universität wien

DIPLOMARBEIT

Titel der Diplomarbeit

Out-of-Home Consumption: Food Group Choices of Austrian Adults

Verfasserin

Bianca Kraft

angestrebter akademischer Grad

Magistra der Naturwissenschaften (Mag.rer.nat.)

Wien, 2012

Studienkennzahl lt. Studienblatt:	A 474
Studienrichtung lt. Studienblatt:	Diplomstudium Ernährungswissenschaften
Betreuer:	emer. o. Univ.-Prof. Mag. Dr. Ibrahim ELMADFA

„Eine neue Art von Denken ist notwendig, wenn die Menschheit weiterleben will."

Albert Einstein

Diese Arbeit ist

Thomas Michael Böhm
(04.11.1964 - 10.06.2012)

gewidmet.

Danke...

An emer. o. Univ.-Prof. Mag. Dr. Ibrahim Elmadfa für die Überlassung des Themas.

Nochmals an Dr. Verena Nowak, für all die Geduld, das Lesen und die Tipps.

Klarerweise Dune Johnson, BSc für die Überarbeitung in Sprache & Ausdruck!

Erstmal meinen Großeltern Margareta, Gertrude und Walter – für alles!

Endlos meinen Eltern: Petra und Wolfgang.

Und meinem Regenbogen Jennifer & Brigitte für Motivation und Support!!!

Chat und Lagebesprechung: meinen Freunden Anja, Rebecca, Martina und Thomas!

Hier meinen Arbeitskollegen: Ernst, Helene, Lisa, Richard, Andrea und Katrin.

Auch Petra Rust, Karl-Heinz Wagner und Gabrielle Linzer für das letzte Jahr!

Liebevoll meinem Onkel Thomas, dem diese Arbeit gewidmet wurde!

Love to my American friends Gretl, Katya and Jen for helping me out several times.

Elisabeth und der kleinen Zoe.

Noch 1000 Dank extra an all die vielen Freundinnen und Freunde die ich nicht alle einzeln aufzählen kann, die mich unterstützt, ermutigt, angespornt, besungen und gefeiert haben. Ohne euch alle wäre das letzte Jahr nicht so gelungen! Ich weiß euch zu schätzen!

I Table of Contents

II List of tables

III List of figures

1 INTRODUCTION AND INTERROGATION

The modern lifestyle, which is related to a lack of time, and the increasing number of single person households has led to changes in dietary behaviour. Long working hours, a lack of motivation and/or knowledge of how to cook keep many people from preparing a meal for themselves. As a consequence, more and more people tend to have breakfast on the go, lunch in the company canteen, a snack from bakeries or vending machines, and dinner with friends in a restaurant; as a result the trend to consume more food and meals from out-of-home sources is rising.

Nutritional sciences have to go with the times. Sixty years ago, after the Second World War, food quality was measured by energy content [ELMADFA AND LEITZMANN, 2004] due to the lack of available foods, with the focus on ensuring that people would not starve. Now that food is produced in abundance and also widely available in developed countries, food and nutritional quality needs to be redefined. It is a privilege and a challenge for nutritional scientists to find this new definition - or perhaps definitions - in order to keep people healthy according to the understanding of the WHO definition. In addition, there is also the new challenge of helping consumers to make the right choices, consulting producers to actually improve food quality instead of just modifying it, and last but not least to consult politicians and guide them toward the adoption of legislation that improves food safety and nutritional quality in order to protect consumers.

Considering the increasing number of people suffering from being overweight, obese and all the related diseases such as diabetes mellitus II, cardiovascular diseases, hyperlipidaemia and some cancers, it becomes quite obvious how important it is to find a proper definition for food and nutritional quality. The basis for this proper definition is a low energy content in food that accompanies a high percentage of fibre [ELMADFA AND LEITZMANN, 2004]. Making conscious food and meals choices requires available knowledge and information for the consumer, which is often limited or nonexistent. Food-based dietary guidelines have been developed in order to enhance people’s knowledge of food and nutritional quality and to raise awareness of healthier food choices, On the other hand, the consumer needs information regarding the

ingredients contained in out-of-home meals. There is a lack of such details for foods obtained for out-of-home consumption. Further difficulties arise when it comes to eating out-of-home or foods sourced from places other than retail stores because the consumer has no control over the ingredients, serving sizes, or the content, including any kind of added lipids. This may result in a higher energy intake through foods consumed at places other than the own home.

Some work on the topic of out-of-home consumption and its related risks for health has already been done in Australia and the United States, whereas there is a lack of such studies in Europe. A European project named HECTOR aims to gain information on the consumption habits of Europeans when they eat out of home using determination and evaluation research methods. Ultimately, suggestions for improvement are to be worked out and implemented to enable healthier out-of-home consumption in Europe [HECTOR-ABOUT, 2010].

Following the ideas of this project, this thesis will discuss whether or not the food and nutritional quality of Austrian adults differs when they eat out of home versus at home; therefore, the food group choices will be analyzed. Since a significant distinction in out-of-home consumption based on age and gender has been found in the literature [ORFANOS et al., 2007] these parameters will be included.

2 LITERATURE OVERVIEW

2.1 Eating out of home

The nutrition of humans basically occurs in two settings: inside the own home or out-of-home [STEINEL, 2008]. The number of people who eat out and the frequency with which they do so has increased since the late 1980s [KANT AND GRAUBARD, 2004]. Therefore, the amount of energy obtained from away-from-home food sources has risen over the past few decades [LIN et al., 1999]. Not only is the number of meals consumed at places other than at home higher now than in the past decades, there is also a lower density of nutrients in food prepared away from home, which corresponds to a higher concentration of fat [GUTHRIE et al., 2002] and results in a higher average energy intake [ORFANOS et al., 2007].

The meaning of out-of-home consumption may vary, depending on what needs to be emphasized [WARDE AND MARTENS, 2000]. This fact leads to different definitions which will be presented in the following section.

2.1.1 Definitions of out-of-home consumption

Currently there is no uniform definition for out-of-home consumption. In terms of the differentiation between eating at home or at places other than one's own household, two criteria are provided, namely the place of consumption and the place of preparation, [STEINEL, 2008].

Therefore, there are two explanations that are used more frequently than others throughout the literature, the first being (1) all foods consumed at places other than home no matter where they were prepared [ORFANOS et al., 2007]. The possible combinations are shown in Table 1 including places of consumption and preparation; the definitions include borderline cases as well as appropriate examples for feeding settings. Some examples of locations that are included in this explanation of eating out: dining at the home of a friend or family member, in a restaurant, a canteen at workplace/university, a snack at a bar, food and drinks on the go (street or car) etc. [WARDE AND MARTENS, 2000] and [ORFANOS et al., 2007] and [LACHAT et al. 2011]. It does not matter where the meals were prepared when out-of-home

consumption is understood in this way. This definition excludes borderline cases such as take-away-food, food delivery services or food catering, when food is prepared and purchased outside of one's own household but consumed at home. A critical distinction is that this definition emphasizes the spatial aspect of where a person eats [WARDE AND MARTENS, 2000].

Table 1 Eating out defined as place of consumption modified according to STEINEL as well as WARDE AND MARTENS [2008] and [2000].

Food is…	…consumed outside of the own household	…consumed inside of the own household
…prepared outside of the own household	Eating out e.g. Having lunch at canteen/restaurant	Eating in* e.g. Ordering food from a delivery service
…prepared inside of the own household	Eating out* e.g. Bringing a lunch from home to work	Eating in e.g. Having a self-prepared meal at home.

*Borderline Cases

The other common definition for eating out is (2) all foods obtained from or prepared at places other than home, regardless of where they are consumed [BURNS et al., 2001] and [GUTHRIE et al., 2002] and [STEINEL, 2008]. Table 2 shows that what is defined as eating out changes by considering the place of preparation rather than the place of consumption. This definition includes all food items, foods and meals prepared at places other than one's own household, e.g. restaurants, and excludes all foods and meals prepared at home (which are defined as foods purchased from retail stores). The place of consumption is not of interest in this definition. The background for this explanation is the assumption that the critical distinction between eating out and at home is the consumer's knowledge of and influence on the ingredients and nutrients in the meal. Information on the nutritional content provided by food service establishments is often inaccurate. Foods and food items purchased from retail stores typically provide more detailed information. Ready-to-eat-meals and convenience products are borderline cases in this definition, as they are prepared – at least partially - at places other than one's home but provided by retail stores [GUTHRIE et al., 2002].

Table 2 Eating out defined as place of preparation modified according to STEINEL as well as WARDE AND MARTENS [2008] and [2000].

Food is…	…consumed outside of the own household	…consumed inside of the own household
…prepared outside of one's own household	Eating out e.g. Having lunch at canteen/restaurant	Eating out* e.g. Ordering food from a delivery service
…prepared inside of one's own household	Eating in* e.g. Bringing a lunch from home to work	Eating in e.g. Having a self-prepared meal at home.

*Borderline Cases

Borderline cases, as mentioned before, occur in all kinds of explanations and are classified differently. An example is ‘meals on wheels’, which is naturally prepared outside one’s own household. When eating out is defined as the place of consumption, some authors classify this meals as ‘at home’ when eaten at home but as ‘out of home’ when eaten elsewhere. Others decided that meals on wheels are to be classified as ‘out of home’ no matter where the consumption takes place [STEINEL, 2008].

In addition to the two most used definitions described above, some studies explain out-of-home consumption in general [CLEMENS et al., 1999], meaning that the place of consumption and preparation have to be outside one’s own home [STEINEL, 2008], e.g. restaurant visits, focus particularly on fast food consumption [BINKLEY et al., 2000].

A uniform definition of out-of-home consumption would make the comparison between countries and global investigation much easier; taking into account the sparse literature on this topic, it would be even more useful if a common solution could be found [BURNS et al., 2001] and [ORFANOS et al., 2007].

2.1.2 Eating out supply sources and segments of the market

A basic distinction has to be made between public and private out-of-home consumption. Private catering is defined as the consumption of foods purchased in a retail store or bakery etc. that are processed at home (if necessary) and consumed at places other than one’s own household. Examples of settings for eating out with private catering include at the homes of friends/family, homemade food supplies consumed at places other than one’s own household (working place, picnic, etc.)…

Public food service establishments must be divided into the two key areas of communal catering and individual catering. Furthermore, there are intermediate forms of catering [STEINEL, 2008].

Communal catering implies a ‘supply with limited priced foods for a restricted number of persons at a place at which these persons have to stay for organizational reasons’ [ELMADFA AND LEITZMANN, 2004]. Communal catering is not profit orientated;

the consumer does not pay cost-covering prices and, the difference between the cost and the price the consumer pays is therefore contributed by the company, public authority or health insurance [RÜCKERT-JOHN J, 2005]. Communal catering covers a complex field that includes service establishments (in hospitals, prisons, retirement-homes) that are responsible for their customers' overall food supply (patients, inmates, residents), but the term equally covers food supply institutions (in schools, at work etc.), which provide an opportunity for the costumers to have lunch or a snack, for example [ELMADFA AND LEITZMANN, 2004].

Individual catering takes place in the gastronomy facilities that are available to the public and operate in a profit-oriented manner. The individuality of these catering services extends to the type of meals and the timing of food intake [PAULUS AND DOSSINGER, 1988].

Intermediate forms of the public food service establishments are those catering settings, which show characteristics of both individual and communal catering (e.g. company cafeterias with long opening times and individual menus, flight catering or some franchise restaurants) [PAULUS AND DOSSINGER, 1988].

Table 3 Classification of out-of-home consumption supply sources and locations modified according to PAULUS AND DOSSINGER and STEINEL [1988] and [2008].

Out-of-home consumption			
Private settings	**Public food service establishments**		
Retail stores	Individual catering	Communal catering	Intermediate Forms
Picnic On the go Home of family/friends	Leisure catering Service-oriented gastronomy Self-service gastronomy	Staff canteens Institutions for long-term stays Institutions for education and training	Flight catering Staff canteens with long opening times and/or special menus

2.1.3 Motivations for eating out of home

The motivations for out-of-home consumption are very diverse and include social and practical reasons as well as time scarcity. Out-of-home consumption in Austria usually takes place at work (41 %). Options regarding where people can eat include right at the

workstation, at work or university canteens or similar institutions. Every third person eats in inns at least once a week. One out of four people visits a restaurant, take-away stand (e.g. sausage stands), coffee house or similar at least weekly [BMLFUW, 2010].

As observed in the latest food report of the Austrian Federal Ministry for Agriculture, Forestry, the Environment and Water Management (BMLFUW) the most common reason for eating out was a subjective lack of time. More than half of the individuals (55 %) who ate out at least sometimes did so because they did not have enough time to eat at home. This fraction was a substantial increase with regard to previous evaluations. The social factor was the second largest motivational factor. In particular, 46 % wanted to meet friends and acquaintances, 25 % named out-of-home consumption as a kind of leisure activity. These motivational factors were distinctly lower than in earlier surveys. One third of the people questioned, 'did not feel like cooking themselves' (32 %) and approximately 7 % had an empty fridge at home [BMLFUW, 2010].

A visit to certain dining locations often correlates to socio-demographic characteristics such as age, sex and education. Working class men visited inns particularly often, whereas higher educated people, people with a higher income or men and women who live in an urban area preferred restaurants. Men, adolescents and people with a lower education level frequently visited take-away food or fast food stands (e.g. sausage stands). Women, younger people and higher educated people regularly visited coffee houses [BMLFUW, 2010].

2.1.4 Current Situation with Regard to Eating Out in Austria

Every six years a representative consumer survey in Austrian households is carried out by Statistik Austria. The most recent data were collected in 2009/10.

As shown in Table 4 the average monthly household expenses were about 2,540 € in 2004/05 and about 2,910 € in 2009/10. At about 22.3% in 2004/05 (and 23.8 % in 2009/10) , 'housing and energy matters' constitute the largest part of these household expenses, followed by nutrition related expenses with 19.6 % in 2004/05 and 18.9 % in 2009/10 (includes nutrition, alcohol-free beverages, alcoholic beverages, coffee house,

restaurant, hotel; excludes tobacco products) and transportation with 16.1 % in 2004/05 and 15.0 % in 2009/10 [STATISTIK AUSTRIA, 2011].

Table 4 Fractions of household-expenses in 2004/05 and 2009/10 modified according to [SATISTICS AUSTRIA, 2011].

Household expenses in %		
	2004/05	2009/10
Expenses for housing and energy matters	22.3	23.8
Nutrition-related expenses	**19.6**	**18.9**
Expenses for traffic	16.1	15

The percentage of nutrition-related household expenses has not clearly changed since the middle of the 1990s; it was 331€ (13 %) in 2004/05 [BMLFUW, 2010] and 352€ (12.1 %) in 2009/10 [STATISTIK AUSTRIA, 2011]. Within these expenses, continuous rates of growth are only seen in the expenses for eating out of home, which increased from 135€ per month and household in 1993/94 to 140€ in 2004/05 [BMLFUW, 2008] and 167€ in 2009/10 [STATISTIK AUSTRIA, 2011]. As shown in Figure 1, the greater part of out-of-home expenses are derived from visits to 'restaurants and inns' (58 % of out-of-home expenses), followed by the amount of money spent in 'bars and coffee houses' (22 %), expenses for 'fast food, take away food and delivery services' (8 %), 'meals at company/university canteens' (8 %), 'hotel visits' (3 %) and the approximately 1 % that is spent on 'meals on wheels' [BMLFUW, 2010]. It is interesting to note that although the overall nutrition-related expenses (in %) decreased from 13.0 % in 2004/05 to 12.1 % in 2009/10, the expenses for eating out increased slightly from 5.5 % in 2004/05 to 5.7 % in 2009/10 [STATISTIK AUSTRIA, 2011]. 11.2 % of all households spend more than a quarter of their household expenditures on food, beverages and out-of-home consumption [BMLFUW, 2010].

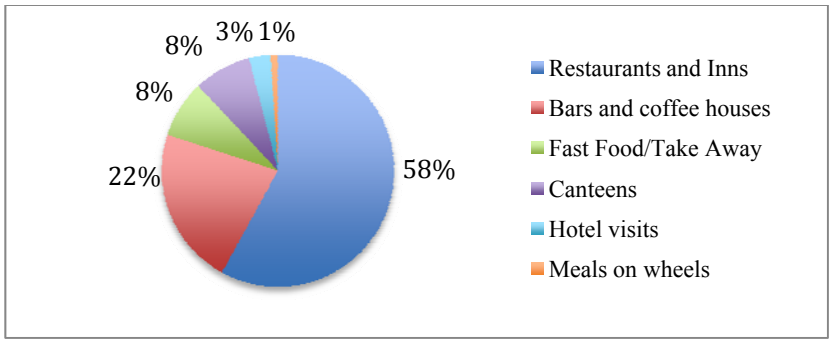


Figure 1 Fractions of nutrition-related household expenses on different out-of-home consumption locations in 2009/10 (total mean 167 €) modified according to STATISTIK AUSTRIA [2011].

Austrian adults' intake of energy and single nutrients was higher in the midmorning snack, dinner and late meals when they ate out-of-home rather than having those meals at home [ELMADFA et al., 2009a]. Compared with the D-A-CH reference values for nutrient intake [DGE, 2008] the overall daily energy and nutrient intake was slightly higher at home. In those cases in which the reference values were not achieved, they were not achieved in either setting, at-home and out-of-home. The average supply with total fat, saturated fat and unsaturated fat was higher at home compared to out-of-home. The intake of fibre and calcium was very low in out-of-home consumption [ELMADFA et al., 2009a].

2.1.5 Trends in out-of-home consumption

Lachat et al. concluded in their 2011 review, in which 29 worldwide studies on out-of-home consumption were included, that various trends in eating out can be observed. One result of the sensitivity analysis was that the association between total energy intake and out-of-home consumption was constant in adults but not in children [LACHAT et al., 2011].

Another determination was that foods eaten at places other than home had a higher content of fat and saturated fat as well as a higher contribution of energy compared to foods eaten at home [LACHAT et al., 2011]. The exception were adults from western and southern Europe, where eating out usually takes place at weekends [ORFANOS, 2007] and is associated with higher alcohol consumption. Since an inverse association between alcohol and fat was also found, it may be the case that the energy intake was higher in those populations also as a result of higher alcohol consumption, but at the expense of the relative contribution of energy from fat [LACHAT et al., 2011].

They were also able to show that there is a relation between eating out of home and poor dietary quality compared to foods eaten at home. Lower intakes of some micronutrients, particularly vitamin C, Ferric and Calcium, were documented [LACHAT et al., 2011].

Furthermore, socioeconomic status and higher energy contribution from out-of-home foods were positively associated [LACHAT et al., 2011]. Household budgets are higher

now than they were in the 1960s. Even though overall expenditures on foods are decreasing, expenses for out-of-home foods are nevertheless rising in households with a high household budget [KINSEY, 1994]. Increasing urbanization, the participation of women in the work force,, time scarcity and accessibility to foods are mentioned as possible justifications for this observation with regard to the demand on out-of-home foods [LACHAT et al., 2011]. Higher socioeconomic status is associated with higher diet quality [DARMON AND DREWNOWSKI, 2008], which indicates for example that financial sanctions regarding fat rich foods or foods with a high energy content may have an effect on out-of-home food choices [LACHAT, 2011].

2.1.6 Current and upcoming challenges for eating out institutions in Austria

The communal catering sector, as defined and described earlier, is increasingly confronted with changes in the necessities of the individuals who need to be fed. Just like any other sector dealing with human nutrition, the public catering sector is subject to constant developments and needs to adapt to meet the desires of all people. Nowadays, the background for this need for adaption and changing necessities of individuals is the globalization of the economy, strong competition, and changes in the markets as well as a general structural change of the world of work. The former mainly energy-rich food supply should be adjusted to ensure a nutrient-optimized food supply with regard to the degree of physical work [ELMADFA et al., 2009a].

The ÖGE - seal of quality

The Austrian nutrition society developed a seal of quality to assist the communal catering institutions to meet these complex requirements similar to that of the German nutrition society implemented in Germany. With the implementation of the quality seal the kitchen has a guarantee that the composition of the meals is optimized in terms of nutrition physiology [ELMADFA et al., 2009a].

Figure 2 Seal of quality given for nutrient-optimized diet quality [ÖGE, 2012a].

The rising tension between cost pressure and expectations of the guests forces a redefinition of the communal catering sector. The food supply should be of the highest quality and freshness, have an appetizing appearance, taste good and still be available at

affordable prices. One aspect of these quality requirements is the hygiene of the kitchen area. Quality assurance and HACCP concepts must be part of the daily routine [ELMADFA et al., 2009a].

The changes in the role of women and the dispersal of extended families, which have been taking place for generations make it necessary to consider different catering requirements in future [ELMADFA et al., 2009a]. In order to implement such a needs-based food supply awareness is increasingly directed towards the proper nutrition of vulnerable groups of people such as children and adolescents but also elderly and infirmed persons [LEHNER et al., 2012].

The Austrian National Nutrition Action Plan (NAP.e) created a task force for communal catering, which met twice in 2011. Setting up harmonized conditions and practicable standards (on the basis of good-practice models) were defined as objectives for various communal catering models. In 2011 the NAP.e focused on the needs of children and adolescents and thus on communal catering institutions for education and training. One result was the “school buffet guideline”, which contains harmonized, science-based recommendations for the food and beverage supply at school buffets. Until the end of 2013 school canteens will be advised locally and in a practice-oriented manner on how to implement food supplies which are oriented towards the “school buffet guideline”. Furthermore, communal catering for elderly people and staff canteens were of special interest. In particular, the finalization of the recommendations with regard to communal catering for elderly people is planned for 2012. In addition, the task force intends to deal with workplace health promotion; current recommendations should be combined and adapted [LEHNER, 2012].

The future of out-of-home consumption in Austria - at least in the communal catering sector - seems to be promising as decision makers have agreed on the motto “The healthier choice should become the easier one” [LEHNER, 2012] and [PHILIPP, 2012].

2.2 Food Groups

Choosing a proper food classification system is the foundation for many processes in nutritional sciences such as the development of food-based dietary guidelines or the assessment of the dietary quality of a population. There are different food grouping systems, each of which is made up for different purposes and hard to compare to the others. Difficulties occur because several viands may be grouped in a different way in the various systems (e.g. are pulses/mushrooms vegetables? More specific: are avocados/rhubarb fruits or vegetables?). Many food classification systems are highly specific because they have been made up on a national or regional level. IRELAND et al., created the Euro Food Group (EFG) classification system in 2002 to make food and nutrient consumption comparable within Europe [IRELAND et al., 2002]. The EFG system was used in the 2008 Austrian nutrition report [ELMADFA et al., 2009a]. In this thesis the viands are classified according to the HECTOR food grouping system, as described in material and methods.

2.2.1 Cereals, cereal products, potatoes and other starchy roots

The food group 'cereals, cereal products, potatoes and other starchy roots' is counted among the most important staple foods in human nutrition. Primarily wheat, rye, oat and barley are of major nutrition-economical importance in central Europe, whereas in other regions of the world corn, rice and millet traditionally play a greater role [KOFRÁNYI et al., 2011]. It is one of the most consumed food groups in quantitative terms and includes not only grain kernels and potatoes but also breakfast cereals, bread, flour, pasta and starchy roots such as sweet potatoes or yams [ELMADFA, et al., 2009a].

