vegetable, fruit consumption and meat consumption by educational level

Source: raw data from Statistik Austria, 2002; own calculation

Indeed, the carbohydrate-meat, vegetable-meat and fruit-meat ratio increases with higher educational level. In other words, low educated households (maximum secondary school achievement) consume fewer carbohydrates (1.3), vegetables (1.5) and fruits (1.3) in proportion to one kilogram of meat. Higher educated households (college/university degree), on the contrary, have higher ratios in favour of carbohydrate, vegetable and fruit consumption, 1.6 for carbohydrate, 1.9 for vegetable and 2.1 for fruit consumption.

4.2.5 Labour force status

Differences in consumed quantities of food and beverage categories by selected labour force status groups (farming households, self-employed households, workers and employee in low, middle or high positions) demonstrate that the group of workers/employees in middle and high positions have the lowest consumption figures for vegetables, fruits, meat and the aggregate of rice, bread, flour and pasta. In contrast, farming households have the highest figures within these categories. In the following, a detailed description of consumption figures is given.

As stated above, farming households are the greatest consumers of **bread, rice, flour and pasta**, with 10 kg per month. That maximum is attributed to a higher consumption of bread and raw flour. In particular, farming households consume 5 kg of bread and 4 kg of flour per month, which is more than twice as much as all other household types. The higher consumption of bread could arise from traditional eating habits, since bread used to be an important component of each meal, especially among the rural population. Those traditional eating habits are still present, particularly among the elderly. The higher quantities of flour may stem from a preference for the self-preparation of meals which contain flour, like breads, tarts, cakes, sauces, side dishes, etc.

labor force status	Farmers	Self-employed	Workers and employees			units
			...in low positions	...middle positions	...high positions	
number of households (in 1,000)	162.1	279.5	1141.1	920.3	570.1	
FOODS						
rice, bread, flour, pasta	9.9	6.0	6.7	5.7	5.0	kg
vegetables (fresh)	9.6	6.4	7.8	6.7	5.9	kg
fruits (fresh)	8.9	7.2	7.0	6.9	6.3	kg
meat (fresh or frozen)	6.8	4.8	5.5	4.6	3.6	kg
fish (fresh, frozen, dried, smoked)	0.3	0.3	0.4	0.4	0.3	kg
yogurt	1.0	2.1	1.4	1.4	1.6	kg
cheese and curd	1.1	1.2	1.1	1.0	1.1	kg
milk	11.7	6.4	7.5	6.2	5.6	litre
eggs	26.2	17.0	20.8	18.7	13.8	units
animal fats	0.8	0.4	0.4	0.4	0.4	kg
vegetable fats	0.4	0.2	0.4	0.4	0.2	kg
candies	4.3	1.9	2.4	2.4	1.5	kg
NON ALCOHOLIC BEVERAGES						
coffee, cacao	0.9	0.9	0.9	0.8	0.8	kg
mineral water, soft drinks, juices	14.9	14.3	15.9	14.7	14.4	litre
mineral water	9.0	6.6	7.8	6.8	7.3	litre
soft drinks	3.9	4.0	4.9	4.6	3.4	litre
fruit juices	2.0	3.5	3.1	3.2	3.6	litre
vegetable juices	0.0	0.2	0.1	0.1	0.1	litre

Table 19: Monthly household equivalence consumption of selected foods and non-alcoholic beverages in kilograms, litres and units by farmers, self-employed people and employees (including public servants and clerks) in low, middle and high positions

Source: raw data from Statistik Austria, 2002; own calculation

High numbers for **vegetable** consumption (in quantities) again occur in farming households (10 kg), whereas self-employed households, workers and employees consume markedly less, between 6 kg and 8 kg. The percentage distribution of various vegetable types as share of total fresh vegetable consumption across selected labour force status groups is shown in Figure 20. Potato consumption within farming households and those led by workers/employees in low positions amounts to between 48% and 51%. Figures below 40% can be found in self-employed households and households with employees in high positions, which substitute fruiting and flowering vegetables (around 28%) and root vegetables (between 12% and 18%) for potatoes. The highest share in leaf vegetable, herb and brassica consumption, at 14% and 9% respectively, can be found in farming households.

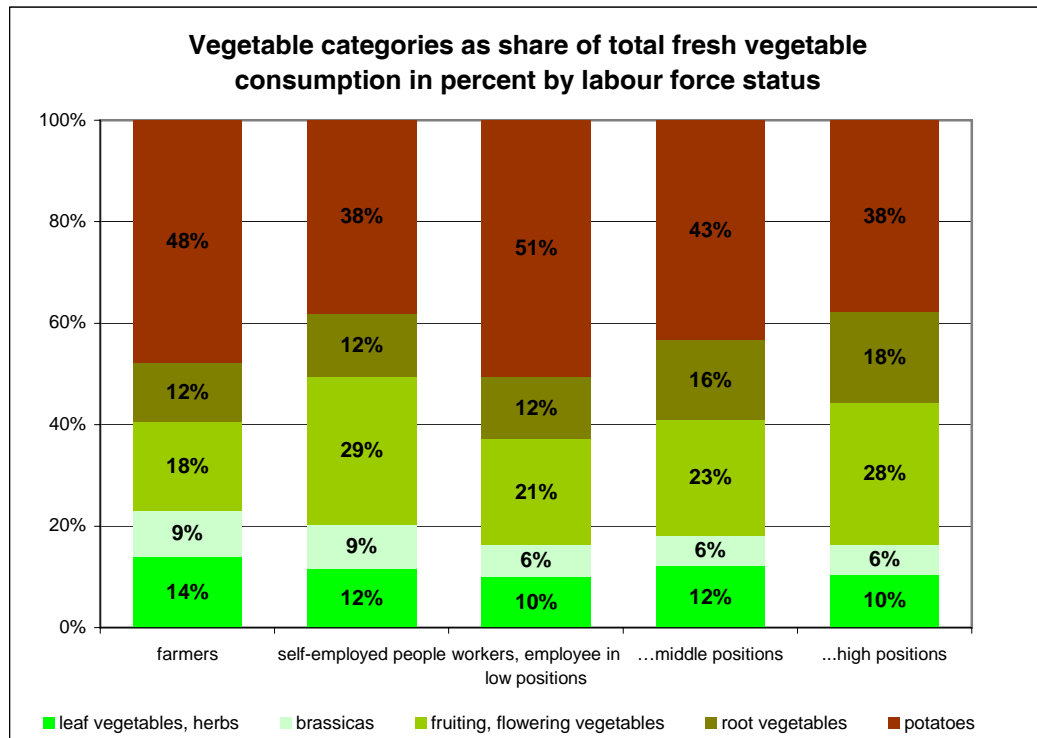


Figure 20: Vegetable categories as share of total fresh vegetable equivalence consumption (in quantities) in percent of farmers, self-employed people and workers/employees (including public servants and clerks) in low, middle and high positions

Source: raw data from Statistik Austria, 2002; own calculation

Concerning fruit consumption, it has already been stated that farming households have the highest observed absolute levels of fruit consumption, whereas employees in middle and high positions have the lowest. More interesting, however, is the percentage distribution of fruits as share of total fresh fruit consumption by labour force status. From Figure 21 it becomes clear that fruit consumption habits of the farming households stand out from other groups. Farming households are the maximum consumers of both, apples and pears, 53% and 11%, respectively. At the same time they seem to put less importance on exotic fruits, like bananas or citrus fruits (16%). Again, traditional eating habits can be responsible for this preference. In worker/employee households, irrespective of position, and self-employed households relative consumption of exotic fruits almost exceeds apple consumption, 32% to 38% for apples versus 30% to 36% for exotic fruits. As for the other groups, the relative pear consumption across labour force status groups remains quite low, under 5%, stone and soft fruit consumption varies between 9% and 13% (stone fruits) and 7% and 11% (soft fruits), respectively.

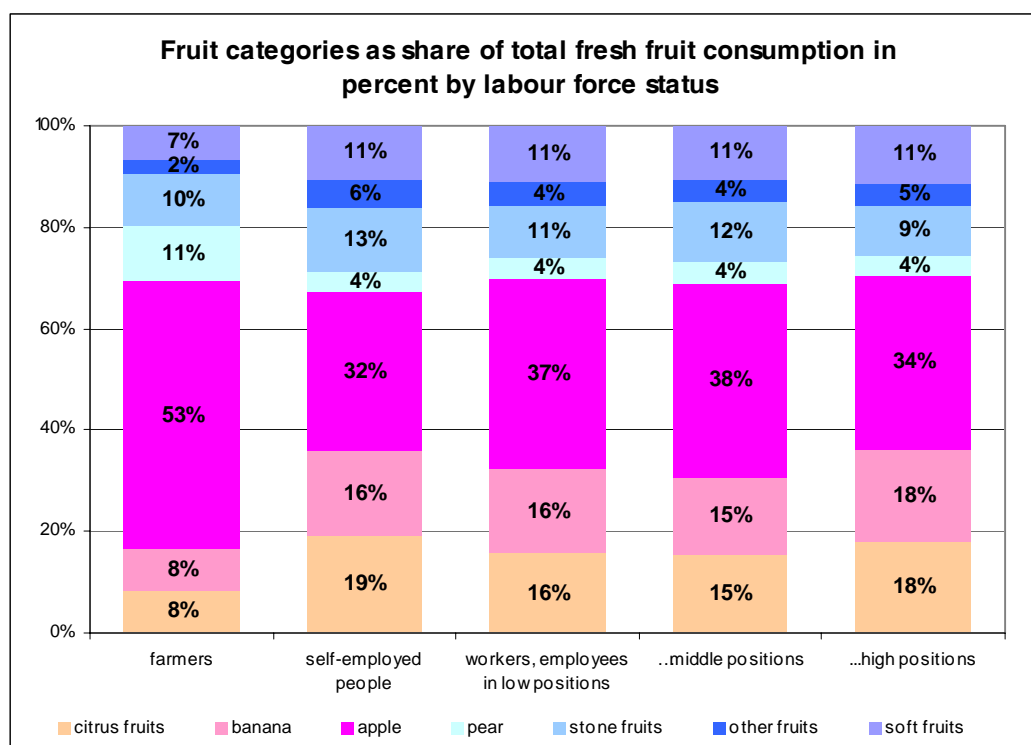


Figure 21: Fruit categories as share of total fresh fruit equivalence consumption (in quantities) in percent of farmers, self-employed people and workers/employees (including public servants and clerks) in low, middle and high positions

Source: raw data from Statistik Austria, 2002; own calculation

With respect to consumed quantities of meat, farming households consume 7 kg monthly, the self-employed and workers/employees between 4 kg and 6 kg. The impact of labour force status on the consumption of various meat categories in relative figures is presented in Figure 22. At least two trends can be identified. First, pork consumption shows high relative figures in farming (31%) and low-positioned worker/employee households (26%), but shows notably less importance in self-employed or employee households in higher positions, where pork consumption accounts for between 15% and 24%. Second, the lower consumption of pork by self-employed and employee households in higher positions is compensated by a higher intake of dried, salted or smoked meat (between 33% and 43%). The consumption of beef, veal and poultry seems to be mostly independent of labour force status. Only the group of workers and employees in high positions consume relatively more beef and veal (15% of total fresh or frozen meat consumption) than the other labour force status groups, due to their higher income level. Somewhat surprisingly, relative sheep and goat consumption accounts for 2% within employee households in middle positions, whereas all other labour force status groups show relative figures that are for the most part below the level of 1%.