Many of the components the whole grain kernel contains are of use to the human body. First of all, it is high in energy (300-350 kcal/100g), carbohydrates (average 65-75 %) and fibres (depending on the degree of fineness). It contains vegetable protein (average 6-12 %), which corresponds to a relatively low content of vegetable fat (average 1-5 %). Furthermore, it is full of essential micronutrients such as vitamins (e.g. vitamin E, thiamine or vitamin B_1, riboflavin or vitamin B_2, niacin), quantity elements (e.g. magnesium, potassium), trace elements (e.g. ferric) and so called secondary plant substances [KOFRÁNYI et al., 2011] and [ELMADFA et al., 2009a]. Details on nutrition facts of different cereal crops are shown in Table 5 [ELMADFA et al., 2009b].

Table 5 Nutrition facts per 100g of cereal crop [ELMADFA et al., 2009b].

Cereal crop	Energy (kcal)	Carbohydrates (g)	Fibre (g)	Protein (g)	Fat (g)
Wheat, kernel	297	59.5	13.3	10.6	1.8
Rye, kernel	293	60.7	13.2	8.8	1.7
Whole oatmeal	348	58.7	12.5	10	7
Barley, hulled	314	63.3	9.8	10.4	2.1
Corn, kernel	323	64.2	9.7	8.5	3.8
Rice, hulled	345	74.1	2.2	7.2	2.2
Millet, hulled	350	9.8	3.8	9.8	3.9

30 % of the overall daily food amount should be from cereals, cereal products, potatoes and other starchy roots, since over 50 % of the daily energy intake should come from carbohydrates [ELMADFA et al., 2009a]. Carbohydrates that are added such as monosaccharides, disaccharides and syrups decrease the nutrient density and increase the energy density (the intake of energy per volume unit) at the same time and should therefore be avoided in order to ensure a sufficient nutrient supply [DGE, 2012]. Whole grain cereals and cereal products are the source of carbohydrates with the highest nutrient density and the second highest source of protein after meat and meat products. The amount of fibre and micronutrients is at the highest in the outer layers of the kernel; thus, it is important to choose whole grain products [ELMADFA et al., 2009a] and [KOFRÁNYI et al., 2011] and [DGE, 2012].

Fibre is a collective name for plant food components that can't be broken down by the body's own enzymes in the human gastrointestinal tract. With the exception of lignin, they are all complex carbohydrates, including cellulose, hemi cellulose, pectin, resistant starch, oligosaccharides and many more [DGE, 2012]. The effects of fibre on some noncommunicable diseases is not uncontroversial but it is likely that a high fibre content in the human nutrition decreases the risk of some of them, such as cardiovascular diseases [ÖGE, 2005]. The recommendation is 30 g/day of fibre for adults, which is equivalent to 16 g/1000 kcal for women and 12.5 g/1000 kcal for men [DGE, 2012]. One half of this fibre recommendation is supposed to come from cereals, cereal products, potatoes and other starchy roots; the rest should be acquired through fruit and vegetable consumption [ÖGE, 2005].

Potatoes also provide fibre, vitamins B_1, B_6, C and folic acid, as well as potassium and magnesium and a very low energy content (70 kcal/100 g) [ELMADFA et al., 2009a].

Austrian adults currently do not reach the recommendations either in carbohydrate or in fibre intake. An increasing consumption of whole grain products and starchy roots, including potatoes, may lead to a higher micronutrient intake and a reduction of fat consumption [ELMADFA et al., 2009a].

2.2.2 Vegetables

Vegetables are a collective name for fresh or processed consumed plant components, mostly from annual or biennial plants, which are intended to be part of the human nutrition. Fruits and seeds of perennial plants are excluded from this definition [KOFRÁNYI et al., 2011]. Vegetables are an important component of a balanced, health promoting diet [KOFRÁNYI et al., 2011] and should therefore be consumed daily. This food group should not be seen as a side dish, but quite the opposite: they should quantitatively be the major part of every meal [ELMADFA et al. 2009a]. The high nutrient density explains the nutrition-physiological importance. This food group has a high water, vitamin, mineral and low energy content. The energy density (the intake of energy per volume unit) of these foods is usually low [KOFRÁNYI et al., 2011], which is the reason for the weight-regulating effects of this food group, with all the indirect health benefits that result from reduced body weight [ELMADFA et al. 2009a].

The “5-a-day” campaign, which is known worldwide, has been running in Austria since 2000. The recommendation is to have approximately 600 g of fruit and vegetables per day in the form of two servings of fruits and three portions of vegetables. One serving is understood to be the amount of fruits and/or vegetables that fills ones hand. One serving is two handfuls when the food is diced or sliced into little pieces. Furthermore, one serving may be replaced by a glass of fruit or vegetable juice. Out-of-home consumption is also dealt with, and practicable information can be found on the website [5xamTag, 2007].

Figure 3 Austrians logo: '5 a day' [5xamTag, 2007].

The overall Austrian vegetable consumption in the 2008/09 economic year was 904,467 tons, which equals a per capita consumption of 108.3 kg (approximately 296 g/d). At 25.3 tons tomato consumption is by far the highest, followed by onions at 9 tons and carrots at 7.5 tons [BMWLUF, 2010]. Other popular vegetables in Austria include lettuce, which is consumed 4-6 times per week, and cucumbers and bell peppers, which are consumed up to 3 times a week [ELMADFA et al., 2009a]. With regard to the economic year, a long-term increase in per capita consumption is notable. While in 2000/2001 only 101.6 kg (approximately 278 g/d) of vegetables were consumed, in 2008/2009 the amount was 108.3 kg [BMWLUF, 2010]. Unfortunately, the actual intake of vegetables is below these numbers. The overall intake of Austrian adults between the ages of 19 and 65 has an average of 180 g/d, more specifically 190 g/d in women and 162 g/d in men [ELMADFA et al., 2009a].

Table 6 Nutrient facts per 100 g vegetables [ELMADFA et al., 2009b].

Vegetable	Energy (kcal)	Carbohydrates (g)	Fibre (g)	Protein (g)	Fat (g)
Tomato	17	2.6	1	1	0.2
Onion	27	4.9	1.8	1.2	0.3
Carrot	25	4.8	3.6	1	0.2

The importance of vegetable consumption in Austria is not sufficiently expressed. Thus, the Department of Nutritional Sciences at the University of Vienna carried out a representative study in 2004. 2,704 individuals throughout Austria between the ages of 19 and 65 were asked about their food consumption habits and the importance of fruits and vegetables in their diet in all four seasons [SCHÄTZER, 2007]. More than half of the Austrian population (52 %) was aware of the '5-a-day' campaign. Every 5th adult (20 %) tried to follow this recommendation. Approximately 40 % could imagine putting the recommendation into practice in future; just as many do not share this thought. The relevance of the availability has increased in recent years and is currently around 38 % for vegetables. The frequency of vegetable consumption has only shifted slightly in recent years; 8 % of the Austrian population consumes vegetables several times a day and 52 % eat vegetables only once daily [ELMADFA et al., 2009a].

Vegetable consumption shows increasing rates in men, from 140 g/d to 162 g/d, and from 153 g/d to 190 g/d in women. Austrian adults clearly have fewer vegetables than

fruits in their daily diet. Women (190 g/d) consume significantly ($p<0.001$) more vegetables than men (162 g/d). Men achieve 40% of the recommendation to have at least three servings of vegetables daily (390 g/d), while women achieve 50% of the recommendation [ELMADFA et al., 2009a].

2.2.3 Pulses

Pulses or Legumes are the collective names for the ripe, dried seeds annual or perennial plants that develop fruit shells. This food group includes beans, soybeans, peas, chickpeas and lentils [KOFRÁNYI et al., 2011].

Pulses feature a low content of fat and high contents of carbohydrates, fibre, minerals and vitamins, as well as a high quality amino acid profile [ELMADFA, 2009a] and [KOFRÁNYI et al., 2011]. The soybean remains an exception, because both the fat and protein content are substantially higher than in other legumes. Nevertheless, legumes contain the highest protein content of all plant foods (on average 20-33 %), but the essential amino acid methionine is missing, which can easily be balanced by combining legumes with cereals, a combination that ensures an ideal protein supply for humans [KOFRÁNYI et al., 2011].

The consumption of pulses has stabilized at a very low level in the post-war period. Thus, the average daily consumption data is in a low gram range. Austrian adults consume on average 10.3 g pulses per day, more precisely 9.3 g/d for men and 11.0 g/d for women. Reasons for the very low consumption of this food group include the fact that pulses are generally hard to digest and their preparation is considered time consuming. According to the 2008 Austrian nutrition report legumes such as beans, peas or lentils are consumed in Austria less than once a week [ELMADFA et al., 2009a].

2.2.4 Fruits and nuts

Fruits are developing from the pollinated blossoms of perennial trees or shrubs. This food group is a good source of essential nutrients in human nutrition. It has a high vitamin content (vitamin C, β-carotene, folic acid, B-vitamins except for B_{12}) minerals (calcium, potassium, magnesium, manganese, ferric) fibre, easily absorbable carbohydrates and secondary plant substances. Due to the high water content (80-90 %)

the nutrient density is the highest of all food groups and the energy density is low. Some of the named components such as fibre and secondary plant substances (special acids and aroma components) have an influence on the digestive system. The major component are the carbohydrates, mainly glucose and fructose but also high molecular polysaccharides. How many vitamins and minerals a fruit contains varies within the fruit varieties based on degree of ripeness, storage or intensity of the sunlight, for example [KOFRÁNYI et al., 2011].

According to the Austrian nutrition report the apple was the most popular fruit in Austria in 2008. On average apples were eaten 4-6 times per week. Bananas and pears have been consumed 1-3 times weekly, while other fruits showed season-based popularity curves. Strawberries were associated with spring; grapes were increasingly eaten in spring and summer. The consumption of nectarines is associated with summer and oranges were specifically eaten during winter. Within the corresponding seasons these fruits were eaten up to three times per week, out of season no more than once a week [ELMADFA et al., 2009a]. The development of the per capita consumption of fruits showed similar trends and has - despite considerable fluctuations - slowly increased in the past 15 years and in 2008/09 reached the previous record high of 96.6 kg per year and capita. The Austrian per capita consumption with regard to the single fruit varieties showed that with about 69,500 tons apples are the most consumed fruits followed by bananas with about 67,000 tons and oranges with approximately 31,000 tons [BMWLUF, 2010].

Table 7 Nutrition facts per 100 g of Austrians' most popular fruits modified according to ELMADFA et al. [2009a,b].

Fruits		**Energy (kcal)**	**Carbohydrates (g)**	**Fibre (g)**	**Protein (g)**	**Fat (g)**
Apple		54	11.4	2	0.3	0.6
Banana		88	20	1.8	1.2	0.2
Pear		55	12.4	3.3	0.5	0.3
Season	Fruits	Energy (kcal)	Carbohydrates (g)	Fibre (g)	Protein (g)	Fat (g)
Spring	Strawberry	32	5.5	1.6	0.8	0.4
Summer	Grape	67	15.2	1.5	0.7	0.3
Summer	Nectarine	53	12.4	2	0.9	0.1
Winter	Orange	42	8.3	1.6	1	0.2

The World Health Organization recommends 400 g of fruits and vegetables per day for all ages (in contrast with 5xamTag - 600 g). The goal of this basic message is to improve general dietary pattern [WHO AND FAO, 2004b]. While Austrian adult men do not adhere to this recommendation (358 g/d), Austrian adult women consume 424 g fruits and vegetables per day [ELMADFA et al., 2009a].

While most of the fruit and vegetable recommendations quantitatively emphasize vegetable consumption and allow for a lower percentage of fruits (for example 5 a day considers three portions of vegetables and two servings of fruits, which is a ratio of 1.5:1), in current situation shows that the population clearly consumes fewer vegetables than fruits. The actual vegetable-fruit ratio is 0.8:1 for adults [ELMADFA et al., 2009a].

The overall average fruit consumption of Austrian adults is 216 g/d. As is the case with vegetable consumption, fruit consumption also shows growth rates. While in 2003 adult men consumed 179 g fruits per day, current consumption is 187 g/d. Adult women's consumption went up from an average of 186 g of fruits per day in 2003 to 234 g/d. Austrian women eat significantly ($p<0,001$) more fruits than Austrian men. Men achieve 70% of the recommendation to have at least two servings of fruits per day (which is equivalent to 260 g/d) and women achieve 90% of the recommendation [ELMADFA et al., 2009a].

The primary motivation for consuming both fruits and vegetables is 'because it tastes good'. The relevance of the availability has risen in the past years and is currently 30 % for fruits. 87 % of the Austrian adults prefer to have fruits as 'a snack'. The frequency of fruit consumption has only shifted slightly in the past years, 23 % (8 % with regard to vegetables) of the Austrian population consume fruits several times a day and 47 % (52 % with regard to vegetables) eat fruit once daily. Despite those low frequencies of consumption of both fruits and vegetables most of the Austrian adult population feels that the current consumption is sufficient [ELMADFA et al., 2009a].

Both fruits and vegetables are mostly purchased from supermarkets (61 %) but also from discount markets (47 %). The three key purchase criteria are quality (81 %), region of origin (44 %) and the season (38 %) [ELMADFA et al., 2009a].

Nuts

Shell fruit is the trade description for edible nuts and cores. The non-edible pericarp is the common feature of this food group. Only the core (seeds) is edible, for example cashews, peanuts, chestnuts, pistachios, hazelnuts and almonds. The cores of apricots also count as shell fruits [KOFRÁNYI et al., 2011].

2.2.5 Fruit and vegetable juices

Fruit juices are comprised of 100 % juice from pomaceous fruit, berry fruit, stone fruit, but also wild fruits, grapes or tropical fruits. Ripe, healthy and fresh fruits are used to produce the juices. Fruit juices from concentrate are produced by diluting the concentrate of a juice with the same amount of water that originally was removed. These products have to be equivalent to the direct juice with regard to sensory properties such as odour, flavour and composition [KOFRÁNYI et al., 2011].

Vegetable juices are undiluted liquid products from vegetables that are either unfermented or lactic fermented and intended for direct human consumption. The basic substances are vegetables, vegetable pulp, vegetable juice concentrate and vegetable pulp concentrate [KOFRÁNYI et al., 2011].

Fruit juices have a high vitamin and mineral content as well as a high sugar content. In contrast to fresh fruits, fibre is limited or no longer present in the product do to the processing [ELMADFA et al., 2009b]. Thus, not more than one serving of fruit per day should be replaced by one glass (250 ml) of fruit or vegetable juice. According to the latest Austrian nutrition report, in 2008 both men and women adhered to this recommendation. The consumption of Austrian adults is about 106 g/d. The preferred juices come from apples, oranges and black current in that order [ELMADFA et al., 2009a].

2.2.6 Total added lipids

Edible fats and oils are distinguished by their solid and liquid state, and with regard to their origin into plant and animal fats. The consistency of fat depends on the content of saturated (solid) and unsaturated fatty acids (liquid). The plant fats include oils and fats that are extracted from plant seeds and fruits through pressing as well as other products such as margarine [KOFRÁNYI et al., 2011]. Plant oils are regularly rich in mono- and polyunsaturated fatty acids and are therefore liquid at room temperature. Coconut fat, palm kernel fat and cacao butter are an exception because they mostly contain saturated fatty acids. Olive oil, rap seed oil and peanut oil have a particularly high mono saturated fatty acid content (oleic acid). Linoleic acid, which is an essential twofold unsaturated oemga-6 fatty acid, is found in sunflower seed oil, corn oil, wheat germ oil, safflower oil and soy oil. α-Linolenic acid, a threefold unsaturated omega-3 fatty acid, is found in linseed oil and to a lesser degree in walnut, rap seed and soy oil. A high vitamin E content usually coincides with a high polyunsaturated fatty acid content [ELMADFA AND LEITZMANN, 2004] and [ELMADFA et al., 2009a]. Animal fats are divided into butter and butter products made when milk is processed (milk fat), and fat from slaughtered animals such as lard (from pork or goose) and beef tallow [KOFRÁNYI et al., 2011]. Animal fats usually have a high saturated fatty acid content and are therefore solid at room temperature [ELMADFA et al., 2009a]. Fish fat may also be extracted (cod-liver oil) and used for medical purposes as fish oil capsules, for example [KOFRÁNYI et al., 2011].

Up to 30 % (60-80 g in total, including hidden fats) of the daily energy intake should come from high quality fats. Still, at 2% the segment for Total added lipids is the smallest of the DGE-ÖGE nutritional circular. This is explained by the fact that the energy density of this food group is very high (fat provides a lot of energy) and other foods and food groups are also a source of fat (meat and meat products, fat-rich milk and milk products, bakery products, sweets and chocolate…). This is why the recommendation for Total added lipids is to have maximum 15-30 g/d of butter or margarine and 10-15 g/d of plant oils. On average Austrians consume 16 g/d of butter, 13 g/d of margarine and 2 g/d of oil [ELMADFA et al., 2009a] and [ÖGE, 2012b] and [BMG-HOME, 2010] and [DGE, 2012]

2.2.7 Meat and meat products

Meat is a collective name for all edible components, including blood and giblets, of slaughtered or slain warm-blooded animals such as mammals or birds; it counts as one of the most important nutrient sources in human nutrition. The muscle with perhaps adherent fatty or connective tissue is what is primarily appropriate for human nutrition. It consists of muscle fibres, which are covered by supporting connective tissue. There is more or less fat between the fibre bundles depending on the animal species and its feeding. A further distinction is sometimes made between red and white meat, which basically depends on the amount of myoglobin, an oxygen-transporting molecule similar to haemoglobin, in the muscle. Red meat is a collective name for beef, pork, lamb/sheep meat, horsemeat and venison. White meat is poultry meat including chicken, turkey, duck, goose and many more [KOFRÁNYI et al., 2011].

Protein, vitamins and minerals contribute to a balanced diet. Muscle tissue consists of 15-25 % protein and has an excellent amino acid profile: from 100 g of meat protein the human Body can build on approximately 80-90 % body-own protein [KOFRÁNYI et al., 2011] and [ELMADFA et al., 2009a]. The content of fat varies between the species and is on average 2-30 %. The relatively high saturated fatty acid and cholesterol content are disadvantages; in particular, meat products such as sausages are often very fat-rich [ELMADFA et al., 2009a]. Meat also contains substantial amounts of selenium, zinc and ferric (which can be easily absorbed in comparison with iron from plant sources), as well as high contents of vitamin A, B-vitamins, especially B_1, B_{12} and niacin [KOFRÁNYI et al., 2011].

The per capita consumption of beef and pork in 2010 was around 52 kg, which breaks down approximately as 140 g/d. In 2006 the per capita consumption of those kinds of meat was approximately the same [STATISTIK AUSTRIA, 2012a]. Daily intake of meat and meat products excluding poultry and giblets was 71 g/d for women and 155 g/d for men, which clearly shows that men eat more meat and meat products than women [ELMADFA et al., 2009a]. The per capita consumption of poultry in 2010 was 12.2 kg, which is approximately 33 g/d, and 11.1 kg in 2006, which is approximately 30 g/d. A slight increase is notable [STATISTIK AUSTRIA, 2012a]. According to the

national nutrition report, in 2008 the average daily poultry intake was 24 g/d for women and 25 g/d for men.

Considering the recommendations of 300-450 g/week for meat and meat products [BMG-HOME, 2010], which is approximately 40-65 g/d (although the recommendation is to have not more than three serving per week) it becomes obvious that both men and women in Austria consume too much of this food group.

2.2.8 Fish and seafood

First of all a distinction has to be made with regard to the habitat, i.e. sea fish and freshwater fish. Predator and non-predator fish belong to both categories. Fish can further be divided into high-fat (> 10 % fat), medium-fat (1-10 % fat) and low-fat fish species (<1 % fat). The fat content fluctuates based on species and season. Seafood is a collective name for crustaceans (lobster, crayfish, Norway lobster, scampi and shrimp), molluscs and shellfish (mussels, escargot and squid). They are protein-rich but low in fat and carbohydrates and thus low in energy [KOFRÁNYI et al., 2011].

Fish and seafood number amongst the highly valuable foods. They consist of 15-20 % high-quality protein and several vitamins, such as vitamin B_{12}, vitamins D and A and minerals such as potassium, zinc, fluorine and iodine. The fish fat contains essential polyunsaturated fatty acids, in particular omega-3 fatty acids [KOFRÁNYI et al., 2011].

Iodine is primarily a component of sea fish, which is why the recommendation is to consume sea fish such as coal fish, haddock, cod or red fish up to three times per week. In the abovementioned species the content of iodine ranges from 100 to 200 µg/100 g. Medium-fat and high-fat fish provide the highest amounts of vitamin A (20-40 µg/100 g) and 5-6 µg/100 g vitamin D [ELMADFA et al., 2009a].

According to the current 2008 Austrian nutrition report, adults consume approximately 14-15 g (105 g/week) of fish and seafood per day [ELMADFA et al., 2009a]. The recommendation for the consumption of fish and seafood is to have at least 1-2 servings (150 g each) per week [BMG-HOME, 2010]. Neither sex achieves this in Austria.

2.2.9 Eggs

Eggs contain many essential nutrients. The egg's amino acid profile has the highest quality of all dietary proteins. In addition to this benefit, eggs have a high vitamin A, D and B_{12} content. A disadvantage is the high cholesterol content, which is part of the yolk. For a long time it was assumed that eggs significantly increased the blood cholesterol level, but it has been found that cholesterol consumed as part of the diet suppresses the body's own cholesterol synthesis [ELMADFA et al., 2009a].

The per capita consumption of 230 eggs (2010) has not clearly changed in recent years [STATISTIK AUSTRIA, 2012a]. Austrian adults eat approximately one third of an egg (20 g/d) daily, excluding processed eggs [ELMADFA et al., 2009a]. Considering the recommendation of three eggs per week [BMG-HOME, 2010] and the latest scientific opinion on diet cholesterol, this level of egg intake should be acceptable.

2.2.10 Milk and milk products

In central Europe 'milk' is automatically associated with cow milk, but of course also sheep milk, goat milk, horse milk or buffalo milk may be consumed. From the biological point of view milk is the nutrient fluid of female mammals (produced in the mammary glands), used for the purpose of feeding the mother's own offspring. From the chemical perspective milk is an oil-in-water emulsion [KOFRÁNYI et al., 2011].

Milk products are all kinds of processed milk and are divided into several groups. Some examples are preserved milk products (condensed milk, whey), fresh milk products (fermented milk products, acidified milk products, yoghurt products, kefir products, butter milk products, mixed milk products) and cream and cream products (whipping cream, cream double, sour cream, etc.). Cheese is also included in this food group and is divided into hard cheeses (emmentaler, parmesan...), cream cheese, curd cheese, processed cheese and other groups [KOFRÁNYI et al., 2011].

Milk and milk products supply a number of important nutrients and should therefore be consumed regularly and in sufficient amounts. Although the recommended amounts are not achieved by the Austrian population, more than half of the calcium intake comes from this food group. Thus, milk and milk products can contribute significantly to bone

health. Furthermore, significant parts of the iodine supply come from milk. High quality protein as well as the vitamin B_{12} content are further benefits provided by this food group, which is especially interesting for people who avoid eating meat and meat products. A disadvantage is that milk and milk products - in particular cheese - often have high fat and saturated fatty acid content. Milk and milk products provide a third to half of the daily maximum needs. The advantages of the high amounts of fat include the short chain fatty acid content as well as conjugated linolic acids, which are considered to be health-promoting. Still, to reduce the daily fat intake, low-fat milk and milk products should be given preference [ELMADFA et al., 2009a].