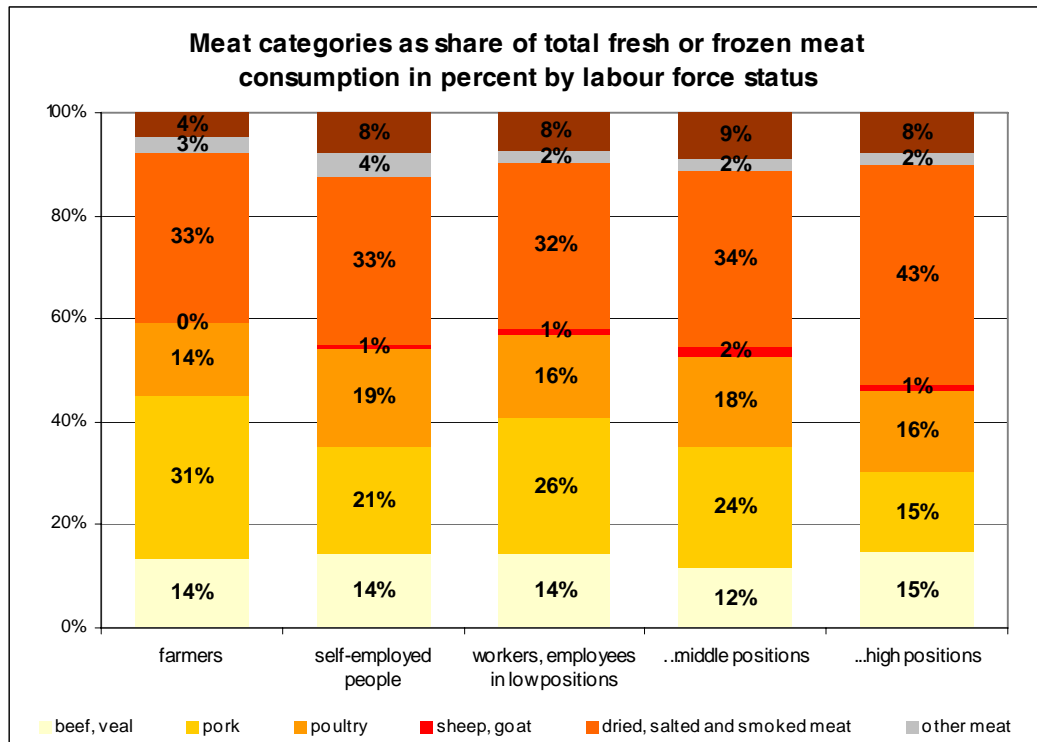


Figure 22: Meat categories as share of total fresh or frozen meat equivalence consumption (in quantities) in percent of farmers, self-employed people and workers/employees (including public servants and clerks) in low, middle and high positions

Source: raw data from Statistik Austria, 2002; own calculation

Food categories like eggs and candies again are most prominent in farming households, whereas worker/employee households have the lowest absolute figures in both eggs and candy consumption. Yogurt consumption is lowest in farming households (1 kg). For the rest, consumption figures seem to be quite independent from labour force status, so that variations remain below a level of 0.5 kg and 0.2 litres respectively.

Finally, the class of mineral water, soft drinks and juices as well as the category of milk is covered. Milk consumption peaks at 12 litres in farming households, whereas the other households consume markedly less, between 8 and 6 litres. Labour force status grouping seems to have no influence on consumed quantities of mineral water, soft drinks and juices.

4.2.6 Out-of-home expenditure quartiles

As pointed out in Section 4.1, some households spend a higher share of their food budgets on eating out (e.g. younger households, households in the labour force, high income households) and others primarily purchase food products for consumption at home. In this context, we are interested in differences in food choice, purchased for consumption at home, between households that spend less on eating out and households that spend a higher amount of their food budget on out-of-home consumption. For this purpose, households are divided into four expenditure groups, which are calculated by computing quartiles of monthly equivalence expenditures on out-of-home consumption, so that households within the first group spend the least and within the fourth group spend the most on eating out. The method and advantage of using equivalence expenditures instead of total household expenditures have already been explained in Section 4.1.4. In the strict sense, out-of-home expenditure quartiles are not socio-economic determinants, but we assume that the impact on consumed food categories is considerable. Therefore, this approach is mentioned at the end of Section 4.2, since it only considers the value of out-of-home expenditures irrespective of age, labour force status, current participation in working life, education and income.

Before discussing consumed quantities, attention must be given to total expenditures on foods and beverages purchased for consumption at home. It seems to be reasonable to postulate that households that spend more money on eating out for whatever reason have a lower need for food to be stored, prepared and eaten at home. Contrary to expectations, monthly equivalence expenditures on foods and beverages consumed at home rise from the first to the third quartile, from € 159 to € 174 and then remain constant. Two influencing factors can explain the increase. First, prices of consumed foods and beverages are higher due to changes in purchased food groups and changes in food quality. Second, against expectations, consumed quantities increase as expenditures on out-of-home consumption grow. Therefore, a detailed analysis of consumed quantities is necessary.

The calculation of monthly equivalence consumption figures (Table 17) confirms the hypothesis that higher expenditures out-of-home result in lower food needs within in the household. The main food categories, rice, bread, flour and pasta, vegetables, fruits and meat decline verifiably from the first to the fourth quartile.

quartiles of out-of-home consumption expenditures	1st (under € 10)	2nd (€ 10 - € 43.9)	3rd (€ 44 - € 100)	4th (over € 100)	units
<i>number of households (in 1,000)</i>	810.3	810.3	810.3	810.3	
FOODS					
rice, bread, flour, pasta	7.0	6.5	5.9	5.7	kg
vegetables (fresh)	8.3	7.8	7.2	5.9	kg
fruits (fresh)	7.2	7.9	6.4	6.6	kg
meat (fresh or frozen)	5.4	5.0	4.9	4.3	kg
fish (fresh, frozen, dried, smoked)	0.3	0.3	0.3	0.3	kg
yogurt	1.4	1.4	1.5	1.6	kg
cheese and curd	1.0	1.0	1.2	1.1	kg
milk	8.5	7.2	6.5	5.8	litre
eggs	21.3	20.3	18.4	16.8	units
animal fats	0.5	0.5	0.5	0.4	kg
vegetable fats	0.4	0.4	0.4	0.3	kg
candies	2.9	2.3	2.3	1.9	kg
NON ALCOHOLIC BEVERAGES					
coffee, cacao	0.8	0.8	0.9	0.9	kg
mineral water, soft drinks, juices	13.0	14.6	16.1	16.3	litre
mineral water	6.5	7.6	7.8	7.7	litre
soft drinks	4.0	4.0	4.7	4.8	litre
fruit juices	2.5	3.0	3.5	3.6	litre
vegetable juices	0.1	0.1	0.1	0.2	litre

Table 20: Monthly household equivalence consumption of selected foods and non-alcoholic beverages in kilograms, litres and units by quartiles of monthly household equivalence expenditures on out-of-home consumption

Source: raw data from Statistik Austria, 2002; own calculation

The consumption of **rice, bread, flour and pasta** decreases only by 1 kg from the first to the fourth quartile. Some of this decline is attributed to a drop in flour consumption, from 2 kg to 1 kg, on the one hand, and in rice consumption, from 0.8 kg to 0.6 kg on the other hand. Only the consumption of pasta increases slightly from 0.7 kg (first quartile) to 0.9 kg (fourth quartile).

The reduction in **vegetable** consumption is more considerable. Households belonging to the quarter that expends the least on eating out consume around 8 kg of vegetables monthly. On the contrary, households belonging to the highest out-of-home expenditure group consume about 2 kg less, that is to say 6 kg. However, not only absolute consumption figures change as expenditures on out-of-home consumption rise, but also the relative preference for single vegetable groups (Figure 23). Potato consumption accounts for 50% of total fresh vegetable

consumption within the first quartile and then declines as out-of-home expenditures increase, so that within the fourth quartile it constitutes only a share of 41%. The drop in potatoes from the first to the fourth quartile is compensated for by higher relative figures in root, fruiting and flowering vegetables. The consumption of brassicas, leaf vegetables and herbs seems to be largely independent of out-of-home consumption quartiles. It stands to reason that households that spend less on eating out take their meals more often at home and possibly cook more regularly, especially when considering that 54% of household heads belonging to the first quartile are retired²⁰. Therefore, those households hesitate less to purchase products that must be boiled, fried, baked- in other words, needing time-consuming preparation before they can be consumed. Since potatoes belong to this group of foods, this could be a reason why (relative) potato consumption dominates within the first quartile of households.

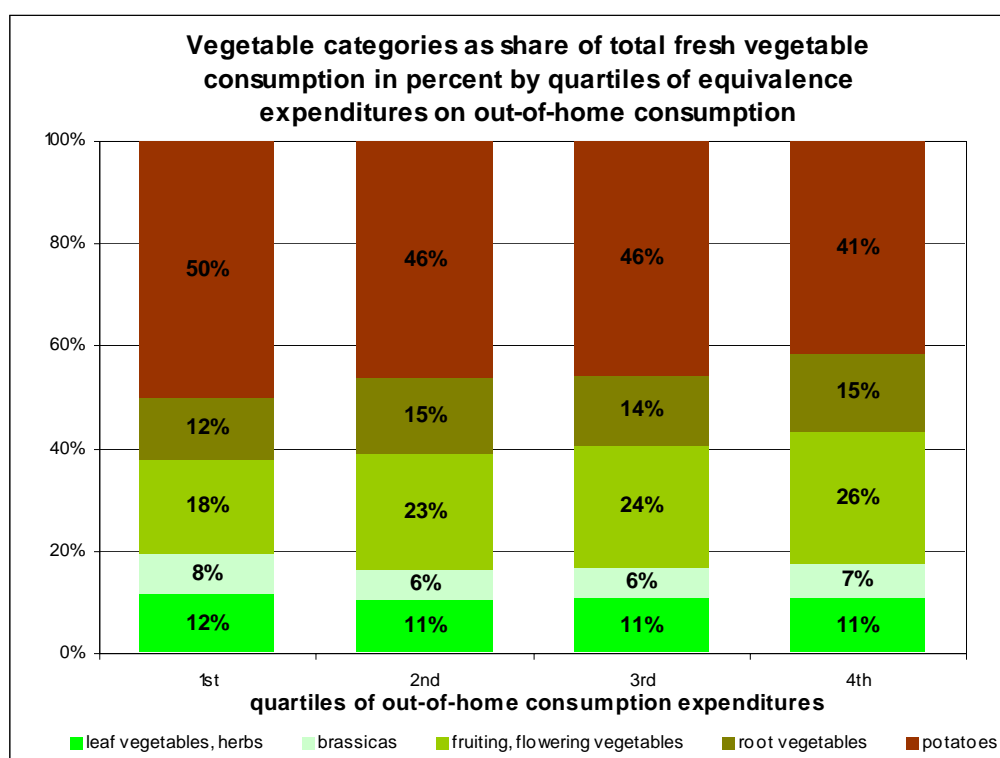


Figure 23: Vegetable categories as share of total fresh vegetable equivalence consumption (in quantities) in percent by quartiles of monthly household equivalence expenditures on out-of-home consumption

Source: Data from Konsumerhebung 1999/2000; own calculation

The consumption of **fruits**, however, decreases by less than one kilogram. By considering the preference for single fruit categories (Figure 24), the apple seems to be the preferred fruit. Apple consumption within the first quartile constitutes a share of 42% of total fresh fruit

²⁰ It should be noted that the number of employed households increases whereas the number of retired household declines from the first to the fourth quartile.

consumption. Similar high figures are observed within the second (38%) and the fourth (37%) quartile. Only the third quartile shows lower figures in apple consumption (33%) that is compensated for by a higher relative intake of both exotic fruits (35%) and soft (12%) and stone fruits (11%). Pear consumption, as share of total fresh fruit consumption, remains very low throughout all four quartiles.

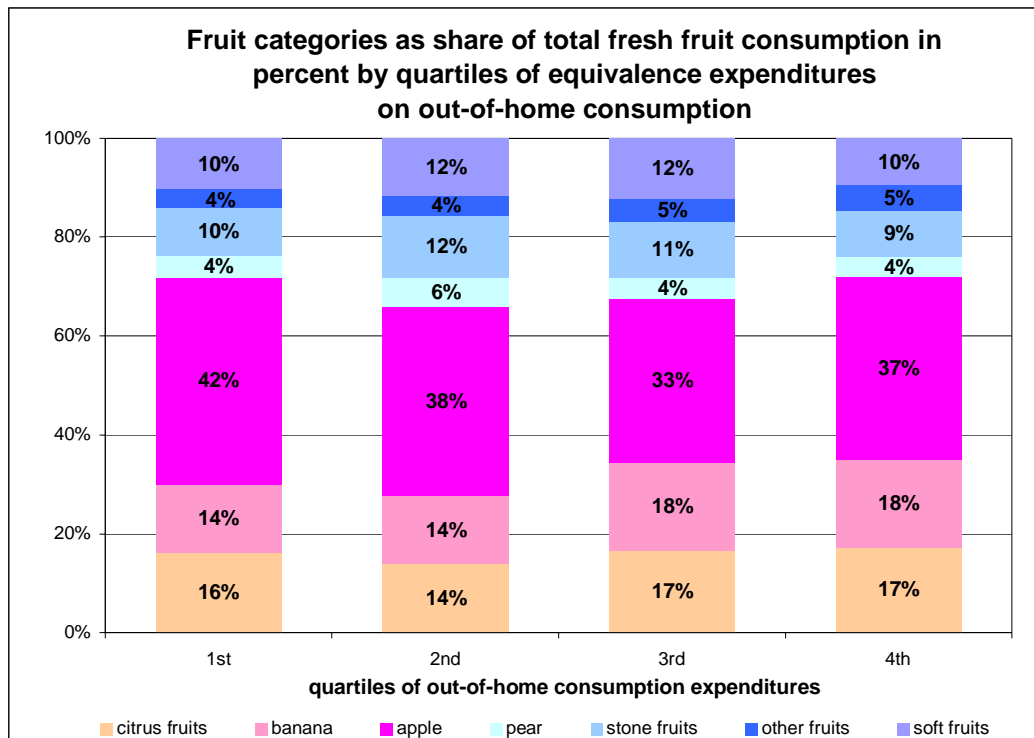


Figure 24: Fruit categories as share of total fresh fruit equivalence consumption (in quantities) in percent by quartiles of monthly household equivalence expenditures on out-of-home consumption