With a per capita consumption of 88.9 kg (approximately 240 g/d) in 2010 versus 92.5 kg (approximately 250 g/d) in 2006 the intake of milk is still slightly decreasing. This data includes milk products except for butter, cream and cheese. The per capita cheese consumption was 19.4 kg (approximately 53 g/d] in 2010 and 18.4 kg per capita (approximately 50 g/d) in 2006, so the trend of increasing cheese consumption continues [STATISTIK AUSTRIA, 2012a].

Considering the recommendation to have three servings of milk (200 g) and milk products (cheese 50-60 g; approximately 200 g of 'white' milk products) daily [BMG-HOME, 2010] Austrians do not meet the recommendation in per capita consumption and the actual intake is even lower [ELMADFA et al., 2009a]. Since this food group is an important source for calcium, iodine, protein and cobalamin (especially for vegetarians) the consumption of low-fat milk and milk products should be further promoted.

2.2.11 Sugar and sugar products

Sugar is a carbohydrate produced by all green plants. The energy of the sun is used for photosynthesis in plants leaves. Using water and carbon dioxide plants built sugar; thus, solar energy is transformed into 'sugar energy'. Sugar beet and cane are the only plants that store sugar directly, and humans extract and use it [KOFRÁNYI et al., 2011]. Sugar products include candy, liquorice, candied fruits, chocolate, ice cream and marzipan. In the 2008 Austrian nutrition report sweet bakery products were also included in this group as well [ELMADFA et al., 2009a].

If one takes a closer look at this food group it is notable that most population groups, such as children, adolescents, adults, seniors and pregnant women, obtain about 50 % of their daily sugar intake from these products. The consumption of foods with a high isolated carbohydrate content (mono- and disaccharides) must be reduced; only moderate consumption is recommended [DGE, 2012] and [ELMADFA et al., 2009a].

In addition to water/tea/coffee, this is also the food group in which the out-of-home consumption in Europe is significantly higher than consumption at home [ORFANOS et al., 2007].

2.2.12 Beverages

The human body is comprised of about 60 % water. Water is the most important solvent and transport medium for the human organism. For example, it transports nutrients, dilutes the stomach acid and dissolves hormones, proteins, vitamins, minerals and trace elements. Therefore, water is essential, meaning it can't be replaced by any other substance. Thus, the intake of sufficient amounts (2-2.5 litre per day) of high quality drinking water is necessary. Water does not supply any macronutrients and thus no energy. Natural mineral waters and soda water are also included in this definition [KOFRÁNYI et al., 2011].

Coffee contains caffeine, chlorogene acid and oils. The raw bean also contains carbohydrates and proteins, but they are almost completely metabolized while roasting. The bean also has a relatively high acid content (totally 4-12 %), and even some vitamins and minerals can be found [KOFRÁNYI et al., 2011].

Tea is a brewed beverage, i.e. hot water is added to dried leafs or fruits and gains flavour through this process. Tea is a collective name for brewed beverages based on different herbs, fruits, flowers, buds or sprouts. Usually they contain no macronutrients and - thus no energy - and different fractions of other components such as caffeine, alkaloids, polyphenols and many others [KOFRÁNYI et al., 2011].

Soft drinks are produced using carbon dioxide, vitamins, minerals, different kinds of sugar and/or sweetener and flavours. These beverages are mostly alcohol-free, may be

sweetened and flavoured, are produced with a water base and can contain caffeine and sweetener. This food group includes fruit juice drinks, fruit spritzers, lemonades and sherbets. They contain fluctuating amounts of sugar and energy [KOFRÁNYI et al., 2011].

Alcoholic beverages contain ethanol, which is an alcohol and appropriate in moderate amounts for the purposes of human nutrition. This food group includes wine, beer and liquors.

The daily fluid intake of healthy adults is between 2.1 and 2.8 litres and depends on several factors, including thirst, drinking habits, climate, body temperature, and enteral and renal fluid losses [ELMADFA AND LEITZMANN, 2004]. About one-third of the needed fluids are gained through food intake; the rest must be acquired through water and other beverages. The recommendation for the daily fluid intake through beverages is in the range of 1.2-1.5 litres for adults [DGE, 2012]. The recommended thirst quenchers are drinking and mineral waters and other beverages that are low in calories, such as diluted fruit juices (3:1) and unsweetened fruit- and herbal tees. Beverages that contain caffeine, such as coffee, black tea and energy drinks, and milk do not count as real thirst quenchers [BMG-HOME, 2010].

The Department of Nutritional Sciences at the University of Vienna conducted a drinking water study in 2007/08. Austrian adults (age 18-65) were interviewed using a 1-day-drinking protocol about their drinking habits and the amounts of beverages consumed. The preferred beverages, amount of nutrients and energy obtained from beverages and the attitude to drinking water were documented. The following beverages were grouped: drinking water, mineral water (with and without carbon dioxide, soda water), coffee, tea (caffeinated and decaffeinated), milk and milk-based beverages, juices (fruit and vegetable juices, nectar juices, smoothies), soft drinks (lemonades, ice teas, coke), alcoholic beverages (wine, beer, liquors) and other beverages (wellness drinks, sports drinks, energy drinks) [ELMADFA et al., 2009a].

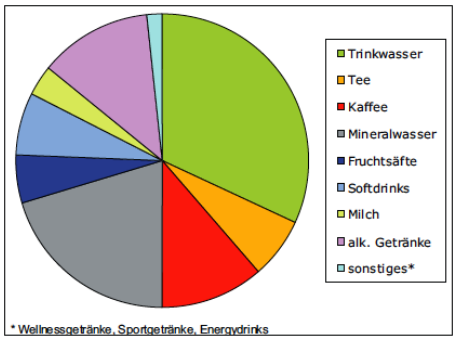


Figure 5 Fraction of beverages on the overall drinking amount of men (%) [ELMADFA et al., 2009a].

The overall average fluid intake through beverages in Austrian adults was 2.7 litres per day; excluding the "unreal thirst quenchers" (alcoholic beverages, milk and caffeinated beverages) the average per capita consumption was 2.1 litres per day. It was found that the amount of fluid intake decreases with age, but still even the oldest group in the range of 57-65 years met the D-A-CH recommendations of 1.2-1.5 litres per day [DGE, 2012] and [ELMADFA et al., 2009a]. Broken down by sex, the results show that women have an overall average daily fluid intake of 2.6 litres per day - excluding the unreal thirst quenchers they drank 2.0 litres per day - whereas men have an overall average fluid consumption of 2.8 litres per day and 2.1 litres when the unreal thirst quenchers were excluded. Women preferred milk/milk-based drinks and fruit/vegetable juice, whereas men more often drank soft drinks and alcoholic beverages. 1.0 litre of drinking water and 0.4 litres of mineral water were consumed per day and capita and were the two highest percentages. The overall average energy intake from beverages was 338 kcal/d, by excluding the unreal thirst quencher the value is halved, 177 kcal/d. People who are obese or overweight gain significantly more energy from beverages than people with a normal weight [ELMADFA et al., 2009a].

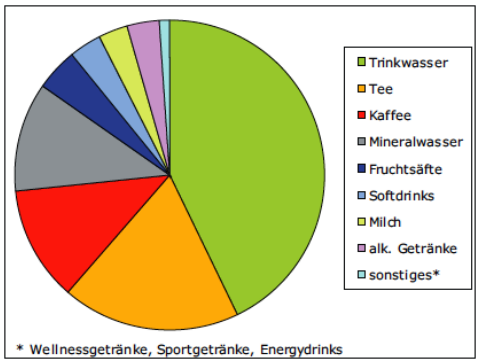


Figure 4 Fraction of beverages on the overall drinking amount of women (%) [ELMADFA et al., 2009a].

Alcohol consumption was lower in the cities than in the rural area. Vienna had the lowest alcohol intake with 200 ml/d, whereas in southern Austria the average intake was 260 ml/d per capita and day, which was the highest value in Austria. Alcohol consumption correlated with the BMI. Obese individuals (15 g/d) drank almost twice as much alcohol as people with a normal weight (9 g/d) [ELMADFA et al., 2009a].

Most of the findings of the drinking study were pleasing. The recommended amount of fluids was achieved by all age groups and more than half of the recommended amount was consumed through drinking water intake. The highest amount of energy through beverage intake was achieved by men due to higher consumption of unreal thirst quenchers such as alcohol and soft drinks; they should therefore give preference to water as a thirst quencher [ELMADFA et al., 2009a].

The alcohol intake of both sexes was moderate and below the tolerated maximum amount. Obese and overweight people in particular should make sure that they do not consume too much alcohol with regard to the high amount of energy these beverages contain [ELMADFA et al., 2009a].

2.2.13 Current situation of Food Group Consumption in Austria

The quantitative development of food consumption according to product groups shows substantial modifications over the past ten years (2000-2009):
The average yearly consumption of meats like sheep, beef and pork slightly decreased (-2.5 %), which contrasts with significant relative increases of per capita consumption of fish and fish products (+38.9 %) and poultry meat (+17.5 %). The consumption of milk and milk products (e.g. yoghurt) increased over the long term (+5.4 %). Growth rates can also be shown in the consumption of cream (+5.4 %), butter (+8.3 %) and cheese (+11.9 %). The per capita consumption of vegetables (+ 6.6 %) and fruits (+4.1 %) has risen. The per capita consumption of cereals (+12.8 %) significantly increased, as did the request for potatoes (+4.1 %). Sugar consumption just slightly fell by -2.3 %, whereas the consumption of honey has sharply decreased by -25.0 %. Significant growth rates are seen in the per capita consumption of vegetable oils (+19.3 %) and animal fats (+14.1%). The per capita consumption of beer (-3.0 %) and wine (-1.3 %) decreased slightly; in contrast, the request for mineral water (+9.7 %) has grown substantially [BMLFUW, 2010].

2.3 Dietary guidelines

These days' interested individuals can easily be confused by the immense increase of information on nutrition and health with which they are confronted from various sources. Food labels provide details on the amounts of macro- and micronutrients as

well as on the energy a food contains, which is naturally useful and important once the consumer understands what the framework for a proper diet is. To ensure that people have this knowledge it is necessary to provide nutrient advice that consumers understand [EUFIC, 2010].

2.3.1 Distinction between dietary allowance, dietary goals and dietary guidelines

A distinction must be made between nutrient-based recommendations (depending on the country also called: recommended dietary allowance, recommended nutrient intake, recommended dietary intakes, dietary reference value or population reference intakes), dietary goals and dietary guidelines [GIBNEY AND WOLMARANS, 2004].

Nutrient-based recommendations (dietary allowance) are quantitative guidelines [GIBNEY AND WOLMARANS, 2004] at the national or regional level. They are based on scientific studies and published by nutrition societies (e.g. the Austrian nutrition society or the German nutrition society). The results of the scientific studies are converted into the average requirement and its variance in form of the standard deviation [GIBNEY AND WOLMARANS, 2004] and [ELMADFA AND LEITZMANN, 2004]. The resulting reference values provide information for experts (nutritional scientists, medical doctors, dietary assistants and the food industry) on how much different population groups and subgroups [GIBNEY AND WOLMARANS, 2004] on average need of specific micro- and macronutrients and energy to keep people healthy and able-bodied [ELMADFA, 2004]. An example for reference values in the German speaking countries would be the D-A-CH reference values for nutrient intake [DGE, 2012] which were first published 2000 and have been continually updated since then, but also the WHO/FAO provides vitamin and mineral requirements for human nutrition [WHO AND FAO, 2004a]; many more of these publications can be found for different states and nations. As mentioned above is it very difficult for consumers to put these abstract intake recommendations into practice, i.e. choosing proper foods and adequate amounts of them at the same time [BIESALSKI AND GRIMM, 2011].

Dietary goals are national targets regarding certain macro- and micronutrients, the long-term goal being to prevent non-communicable nutrition-related diseases such as coronary heart disease, some kinds of cancer and stroke. In general dietary goals are

worked out in order to plan strategies on the national level; they are not meant for advising individuals [GIBNEY AND WOLMARANS, 2004]. The dietary goals currently being worked toward in Austria are: an adjusted energy supply with sufficient vitamin and mineral intake and at the same time avoidance of oversupply; optimizing the intake of fluids; decreasing the intake of salt; reducing sugar consumption and simultaneously increasing the intake of complex carbohydrates (sources e.g. whole grain products or legumes) and dietary fibre. Additional objectives are to optimize the fat quality, and to decrease fat, saturated fatty acid and trans fatty acid consumption [LEHNER et al., 2012]. Dietary guidelines provide advice for individuals. The nutrition societies implement food-based dietary guidelines, which are based on the scientific reference values and combine quantitative and qualitative information [BIESALSKI AND GRIMM, 2011] into possible foods, meals and eating habits [GIBNEY AND WOLMARANS, 2004]. The depiction of these recommendations should be easily understandable and/or visually appealing to the consumer [ELMADFA, 2004].

Figure 6 Dietary guidelines modified according to GIBNEY AND WOLMARANS and ÖGE and DGE [2004] and [2005] and [2012].

2.3.2 Food-based dietary guidelines

The WHO and FAO requirement for governments of the different nations is to develop quantitative and/or qualitative dietary guidelines that consider age and sex as well as national characteristics such as lifestyle, consumption habits and health risks [ÖGE, 2005]; thus, the German nutrition society developed the guidelines for a wholesome diet. These rules may be used as an introduction to a healthier diet, instructions for times when changes in dietary behaviour are planned or as a reminder for consumers who are already well informed. The recommendation is currently to have 5-6 meals evenly distributed throughout the day, whereby the main meals should each cover

between 25-30 % of the daily energy intake and the snacks between the meals 10 % thereof [BIESALSKI AND GRIMM, 2011]. In particular the message, which is composed of ten points, is to enjoy a varied diet with lots of cereals and potatoes, as well as five servings of fruits and vegetables daily. The rules also emphasize the importance of having milk and milk products every day and plenty of low-energy beverages. The spare consumption of added lipids as well as of sugar and salt is recommended. The proposed behaviour modifications are to carefully prepare a tasty meal, take time to eat, watch your weight and keep moving [DGE, 2011].

2.3.3 Austrian food-based dietary guidelines

In order to fulfil the WHO/FAO requirement the Austrian nutrition society also worked out guidelines for cereal and potato products for the establishment of food-based dietary guidelines. The promotion and maintenance of good health, reduction of the prevalence of nutrition-related diseases, practical support to ensure the nutrient supply of the Austrian population are the objectives of these guidelines. Furthermore, detailed and practice-related measures for actions with regard to food choices, support of a seasonal and regional choice of foods and finally the foundation for further materials for disseminating the Austrian dietary recommendation are included in this paper [ÖGE, 2005]. Further information on the details can be found in the chapter on cereals, cereals products, potatoes and other starchy roots.

2.3.3.1 *The DGE nutrition circle*

Figure 7 The DGE-ÖGE nutritional circular [ÖGE, 2012b].

The nutritional circular, which is shown in Figure 7 has been made up by the German nutrition society and is used and further developed by the Austrian nutrition society. It is a guide for wholesome food choices. The particularity of this model in comparison to other visualization forms of nutritional advices is that it represents the only pictorial presentation in which the segment size at the same time is a measurement for the amount of food. The sizes of the segments emphasize the proportion of the food groups to each other. The

calculations are based on the D-A-CH reference values for nutrient intake. Thus, the nutrient-related level of the reference values is translated to the food-based level. In the DGE nutritional circle is clearly shown that foods of plant origin, such as cereal products, preferred whole grain products, vegetables and fruits are the majority of a balanced diet. Ideally this diet is supplemented trough low fat milk products, meat, fish and high quality plant oils and fats. A sufficient supply with fluids, through low energy or even better energy free beverages, preferred water should accompany the food intake [ÖGE, 2012b].

Thus, the need-based and sufficient supply of nutrients, fibre and secondary plant substances can be ensured, which is a substantial contribution to the prevention of nutrition-related diseases. The possibility to choose from the different food groups with regard to the presented proportions together with physical activity gives the population an important component for the conservation of health [ÖGE, 2012b].

2.3.3.2 The Austrian Food Pyramid - Seven steps to healthiness

The current Austrian dietary recommendations are oriented towards the standardized Austrian Food pyramid, which is shown in Figure 8 has been realized in the frame of the Austrian National Nutrition Action Plan (Nap.e), in 2010 [LEHNER, 2012]. The pyramid is composed of six food groups and one group for beverages. The further down one viand is found, the more it should be consumed [BMG-HOME, 2010]. The particular food groups of the pyramid are described in Table 8:

Figure 8 The Austrian food pyramid [BMG-HOME, 2010].

Table 8 Description of the Austrian food pyramid [BMG-HOME, 2010].

Food groups	Austrian Alimentary Pyramid
Group 1 ***Exceptionally***	***Fatty, sweet and savoury*** Rarely consume fat-rich, high-sugar and high-salt foods or energized beverages. Sweets, pastries,

	high-fat and/or high-sugar fast food products, snacks, savouries and soft drinks are nutritionally less recommendable and should be consumed infrequently – which means one portion a day of those energy-rich snacks at an outside estimate. Use herbs and spices but less salt (6g per day max.). Avoid heavily salted groceries such as corned meats, salted nuts, ready-made sauces…
Group 2 ***Daily*** 	***Added lipids*** 1-2 tablespoons (10-20g) of vegetable oil, nuts or seeds per day. Quality matters more than quantity. Higher quality vegetable oils such as olive oil or rape seed oil and other vegetable oils such as walnut, soy, linseed, sesame, corn germ, sunflower, pumpkin seed, and grape seed oil as well as nuts and seeds contain valuable fatty acids and can therefore be consumed in moderate daily amounts. Sparingly use spreadable fats, shortenings and frying greases such as butter, margarine or lard plus fat-laden milk products such as whipping cream, or sour cream.
Group 3 ***Weekly*** 	***Fish, meat, meat products and eggs*** Eat at least 1-2 portions of **fish** (about 150 g each) per week. Preference should be given to fat-rich saltwater fish such as mackerel, salmon, tuna and herring or local cold water fish such as char. Consume a maximum of three portions of low-fat **meat** or low-fat meat products (meaning 300-450 g) per week. rarely eat red meat (i.e. beef, pork and lamb) and meat products. You may consume up to three **eggs** per week.
Group 4 ***Daily*** 	***Milk and milk products*** Consume three servings of milk and milk products daily. Preference should be given to low-fat versions. One serving is: 200 ml of milk, 200 g of curd or cottage cheese, 180-200 g of yoghurt and 50-60 g of cheese. Ideally choose two servings of 'white' (for example yoghurt, buttermilk, cottage cheese) and one serving of 'yellow' (cheese) milk products.
Group 5 ***Daily*** 	***Cereals, cereal products and potatoes*** Eat four servings per day of cereals, bread, pasta, rice or potatoes (five servings for high sports-active individuals and children). One serving is: about 50-70 g of bread/whole grain bread, 50-70 g of rolls such as whole grain rolls or crisp rolls, 50-60 g of muesli or cereal flakes (oatmeal), 65-80 g of (raw) meets 200-250 g (boiled) pasta, 50-60 g (raw) is (150-180 g) boiled rice/cereals and 3-4 medium sized (boiled about 200-250 g) potatoes. Give preference to whole grain products!
Group 6 ***Daily*** 	***Vegetables, pulses and fruits*** Eat five servings of vegetables, legumes and fruits daily. Three portions of vegetables and/or pulses and two portions fruits are ideal. One serving is 200-300 g of cooked vegetables, 100-200g of uncooked vegetables, 75-100 g of salad/lettuce, 70-100 g of (raw) or 150-200 g of (cooked) legumes, 125-150 g of fruits and 200 ml of fruit or vegetable juices **Rule of thumb:** One's clenched fist equals a serving of fruits, vegetables or pulses. Have your vegetables partly raw and consider seasonal and regional availability when choosing fruit and vegetables.
Group 7 ***Daily*** 	***Non-alcoholic beverages*** Drink at least 1.5 litres of liquid daily. Give preference to low-energy beverages such as water, mineral water, unsweetened fruit and herbal teas or diluted fruit or vegetable juices. There are no reasons against moderate daily amounts of coffee, black tea (3-4 cups) or other caffeinated beverages.

3 MATERIALS AND METHODS

This thesis has been conceived based on the HECTOR Project, which is a European study about eating out: habits, determinants and recommendations for European consumers and the European catering sector. Therefore, the essential objectives of this project will first be pointed out and subsequently examples of the survey methods used for this thesis will be provided.

3.1 HECTOR - Eating out: Habits, Determinants, and Recommendations for Consumers and the European Catering Sector

'The HECTOR Project is supported by the European Commission Research Directorate_ general within Sixth Framework Programme's Thematic Priority 5 "Food Quality and Safety" [HECTOR-ABOUT, 2010].

The Project started in June 2006 and has been ongoing for 42 months. Data were collected in several European countries and from 12 European catering-related enterprises. The Department for Nutritional Sciences (University of Vienna) has provided the Austrian data [HECTOR-ABOUT, 2010].

The main goal of the HECTOR Project is to establish a platform to foster the collaboration of the scientific community, 12 catering-related enterprises and consumer associations to find out more about the practices of catering-related enterprises and to estimate food types and quantities offered (food supply) as well as to increase knowledge about eating out patterns (food demand) [HECTOR-HOME, 2010].

3.1.1 What is HECTOR about?

Eating out is no longer just for special occasions. It seems that modern life is inducing people to eat out more and more. The already large variety and convenient availability of food makes it easy for people to eat out [HECTOR-HOME, 2010].

The HECTOR Project and the following goals arose out of the increasing concern about unwise food decisions related to chronic diseases and nutrition-related disorders and the

lack of published data regarding what and how Europeans eat out [HECTOR-HOME, 2010].

3.1.2 Objectives of the Hector Project

The three main objectives of the HECTOR Project are explained as follows:

1) To extend knowledge about eating out in Europe by

    (a) Getting more information about the eating-out patterns of European consumers in terms of prevalence, size and type of consumed foods and the influence anthropometric-, socio-demographic and lifestyle factors might have and
    (b) Determining methods used and services offered by catering-related enterprises, including SMEs [HECTOR-ABOUT, 2010].

2) To encourage European consumers to make healthy eating-out choices through the evaluation and finding of strategies and measures [HECTOR-ABOUT, 2010] and to develop these strategies and measures through the creation of a network of medical doctors, nutrition scientists, epidemiologists, economists, food technologists and catering specialists. [HECTOR-HOME, 2010] Strategies and measures will aim to enhance the quality of meals and services offered by catering-related enterprises, as well as to increase the acceptance of and to promote the demand for healthy food on the European market. This approach will ensure that both directions of the food chain (from the producer to the consumer and vice versa) are equally addressed [HECTOR-ABOUT, 2010].

3) To collect data that are relevant to out-of-home consumer spending, constantly gathered through the household budget surveys undertaken among nationally representative population samples thereby creating a methodological framework which would theoretically allow the assessment and monitoring of the food choices made inside the home and out [HECTOR-ABOUT, 2010].

3.1.3 Additional Objectives of the Hector Project

- To describe European consumers' out-of-home consumption

- To compare dietary intake at home and out, where possible on a national and international level.
- To tailor eating-out consumption to national and international recommendations and determine optimal patterns for eating out based on an innovative strategy [HECTOR-ABOUT, 2010].
- To find out more about European patterns of eating out, including foods, nutrients and meals.
- To survey the practices of catering-related enterprises to modify sizes and the effect this would have on consumers [HECTOR-HOME, 2010].

After the evaluation of food supply and demand the results will be translated into a common strategic action plan to increase the quality and safety of the European consumers' food choices when they are eating out. To prove its efficiency the SMEs in the consortium will pre-test the action plan [HECTOR-ABOUT, 2010].

3.2 Target Population

The random sample included the nine Austrian federal states. There was an independent evaluation in each province every season [SCHÄTZER, 2007].

The 'Yellow Pages Austria' was used to select the random samples. In all nine Austrian federal states selections were made from: factories for manual workers; community depots, vehicle undertakings, market-gardens etc., for employees; massage salons, beauty salons and general practitioners for the self-employed; gynaecologists and catholic women's groups for housewives; official representations of university students and colleges for students; and the official job centre of Austria for unemployed people [SCHÄTZER, 2007].

2,632 contacts were selected nationwide, compiled in a contact list and called if necessary. Altogether 5,138 questionnaires were sent out: 1,385 in spring (May to June 2005), 1,241 in summer (July to August 2005), 1,243 in autumn (September to October 2005) and 1,269 in winter (January to February 2006). A total of 2,704 valid questionnaires were returned, which equates to a response rate of 52.7 % [SCHÄTZER, 2007].

3.3 Survey Methods

3.3.1 Questionnaire design

Data on the fruit and vegetable consumption of Austrian adults were evaluated by the Department of Nutritional Sciences, Vienna in 2000. In order to make the data comparable the evaluations questionnaires in 2006 were formulated in a moderately similar manner; new questions were also added, for example on the topics of functional food and frozen food [SCHÄTZER, 2007].

3.3.2 24-hour recall

The 24-hour recall is a retrospective survey method used to gather food consumption data from single individuals within the space of 24 hours either through self-reporting or through an interviewer. The test subject provides information about food, frequency and duration of meals as well as the amount of food and beverages consumed using conventional household metrics for the estimation [ELMADFA AND LEITZMANN, 2004], which can be a source of significant bias [MÜLLER AND TRAUTWEIN, 2005].

The benefits of this method are that it is comparatively stress-free for the test subject and there is no influence on the eating habits [ELMADFA AND LEITZMANN, 2004]. The short delay between consumption and documentation is also advantageous, since the accuracy of the information and the cooperation of the participant increases [MÜLLER AND TRAUTWEIN, 2005].

Some issues could be the possibility that several foods and drinks happen to be left out, are underestimated (e.g. alcohol) or overestimated (e.g. fruit and vegetable consumption) and that the described day might not have been a typical day for the person, which may lead to bias. It is a good method for a major collective [ELMADFA and LEITZMANN, 2004] and [MÜLLER AND TRAUTWEIN, 2005].

The 24-hour recalls for this thesis were sent out to Austrian adults by mail along with a questionnaire about fruit and vegetable consumption. Furthermore, detailed instructions on how to fill out the recall and samples were included. The 24-hour recall itself

contains fields for each meal (breakfast, midmorning snack, lunch, afternoon snack, dinner, late night snack) and additional fields for the place of consumption for each eating occasion. The test subjects were also asked to fill in the date and weekday of the reported day and to tick off whether it had been a typical day or not. The empty protocols provided questions intended to help the test subjects remember drinks and snacks they had forgotten [SCHÄTZER, 2007].

3.3.3 Control of the data

It was necessary to revise the data that had already been stored in the database. Since the date the data was acquired, the German federal food code 2.3 (BLS), which forms the basis for the Access database, has been expanded to include traditional Austrian recipes. The purpose of controlling the data was primarily to replace the so-called XY components with the currently included Austrian recipes so as to allow for an evaluation according to food groups.

Each 24-hour protocol was reviewed according to two aspects: the place of consumption and the XY components that had been used. In addition, standards for information reported inaccurately by participants and meal labeling were unified.

The place of consumption was categorized with regard to the HECTOR project into (1) ‘at home’, which includes all foods and meals consumed at home – regardless of where they came from – and was reported in the protocols as ‘at home’/’home’ or similar. (2) ‘Out of home’ was defined as all foods and meals consumed at places than one’s own home, reported in protocols as ‘restaurant/inn/coffeehouse/bar’, ‘canteen/workplace’, ‘friends/family/picnic/party’, etc.

The Access database, based on the German federal food code 2.3 (BLS), originally contained single food items in different states of processing (e.g. apple, apple raw, apple without kitchen waste, apple cooked etc.) and so-called XY-components, which are mostly traditionally German dishes. These components consist of more than one food item, which can’t be changed or separated in an evaluation. The expansion of the database to include traditional Austrian recipes was intended to adapt the dishes to

Austrian eating habits and to enable the distribution of the single food items to different food groups in an evaluation.

The standardization of meals labels was necessary because different labels were previously used; the old and standardized labels are shown in Table 9:

Table 9 Old and standardized meal labels.

Old label	Standardized label
Breakfast	Breakfast
Coffee break snack	Midmorning snack
Lunch	Lunch
Snack	Afternoon snack
Dinner	Dinner
Snack	Late night snack

Finding standards for information inaccurately reported by participants was necessary because several individuals worked on data entry and therefore different standards occurred. Inaccurate information refers to general information (e.g. bread, pizza, salad) was provided instead of detailed information (whole grain bread with butter and gouda cheese, pizza margarita, or tomato salad) with regard to consumed meals, dishes or foods. An example for revising a protocol is shown in Figure 9.

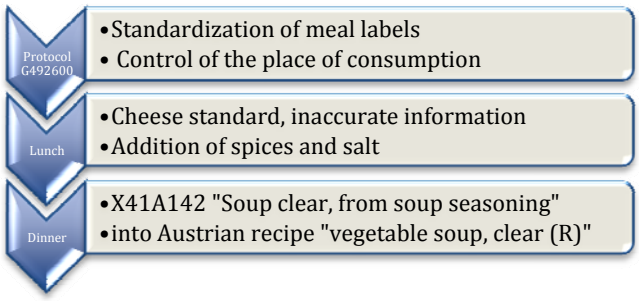


Figure 9 Example of controlling a protocol (G492600).

3.3.4 The process of food grouping

The food groups were made up according to the requirements of the HECTOR project. The HECTOR project team was consulted whenever ambiguities arose. Some of the 19 main food groups were further divided into 2 to 11 related subgroups.

The food groups were created in the access database based on the German federal food code (BLS 2.3), which was expanded to include traditional Austrian recipes. The main food groups were coded with numbers in the range of 435-505. Table 10 shows the

main HECTOR food groups and the related subgroups. If no subgroups are shown, then there is no further distinction in the respective group.

Subsequently the data was transferred to Excel as an intermediate step and finally to SPSS 12.0 for initial processing, e.g. variable aggregation.

Table 10 HECTOR Main food groups and related subgroups and food items.

HECTOR MAIN FOOFGROUPS	RELATED HECTOR SUBGROUPS
Food Group 1 (FG1) Cereals and cereal products	Bread and rolls (FG1.1) Bakery products (excl. sweet and savoury) (FG1.2) Rice, cereals and products (excluding flour and pasta)(FG1.3) Flour (FG1.4) Pasta (FG1.5)
Food Group 2 (FG2) Sweet & savoury cereal products	
Food Group 3 (FG3) Meat and meat products	Pork meat (FG3.1) Beef, veal and calf meat (FG3.2) Red meat (excl. pork and beef) (FG3.3) Offals (FG3.4) Poultry (FG3.5) Canned meat and meat products (FG3.6)
Food Group 4 (FG4) 4 Eggs	
Food Group 5 (FG5) Milk and milk products	Milk (FG5.1) Cheese (FG5.2) Milk products (excluding cheese) (FG5.3)
Food Group 6 (FG6) Ice cream	
Food Group 7 (FG7) Vegetables (fresh and processed)	Green leafy vegetables (FG7.1) Cabbage (FG7.2) Tomatoes (FG7.3) Carrots (FG7.4) Onions, garlic and leek (FG7.5) Other fresh vegetables (FG7.6) Processed vegetables (FG7.7)
Food Group 8 (FG8) Pulses	
Food Group 9 (FG9) Potatoes and other starchy roots	
Food Group 10 (FG10) Total added lipids	Butter (FG10.1) Animal fat (butter excluded) (FG10.2) Margarine (FG10.3) Vegetable fat (margarine excluded) (FG10.4) Olive oil (FG10.5) Seed oils (olive oil excluded) (FG10.6)
Food Group 11 (FG11) Fish and seafood	Fish (fresh, frozen and processed) (FG11.1) Seafood (FG11.2)
Food Group 12 (FG12) Fruits (fresh and processed)	Apples (FG12.1) Citrus fruits (FG12.2) Bananas (FG12.3) Grapes (FG12.4) Plums (FG12.5) Berries (FG12.6) Apricots and peaches (FG12.7) Cherries and sour cherries (FG12.8) Pears (FG12.9) Other fresh fruit (FG12.10) Processed fruits (FG12.11)
Food Group 13 (FG13) Nuts	
Food Group 14 (FG14) Fruit and vegetable juices	Fruit juices (FG14.1) Vegetable juices (FG14.2)
Food Group 15 (FG15) Alcoholic beverages	Wine (FG15.1) Beer (FG15.2) Spirits (FG15.3)

Food Group 16 (FG16) Non-alcoholic beverages	Coffee (FG16.1) Tea and similar infusions (FG16.2) Cocoa (FG16.3) Mineral water (FG16.4)
Food Group 17 (FG17) Soft drinks	
Food Group 18 (FG18) Sugar and sugar products	Sugar (FG18.1) Sugar products (excl. sweets and chocolate) (FG18.2)
Food Group 19 (FG19) Sweets/chocolate	
Miscellaneous	

3.3.5 Working definition: Out-of-home consumption

The place of consumption was also noted for every occurrence of food or beverage consumption declared in the 24-hour recalls. Places other than one's own home included: friend's and family member's homes, coffeehouses, restaurants, workplace and canteen, fast-food-establishments and on the go (either streets or cars). Out-of-home consumption includes, as operationally defined, all foods, meals and food items consumed at places other than one's own household regardless of where they were purchased or prepared [ORFANOS et al., 2007].

On the other hand, all foods, meals and food items eaten at home were defined as 'at-home' regardless of where they were prepared, which naturally also includes foods delivered by food catering services or similar.

3.3.6 Contribution of each food group to the average total energy and quantity

First, the total average energy and total average quantity consumed both out of home and at home were calculated in total as well as for the determinants body mass index, sex, and age. Subsequently the proportion - in terms of energy and quantity in percentage - of the diverse food groups with reagard to the total energy or quantity were calculated at home and out of home and for each determinant.

Since the data on the food group consumption were not normally distributed in energy or in quantity, other ways had to be found to show intake differences. A ratio was calculated by dividing the out-of-home-percentage by the at-home-percentage to make a distinction that is noticeable at first sight.

3.3.7 Out-of-home/at-home ratio

Ratios of 1 indicate that the particular food group is consumed, in proportional terms, as frequently out of home as at home. Ratios above should be interpreted as food groups that are consumed more frequently out of home than at home in proportional terms; values below 1 suggest that a certain food group is consumed less frequently out of home.

The ratio itself, of course, does not provide information on the amounts of food or energy consumed; it is the expression of the relation between the proportional out-of-home and at-home consumption of a certain food group, either in total or using a determinant (gender, BMI, age).

3.3.8 Energy density

Energy density is a measurement of how much energy (kcal, kJ) is provided by a particular macronutrient, food, food group or meal per quantity (g). It is expressed as a ratio as shown in Table 11:

Table 11 Atwater factors for macronutrients, modified according to ELMADFA AND LEITZMANN [2004].

Macronutrients	Atwater-factor (kcal/g)
Carbohydrates	4 kcal/g
Proteins	4 kcal/g
Lipids	9 kcal/g
Alcohol	7 kcal/g

That means that 1 gram (quantity) of pure sugar contains 4 kcal (energy), or 100 grams of pure sugar provide 400 kcal of energy, expressed as 400 kcal/100g energy density. Lipids provide more energy (9 kcal) per gram. The resulting conclusion is that fat has more than double the energy density (900 kcal/100 g) of carbohydrates (400 kcal/100 g). Foods rarely consist of pure macronutrients, though exceptions include for example oils (pure lipids), sugar and honey (pure carbohydrates). Most foods consist of one to all four energy-providing macronutrients in various proportions and components (water, fibre) that increase the quantitative amounts of the food but not the energy and thus lower the energy density.

The relevancy of energy density is based on the fact that a constant positive energy balance leads to excess weight and obesity. In order to avoid a positive energy balance, one's diet should ensure adequate saturation that corresponds to relatively low energy intake [BELL AND ROLLS, 2001].

A key factor for adequate saturation is the weight and volume of the food or meal consumed regardless of the energy content. The consumption of food, food groups or meals with a relatively low energy density could therefore be useful in the attempt to avoid long-term positive energy balances in the diet [BELL AND ROLLS, 2001].

As mentioned above, carbohydrates, lipids and proteins (and alcohol) increase the energy density of a food or meal to various degrees, while water and fiber decrease the energy density. Therefore foods (and food groups) that consist of water and high amounts should be given preference in the daily diet [WORM, 2002]. Food-based dietary guidelines take that into consideration; thus, low-energy beverages, fruits and vegetables as well as whole grain cereals form the base of the food pyramid or constitute significant percentages of the nutrition circle.

Energy density was calculated for all food groups by gender, body mass index and age for both out-of-home and at-home consumption. Furthermore, a ratio was calculated by dividing the out-of-home energy density by the at-home energy density. Values of 1 mean the same energy density out-of-home as at-home. Values below 1 indicate that the energy density at home was higher; values above 1 suggest that the out-of-home energy density was higher on the day of the 24-hour recall.

3.3.9 Exclusion criteria

Of the 2,704 valid questionnaires that were returned, in total 2,351 were used for the statistical evaluation in this thesis.

The primary reason for excluding protocols was missing information or misreporting. This affects protocols that did not provide adequate information on foods consumed on the specific day (e.g. only information on breakfast reported) and also unrealistic specifications of energy intake.

A major point for excluding data in dietary assessment is misreporting of the energy intake. A daily energy intake below 400 kcal and above 3,500 kcal was considered an unrealistic specification of the total energy intake on the day of the 24-hour recall in this study; these limits were used as misreporting cut-off points for women. For men the cut off points were below 800 kcal and above 4000 kcal [WILLET, 1998]. That means participants who reported a higher or lower energy intake on the day of the 24-h recall were excluded due to misreporting.

3.3.10 Statistical Analysis

The statistical analysis of the 2,351 valid protocols was conducted using the statistical program SPSS 15.0. The characterization of the study population was performed through descriptive statistics, using primary cross tabs, frequency counts and chi-square tests. Furthermore, most of the statistical analyses were performed separately for both men and women, as well as for body mass index and age.

All HECTOR main food groups as described in Table 10 were included in the analysis. The subgroups are not evaluated in this thesis.

3.3.11 Significance and correlation level

The expected likelihood of error is $\alpha = 0{,}05$ (5%), therefore a $\alpha \geq 0{,}05$ was not significant. The significance levels are shown in Table 12:

Table 12 Significance levels [ZÖFEL, 2003].

Significance level	Classification	Short
$\alpha \leq 0{,}05$	Significant	*
$\alpha \leq 0{,}01$	Highly significant	**
$\alpha \leq 0{,}001$	Most significant	***

The intake of neither energy nor quantity was normally distributed in terms of food groups. Therefore, the significance of differences between the out-of-home and at home consumption of specific food groups was determined using the out-of-home/at-home ratios. The significance of differences between gender, BMI groups and age groups in the average intake of energy or quantity from various food groups both at home and out of home were calculated using non parametric analyses due to the fact that the data was

not normally distributed. The average differences with regard to energy and quantitative intake of food groups (at home and out of home) in terms of gender were verified with the Mann-Whitney-U test, while differences in BMI and age groups were verified with the Kruskal-Wallis test.

The correlation describes relationships of the type "the higher one variable, the higher the other" and "the higher one variable, the lower the other". The measured value that describes the strength of these relationships is the correlation coefficient |r|, which ranges between -1 and 1, and is expressed as $-1 \leq r \leq 1$ [ZÖFEL, 2003]. The classification of r-values is shown in Table 13:

Table 13 Correlation levels [ZÖFEL, 2003].

Correlation coefficient	Classification
$\|r\| \leq 0.2$	Very weak correlation
$0.2 < \|r\| \leq 0.5$	Weak correlation
$0.5 < \|r\| \leq 0.7$	Moderate correlation
$0.7 < \|r\| \leq 0.9$	Strong correlation
$0.9 < \|r\| \leq 1$	Very strong correlation

3.4 Characterisation of the study population

The pool consists of 2,347 Austrian adults between the ages of 18 and 65. The discrepancy with the initial pool of 2,704 valid questionnaires constitutes the 353 individuals who reported no information about the place of consumption, which of course was one of the key indicators for my study; an additional four individuals made no indication of their gender and 33 individuals did not report information on their weight and height; thus they were not included in all BMI-relevant analyses.

3.4.1 Distribution of gender

The study population consists of 2,351 individuals. Approximately 63% (n=1,471) of the participants are women and about 37% (n=876) are men. 4 (0.2 %) individuals did not report their gender.

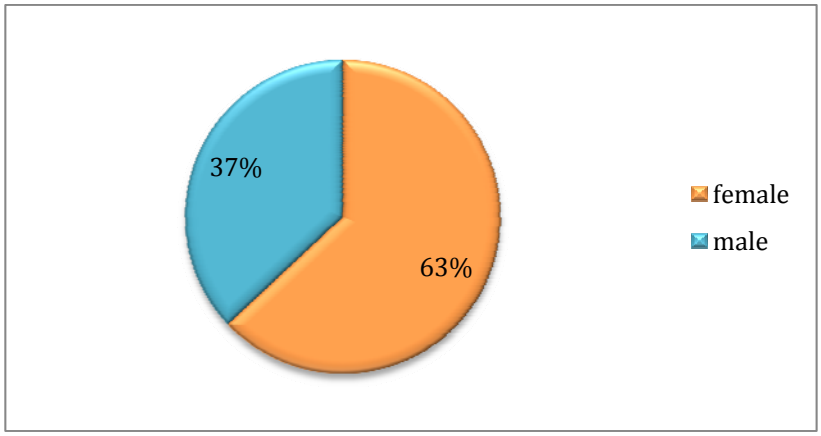


Figure 10 Gender distribution of study population (n=2,351)

Although a quota-based selection process was used to find the sample population, the distribution of gender is not representative of the Austrian population. The gender distribution of Austrian adults (20-64 years) is approximately 50 % women and 50 % men in both the data of the year the study was conducted (2005/06) and the most recent data (2011) [STATISTIK AUSTRIA, 2012b].

A possible explanation for the bias in the gender distribution is that they may result from the greater willingness of female individuals to participate in a survey or a general wider interest in the female population regarding nutritional topics than in the male population.

3.4.2 Distribution of age

The study population consists of Austrian adults. Their ages range between 18 and 64. Figure 11 shows the distribution of the population in terms of gender and age (total average = 38.67 years old, standard deviation = 11.06). The labels indicate frequencies. The graphs on both sides illustrate the theoretical normal distributions (in the actual sample age is not normally distributed within the two gender categories - Kolmogorov-Smirnov Test: $p = 0.000$; Z for the total population = 2.91).

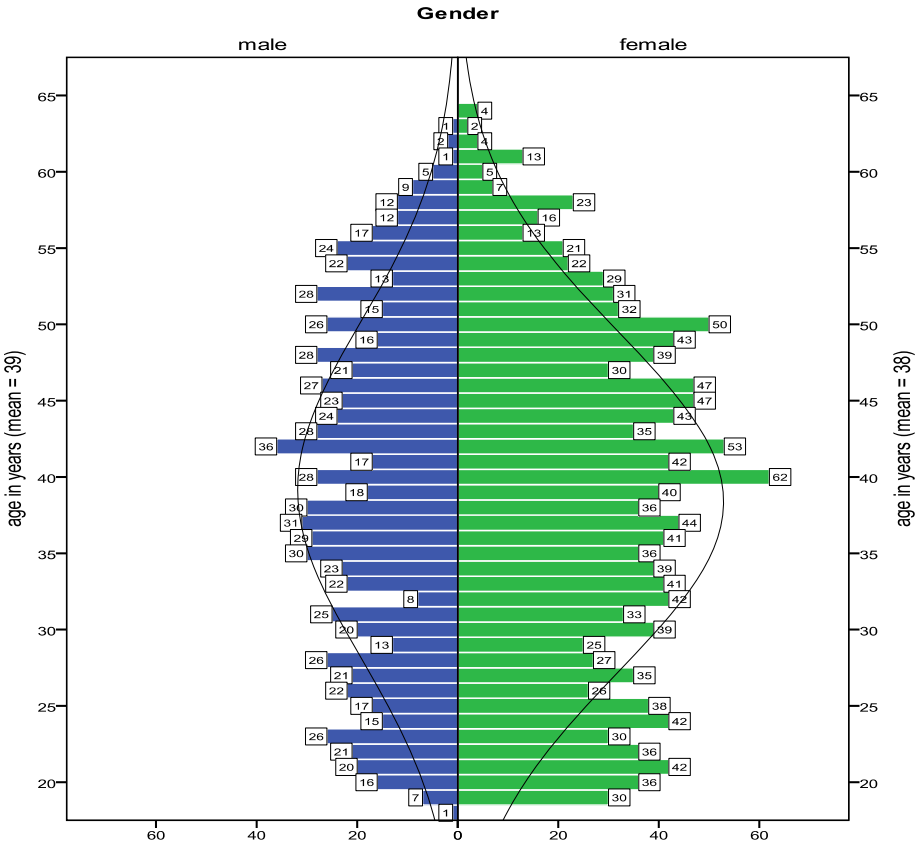


Figure 11 Sample distribution in terms of age and gender (n=2,347).

According to the D-A-CH reference values for nutrient intake, age is categorized into three groups:

1. Individuals who are between 18 and 24: According to the D-A-CH reference values for nutrient intake, only individuals between 19 and 24 are included in the first category, but since there was only one 18-year old person the individual was grouped together with the others.
2. Individuals between 25 and 50 and
3. Individuals between 51 and 64 [DGE, 2008].

About 70 % of the total population as well as of both genders are in the second age group (age 25 to under 51 years), which is also the group with the widest range (26 years). The distribution among all age groups and between genders is similar. About 14 % of all individuals are found in the youngest group (under 19 to under 25 years); 12 % of the male and 15 % of the female participants are included in this age group. 16 % of

the total population is in the group of people between 51 and 64 approximately, 18 % of the male and 15 % of the female participants. Results are shown in Table 14:

Table 14 Gender specific age distribution of Austrian adults according to the D-A-CH age groups (n=2,347).