Source: raw data from Statistik Austria, 2002; own calculation

Meat consumption decreases from 5 kg to 4 kg as monthly equivalence expenditures on out-of-home consumption rise. Within the category of **meat**, two quite weak patterns can be identified (Figure 25). First, the consumption of dried, smoked and salted meat rises from 31% to 39% with increasing expenditures on out-of-home consumption. Second, beef and veal decrease slightly, from 14% (first quartile) to 11% (fourth quartile). In other respects, relative consumption figures of other meat categories seem not to correlate with expenditures on eating out. Relative pork consumption, for example, decreases from the first to the second quartile, from 26% to 23%, but then remains constant. The category of poultry fluctuates between 16% and 17% of total meat consumption throughout.

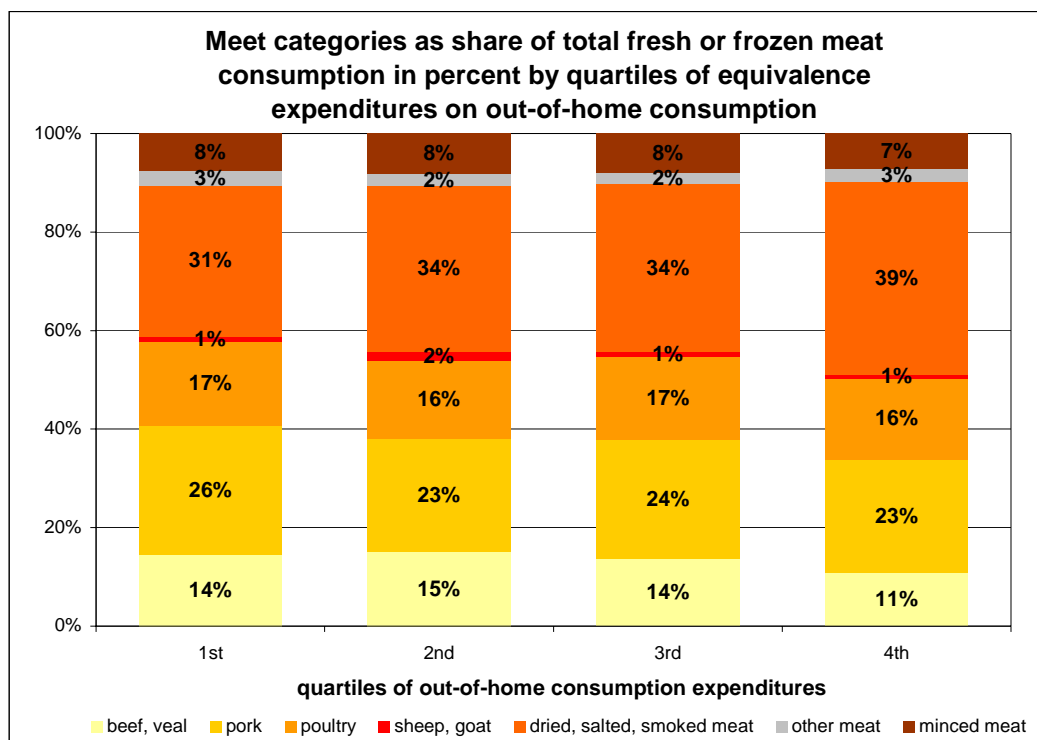


Figure 25: Meat categories as share of total fresh or frozen meat equivalence consumption (in quantities) in percent by quartiles of monthly household equivalence expenditures on out-of-home consumption

Source: raw data from Statistik Austria, 2002; own calculation

Further reductions in consumption figures are observed in the categories of **milk, eggs, fats** and **candies**. Figures of **fish** consumption, on the contrary, remain constant at a level of 0.3 kg per month. Thus far, in-home consumption of various food categories has decreased as expenditures on out-of-home consumption grow. However, not all food categories respond negatively on increasing out-of-home consumption expenditures. Again, food categories that are important ingredients in cold dishes (snacks), like **yogurt, cheese** and **curd**, rise slightly from the first to the fourth quartile. Also the consumption of **coffee and cacao** seems to respond positively to increasing expenditures on eating out.

The last category that has to be discussed is the category of **mineral water, soft drinks** and **juices**, which is compared with milk consumption. Households within the first quartile consume 9 litres of milk, two litres more than that of mineral water. However, within the second quartile mineral water consumption already exceeds that of milk, due to both an increase in mineral water consumption and a decline in milk consumption. Between the first and fourth quartile, milk consumption declines by 4 litres whereas mineral water consumption is up by 1 litre. Similarly, soft drink, fruit and vegetable juice consumption responds positively with higher expenditures on eating out.

5 Conclusions

The aim of the concluding section is to compare key results obtained from the literature research cited in Section 2.3 with results of self-reported data in Chapter 3 and 4. Using the description of sustainable food consumption within this thesis (Section 1.3), the author makes an attempt to evaluate consumption trends in Austria with respect to environmental sustainability. Finally, recommendations for further research and ideas that could bring more sustainability in food consumption are presented.

First, average Austrian consumption patterns which were identified through calculations in Section 3.3, are compared with key results of international patterns, discussed by BMLFUW (2003), EEA (2005), FAO and WHO (2003), OECD (2002) and Payer et al. (2000). In line with the trend toward declining household expenditures on foods (inclusive beverages) as share of total household budget in industrialized countries as discussed by EEA (2005), OECD (2002) and Regmi et al. (2001), the analysis shows that Austrian households spend a rather low percentage of their total household budget on foods and beverages (13%). In addition, still lower figures are found within high income households (9%). Apart from expenditures spent on food consumed at home, the thesis also considers spending out-of-home. Out-of-home consumption expenditures (inclusive expenditures in hotels) as share of total household budget account for 6%, as compared to 5% in the previous Household Budget Survey 1993/1994 (Statistik Austria, 2006^a). These results are in accordance with the study by the OECD (2002) and Regmi et al. (2001), which argue that the share of food budget spent on out-of-home consumption has increased.

After the budget analysis, the thesis deals with consumed quantities of different food and beverage categories. Since the data evaluation in Chapter 3 is based on a two-person household with 0.5 children (the average Austrian household), a comparison of consumption results (consumed quantities in kilograms, litres and units) in this work with other studies is not possible. However, results gained in this thesis can be compared to general consumption trends such as those identified through EEA (2005), FAO and WHO (2003) and OECD (2002). These reports agree that dietary habits in industrialized countries as well as global patterns are characterised by a shift to more vegetables, fruits, meat (especially pork and poultry) and bottled beverages with a resulting decrease in potatoes and dairy products (with the exception of cheese which is rising). By comparing international to Austrian patterns, the trend toward higher vegetable, fruit and meat consumption is verified through data evaluation.

Calculations yielded monthly consumption figures of 14 kg for fruits, 14 kg for vegetables and 10 kg for meat. By focusing on preferred vegetable, fruit and meat categories, we find that in terms of consumed vegetable quantities, potatoes amount to 46% of total fresh vegetable consumption in Austria, somewhat in contradiction to the OECD study in which declining potato consumption is noted. Apart from potatoes, the thesis points out that fruiting and flowering vegetables (22%), root (14%) and leaf vegetables (11%) are also important vegetable categories. Focusing on relative quantities of fresh fruits, calculations show that the apple still holds an important position in Austrian's diet (37%). Exotic fruits, however, become more and more important. Relative consumption figures are only slightly lower than that of apples (32%). Within the category of meat, dried, salted and smoked meat (34%) dominates the menu of an average Austrian household. The higher consumption figures for that category can be related to a higher frequency of cold meal and snack consumption. With respect to the growing preference for pork and poultry mentioned in the OECD study, the analysis indicates high consumption figures for pork (25%), and slightly lower ones for poultry (16%). In addition, beef and veal consumption accounts for 14% of total fresh or frozen meat consumption. As far as fats and oils are concerned, the thesis confirms the substitution of animal fats with vegetable fats, mentioned by OECD (2002), for Austria. In the strict sense, calculations produced consumption figures of animal fats that exceed that of vegetable fats only by few tenth litres, 0.9 litre versus 0.7 litre per month. The decline in dairy products (with the exception of cheese) is in accordance with the OECD study (2002). With cheese accounting for roughly for 1 kg per month, the thesis identifies yogurt (3 kg) to be more important, in contrast to the increasing importance of cheese claimed by the OECD (2002). Finally, the argued increase in bottled beverage consumption (EEA, 2005; OECD, 2002) can also be seen in Austrian households. The data evaluation produced consumption figures of mineral water, soft drinks and juices around 29 litres monthly.

Furthermore, several studies argue that in industrialized countries the convenience factor influences people's diet and results in a higher demand for *quick-to-prepare foods* (BMLFUW, 2003; EEA, 2005; OECD, 2002; Payer et al., 2000). In Austria's case, calculations contradict this result. Since the Austrian Household Budget Survey does not offer consumption figures (in quantities) for these categories, the author's conclusion is supported by expenditure figures: the consumption of convenience foods like frozen, preserved (instant, canned) or chilled ready-to-eat meals in Austria is rather low since they constitute only a share of 2% of total household food budget.

Based on these results the thesis comes to the conclusion that average household consumption in Austria is dominated by traditional food categories like brown bread, potatoes, apples and pork. With respect to the author's definition of sustainable food

consumption, the author points out that higher consumption figures of bottled beverages, exotic fruits, fruiting and flowering vegetables²¹ and meat could indicate a shift toward less sustainable patterns.

Whereas Chapter 3 investigates consumption patterns of an average Austrian household, Chapter 4 stresses the aspect of **socio-economic determinants** on food consumption. The following socio-economic determinants are considered: household size (in persons), age of the household head, total household net income, educational level and labour force status of the household head. In Section 4.1, an investigation of the influence of socio-economic determinants on total food budget is the focus. This is an issue hardly addressed by the international studies previously mentioned. Then, the influence of socio-economic characteristics on the relative expenditures on out-of-home consumption and on expenditures on foods and beverages purchased for consumption at home is examined.

In terms of expenditures, the thesis finds that the household size seems to be the most influential determinant: with each additional member, total food budget increases, however not in a proportional way. In the strict sense, total expenditures grow but per capita figures decline due to the economies of scale in consumption, discussed in Section 4.2. Within the total food budget, however, the relative distribution of expenditures on out-of-home consumption and on food purchased for consumption at home changes as household size increases at the expense of out-of-home consumption. As a result, small sized households spend a higher share of their food budget on eating out (40%), whereas larger sized household spend only 20%. These results are in accordance with BMLF (1997), in which it is argued that the higher trend toward out-of-home consumption is driven by small sized households (single-, two-person households). This can be traced to the fact that for small sized households cooking is less efficient in terms of both time and money. As a result, small sized households spend a higher portion of their budgets on eating out. Generally, the thesis finds that the relative distribution of total food budget is determined by three factors: time constraints (depending on participation in working life and labour force status), income and household size. These factors cause younger households, small sized households, high income and educated households, self-employed and employee households to spend a higher share of their food budget on eating out (40%) and a smaller share on food purchased for consumption at home (60%). These results confirm the claim of BMLF (1997), that out-of-home consumption is determined by working life (growing distance between working place

²¹ Referring to the work of Carlsson-Kanyama (1998), we presume that fruiting and flowering vegetables are for the most part glasshouse grown or imported from Southern Europe and therefore less sustainable.

and place of residence), household size, income, age and increasing number of women in the labour force.

Section 4.2 analyses consumed quantities of foods and beverages purchased for consumption at home across socio-economic groups. In this context, we focus on absolute consumed quantities, but above all on relative differences, which reflect people's preference for different food categories. Thus, results of the socio-economic approach are presented and, if available, compared with international studies. In addition, the author makes an attempt to evaluate consumption patterns with respect to the definition of sustainable food consumption within this thesis.

Due to the lack of studies on the influence of **household size**, results presented are based on self-reporting evaluation. Calculations find that the household size significantly influences absolute food quantities, which could be explained by rising food needs with each additional member. With respect to different food and beverage categories, however, consumption preferences (in terms of relative and absolute consumed quantities) cannot be observed. In contrast, preferences are more determined by age, household income, educational level and labour force status.