			Age groups according to D-A-CH			Total
			<19 - <25 years	25 - <51 years	51 - 64 years	
Gender	Male	Number	106	609	161	876
		%	**12.1 %**	**69.5 %**	**18.4 %**	**100 %**
	Female	Number	216	1033	222	1,471
		%	**14.7 %**	**70.2 %**	**15.1 %**	**100 %**
Total		Number	322	1,642	383	2,347
		%	**13.7 %**	**70.0 %**	**16.3 %**	**100 %**

Similar distributions were found in 2006 for the overall Austrian population, with 20 % in the younger group, 61 % in the middle-age group and 19 % in the elderly group [STATISTIK AUSTRIA, 2012b]. The age grouping was slightly different (five-year intervals, i.e. 25-30, 30-35 etc.) and so the compatibility is not given for 100 %.

3.4.3 Distribution of body mass index (BMI)

Anthropometric factors include measurements of the human body and the ascertaining of measurement ratios. The BMI is the ratio of bodyweight in kilogram and the body height in meters squared (kg/m²). The BMI correlates to body fat content, which makes it to a good indicator of being overweight and obese [ELMADFA AND LEITZMANN, 2004].

The classifications of Under- and Overweight were determined using the recommendations made by WHO in 2000: underweight is defined as BMI <18.5, normal weight is in the range from 18.5-24.9, overweight (pre-obesity) is in the range of 25-29.9 and obesity is >30kg/m². Further classification of obesity, i.e. obesity I in the range of 30-34.9, obesity II 35-39.9 and obesity III ≥40, is not included in this thesis [WHO, 2000].

Health insurance companies in the United States of America and Europe concluded that a BMI slightly exceeding the norm in terms of body weight increases life expectancy.

Table 15 shows the ideal BMI with regard to the highest life expectancy, taking into consideration age and gender [ÖGE, 2012c].

Table 15 Preferable BMI with regard to age groups and gender [ÖGE, 2012c].

Age Group	Preferable BMI	
Age	Women	Men
19-24	19.5	21.4
25-34	23.2	21.6
35-44	23.4	22.9
45-54	25.2	25.8

In Austria more adult men are overweight than women. Conversely, more women were in the underweight category than men. Obesity (BMI>30) was to an equal extent found in both genders [ELMADFA et al., 2003]. Almost half (42 %) of the overall population in the group of adults (18-65 years) is overweight; 11 % of those individuals are obese [ELMADFA et al., 2009a].

Of the study population (n=2,351) 33 individuals did not report anthropometric data (body height and weight) and were therefore excluded from BMI-based analyses. Of the remaining 2,318 individuals about 63 % had normal body weight, but the percentage of women was higher (approximately 72 %) than men (49 %). About 26% of the total study population is overweight and another 8 % is obese. The percentage of men was higher in both the overweight and obesity categories (overweight 38% men, 18% women; and obesity 13 % men and 6 % women). The data for underweight constitutes 3% of the total study population, but these results show trends at best since there are only three male individuals in this category. All abovementioned data is shown in Figure 12. Although the exact distribution of the Austrian nutritional reports could not be found, the overall interpretation is similar, that is to say more men are overweight and obese than women in this age group. The percentage of overweight and obese individuals is relatively high (34 % of the overall study population).

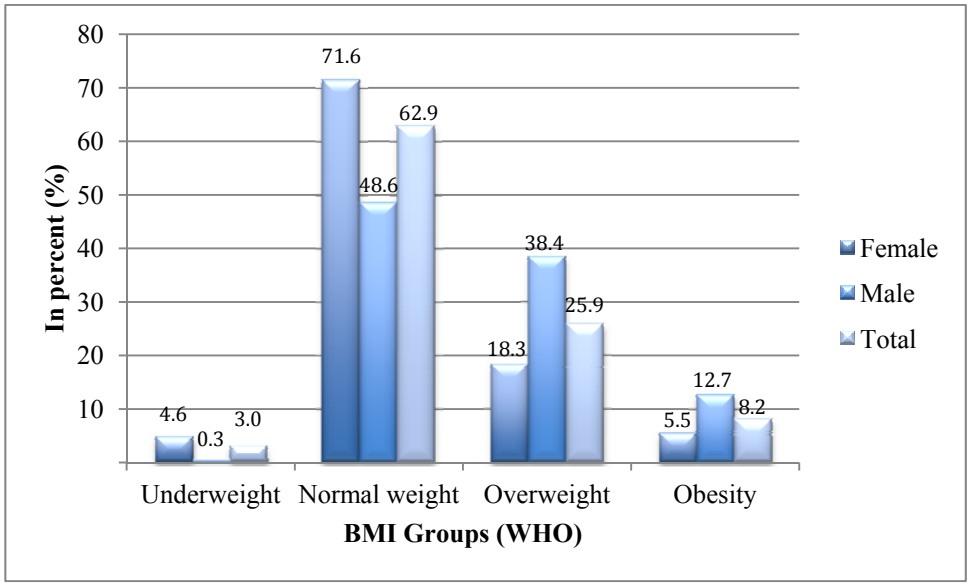


Figure 12 Distribution of BMI with regard to gender and total population (n=2,318) in percent.

The assessment of the BMI with consideration given to gender using a Pearson Chi Square test (gender as nominal and BMI as ordinal variable) led to the observation of a most significant ($p \leq 0.001$) chi square value. The observed values deviate from the expected values of a uniform distribution in all BMI groups and for both genders. There were fewer normal weighted individuals in the Austrian adult men group than expected, but more overweight and obese individuals ($p \leq 0.001$). There were more individuals in the women group than expected who fit into the underweight and normal weight categories and fewer in overweight and obesity ($p \leq 0.001$).

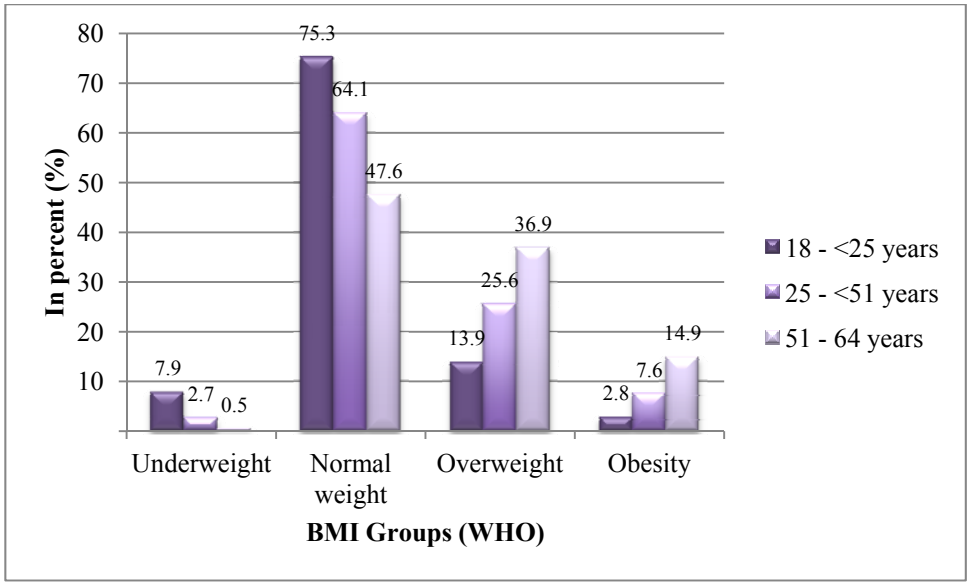


Figure 13 Distribution of BMI with regard to age groups (n=2,318) in percent.

Figure 13 shows that in the study population normal weight is more common in the younger age group, whereas the BMI also rises with increasing age. This increasing prevalence for overweight and obesity over a lifetime was also observed in the 2003 and 2008 Austrian nutritional reports; according to this literature the peak of this trend is reached around the age of 65 before again tending toward a lower BMI [ELMADFA et al., 2003] and [ELMADFA et al., 2009a].

4 RESULTS AND DISCUSSION

4.1 Results for energy intake and place of consumption

4.1.1 Total energy intake, place of consumption and gender

The total average energy intake of the study population was 1770 ± 625 (M±SD) kcal per day. Female individuals had an average total energy intake of 1666 ± 572 kcal per day, whereas the total average energy intake for men was 1944 ± 670 kcal. At least a part of the difference of approximately 15 % between the energy intake for men and women occurs naturally because men have a 10 % higher basal metabolic rate than women due to their higher content of muscles and a lower content of fat [ELMADFA, 2004 and DGE, 2012]. Additionally, the fraction of the study population that is overweight or obese is higher in men than in women, which could be a result of a higher energy intake on the part of the male individuals in the study population.

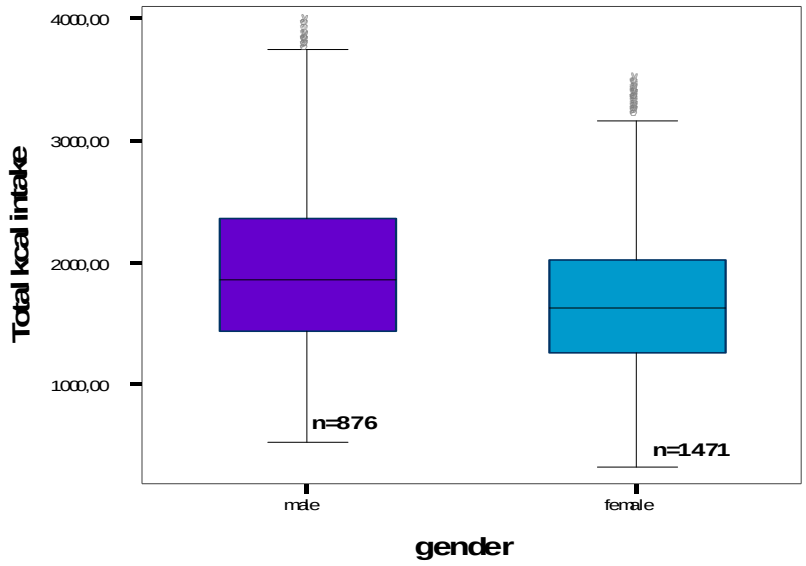


Figure 14 Total energy intake (kcal) of Austrian adults by gender (n= 2,347).

As shown in Figure 14, outliers were observed within both sexes, although the data has been adjusted by excluding extreme values (over- and underreporting of energy intake). Considering that one single day per person was reported in the 24h recall, it is also possible that people had more or less food and thus energy intake than usual. Furthermore there was no interviewer, so the information for participating individuals

on how to report their food intake was limited to the basic instructions. On the one hand this method prevents interviewer bias; on the other hand it could lead to bias in energy intake because of foods that have possibly been forgotten.

Approximately one third of the 1,770 ± 625 kcal/d was consumed at places other than home, as illustrated in Figure 15.

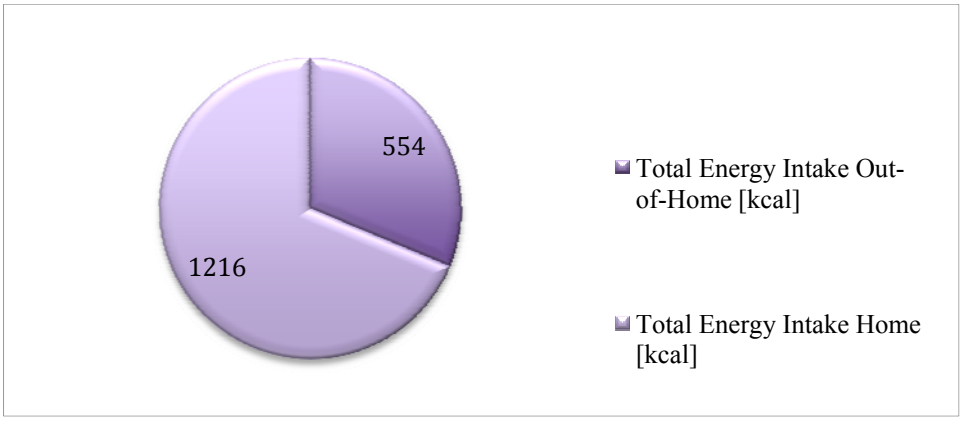


Figure 15 Total average energy intake [kcal/d] at home and out-of-home (n=2,347).

As shown in Figure 16, men gain 36 % of their average daily total energy intake from out-of-home consumption, which is about 8 % more than women (28 %). The finding that men report higher percentages of their average total daily energy intake out of home than women was also found in the EPIC study [ORFANOS et al., 2007].

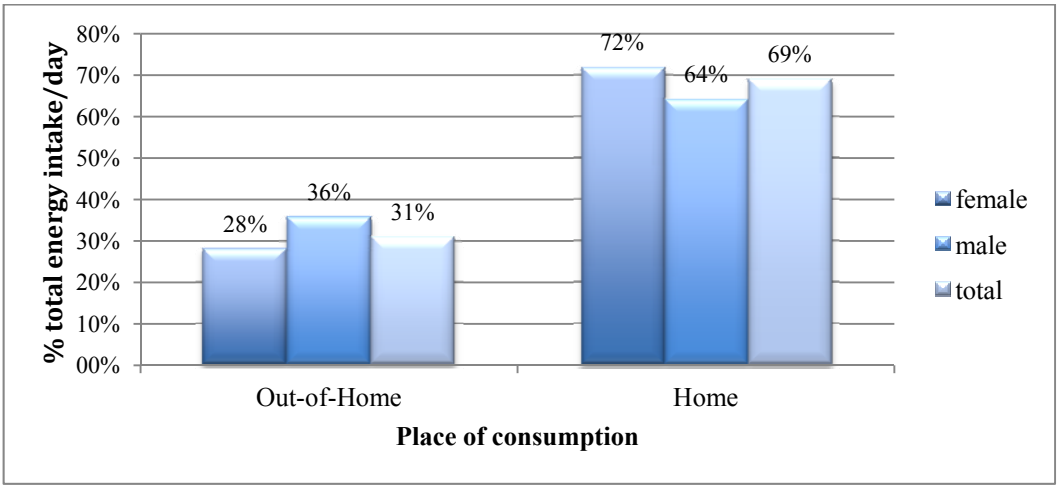


Figure 16 Total average energy intake in % at home and out-of-home of adult Austrians by place of consumption and gender (n=2,347).

Approximately 7 % (168 out of 2,351 individuals) of the study population reported that they exclusively ate out of home, which means they had no food at home. About 34 %

(791 individuals, n=2,351) did not eat out of home at all, which is represented by the column ‘total’ in Figure 17. The remaining 1,392 individuals (59 %) consumed foods both at home and outside their own household. The percentages of men and women are also shown in this context in Figure 17. Approximately 37 % of the female individuals ate exclusively at home and had no energy intake at other places, while only about 27 % of the male participants did the same. About 5.5 % of the female individuals ate exclusively out of home; almost twice as many (10 %) of the men did so.

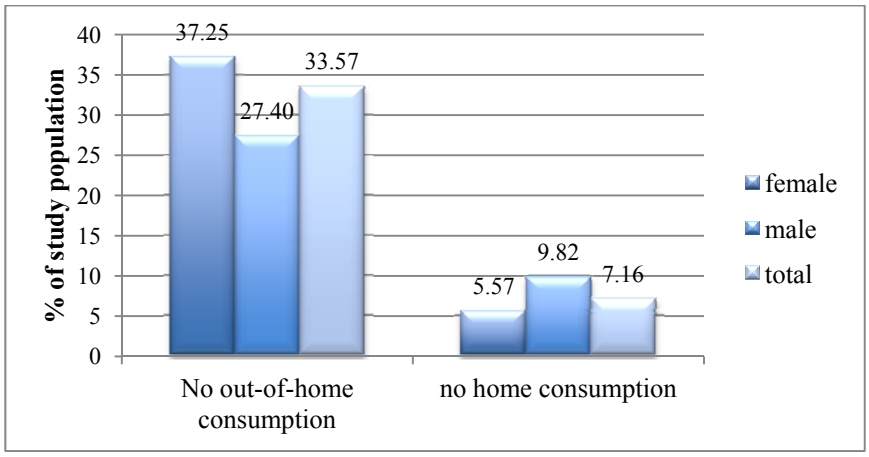


Figure 17 Exclusive out-of-home/home consumption in %, by gender (n=2,347).

4.1.2 Total energy intake, place of consumption and BMI

Figure 18 illustrates the distribution of the BMI groups (according to the WHO classification) and the percentage of individuals who eat exclusively at home and out-of-home. In the group of people who did not consume any foods out of home, a strong correlation can be observed (r=0,71) between the BMI and the number of individuals in percent who ate exclusively at home. In the group that consumed nothing at home, a very strong correlation (r=0,91) was found between the BMI and the number of persons who exclusively ate out-of-home. This means the higher the BMI, the higher the percentage of individuals who exclusively eat at home or out of home.

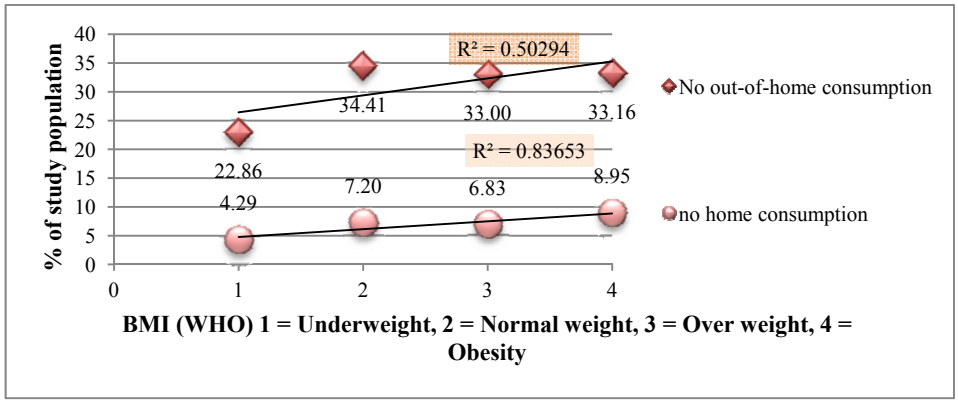


Figure 18 Exclusive out-of-home/home consumption in %, by BMI (WHO) (n=2,319).

4.2 Results - Food-Groups

4.2.1 Food Group choices of Austrian adults - Quantity

Table 16 shows the average daily intake among both male and female Austrian adults (n=2,318) by food group and place of consumption (at home and out-of-home as operationally defined) in grams (average ± standard deviation, M±SD). P for trend indicates the significance of differences in intake between male and female participants (significant difference when $p \leq 0.05$ as shown in Table 12).

In quantitative terms (g) more food was generally consumed at home in most food groups and both genders. An exception was observed in the fact that men consume quantitatively more soft drinks (such as lemonade) out of home than at home and most significantly more than female participants ($p<0.001$). At approximately 200g (90g out of home and 110 g at home), the overall consumption of alcoholic beverages (also referred to as 'alcohol') is about four times higher in male participants than in female participants, who had an overall consumption of about 50 g (20 g out of home and 30 g at home), in both (at home and out of home) these differences between genders were most significant ($p<0.001$). As shown above Figure 14 Total energy intake (kcal) of Austrian adults by gender (n= 2,347)., the distribution of total out-of-home energy intake was about one-third; the rest was consumed at home. These results could also be shown in grams: with an average consume of 2,710 g (100 %), 1,714 g (63 %) were consumed at home and 996 g (37 %) out of home.

Table 16 Daily food intake in g (at home and out-of-home) of male and female participants (n=2,318).

Food Group	Place of consumption	Female		Male		P for trend	Total mean (g)
		Mean (g)	±SD	Mean (g)	±SD		
Fruits (g)	Out of home	78.84	±141.98	87.53	±166.78	0.819	83.19
	At home	146.89	±196.01	87.24	±160.83	<0.001***	117.07
Vegetables (g)	Out of home	44.75	±92.59	54.23	±127.57	<0.001***	49.49
	At home	140.94	±214.15	100.56	±103.47	<0.001***	120.75
Fruit & vegetable juices (g)	Out of home	34.22	±152.88	45.21	±161.37	0.162	39.72
	At home	84.39	±205.36	80.03	±210.69	<0.001***	82.21
Pulses (g)	Out of home	2.06	±11.93	3.07	±14.55	0.039*	2.57
	At home	8.90	±29.51	6.39	±24.41	0.018*	7.65
Cereals (g)	Out of home	50.27	±82.96	79.62	±109.90	<0.001***	64.95
	At home	154.56	±127.47	166.87	±141.58	0.158	160.72
Potatoes (g)	Out of home	10.21	±39.09	17.85	±56.17	<0.001***	14.03
	At home	38.26	±74.87	35.83	±75.72	0.092	37.05
Nuts (g)	Out of home	0.96	±6.95	0.32	±2.42	0.03*	0.64
	At home	2.97	±15.34	1.69	±12.76	<0.001***	2.33
Total added lipids (g)	Out of home	6.81	±12.01	9.81	±15.28	<0.001***	8.31
	At home	23.68	±19.36	21.85	±19.95	0.005**	22.77
Meat (g)	Out of home	25.93	±56.37	65.78	±93.90	<0.001***	45.86
	At home	65.05	±81.12	106.31	±108.70	<0.001***	85.68
Fish (g)	Out of home	3.46	±23.62	3.94	±25.65	0.915	3.70
	At home	9.73	±41.78	8.12	±40.08	0.092	8.93
Eggs (g)	Out of home	3.95	±14.45	4.63	±15.17	0.023*	4.29
	At home	11.66	±22.24	10.63	±23.70	0.0083**	11.15
Milk (g)	Out of home	53.99	±122.19	51.83	±114.60	0.876	52.91
	At home	136.03	±163.09	109.07	±146.24	<0.001***	122.55
Ice cream (g)	Out of home	2.77	±28.16	1.58	±15.64	0.129	2.18
	At home	2.66	±22.33	2.77	±28.16	0.395	2.72
Sugar (g)	Out of home	5.99	±18.70	5.87	±16.85	0.308	5.93
	At home	16.71	±26.81	16.06	±30.44	<0.001***	16.39
Chocolate (g)	Out of home	5.15	±23.84	2.83	±18.65	<0.001***	3.99
	At home	6.94	±19.15	5.89	±22.86	0.001***	6.42
Sweet cereals (g)	Out of home	5.96	±22.81	3.75	±20.45	<0.001***	4.86
	At home	9.86	±30.21	7.10	±26.19	0.001***	8.48
Non-alcoholic (g)	Out of home	484.01	±689.55	520.71	±695.08	0.021*	502.36
	At home	896.37	±773.84	650.75	±662.95	<0.001***	773.56
Soft drinks (g)	Out of home	21.91	±100.42	66.74	±226.80	<0.001***	44.33
	At home	33.05	±131.90	49.41	±190.50	0.106	41.23
Alcohol (g)	Out of home	17.92	±88.73	94.37	±333.48	<0.001***	56.15
	At home	27.96	±97.69	113.67	±299.87	<0.001***	70.82
Misc (g).	Out of home	5.45	±19.96	7.38	±20.97	<0.001***	6.42
	At home	17.26	±31.37	13.01	±23.63	<0.001***	15.14
Total (g)	**Out of home**	**864.61**		**1127.05**		<0.001***	**995.83**
Total (g)	**At home**	**1833.87**		**1593.25**		<0.001***	**1713.56**
Total (g)	**Total**	**2698.48**		**2720.30**			**2709.39**

Table 17 shows the average daily intakes (in g) of Austrian adults (n=2,248) in BMI groups (classified according to the recommendations of the WHO) by food group and place of consumption (at home and out of home) as well as the total average amounts per BMI- and food group. P for trend indicates the significance of differences in quantitative intake between BMI groups (significant difference when $p \leq 0.05$ as shown in Table 12).

In most of the food groups differences in average intake are observed between the lowest BMI group (<18.5) and the highest (>30). In general, the distribution shows that

those individuals with higher BMIs (overweight or obese individuals) had higher quantitative intakes than participants with lower BMIs (normal weight or underweight indviduals), as expected. In particular it seems that individuals with a higher BMI consumed greater amounts with regard to the alcoholic beverage and soft drink food groups, but the difference of intake between the BMI groups is not significant. Nevertheless, at 150 g obese individuals had twice as much soft drinks in total as slender indviduals, and out-of-home obese individuals consumed six times more (76 g) of these beverages than underweight individuals (13 g) on the day of the 24-hour recall. Out-of-home consumption was clearly higher in the soft drink group than the amounts drank at home with regard to obese and overweight people, but not with regard to normal and underweight participants.

Very significant differences between the BMI groups were found in the meat (meat and meat products) food group at both places of consumption. As expected, slender individuals consumed less (about half as much) meat and meat products than obese individuals.

Surprisingly, underweight participants reported that on average they had twice as much of the food groups associated with higher amounts of monosaccharides (such as: sugar = sugar and sugar products; chocolate = sweets and chocolate; ice cream; sweet cereals = sweet cereals and products) when compared to obese participants. The difference of intake among the BMI groups with regard to the high sugar food groups was most significant ($p<0.001$) at home for ‘sugar’, and ‘chocolate’ and out-of-home for ‘chocolate’ and ‘sweet cereals’. These significance levels indicate that underweight individuals consumed more of the high sugar products than obese individuals. This may be a result of underreporting in the obese and overweight group in an attempt to meet what generally is understood to be ‘proper amounts’ of these food groups.

Table 17 Daily food intake in g (at home and out-of-home) by BMI groups (n=2,248).

Food Group	Place of consumption	BMI (WHO)				P for trend	Mean total (g)
		<18.5 (g)	18.5-24.9 (g)	25-29.9 (g)	>30 (g)		
Fruits (g)	Out of home	57.96	83.34	75.58	103.35	0.22	80.06
	At home	123.17	128.47	123.62	105.17	0.16	120.11
	Total	181.13	211.81	199.2	208.52		200.17
Vegetables (g)	Out of home	53.34	50.82	40.54	51.76	0.354	49.12
	At home	127.91	124.8	122.51	108.27	0.484	120.87
	Total	181.25	175.62	163.05	160.03		169.99
Fruit & vegetable juices	Out of home	97.39	38.05	29.58	36.08	0.201	50.28

Food Group	Place of consumption	BMI (WHO)				P for trend	Mean total (g)
		<18.5 (g)	18.5-24.9 (g)	25-29.9 (g)	>30 (g)		
(g)	At home	109.4	83.66	80.7	67.98	0.755	85.44
	Total	206.79	121.71	110.28	104.06		135.71
Pulses (g)	Out of home	3.29	2.2	2.81	3.19	0.312	2.87
	At home	7.06	7.95	7.57	9.91	0.766	8.12
	Total	10.35	10.15	10.38	13.1		11.00
Cereals (g)	Out of home	44.24	61.99	59.26	70.21	0.339	58.93
	At home	160.8	161.28	158.83	138.42	0.426	154.83
	Total	205.04	223.27	218.09	208.63		213.76
Potatoes (g)	Out of home	15.94	12.52	10.91	21.81	0.066	15.30
	At home	22.26	37.8	36.37	45.94	0.726	35.59
	Total	38.2	50.32	47.28	67.75		50.89
Nuts (g)	Out of home	0.37	1	0.28	0.22	0.002**	0.47
	At home	4.6	3.04	1.24	1.38	0.026**	2.57
	Total	4.97	4.04	1.52	1.6		3.03
Total added lipids (g)	Out of home	7.33	8.01	7.49	9.21	0.26	8.01
	At home	21.94	23.54	22.43	21.81	0.463	22.43
	Total	29.27	31.55	29.92	31.02		30.44
Meat (g)	Out of home	34.41	36.55	45.86	62.24	<0.001***	44.77
	At home	47	70.92	92.7	97	<0.001***	76.91
	Total	81.41	107.47	138.56	159.24		121.67
Fish (g)	Out of home	0.76	4.52	2.3	2.69	0.07	2.57
	At home	4.84	10.23	6.81	8.97	0.322	7.71
	Total	5.6	14.75	9.11	11.66		10.28
Eggs (g)	Out of home	2.29	2.85	2.86	3.9	0.513	2.10
	At home	12.26	11.49	11.32	9.62	0.347	11.17
	Total	14.55	14.34	14.18	10.01		13.27
Milk (g)	Out of home	36.93	58.27	42.31	36.27	0.091	43.45
	At home	115.23	129.56	121.8	116.46	0.518	120.76
	Total	152.16	187.83	164.11	152.73		164.21
Ice cream (g)	Out of home	1	2.97	0.54	3.29	0.153	1.95
	At home	5.71	2.85	2.89	0.39	0.197	2.96
	Total	6.71	5.82	3.43	3.68		4.91
Sugar (g)	Out of home	13.4	6.27	4.75	4.95	0.177	7.34
	At home	19.24	17.03	16.28	11.44	0.001***	16.00
	Total	32.64	23.3	21.03	16.39		23.34
Chocolate (g)	Out of home	6.7	5.04	2.91	2.29	<0.001***	4.24
	At home	7.64	7.17	5.26	4.87	0.001***	6.24
	Total	14.34	12.21	8.17	7.16		10.47
Sweet cereals (g)	Out of home	13.2	5.41	3.69	3.9	<0.001***	6.55
	At home	5.29	9.39	9.12	5.11	0.06	7.23
	Total	18.49	14.8	12.81	9.01		13.78
Non-alcoholic (g)	Out of home	600.31	495.57	468.28	571.33	0.246	540.00
	At home	722.49	824.18	787.97	724.35	0.184	971.65
	Total	1322.80	1319.75	1256.25	1295.68		1511.65
Soft drinks (g)	Out of home	12.86	34.88	40.63	76.47	0.282	41.21
	At home	56.43	36.23	36.26	60.74	0.356	47.42
	Total	69.29	71.11	76.89	137.21		88.63
Alcohol (g)	Out of home	25.59	42.61	57.99	53.98	0.935	45.04
	At home	38.73	49.28	79.71	95.74	0.456	65.87
	Total	64.32	91.89	137.7	149.72		110.91
Misc (g).	Out of home	6.31	6.26	5.83	6.66	0.361	6.27
	At home	13.76	17.12	13.61	12.54	0.346	14.26
	Total	20.07	23.38	19.44	19.2		20.52
Total (g)	Out of home	1043.59	967.77	912.86	1129.52	0.298	1019.56
Total (g)	At-home	1615.79	1747.35	1728.54	1636.88	0.684	1889.04
Total (g)	Total	2659.38	2715.12	2641.40	2766.40	---	2908.60

Table 18 shows the average daily intake (in g) of Austrian adults (n=2,318) by age groups (classified according to the D-A-CH reference values for nutrient intake), food group and place of consumption (at home and out of home), as well as the total average amounts per age group and food group. P for trend indicates the significance of

differences in energy intake between male and female participants (significant difference when $p \leq 0.05$ as shown in Table 12).

In general the participants in the group of 51-64-year-old individuals consumed in absolute numbers less amounts of food out of home and more at home. Exceptions to this were found in the "fruits" (fresh and processed) food group, in which elderly individuals consumed with 83.06 g the second highest amount out of home at 83.06g and the highest amount at home of all age groups at 163.97g ($p<0.001$ for differences in intake between BMI groups), and the alcoholic beverage ('alcohol') group, in which those between 51 and 64 had the highest overall out-of-home and home consumption ($p<0.001$ for differences in intake among BMI groups). The younger participants as well as the middle aged ones alternately ate higher amounts out-of-home when compared to each other.

In 2007 ORFANOS et al. found that in Europe younger people consumed higher amounts out of home than older adults [ORFANOS, 2007].

Table 18 Daily food intake in g (at home and out-of-home) by age groups according to the D-A-CH reference values for nutrient intake of the participants (n=2,318).

Food Group	Place of consumption	Age (D-A-CH) in years			P for trend	Mean total (g)
		18-<25	25-<51	51-64		
Fruits (g)	Out of home	60	86.13	83.06	0.076	76.40
	At home	67.98	126.48	163.97	<0.001***	119.48
	Total	127.98	212.61	247.03		195.87
Vegetables (g)	Out of home	53.61	49.49	38.52	0.002**	47.21
	At home	91.75	130.25	135.45	<0.001***	119.15
	Total	145.36	179.74	173.97		166.36
Fruit & vegetable juices (g)	Out of home	79.34	34.96	18.15	0.047*	44.15
	At home	92.99	84.46	66.66	0.909	81.37
	Total	172.33	119.42	84.81		125.52
Pulses (g)	Out of home	2.98	2.47	1.83	0.347	2.43
	At home	6.67	7.98	8.93	0.365	7.86
	Total	9.65	10.45	10.76		10.29
Cereals (g)	Out of home	75.25	59.91	54.89	<0.001***	63.35
	At home	138.52	161.17	167.73	<0.001***	155.81
	Total	213.77	221.08	222.62		219.16
Potatoes (g)	Out of home	16.74	12.2	13.63	0.322	14.19
	At home	32.27	35.85	48	0.004**	38.71
	Total	49.01	48.05	61.63		52.90
Nuts (g)	Out of home	0.98	0.71	0.55	0.677	0.75
	At home	1.22	2.95	1.6	0.089	1.92
	Total	2.2	3.66	2.15		2.67
Total added lipids (g)	Out of home	8.62	8.02	6.93	0.014*	7.86
	At home	17.89	23.33	25.9	<0.001***	22.37
	Total	26.51	31.35	32.83		30.23
Meat (g)	Out of home	48.1	40.38	36.39	0.001***	41.62
	At home	72.43	76.79	86.82	0.016*	78.68
	Total	120.53	117.17	123.21		120.30
Fish (g)	Out of home	3.67	3.99	2.07	0.565	3.24
	At home	7.05	8.97	11.54	0.061	9.19

Food Group	Place of consumption	Age (D-A-CH) in years			P for trend	Mean total (g)
		18-<25	25-<51	51-64		
	Total	10.72	12.96	13.61		12.43
Eggs (g)	Out of home	4.49	4.37	3.27	0.088	4.04
	At home	9	11.61	11.73	0.187	10.78
	Total	13.49	15.98	15		14.82
Milk (g)	Out of home	63.94	55.16	35.53	<0.001***	51.54
	At home	125.1	125.82	127.08	0.197	126.00
	Total	189.04	180.98	162.61		177.54
Ice cream (g)	Out of home	0.23	3.02	0.81	0.009**	1.35
	At home	2.48	2.89	2.08	0.474	2.48
	Total	2.71	5.91	2.89		3.84
Sugar (g)	Out of home	9.1	5.65	4.52	0.1	6.42
	At home	15.47	16.62	16.59	0.037*	16.23
	Total	24.57	22.27	21.11		22.65
Chocolate (g)	Out of home	7.96	4.16	1.73	<0.001***	4.62
	At home	7.73	6.75	4.68	0.002**	6.39
	Total	15.69	10.91	6.41		11.00
Sweet cereals (g)	Out of home	5.2	5.36	4.1	0.114	4.89
	At home	6.5	9.62	7.4	0.054	7.84
	Total	11.7	14.98	11.5		12.73
Non-alcoholic (g)	Out of home	457.15	524.73	417.72	0.001***	466.53
	At home	533.31	827.14	927.08	<0.001***	762.51
	Total	990.46	1351.86	1344.80		1229.04
Soft drinks (g)	Out of home	65.09	36.91	23.75	<0.001***	41.92
	At home	73.9	37.2	18.27	<0.001***	43.12
	Total	138.99	74.11	42.02		85.04
Alcohol (g)	Out of home	37.46	45.74	56.92	0.825	46.71
	At home	25.2	58.6	94.82	<0.001***	59.54
	Total	62.66	104.34	151.74		106.25
Misc (g).	Out of home	7.15	6.08	5.73	<0.001***	6.32
	At home	13.2	15.83	17.07	0.001***	15.37
	Total	20.35	21.91	22.8		21.69
Total (g)	Out of home	1007.06	989.44	810.10	<0.001***	935.53
	At home	1340.66	1770.31	1943.40	<0.001***	1684.79
	Total	2347.72	2759.74	2753.50	---	2620.32

4.2.2 Food group choices of Austrian adults – energy

Table 19 shows the average daily energy intake of both male and female Austrian adults (n=2,318) by food group and place of consumption (at home and out of home as operationally defined) in kcal (average ± standard deviation, M±SD). P for trend indicates the significance of differences in energy intake between male and female participants (significant difference when $p \leq 0.05$ as shown in Table 12).

In general and absolute numbers the participants consumed higher amounts of energy at home than out of home in most food groups and with regard to both genders. An exception is again seen in the fact that men consumed more energy from soft drinks (such as lemonade) out of home than at home and significantly more than female participants ($p<0.001$) consumed outside of their own household. As already observed in the quantitative intake averages, alcohol consumption was also higher in men than in

women in terms of energy; the difference in energy intake between the genders in this food group is very significant ($p<0.001$).

The difference between the average energy intake of male participants (out of home 700 kcal; at home 1250 kcal) and female participants (out of home 470 kcal; at home 1200 kcal) is most significant in terms of out-of-home consumption ($p<0.001$) but not significant with regard to the genders' energy intakes at home ($p=0.213$), which leads to the assumption that men consume higher amounts of energy out of home than women, a conclusion that was also reached in the literature [BMLFUW, 2010].

Table 19 Daily energy (kcal) intake by food group (at home and out-of-home) of male and female participants (n=2,318).

Food Group	Place of consumption	Female		Male		P for trend	Total mean (kcal)
		Mean (kcal)	±SD	Mean (kcal)	±SD		
Fruits (kcal)	Out of home	49.69	±88.55	56.60	±107.02	0.839	53.14
	At home	94.42	±126.44	58.03	±103.46	<0.001***	76.23
Vegetables (kcal)	Out of home	9.80	±20.92	11.55	±21.82	<0.001***	10.67
	At home	29.63	±52.50	21.13	±28.16	<0.001***	25.38
Fruit & vegetable juices (kcal)	Out of home	17.59	±76.38	23.48	±83.38	<0.001***	20.53
	At home	41.86	±102.84	40.29	±106.98	0.159	41.08
Pulses (kcal)	Out of home	1.75	±10.82	2.51	±12.76	0.04*	2.13
	At home	5.96	±20.13	4.94	±19.90	0.022*	5.45
Cereals (kcal)	Out of home	90.26	±141.91	145.82	±193.15	<0.001***	118.04
	At home	275.38	±211.64	299.67	±231.45	0.032*	287.52
Potatoes (kcal)	Out of home	8.30	±34.48	12.59	±39.71	<0.001***	10.44
	At home	28.89	±63.54	31.10	±84.16	0.116	30.00
Nuts (kcal)	Out of home	5.55	±41.17	2.01	±15.00	0.031*	3.78
	At home	14.87	±70.04	8.82	±63.86	<0.001***	11.84
Total added lipids (kcal)	Out of home	55.29	±97.63	81.12	±125.75	<0.001***	68.21
	At home	189.69	±154.47	176.38	±160.02	0.001***	183.03
Meat (kcal)	Out of home	59.61	±129.66	157.55	±232.32	<0.001***	108.58
	At home	145.59	±181.42	234.93	±264.59	<0.001***	190.26
Fish (kcal)	Out of home	4.29	±29.49	4.77	±32.68	0.92	4.53
	At home	11.18	±48.11	10.76	±52.71	0.1	10.97
Eggs (kcal)	Out of home	6.15	±22.17	7.23	±23.03	0.022*	6.69
	At home	18.39	±34.47	16.67	±37.32	0.006**	17.53
Milk (kcal)	Out of home	57.43	±112.02	58.51	±114.63	0.812	57.97
	At home	150.52	±166.76	131.59	±160.29	<0.001***	141.06
Ice cream (kcal)	Out of home	2.59	±20.59	1.90	±19.66	0.131	2.25
	At home	2.80	±24.05	3.06	±30.58	0.396	2.93
Sugar (kcal)	Out of home	21.90	±64.03	21.58	±59.38	0.211	21.74
	At home	61.08	±94.04	58.20	±104.95	<0.001***	59.64
Chocolate (kcal)	Out of home	24.24	±115.23	13.89	±92.65	<0.001***	19.07
	At home	32.85	±93.26	29.73	±119.89	0.001***	31.29
Sweet cereals (kcal)	Out of home	22.99	±84.57	15.37	±86.01	<0.001***	19.18
	At home	39.72	±121.37	29.28	±108.24	0.001***	34.50
Non-alcoholic (kcal)	Out of home	2.81	±15.06	2.98	±10.31	0.003**	2.89
	At home	4.69	±9.79	4.23	±13.22	<0.001***	4.46
Soft drinks (kcal)	Out of home	8.71	±45.41	27.09	±87.79	<0.001***	17.90
	At home	13.72	±57.80	20.81	±81.05	0.103	17.27
Alcohol (kcal)	Out of home	11.22	±51.97	42.59	±147.80	<0.001***	26.90
	At home	17.06	±55.09	53.00	±136.02	<0.001***	35.03
Misc (kcal).	Out of home	8.12	±55.64	7.84	±32.22	<0.001***	7.98
	At home	19.29	±58.59	14.20	±46.38	<0.001***	16.74
Total (kcal)	Out of home	468.29		696.97		<0.001***	582.63
Total (kcal)	At home	1197.59		1246.84		0.213	1222.21

Food Group	Place of consumption	Female		Male		P for trend	Total mean (kcal)
		Mean (kcal)	±SD	Mean (kcal)	±SD		
Total (kcal)	Total	1665.88		1943.81		---	1804.84

Table 20 shows the average daily energy intake (in kcal) of Austrian adults (2,248) per BMI groups (classified according to the recommendations of the WHO) by food group and place of consumption (at home and out of home), as well as the total average amounts per BMI- and food group. P for trend indicates the significance of differences in energy intake between male and female participants (significant difference when $p \leq 0.05$ as shown in Table 12).

Differences in average intake are observed in most of the food groups between the lowest BMI group (<18.5) and the highest (>30). In general and as expected, the distribution shows that individuals with higher BMIs (overweight or obese individuals) had a higher energy intake than participants with lower BMIs (normal weight or underweight individuals). The opposite observation could be shown for the food groups 'fruits' (fresh and processed), vegetables (fresh and processed) and fruit and vegetable juices, in which participants with lower BMIs had higher intakes in terms of energy in absolute numbers, but the differences were not significant.

Very significant differences between the BMI groups were found in the 'meat' (meat and meat products) food group at both places of consumption. As expected, slender individuals had a lower energy intake from this food group than obese individuals.

Low consumption of high sugar products (i.e. sugar = sugar and sugar products; chocolate = sweets and chocolate; ice cream; sweet cereals = sweet cereals and products) with regard to obese participants compared to lean individuals was an unexpected finding also found in energy intake. The difference of intake between the BMI groups with regard to the high sugar food groups was most significant ($p<0.001$) at home for 'sugar' and 'chocolate', and out-of-home for 'chocolate' and 'sweet cereals'. As mentioned above, these significance levels indicate that underweight individuals consumed more high sugar products than obese individuals. This - as mentioned above -

may be a result of underreporting in the obese and overweight group in an attempt to meet what generally is understood to be the 'proper amounts' of these food groups.

Table 20 Daily energy (kcal) intake by food group (at home, out-of-home and total) and BMI of participants (n=2,318).

Food Group	Place of consumption	BMI (WHO)				P for trend	Mean total (kcal)
		<18.5	18.5-24.9	25-29.9	>30		
Fruits (kcal)	Out of home	36.69	53.61	47.40	63.75	0.220	50.36
	At home	95.80	82.73	79.42	69.08	0.160	81.76
	Total	132.49	136.35	126.81	132.84		132.12
Vegetables (kcal)	Out of home	12.41	11.04	8.65	10.83	0.354	10.73
	At home	25.99	25.97	25.73	22.94	0.484	25.16
	Total	38.40	37.01	34.38	33.77		35.89
Fruit & vegetable juices (kcal)	Out of home	49.04	19.85	14.72	19.81	0.201	25.85
	At home	50.86	41.61	40.94	34.67	0.759	42.02
	Total	99.90	61.46	55.66	54.47		67.87
Pulses (kcal)	Out of home	2.84	1.88	2.22	2.68	0.344	2.40
	At home	6.43	5.82	4.83	5.78	0.355	5.71
	Total	9.27	7.69	7.04	8.46		8.12
Cereals (kcal)	Out of home	79.21	111.50	109.67	126.97	0.353	106.84
	At home	271.01	288.68	284.05	257.30	0.525	275.26
	Total	350.23	400.19	393.72	384.27		382.10
Potatoes (kcal)	Out of home	10.99	9.18	9.48	15.06	0.072	11.18
	At home	18.70	30.76	28.01	34.03	0.741	27.87
	Total	29.69	39.94	37.49	49.08		39.05
Nuts (kcal)	Out of home	2.34	5.84	1.64	1.34	0.002**	2.79
	At home	15.57	15.88	6.33	5.41	0.003**	10.80
	Total	17.91	21.72	7.97	6.75		13.59
Total added lipids (kcal)	Out of home	60.09	65.60	61.22	75.33	0.259	65.56
	At home	177.16	188.64	180.69	176.82	0.551	180.83
	Total	237.25	254.24	241.92	252.16		246.39
Meat (kcal)	Out of home	79.49	86.71	107.10	146.01	<0.001***	104.83
	At home	105.30	161.50	216.95	226.94	<0.001***	177.67
	Total	184.79	248.22	324.05	372.94		282.50
Fish (kcal)	Out of home	0.70	5.62	2.58	3.62	0.065	3.13
	At home	4.66	11.97	8.94	11.66	0.321	9.31
	Total	5.36	17.59	11.52	15.28		12.44
Eggs (kcal)	Out of home	3.41	6.97	6.76	3.91	0.341	5.26
	At home	18.96	18.21	17.71	14.67	0.452	17.39
	Total	22.37	25.18	24.47	18.58		22.65
Milk (kcal)	Out of home	38.17	63.20	46.81	59.64	0.066	51.95
	At home	162.90	143.11	146.88	131.42	0.518	146.08
	Total	201.07	206.31	193.69	191.05		198.03
Ice cream (kcal)	Out of home	0.94	3.11	0.56	2.82	0.153	1.86
	At home	5.11	2.92	3.53	0.37	0.198	2.98
	Total	6.06	6.03	4.09	3.18		4.84
Sugar (kcal)	Out of home	44.37	23.08	17.82	17.95	0.285	25.80
	At home	68.96	62.16	59.31	41.77	0.001***	58.05
	Total	113.33	85.24	77.13	59.72		83.86
Chocolate (kcal)	Out of home	33.79	23.75	14.16	11.39	<0.001***	20.77
	At home	36.07	34.73	25.28	23.93	0.001***	30.00
	Total	69.86	58.47	39.44	35.32		50.77
Sweet cereals (kcal)	Out of home	51.49	21.26	13.99	15.77	<0.001***	25.62
	At home	22.39	38.01	36.96	20.92	0.065	29.57
	Total	73.87	59.27	50.94	36.68		55.19
Non-alcoholic (kcal)	Out of home	1.66	2.84	2.68	4.36	0.178	2.88
	At home	3.33	4.36	4.91	4.46	0.009**	4.27
	Total	4.99	7.20	7.59	8.82		7.15
Soft drinks (kcal)	Out of home	6.41	13.95	18.20	25.36	0.292	15.98
	At home	29.90	15.36	14.42	23.89	0.324	20.89
	Total	36.31	29.31	32.62	49.26		36.88
Alcohol (kcal)	Out of home	13.87	21.47	27.05	27.78	0.934	22.54
	At home	19.27	26.04	38.54	47.39	0.524	32.81
	Total	33.14	47.51	65.58	75.18		55.35
Misc (kcal)	Out of home	9.24	7.82	8.60	7.86	0.218	8.38
	At home	15.24	19.32	13.87	15.83	0.494	16.07

Food Group	Place of consumption	BMI (WHO)				P for trend	Mean total (kcal)
		<18.5	18.5-24.9	25-29.9	>30		
	Total	24.49	27.14	22.47	23.69		24.45
Total (kcal)	Out of home	537.16	558.29	521.28	642.23	0.522	564.74
Total (kcal)	At home	1153.60	1217.77	1237.29	1169.28	0.459	1194.49
Total (kcal)	Total	1690.76	1776.07	1758.57	1811.51	---	1759.23

Table 21 shows the average daily energy intake (in kcal) of Austrian adults (n=2,318) in different age groups (classified according to the D-A-CH reference values for nutrient intake) by food group and place of consumption (at home and out of home), as well as the total average amounts per age group and food group. P for trend indicates the significance of differences in energy intake between male and female participants (significant difference when $p \leq 0.05$ as shown in Table 12).