As far as **age** is concerned, the thesis agrees with Hayn et al. (2005) who argue that middle aged people are more interested in food that can be quickly prepared, whereas the aged put more emphasis on healthy food and generally have better understanding of nutrition. Furthermore, the trend toward lower meat consumption by older people discussed by Gossard and York (2003) is verified. In particular, the following results can be gleaned: older people consume more vegetables and fruits in proportion to meat than younger age groups. In particular, younger people have a higher (relative) preference for dried, smoked and salted meat, minced meat, rice, pasta products, bread and fruiting and flowering vegetables, which could reflect the time convenience dependency in the diets of young people. In addition, calculations have identified that older age groups have diets which are more in line with traditional eating habits (potatoes, apples, pork) whereas younger people have more diversity (exotic fruits, root vegetables). With respect to the author's definition of sustainable food consumption within this thesis, it can be stated that older age groups have more environmentally sustainable habits than younger ones. This conclusion is based on older people's preference for apples instead of exotic fruits, potatoes instead of fruiting and flowering vegetables and lower consumption figures for bottled beverages.

The impact analysis of **income** (Section 4.2.3) confirms the trends found in several studies claiming that lower income households respond mainly to price and look for filling foods (Hayn et al., 2005; Trichopoulou et al., 2002). In particular, the calculations show that lower

income households have a higher relative consumption of potatoes (instead of root, fruiting and flowering vegetables), apples and pears (instead of exotic fruits) and lower absolute figures in bottled beverages. These results relate to the price dependency of lower income households. Concerning meat consumption, the thesis agrees with Gossard and York (2003), who argue that income has no influence on total consumed quantities of meat, but only on the consumption of beef. Indeed, calculations within this thesis indicate that high income households consume a higher share of beef (16% of total fresh or frozen meat consumption), whereas low income households substitute beef (13%) with higher amounts of pork, resulting in 28% pork consumption for low income households versus 18% for high income households. In addition, this thesis states that diets of higher income households respond to time scarcity. This argument is based on higher (relative and absolute) consumption figures for foods that can be quickly prepared (dried, salted and smoked meat, cheese, curd and yogurt) by high income households. With respect to environmental sustainability, we find ambiguous results. While lower quantities of bottled beverages and exotic fruits indicate a more sustainable consumption pattern by low income households, high absolute quantities of meat could speak for less sustainable patterns. Conversely, the preference for exotic fruits, fruiting and flowering vegetables, meat (beef, in particular) of high income households are undoubtedly indications for higher environmental pressure.

As far as the determinant **education** is concerned, Trichopoulou et al. (2002) argue that the educational level is the strongest determinant affecting diet, because education is a precondition for the understanding of health and environmentally related information. Several authors agree that a higher educational level results in a reduced consumption of meat, potatoes and cereals but in a higher intake of fruits and vegetables (Gossard and York, 2003; Irala-Estevez et al., 2000; Trichopoulou et al., 2002). Indeed, results gained from data evaluation in Section 4.2.4 confirm not only lower meat consumption, but also higher fruit and vegetable consumption. In particular, the thesis finds that people with more education consume more vegetables, fruits, bread, rice, flour and pasta in proportion to meat. The dietary choices of higher educated households are generally dependent on three factors: taste, time scarcity and health and/or environmental awareness. These arguments are based on higher (relative) consumption figures of exotic fruits (taste) and of foods that can be prepared quickly (time scarcity), like dried, salted and smoked meat, fruiting and flowering vegetables and yogurt. Furthermore, the preference for poultry instead of pork, vegetable fats instead of animal fats, fruit and vegetable juices instead of soft drinks could come from a higher awareness for health and/or environmental issues. By attempting to assess environmental sustainability, results are again ambiguous since gains made through a higher awareness of environmental issues may be lowered through the influence of time scarcity and taste that affect people's diet strongly.

The determinant **labour force status** can be seen as an issue neglected in most of the previous studies. Based on the argument of Payer et al. (2000) that farmers, blue-collar workers and managers show the highest meat intake, the author seeks to learn how labour force status affects people's food choice. Since the literature survey could not identify adequate studies that deal with this approach in a comprehensive way, results presented in Section 4.2.5 are based solely on self-reported data. By focusing the analysis on farmers, the self-employed, employees, public servants and clerks in different positions we come to the following results: diets of farming households are largely made up of traditional foods like bread, flour, apples, pears and pork. Dietary choices of employees, irrespective of their position, and the self-employed are driven mostly by time constraints. This argument is based on a higher preference for food products that need less time for preparation (e.g. dried, salted and smoked meat instead of pork, fruiting and flowering vegetables instead of potatoes) by both labour force status groups. The income factor may be the reason why employees in top positions have the highest share of beef and veal consumption. Assessing the dietary choice by labour force status, the diets of farming households can be classified as more environmentally compatible since they consume more apples and pears instead of exotic fruits, more potatoes instead of fruiting and flowering vegetables and more pork instead of beef. However, maximum absolute figures of meat consumption (7 kg monthly versus 4 kg to 5 kg within self-employed and employee households) could undoubtedly lower this effect. Indications for less sustainable patterns of those who are self-employed and employees could be their preference for exotic fruits, fruiting and flowering vegetables and beef.

Finally, we investigate the differences in food purchased for consumption at home between households that spend less on eating out and households that spend a higher amount of their food budget on **out-of-home consumption**. Calculations demonstrate that households spending a higher share of their food budget on out-of-home consumption consume more products that can be quickly prepared or consumed cold. In particular, the observed increases in absolute consumed quantities of cheese, curd and yogurt, bottled beverages and relative increases in root, fruiting and flowering vegetables (instead of potatoes), dried salted and smoked meat (resulting in lower pork and beef numbers) confirm this finding. The evaluation of environmental sustainability of these groups is difficult, since detailed information of consumed quantities and kind of foods for out-of-home consumption are not available. Nevertheless, the higher consumed quantities of bottled beverages, exotic fruits, and fruiting and flowering vegetables suggest less sustainable patterns in households that spend a higher share of their food budget on out-of-home consumption.

To sum up, data evaluation in Chapters 3 and 4 reveals that some positive and negative consumption trends with respect to environmental sustainability cancel each other out. Furthermore, we find that unsustainable patterns can be attributed to time constraints and to the interaction of income, taste and the preference for more diversity in consumed food products. Further investigations which not only consider consumed quantities but also food origin (regional/local vs. imported, open-ground irrigation vs. greenhouse production) and quality (organic vs. conventional production) are needed to get a more detailed assessment of environmental sustainability. In addition, we are able to show that the category out-of-home consumption makes up a major part of total food budget (around 20% to 40%). Payer et al. (2000) additionally estimate that this share will rise in future. Thus, for a more comprehensive analysis with respect to sustainable food consumption in Austria, additional information concerning consumed quantities and kind of meals taken out-of-home are necessary.