Significant differences in energy intake between the age groups in terms of out-of-home consumption were observed in the food groups 'vegetables' (p=0.003), 'fruit and vegetable juices' (p=0.049), 'cereals' (p<0.001), 'Total added lipids' (p=0.012), 'meat' (p<0.001), 'milk' (p<0.001), 'chocolate' (p<0.001), 'non-alcoholic beverages' (p<0.001) and 'soft drinks'. (p<0.001). In the specified food groups the out-of-home energy intake was higher in younger participants. A significant difference (p=0.009) between the age groups in out-of-home energy intake was also observed in the 'ice cream' food group, but here it seems that elderly participants consume higher amounts of energy out of home.

Table 21 Daily energy (kcal) intake by food group (at home, out-of-home and total) and age of participants (n=2,318).

Food Group	Place of consumption	Age (D-A-CH) in years			P for trend	Mean total (kcal)
		18-<25	25-<51	51-64		
Fruits (kcal)	Out of home	39.23	55	51.37	0.086	48.53
	At home	42.58	83	103.53	<0.001***	76.37
	Total	81.81	138	154.9		124.9
Vegetables (kcal)	Out of home	11.42	10.76	8.29	0.003**	10.16
	At home	20.36	27.3	27.9	<0.001***	25.19
	Total	31.78	38.06	36.19		35.34
Fruit & vegetable juices (kcal)	Out of home	38.61	18.47	9.54	0.049*	22.21
	At home	45.36	42.13	34.07	0.883	40.52
	Total	83.97	60.6	43.61		62.73
Pulses (kcal)	Out of home	2.9	1.98	1.52	0.344	2.13
	At home	4.66	5.69	5.9	0.355	5.41
	Total	7.56	7.67	7.41		7.55
Cereals (kcal)	Out of home	140.57	108.09	98.28	<0.001***	115.65
	At home	244.81	285.06	315.05	<0.001***	281.64
	Total	385.38	393.15	413.33		397.28
Potatoes (kcal)	Out of home	11.54	9.69	9.4	0.336	10.21
	At home	33.17	28.23	33.13	0.009**	31.51
	Total	44.72	37.91	42.52		41.72
Nuts (kcal)	Out of home	5.63	4.32	2.66	0.668	4.2
	At home	7.54	14.29	9.62	0.093	10.49

	Total	13.17	18.61	12.28		14.69
Total added lipids (kcal)	Out of home	71.54	65.7	55.92	0.012*	64.39
	At home	145.47	187.57	205.62	<0.001***	179.56
	Total	217.01	253.27	261.55		243.94
Meat (kcal)	Out of home	115.33	95.04	84.65	0.001***	98.34
	At home	171.72	176.34	197.03	0.044*	181.7
	Total	287.06	271.37	281.68		280.04
Fish (kcal)	Out of home	4.64	4.82	2.82	0.567	4.09
	At home	7.54	10.96	14.17	0.061	10.89
	Total	12.18	15.78	16.99		14.99
Eggs (kcal)	Out of home	6.77	6.85	5.09	0.092	6.24
	At home	13.76	18.45	18.06	0.166	16.76
	Total	20.54	25.3	23.15		23
Milk (kcal)	Out of home	71.32	58.35	44.14	<0.001***	57.93
	At home	128.6	145.2	148.39	0.062	140.73
	Total	199.92	203.55	192.53		198.66
Ice cream (kcal)	Out of home	0.37	3.07	0.82	0.009**	1.42
	At home	2.84	3.07	2.2	0.474	2.7
	Total	3.21	6.14	3.02		4.12
Sugar (kcal)	Out of home	32.02	20.87	17.04	0.079	23.31
	At home	55.84	60.51	61.18	0.037*	59.18
	Total	87.86	81.38	78.22		82.49
Chocolate (kcal)	Out of home	37.68	19.81	8.22	<0.001***	21.9
	At home	37.01	32.76	22.53	0.002**	30.76
	Total	74.69	52.57	30.75		52.67
Sweet cereals (kcal)	Out of home	20.7	21.12	15.42	0.113	19.08
	At home	26.94	38.96	29.73	0.057	31.88
	Total	47.64	60.08	45.15		50.96
No Alcohol (kcal)	Out of home	2.72	3.02	2.36	<0.001***	2.7
	At home	3.69	4.51	5.23	<0.001***	4.48
	Total	6.41	7.53	7.59		7.18
Soft drinks (kcal)	Out of home	31.05	14.51	7.08	<0.001***	17.55
	At home	33.66	15.18	6.88	<0.001***	18.57
	Total	64.71	29.69	13.96		36.12
Alcohol (kcal)	Out of home	17.39	22.79	28.1	0.812	22.76
	At home	12.23	29.64	49.34	<0.001***	30.4
	Total	29.61	52.43	77.44		53.16
Misc (kcal)	Out of home	9.56	7.38	9.41	0.001***	8.78
	At home	17.65	17.22	17.86	0.020*	17.58
	Total	27.21	24.6	27.27		26.36
Sum (kcal)	Out of home	670.99	551.45	462.12	<0.001***	561.52
	At home	1055.50	1225.99	1307.42	<0.001***	1196.30
	Total	1726.49	1777.44	1769.54	---	1757.82

4.2.3 Food group choices of Austrian Adults – out-of-home/at-home ratio

The percentages were calculated for proportional out-of-home and at-home consumption (in terms of amounts and energy) separately by gender, age and BMI groups. The quantity of energy intake from a specific food group was divided by the total quantity of energy intake out of home or at home. The ratios were obtained by dividing the proportional out-of-home percentage of a specific food group by the at-home percentage; thus, values above 1 indicate higher proportional out-of-home consumption. Ratios were calculated for male and female participants, age- and BMI groups and overall totals.

The proportional percentages and the ratios are shown in the tables. Lighter shades indicate a lower value within the food group. Total values above 1 are highlighted, signifying that total proportional out-of-home consumption in these food groups was higher than proportional at-home consumption.

Table 22 shows proportional percentages of the quantities of all food groups (out of home, at home and in total) consumed by Austrian adults (n=2,318), separated by gender. Ratios of 1 indicate that the proportional fractions of out-of-home and at-home consumption in terms of quantity were equal; values above 1 indicate a higher out-of-home consumption; values below 1 mean that at-home the consumption was higher.

Total out-of-home consumption in terms of quantity (consumption of a specific food group out of home and at home in relation to total consumption out of home and at home) was higher than the at-home consumption in the food groups ‘fruits’ (1.22), ‘ice cream’ (1.38), ‘chocolate’ (1.07), ‘non-alcoholic beverages’ (1.12), ‘soft drinks’ (1.85) and ‘alcoholic beverages’ (1.36).

Separated by gender, it was observed that female participants consumed less amounts (1.14) of fruits out of home than male participants (1.42), but higher amounts of ice cream (female 2.21, male 0.81) and chocolate (female 1.57, male 0.68), sweet cereals (female 1.28, male 0.75), non-alcoholic beverages (female 1.15, male 1.13) and alcoholic beverages (female 1.36, male 1.17) out of home than at their own home. Male participants consumed larger amounts (1.91) of soft drinks out of home than female participants (1.41).

Table 22 Percentage of quantity (g) from all food groups when consumed out of home and at home by gender and in total. Ratio calculated by dividing the out-of-home percentage by the corresponding at-home percentage (n=2,318).

Food Group	Place of consumption	Percentage of total out-of-home/at-home Quantity (g)			RATIO (Out of home/at home)		
		Women	Men	Total	Women	Men	Total
Fruits (%)	Out of home	9.12	7.77	8.35	1.14	1.42	1.22
	At home	8.01	5.48	6.83			
Vegetables (%)	Out of home	5.18	4.81	4.97	0.67	0.76	0.71
	At home	7.69	6.31	7.05			
Fruit & vegetable juices (%)	Out of home	3.96	4.01	3.99	0.86	0.80	0.83
	At home	4.60	5.02	4.80			
Pulses (%)	Out of home	0.24	0.27	0.26	0.49	0.68	0.58
	At home	0.49	0.40	0.45			
Cereals (%)	Out of home	5.81	7.06	6.52	0.69	0.67	0.70
	At home	8.43	10.47	9.38			
Potatoes (%)	Out of home	1.18	1.58	1.41	0.74	0.70	0.65

Food Group	Place of consumption	Percentage of total out-of-home/at-home Quantity (g)			RATIO (Out of home/at home)		
		Women	Men	Total	Women	Men	Total
	At home	2.09	2.25	2.16			
Nuts (%)	Out of home	0.11	0.03	0.06	0.69	0.27	0.47
	At home	0.16	0.11	0.14			
Total added lipids (%)	Out of home	0.79	0.87	0.83	0.61	0.63	0.63
	At home	1.29	1.37	1.33			
Meat (%)	Out of home	3.00	5.84	4.60	0.85	0.87	0.92
	At home	3.55	6.67	5.00			
Fish (%)	Out of home	0.40	0.35	0.37	0.75	0.69	0.71
	At home	0.53	0.51	0.52			
Eggs (%)	Out of home	0.46	0.41	0.43	0.72	0.62	0.66
	At home	0.64	0.67	0.65			
Milk (%)	Out of home	6.24	4.60	5.31	0.84	0.67	0.74
	At home	7.42	6.85	7.15			
Ice cream (%)	Out of home	0.32	0.14	0.22	2.21	0.81	1.38
	At home	0.15	0.17	0.16			
Sugar (%)	Out of home	0.69	0.52	0.60	0.76	0.52	0.62
	At home	0.91	1.01	0.96			
Chocolate (%)	Out of home	0.60	0.25	0.40	1.57	0.68	1.07
	At home	0.38	0.37	0.37			
Sweet cereals (%)	Out of home	0.69	0.33	0.49	1.28	0.75	0.99
	At home	0.54	0.45	0.49			
Non-alcoholic (%)	Out of home	55.98	46.20	50.45	1.15	1.13	1.12
	At home	48.88	40.84	45.14			
Soft drinks (%)	Out of home	2.53	5.92	4.45	1.41	1.91	1.85
	At home	1.80	3.10	2.41			
Alcohol (%)	Out of home	2.07	8.37	5.64	1.36	1.17	1.36
	At home	1.52	7.13	4.13			
Misc. (%)	Out of home	0.63	0.65	0.64	0.67	0.80	0.73
	At home	0.94	0.82	0.88			
Total (%)	Out of home	100 %	100 %	100 %			
	At home	100 %	100 %	100 %			

Table 23 shows proportional percentages energy from all food groups (out of home, at home and in total) consumed by Austrian adults (n=2,318), separated by gender. Ratios of 1 indicate that the percentage of out-of-home and at-home consumption were equal in terms of energy; values above 1 indicate higher out-of-home consumption; values below 1 mean that at-home consumption was higher.

The total out-of-home consumption in terms of energy (consumption of a specific food group out of home and at home in relation to total consumption out of home and at home) was higher than at-home consumption in the food groups ‘fruits’ (1.46), ‘fruit and vegetable juices’ (1.05), ‘meat’ (1.20), ‘ice cream’ (1.61), ‘chocolate’ (1.28), ‘sweet cereals (1.17), ‘non-alcoholic beverages’ (1.36), ‘soft drinks’ (2.17) and ‘alcoholic beverages’ (1.61). Equal energy intake (1.00) was observed for the ‘miscellaneous’ food group.

The fact that more food groups have ratios above 1 in terms of energy intake compared to the ratios of consumption in terms of quantity may indicates that Austrian adults choose foods with higher energy density out of home than at home in specific food groups. Results for energy density are shown in the chapter "Food group choices of Austrian Adults – Energy density".

Separated by gender it was observed that the female participants' energy intake out of fruits out of home was less (1.35) than male intake (1.74). Female participants also had less out-of-home energy intakes in the meat food group (1.05) compared to male individuals (1.20). Higher energy intakes were observed for female participants in the food groups 'fruit and vegetable juices' (female 1.07, male 1.04), 'ice cream' (female 2.37, male 1.11), 'chocolate' (female 1.89, male 0.84), sweet cereals (female 1.48, male 0.94), non-alcoholic beverages (female 1.53, male 1.26) and alcoholic beverages (female 1.68, male 1.44) out-of-home than at their own home. Male participants consumed higher amounts of energy out of home (2.33) through soft drinks than female participants (1.68).

Table 23 Percentage of energy (kcal) from all food groups when consumed out of home and at home by gender and in total. Ratio calculated by dividing the out-of-home percentage by the corresponding at-home percentage (n=2,318).

Food Group	Place of consumption	Percentage of total out-of-home/at-home Energy (kcal)			RATIO (out of home/at home)		
		Women	Men	Total	Women	Men	Total
Fruits (%)	Out of home	10.61	8.12	9.12	1.35	1.74	1.46
	At home	7.88	4.65	6.24			
Vegetables (%)	Out of home	2.09	1.66	1.83	0.85	0.98	0.88
	At home	2.47	1.69	2.08			
Fruit & vegetable juices (%)	Out of home	3.76	3.37	3.52	1.07	1.04	1.05
	At home	3.50	3.23	3.36			
Pulses (%)	Out of home	0.37	0.36	0.37	0.75	0.91	0.82
	At home	0.50	0.40	0.45			
Cereals (%)	Out of home	19.27	20.92	20.26	0.84	0.87	0.86
	At home	22.99	24.03	23.52			
Potatoes (%)	Out of home	1.77	1.81	1.79	0.73	0.72	0.73
	At home	2.41	2.49	2.45			
Nuts (%)	Out of home	1.19	0.29	0.65	0.96	0.41	0.67
	At home	1.24	0.71	0.97			
Total added lipids (%)	Out of home	11.81	11.64	11.71	0.75	0.82	0.78
	At home	15.84	14.15	14.98			
Meat (%)	Out of home	12.73	22.61	18.64	1.05	1.20	1.20
	At home	12.16	18.84	15.57			
Fish (%)	Out of home	0.92	0.68	0.78	0.98	0.79	0.87
	At home	0.93	0.86	0.90			
Eggs (%)	Out of home	1.31	1.04	1.15	0.86	0.78	0.80
	At home	1.54	1.34	1.43			
Milk (%)	Out of home	12.26	8.40	9.95	0.98	0.80	0.86
	At home	12.57	10.55	11.54			
Ice cream (%)	Out of home	0.55	0.27	0.39	2.37	1.11	1.61
	At home	0.23	0.25	0.24			
Sugar (%)	Out of home	4.68	3.10	3.73	0.92	0.66	0.76
	At home	5.10	4.67	4.88			

Food Group	Place of consumption	Percentage of total out-of-home/at-home Energy (kcal)			RATIO (out of home/at home)		
		Women	Men	Total	Women	Men	Total
Chocolate (%)	Out of home	5.18	1.99	3.27	1.89	0.84	1.28
	At home	2.74	2.38	2.56			
Sweet cereals (%)	Out of home	4.91	2.21	3.29	1.48	0.94	1.17
	At home	3.32	2.35	2.82			
Non-alcohol (%)	Out of home	0.60	0.43	0.50	1.53	1.26	1.36
	At home	0.39	0.34	0.36			
Soft drinks (%)	Out of home	1.86	3.89	3.07	1.62	2.33	2.17
	At home	1.15	1.67	1.41			
Alcohol (%)	Out of home	2.40	6.11	4.62	1.68	1.44	1.61
	At home	1.42	4.25	2.87			
Misc. (%)	Out of home	1.73	1.12	1.37	1.08	0.99	1.00
	At home	1.61	1.14	1.37			
Total (%)	Out of home	100%	100%	100%			
	At home	100%	100%	100%			

Table 24 shows proportional percentages of quantities of all food groups (out of home, at home and in total) consumed by Austrian adults (n=2,248), separated by BMI. Ratios of 1 indicate that the proportional percentages of out-of-home and at-home consumption were equal in terms of quantity; values above 1 indicate higher out-of-home consumptions; values below 1 mean that at-home consumption was higher.

In terms of quantity, total out-of-home consumption (consumption of a specific food group out of home and at home in relation to total consumption out of home and at home) was higher than at-home consumption in the food groups ‘fruits’ (1.23), ‘fruit and vegetable juices’ (1.09), ‘meat’ (1.08), ‘ice cream’ (1.22), ‘chocolate’ (1.26), ‘sweet cereals’ (1.68), ‘non-alcoholic beverages’ (1.03), ‘soft drinks’ (1.61) and ‘alcoholic beverages’ (1.27).

In terms of the BMI groups it was observed that underweight participants were the only ones who consumed less amounts of fruits (0.73) and soft drinks (0.35) out of home than at home; in the food groups ‘fruit and vegetable juices’ (1.38), ‘potatoes’ (1.11), ‘meat’ (1.13) and ‘sugar’ (1.08) underweight individuals comprised the only group in which out-of-home consumption was higher than consumption at home.

Table 24 Percentage of quantity (g) from all food groups when consumed out of home and at home by BMI group and in total. Ratio calculated by dividing the out-of-home percentage by the corresponding at-home percentage (n=2,248).

Food Group	Place of consumption	Percentage of total out-of-home/at-home Quantity (g)					RATIO (Out of home/at home)				
		< 18.5	18.5-24.9	25-29.9	> 30	Total	< 18.5	18.5-24.9	25-29.9	> 30	Total
Fruits (%)	Out of home	5.6	8.6	8.3	9.1	7.9	0.73	1.17	1.16	1.42	1.23
	At home	7.6	7.4	7.2	6.4	6.4					
	Total	6.8	7.7	5.7	7.5	6.9					
Vegetables (%)	Out of home	5.1	5.3	4.4	4.6	4.8	0.65	0.74	0.63	0.69	0.75
	At home	7.9	7.1	7.1	6.6	6.4					

Food Group	Place of consumption	Percentage of total out-of-home/at-home Quantity (g)					RATIO (Out of home/at home)				
		< 18.5	18.5-24.9	25-29.9	> 30	Total	< 18.5	18.5-24.9	25-29.9	> 30	Total
	Total	6.8	6.4	4.7	5.8	5.8					
Fruit & vegetable juices (%)	Out of home	9.3	3.9	3.2	3.2	4.9					
	At home	6.8	4.8	4.7	4.2	4.5	1.38	0.82	0.69	0.77	1.09
	Total	7.8	4.4	3.2	3.8	4.7					
Pulses (%)	Out of home	0.3	0.2	0.3	0.3	0.3					
	At home	0.4	0.5	0.4	0.6	0.4	0.72	0.50	0.70	0.47	0.66
	Total	0.4	0.4	0.3	0.5	0.4					
Cereals (%)	Out of home	4.2	6.4	6.5	6.2	5.8					
	At home	10.0	9.2	9.2	8.5	8.2	0.43	0.69	0.71	0.74	0.71
	Total	7.7	8.2	6.3	7.5	7.3					
Potatoes (%)	Out of home	1.5	1.3	1.2	1.9	1.5					
	At home	1.4	2.2	2.1	2.8	1.9	1.11	0.60	0.57	0.69	0.80
	Total	1.4	1.8	1.4	2.4	1.7					
Nuts (%)	Out of home	0.0	0.1	0.0	0.0	0.0					
	At home	0.3	0.2	0.1	0.1	0.1	0.12	0.59	0.43	0.23	0.34
	Total	0.2	0.1	0.0	0.1	0.1					
Total added lipids (%)	Out of home	0.7	0.8	0.8	0.8	0.8					
	At home	1.4	1.3	1.3	1.3	1.2	0.52	0.61	0.63	0.61	0.66
	Total	1.1	1.2	0.9	1.1	1.0					
Meat (%)	Out of home	3.3	3.8	5.0	5.5	4.4					
	At home	2.9	4.1	5.4	5.9	4.1	1.13	0.93	0.94	0.93	1.08
	Total	3.1	3.9	4.0	5.8	4.2					
Fish (%)	Out of home	0.1	0.5	0.3	0.2	0.3					
	At home	0.3	0.6	0.4	0.5	0.4	0.24	0.80	0.64	0.43	0.62
	Total	0.2	0.5	0.3	0.4	0.4					
Eggs (%)	Out of home	0.22	0.30	0.32	0.85	0.21					
	At home	0.75	0.65	0.65	0.61	0.59	0.29	0.45	0.49	0.55	0.35
	Total	0.55	0.53	0.54	0.36	0.46					
Milk (%)	Out of home	3.5	6.0	4.6	3.2	4.3					
	At home	7.1	7.4	7.0	7.1	6.4	0.50	0.81	0.66	0.45	0.67
	Total	5.7	6.9	4.7	5.5	5.6					
Ice cream (%)	Out of home	0.1	0.3	0.1	0.3	0.2					
	At home	0.4	0.2	0.2	0.0	0.2	0.27	1.88	0.35	12.23	1.22
	Total	0.3	0.2	0.1	0.1	0.2					
Sugar (%)	Out of home	1.3	0.6	0.5	0.4	0.7					
	At home	1.2	1.0	0.9	0.7	0.8	1.08	0.66	0.55	0.63	0.85
	Total	1.2	0.9	0.6	0.6	0.8					
Chocolate (%)	Out of home	0.6	0.5	0.3	0.2	0.4					
	At home	0.5	0.4	0.3	0.3	0.3	1.36	1.27	1.05	0.68	1.26
	Total	0.5	0.4	0.2	0.3	0.4					
Sweet cereals (%)	Out of home	1.3	0.6	0.4	0.3	0.6					
	At home	0.3	0.5	0.5	0.3	0.4	3.86	1.04	0.77	1.11	1.68
	Total	0.7	0.5	0.4	0.3	0.5					
Non-alcoholic (%)	Out of home	57.5	51.2	51.3	50.6	53.0					
	At home	44.7	47.2	45.6	44.3	51.4	1.29	1.09	1.13	1.14	1.03
	Total	49.7	49.1	60.1	46.8	52.0					
Soft drinks (%)	Out of home	1.2	3.6	4.5	6.8	4.0					
	At home	3.5	2.1	2.1	3.7	2.5	0.35	1.74	2.12	1.82	1.61
	Total	2.6	2.6	2.2	5.0	3.0					
Alcohol (%)	Out of home	2.5	4.4	6.4	4.8	4.4					
	At home	2.4	2.8	4.6	5.8	3.5	1.02	1.56	1.38	0.82	1.27
	Total	2.4	3.4	4.0	5.4	3.8					
Misc (%)	Out of home	0.6	0.6	0.6	0.6	0.6					
	At home	0.9	1.0	0.8	0.8	0.8	0.71	0.66	0.81	0.77	0.81
	Total	0.8	0.9	0.6	0.7	0.7					
Total (%)	Out of home	100	100	100	100	100					
	At home	100	100	100	100	100					
	Total	100	100	100	100	100					

Table 25 shows proportional percentages of energy from all food groups (out of home, at home and in total) consumed by Austrian adults (n=2,248), separated by BMI. Ratios of 1 indicate that the proportional percentages of out-of-home and at-home consumption

were equal in terms of energy; values above 1 indicate a higher out-of-home consumption; values below 1 mean that at-home consumption was higher.