Based on these results, the author gives some ideas and proposals how food consumption could be influenced in a sustainable way. Strategies in order to change consumption behaviour by decision makers could be regulation and enforcement through taxes, fees or subsidies. More effective, however, would be a behavioural change in consumers that could influence sustainability in the food chain by an environmentally-influenced decision of food products. Since Trichopoulou et al. (2002) argue that education seems to be the key variable for higher awareness of health and environmental related issues, it would be necessary to educate people with respect to sustainable food consumption. A good example of change in consumers' food patterns via education is the current campaign about healthy nutrition conducted by the Austrian funds called *Gesundes Österreich*. The focus of this campaign is on healthy diet, but the recommended higher intake of fresh vegetables, fruits, whole-grain products, and potatoes instead of protein from animals (e.g. meat, eggs), sugars and fats could also encourage an environmentally sustainable diet, too (FGÖ, 2005).

A different programme that promotes organic foods was started in 2005 by the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management. The emphasis of this campaign is on marketing strategies that increase the share of organic products in the market to 6-7% by 2008 as compared to 2% in 2002 (BMLFUW, 2003; BMLFUW, 2006^b). In this context, measures are taken in the areas of public relations, education (especially in schools) and consulting (BMLFUW, 2006^b). Furthermore, we argue that campaigns promoting local and regional food over imported food products and open-ground over greenhouse-grown vegetables could increase people's knowledge for sustainable food consumption.

Apart from knowledge, the willingness to pay for sustainable food products plays a considerable role. Unfortunately, positive attitudes do not imply active purchasing behaviour, since food choices are mainly driven by convenience, time scarcity and taste (Vermeir and Verbeke, 2004). According to BMLFUW (2003), those factors result mainly in higher expenditures on convenience products and on out-of-home consumption. Therefore, we argue that changes in available convenience products and the area of out-of-home consumption would be necessary. In particular, a higher supply of sustainable convenience products (e.g. vegetarian meals, fresh instead of frozen products, foods from organic farming, etc.) in supermarkets is desirable.

With respect to out-of-home consumption, regulating gastronomic sites and communal settings would be difficult since these sectors depend on demand by consumers. Possibly initiatives that attract consumers' interest could be the usage of labels which cite sustainability. Using Austria as an example, gastronomic establishments can apply for the *Austrian Umweltzeichen*, a label that guarantees that establishments act sustainably in the areas of building, energy consumption, waste generation, transport, management and food supply. As far as food supply is concerned, the directive for *Umweltzeichen im Gastronomiebereich* requires a strong emphasis on organic foods, local/regional produced products, seasonal foods and on products from fair trade. Furthermore, such establishments have to offer a higher variety of vegetarian meals and of meals that guarantee a balanced nutrition (BMLFUW, 2006^a).

Another measure that could influence in particular the area of communal settings would be a more sustainable food supply by canteens in public institutions like kindergartens, schools, universities, hospitals and of private institutions (firms). In this context, the Austrian EU presidency set a good example: from 17th to 24th May 2006 the Austrian Presidency and the International Federation of Organic Agriculture Movements (IFOAM) inaugurated an *Organic Week* in the European Commission and Council canteens. It was a public-private initiative that aims to support the use of organic food in public canteens. Other examples for successful implementation of organic catering in the private sector are IKEA, Scandic Hotels (an European-wide hotel chain) or the bank WestLB²² (IFOAM, 2006).

These examples show that organic catering can contribute significantly to increase sustainability in out-of-home consumption. Nevertheless, achievements on the global level, can only be reached if consumers realise the environmental consequences of their eating patterns and are willing to contribute to sustainability on a personal level.

²² WestLB AG is a European commercial bank with firm roots in North Rhine-Westphalia, Germany's largest federal state.

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Abstract:

Approximately one third of total environmental damages from consumption within the EU are related to food and beverages. Thus, household food choices significantly influence environmental sustainability. Using the Austrian Household Budget Survey 1999/2000, this report offers an in depth analysis of Austrian household food consumption patterns by focusing on expenditures and consumed quantities for foods purchased for consumption at home. In addition to the survey of average Austrian consumption patterns, the influence of socio-economic household characteristics is investigated.

The share of the average total household budget spent on food has fallen relative to total household expenditures, while expenditures on out-of-home consumption have risen. By looking more closely at the consumed quantities of different food and beverage categories, Austrian consumption patterns are found to be in line with international trends, for example the move to increased consumption of vegetables, fruits, bottled beverages and meat. Concentrating on the results of the socio-economic analysis, we find that preferences for several food categories are independent from household size, but they are influenced significantly by age, income, education and labour force status.

Zum Inhalt:

Rund ein Drittel der Umweltwirkungen des Konsums innerhalb der EU sind auf Nahrungsmittel und Getränke zurückzuführen, weshalb die Ernährung beim Erreichen von globalen Nachhaltigkeitszielen eine entscheidende Rolle spielt. Für eine Veränderung der Konsumgewohnheiten im Sinne der Nachhaltigkeit bedarf es einer umfassenden Analyse von Konsummustern, wie sie in dieser Arbeit anhand der Konsumerhebung österreichischer Haushalte 1999/2000 durchgeführt wird. Schwerpunkt der Analyse sind Haushaltsausgaben und konsumierte Mengen für Lebensmittel im Heimbedarf. Neben den durchschnittlichen Konsumgewohnheiten wird zwischen Haushalten mit unterschiedlichen sozioökonomischen Charakteristika differenziert.

Der Ausgabenanteil für Nahrungsmittel gemessen an den gesamten Haushaltsausgaben sinkt in Österreich. Im Gegenzug sind die Ausgabenanteile im Außer-Haus-Konsum jedoch gestiegen. Betrachtet man die konsumierten Mengen einzelner Nahrungsmittelkategorien, so zeigt sich, dass österreichische Ernährungstrends den international beobachteten folgen: Zunahmen werden im Gemüse-, Früchte-, Flaschengetränke- und im Fleischkonsum beobachtet, zudem gibt es Verschiebungen innerhalb dieser Kategorien. Die Ergebnisse der sozioökonomischen Analyse zeigen, dass die Präferenzen für bestimmte Lebensmittelkategorien unabhängig von der Haushaltsgröße sind aber entscheidend von Alter, Einkommen, Bildung und beruflicher Stellung beeinflusst werden.