Total out-of-home consumption in terms of energy (consumption of a specific food group out of home and at home in relation to total consumption out of home and at home) was higher than at-home consumption in the food groups 'fruits' (1.30), 'fruit and vegetable juices' (1.30), 'meat' (1.25), 'ice cream' (1.32), 'chocolate' (1.46), 'sweet cereals (1.83), 'non-alcoholic beverages' (1.43), 'soft drinks' (1.62), 'alcoholic beverages' (1.45) and 'miscellaneous' (1.10).

Separated by BMI it was observed that the underweight participants' energy intake out of fruits out-of-home was lower than at home (0.83). All other BMI groups consumed more energy out of home with regard to fruits. In the meat food group underweight participants had a higher out-of-home proportional energy intake (1.62) compared to individuals with higher body mass indices (1.17). Higher out-of-home energy intakes for underweight participants were observed in the food groups 'fruit and vegetable juices' (underweight individuals 2.07, all others < 2.00), 'sugar' (underweight individuals 1.38, all others < 1), 'chocolate' (underweight individuals 2.01, all others < 2.00) and sweet cereals (underweight individuals 4.94, all others < 2.00) out of home than at their own home.

Table 25 Percentage of energy (kcal) from all food groups when consumed out of home and at home by BMI group and in total. Ratio calculated by dividing the out-of-home percentage by the corresponding at-home percentage (n=2,248).

Food Group	Place of consumption	Percentage of total out-of-home/at-home Energy (kcal)					RATIO (Out of home/at home)				
		< 18.5	18.5-24.9	25-29.9	> 30	Total	< 18.5	18.5-24.9	25-29.9	> 30	Total
Fruits (%)	Out of home	6.8	9.6	9.1	9.9	8.9	0.82	1.41	1.42	1.68	1.30
	At home	8.3	6.8	6.4	5.9	6.8					
	Total	7.8	7.7	7.2	7.3	7.5					
Vegetables (%)	Out of home	2.3	2.0	1.7	1.7	1.9	1.03	0.93	0.80	0.86	0.90
	At home	2.3	2.1	2.1	2.0	2.1					
	Total	2.3	2.1	2.0	1.9	2.0					
Fruit & vegetable juices (%)	Out of home	9.1	3.6	2.8	3.1	4.6	2.07	1.04	0.85	1.04	1.30
	At home	4.4	3.4	3.3	3.0	3.5					
	Total	5.9	3.5	3.2	3.0	3.9					
Pulses (%)	Out of home	0.5	0.3	0.4	0.4	0.4	0.95	0.70	1.09	0.84	0.89
	At home	0.6	0.5	0.4	0.5	0.5					
	Total	0.5	0.4	0.4	0.5	0.5					
Cereals (%)	Out of home	14.7	20.0	21.0	19.8	18.9	0.63	0.84	0.92	0.90	0.82
	At home	23.5	23.7	23.0	22.0	23.0					
	Total	20.7	22.5	22.4	21.2	21.7					
Potatoes (%)	Out of home	2.0	1.6	1.8	2.3	2.0	1.26	0.65	0.80	0.81	0.85
	At home	1.6	2.5	2.3	2.9	2.3					
	Total	1.8	2.2	2.1	2.7	2.2					
Nuts (%)	Out of home	0.4	1.0	0.3	0.2	0.5	0.32	0.80	0.62	0.45	0.55

Food Group	Place of consumption	Percentage of total out-of-home/at-home Energy (kcal)					RATIO (Out of home/at home)				
		< 18.5	18.5-24.9	25-29.9	> 30	Total	< 18.5	18.5-24.9	25-29.9	> 30	Total
	At home	1.3	1.3	0.5	0.5	0.9					
	Total	1.1	1.2	0.5	0.4	0.8					
Total added lipids (%)	Out of home	11.2	11.8	11.7	11.7	11.6	0.73	0.76	0.80	0.78	0.77
	At home	15.4	15.5	14.6	15.1	15.1					
	Total	14.0	14.3	13.8	13.9	14.0					
Meat (%)	Out of home	14.8	15.5	20.5	22.7	18.6	1.62	1.17	1.17	1.17	1.25
	At home	9.1	13.3	17.5	19.4	14.9					
	Total	10.9	14.0	18.4	20.6	16.1					
Fish (%)	Out of home	0.1	1.0	0.5	0.6	0.6	0.32	1.02	0.69	0.57	0.71
	At home	0.4	1.0	0.7	1.0	0.8					
	Total	0.3	1.0	0.7	0.8	0.7					
Eggs (%)	Out of home	0.6	1.2	1.3	0.6	0.9	0.39	0.83	0.91	0.49	0.64
	At home	1.6	1.5	1.4	1.3	1.5					
	Total	1.3	1.4	1.4	1.0	1.3					
Milk (%)	Out of home	7.1	11.3	9.0	9.3	9.2	0.50	0.96	0.76	0.83	0.75
	At home	14.1	11.8	11.9	11.2	12.2					
	Total	11.9	11.6	11.0	10.5	11.3					
Ice cream (%)	Out of home	0.2	0.6	0.1	0.4	0.3	0.40	2.33	0.37	13.9	1.32
	At home	0.4	0.2	0.3	0.0	0.2					
	Total	0.4	0.3	0.2	0.2	0.3					
Sugar (%)	Out of home	8.3	4.1	3.4	2.8	4.6	1.38	0.81	0.71	0.78	0.94
	At home	6.0	5.1	4.8	3.6	4.9					
	Total	6.7	4.8	4.4	3.3	4.8					
Chocolate (%)	Out of home	6.3	4.3	2.7	1.8	3.7	2.01	1.49	1.33	0.87	1.46
	At home	3.1	2.9	2.0	2.0	2.5					
	Total	4.1	3.3	2.2	1.9	2.9					
Sweet cereals (%)	Out of home	9.6	3.8	2.7	2.5	4.5	4.94	1.22	0.90	1.37	1.83
	At home	1.9	3.1	3.0	1.8	2.5					
	Total	4.4	3.3	2.9	2.0	3.1					
Non-alcoholic (%)	Out of home	0.3	0.5	0.5	0.7	0.5	1.07	1.42	1.30	1.78	1.43
	At home	0.3	0.4	0.4	0.4	0.4					
	Total	0.3	0.4	0.4	0.5	0.4					
Soft drinks (%)	Out of home	1.2	2.5	3.5	3.9	2.8	0.46	1.98	3.00	1.93	1.62
	At home	2.6	1.3	1.2	2.0	1.7					
	Total	2.1	1.7	1.9	2.7	2.1					
Alcohol (%)	Out of home	2.6	3.8	5.2	4.3	4.0	1.55	1.80	1.67	1.07	1.45
	At home	1.7	2.1	3.1	4.1	2.7					
	Total	2.0	2.7	3.7	4.2	3.1					
Misc (%)	Out of home	1.7	1.4	1.6	1.2	1.5	1.30	0.88	1.47	0.90	1.10
	At home	1.3	1.6	1.1	1.4	1.3					
	Total	1.4	1.5	1.3	1.3	1.4					
Sum (%) Total	Out-of-home	100	100	100	100	100					
	At-home	100	100	100	100	100					
	Total	100	100	100	100	100					

Table 26 shows proportional percentages of quantities of all food groups (out of home, at home and in total) consumed by Austrian adults (n=2,318), separated by age. Ratios of 1 indicate that the proportional percentages of out-of-home and at-home consumption were equal in terms of quantity; values above 1 indicate higher out-of-home consumptions; values below 1 mean that at-home consumption was higher.

Total out-of-home consumption in terms of quantity (consumption of a specific food group out of home and at home in relation to total consumption out of home and at home) was higher than at-home consumption in the food groups ‘fruits’ (1.15),

'chocolate' (1.30), 'sweet cereals (1.12), 'non-alcoholic beverages' (1.10), 'soft drinks' (1.75) and 'alcoholic beverages' (1.41).

Separated by age group it was observed that participants who between 18 and 25 consumed less amounts (0.12) of ice cream out of home than those between15 and 51 (1.87) and between 51 and 64 (0.93), but higher amounts of fruit and vegetable juices (younger individuals 1.14, people older than 25 years < 1), nuts (younger individuals 1.07, people older than 25 years < 1) and alcoholic beverages (younger individuals 1.98, people older than 25 years < 1.50) out of home than at their own home.

Table 26 Percentage of quantity (g) from all food groups when consumed out of home and at home by age group and in total. Ratio calculated by dividing the out-of-home percentage by the corresponding at-home percentage (n=2,318).

Food Group	Place of consumption	Percentage of total out-of-home/at-home Quantity (g)				RATIO (Out of home/at home)			
		18-<25	25-<51	51-64	Total	18-<25	25-<51	51-64	Total
Fruits (%)	Out of home	5.96	8.70	10.25	8.17	1.17	1.22	1.22	1.15
	At home	5.07	7.14	8.44	7.09				
	Total	5.45	7.70	8.97	7.48				
Vegetables (%)	Out of home	5.32	5.00	4.75	5.05	0.78	0.68	0.68	0.71
	At home	6.84	7.36	6.97	7.07				
	Total	6.19	6.51	6.32	6.35				
Fruit & vegetable juices (%)	Out of home	7.88	3.53	2.24	4.72	1.14	0.74	0.65	0.98
	At home	6.94	4.77	3.43	4.83				
	Total	7.34	4.33	3.08	4.79				
Pulses (%)	Out of home	0.30	0.25	0.23	0.26	0.59	0.55	0.49	0.56
	At home	0.50	0.45	0.46	0.47				
	Total	0.41	0.38	0.39	0.39				
Cereals (%)	Out of home	7.47	6.05	6.78	6.77	0.72	0.67	0.79	0.73
	At home	10.33	9.10	8.63	9.25				
	Total	9.11	8.01	8.08	8.36				
Potatoes (%)	Out of home	1.66	1.23	1.68	1.52	0.69	0.61	0.68	0.66
	At home	2.41	2.03	2.47	2.30				
	Total	2.09	1.74	2.24	2.02				
Nuts (%)	Out of home	0.10	0.07	0.07	0.08	1.07	0.43	0.82	0.70
	At home	0.09	0.17	0.08	0.11				
	Total	0.09	0.13	0.08	0.10				
Total added lipids (%)	Out of home	0.86	0.81	0.86	0.84	0.64	0.62	0.64	0.63
	At home	1.33	1.32	1.33	1.33				
	Total	1.13	1.14	1.19	1.15				
Meat (%)	Out of home	4.78	4.08	4.49	4.45	0.88	0.94	1.01	0.95
	At home	5.40	4.34	4.47	4.67				
	Total	5.13	4.25	4.47	4.59				
Fish (%)	Out of home	0.36	0.40	0.26	0.35	0.69	0.80	0.43	0.63
	At home	0.53	0.51	0.59	0.55				
	Total	0.46	0.47	0.49	0.47				
Eggs (%)	Out of home	0.45	0.44	0.40	0.43	0.66	0.67	0.67	0.67
	At home	0.67	0.66	0.60	0.64				
	Total	0.57	0.58	0.54	0.57				
Milk (%)	Out of home	6.35	5.57	4.39	5.51	0.68	0.78	0.67	0.74
	At home	9.33	7.11	6.54	7.48				
	Total	8.05	6.56	5.91	6.78				
Ice cream (%)	Out of home	0.02	0.31	0.10	0.14	0.12	1.87	0.93	0.98
	At home	0.18	0.16	0.11	0.15				
	Total	0.12	0.21	0.10	0.15				
Sugar (%)	Out of home	0.90	0.57	0.56	0.69	0.78	0.61	0.65	0.71
	At home	1.15	0.94	0.85	0.96				
	Total	1.05	0.81	0.77	0.86				
Chocolate	Out of home	0.79	0.42	0.21	0.49	1.37	1.10	0.89	1.30

Food Group	Place of consumption	Percentage of total out-of-home/at-home Quantity (g)				RATIO (Out of home/at home)			
		18-<25	25-<51	51-64	Total	18-<25	25-<51	51-64	Total
(%)	At home	0.58	0.38	0.24	0.38				
	Total	0.67	0.40	0.23	0.42				
Sweet cereals (%)	Out of home	0.52	0.54	0.51	0.52	1.07	1.00	1.33	1.12
	At home	0.48	0.54	0.38	0.47				
	Total	0.50	0.54	0.42	0.49				
Non-alcoholic (%)	Out of home	45.39	53.03	51.56	49.87	1.14	1.14	1.08	1.10
	At home	39.78	46.72	47.70	45.26				
	Total	42.19	48.99	48.84	46.90				
Soft drinks (%)	Out of home	6.46	3.73	2.93	4.48	1.17	1.78	3.12	1.75
	At home	5.51	2.10	0.94	2.56				
	Total	5.92	2.69	1.53	3.25				
Alcohol (%)	Out of home	3.72	4.62	7.03	4.99	1.98	1.40	1.44	1.41
	At home	1.88	3.31	4.88	3.53				
	Total	2.67	3.78	5.51	4.05				
Misc (%)	Out of home	0.71	0.61	0.71	0.68	0.72	0.69	0.81	0.74
	At home	0.98	0.89	0.88	0.91				
	Total	0.87	0.79	0.83	0.83				
Sum (%) Total	Out of home	100	100	100	100				
	At home	100	100	100	100				
	Total	100	100	100	100				

Table 27 shows proportional percentages of the energy from all food groups (out-of-home, at-home and in total) consumed by Austrian adults (n=2,318), separated by age. Ratios of 1 indicate that the proportional percentages of out-of-home and at-home consumption were equal in terms of energy; values above 1 indicate higher out-of-home consumption; values below 1 mean that at-home consumption was higher.

Total out-of-home consumption in terms of energy (consumption of a specific food group out of home and at home in relation to total consumption out of home and at home) was higher than at-home consumption in the food groups ‘fruits’ (1.35), ‘fruit and vegetable juices’ (1.17), ‘meat’ (1.15), ‘ice cream’ (1.12), ‘chocolate’ (1.52), ‘sweet cereals (1.28), ‘non-alcoholic beverages’ (1.28), ‘soft drinks’ (2.01), ‘alcoholic beverages’ (1.59) and ‘miscellaneous’ (1.06).

Separated by age it was observed that out-of-home meat-derived energy intake of participants between 18 and 25 was less (1.06) than that of individuals who were older than 25 (about 1.20). Younger participants also had lower out-of-home energy intakes with regard to the ice cream food group (0.21) compared to individuals between 25 and 51 years (2.22) and between 51 and 64 (1.05). Higher energy intakes out of home than at home with regard to younger participants (18- < 25 years) were observed in the food groups ‘fruit and vegetable juices’ (younger individuals 1.34, people older than 25 < 1), ‘nuts’ (younger individuals 1.17, people older than 25 < 1) and alcoholic beverages

(younger individuals 2.24, people older than 25 < 2). Participants between 51 and 64 consumed higher amounts of energy out of home (2.91) through soft drinks than younger individuals.

Table 27 Percentage of energy (kcal) from all food groups when consumed out of home and at home by BMI group and in total. Ratio calculated by dividing the out-of-home percentage by the corresponding at-home percentage (n=2,318).

Food Group	Place of consumption	Percentage of total out-of-home/at-home Energy (kcal)				RATIO (Out of home/at home)			
		18-<25	25-<51	51-64	Total	18-<25	25-<51	51-64	Total
Fruits (%)	Out of home	5.85	9.97	11.12	8.64	1.45	1.47	1.40	1.35
	At home	4.03	6.77	7.92	6.38				
	Total	4.74	7.76	8.75	7.11				
Vegetables (%)	Out of home	1.70	1.95	1.79	1.81	0.88	0.88	0.84	0.86
	At home	1.93	2.23	2.13	2.11				
	Total	1.84	2.14	2.05	2.01				
Fruit & vegetable juices (%)	Out of home	5.75	3.35	2.07	3.95	1.34	0.97	0.79	1.17
	At home	4.30	3.44	2.61	3.39				
	Total	4.86	3.41	2.46	3.57				
Pulses (%)	Out of home	0.43	0.36	0.33	0.38	0.98	0.78	0.73	0.84
	At home	0.44	0.46	0.45	0.45				
	Total	0.44	0.43	0.42	0.43				
Cereals (%)	Out of home	20.95	19.59	21.27	20.59	0.90	0.84	0.88	0.87
	At home	23.19	23.25	24.10	23.54				
	Total	22.32	22.12	23.36	22.60				
Potatoes (%)	Out of home	1.72	1.76	2.03	1.82	0.55	0.76	0.80	0.69
	At home	3.14	2.30	2.53	2.63				
	Total	2.59	2.13	2.40	2.37				
Nuts (%)	Out of home	0.84	0.78	0.57	0.75	1.17	0.67	0.78	0.85
	At home	0.71	1.17	0.74	0.88				
	Total	0.76	1.05	0.69	0.84				
Total added lipids (%)	Out of home	10.66	11.91	12.10	11.47	0.77	0.78	0.77	0.76
	At home	13.78	15.30	15.73	15.01				
	Total	12.57	14.25	14.78	13.88				
Meat (%)	Out of home	17.19	17.23	18.32	17.51	1.06	1.20	1.22	1.15
	At home	16.27	14.38	15.07	15.19				
	Total	16.63	15.27	15.92	15.93				
Fish (%)	Out of home	0.69	0.87	0.61	0.73	0.97	0.98	0.56	0.80
	At home	0.71	0.89	1.08	0.91				
	Total	0.71	0.89	0.96	0.85				
Eggs (%)	Out of home	1.01	1.24	1.10	1.11	0.77	0.83	0.80	0.79
	At home	1.30	1.50	1.38	1.40				
	Total	1.19	1.42	1.31	1.31				
Milk (%)	Out of home	10.63	10.58	9.55	10.32	0.87	0.89	0.84	0.88
	At home	12.18	11.84	11.35	11.76				
	Total	11.58	11.45	10.88	11.30				
Ice cream (%)	Out of home	0.06	0.56	0.18	0.25	0.21	2.22	1.05	1.12
	At home	0.27	0.25	0.17	0.23				
	Total	0.19	0.35	0.17	0.23				
Sugar (%)	Out of home	4.77	3.78	3.69	4.15	0.90	0.77	0.79	0.84
	At home	5.29	4.94	4.68	4.95				
	Total	5.09	4.58	4.42	4.69				
Chocolate (%)	Out of home	5.62	3.59	1.78	3.90	1.60	1.34	1.03	1.52
	At home	3.51	2.67	1.72	2.57				
	Total	4.33	2.96	1.74	3.00				
Sweet cereals (%)	Out of home	3.08	3.83	3.34	3.40	1.21	1.20	1.47	1.28
	At home	2.55	3.18	2.27	2.66				
	Total	2.76	3.38	2.55	2.90				
Non-alcoholic (%)	Out of home	0.40	0.55	0.51	0.48	1.16	1.49	1.28	1.28
	At home	0.35	0.37	0.40	0.37				
	Total	0.37	0.42	0.43	0.41				
Soft drinks (%)	Out of home	4.63	2.63	1.53	3.12	1.45	2.12	2.91	2.01
	At home	3.19	1.24	0.53	1.55				
	Total	3.75	1.67	0.79	2.05				
Alcohol (%)	Out of home	2.59	4.13	6.08	4.05	2.24	1.71	1.61	1.59

Food Group	Place of consumption	Percentage of total out-of-home/at-home Energy (kcal)				RATIO (Out of home/at home)			
		18-<25	25-<51	51-64	Total	18-<25	25-<51	51-64	Total
	At home	1.16	2.42	3.77	2.54				
	Total	1.72	2.95	4.38	3.02				
Misc (%)	Out of home	1.42	1.34	2.04	1.56	0.85	0.95	1.49	1.06
	At home	1.67	1.40	1.37	1.47				
	Total	1.58	1.38	1.54	1.50				
Sum (%) Total	Out of home	100 %	100 %	100 %	100 %				
	At home	100 %	100 %	100 %	100 %				
	Total	100 %	100 %	100 %	100 %				

4.2.4 Food group choices of Austrian Adults – Energy density

In order to calculate energy densities, the energy in kcal was divided by the corresponding amount in grams. The result was multiplied by 100 in order to determine the energy density per 100g of consumed food. This calculation was made for all determinants (gender, BMI, age groups) and all food groups (out of home, at home and in total). Subsequently, the at-home energy density was divided by the out-of-home energy density; the resulting ratio indicates whether or not foods of a specific food group have the same (1±0.05) energy densities out of home as at home, or if the energy density of foods from a specific food group are higher out of home than at home (ratio > 1.05).

Table 28 shows the energy densities and energy density ratios separated by gender. Generally, the energy densities were similar out of home and at home (1±0.05). Female participants chose foods with higher energy densities out of home in the food groups ‘pulses’ (1.27), ‘potatoes’ (1.08), ‘nuts’ (1.16), ‘fish’ (1.08) and ‘miscellaneous’ (1.33). Male participants consumed more foods with higher energy densities out of home than at home in the food groups ‘pulses’ (1.06), ‘nuts’ (1.20), ‘meat’ (1.08) and ‘ice cream’ (1.09).

Table 28 Energy density (kcal/100g) of all food groups consumed out of home and at home, as well as ratio calculated by dividing the out-of-home energy density by at-home energy density according to the gender of the participants (n=2,318).

Food Group	Place of consumption	Female		Male		Total	
		kcal/100g	Ratio	kcal/100g	Ratio	kcal/100g	Ratio
Fruits	Out of home	63	0.98	65	0.97	64	0.98
	At home	64		67		65	
Vegetables	Out of home	22	1.04	21	1.01	22	1.03
	At home	21		21		21	
Fruit & vegetable juices	Out of home	51	1.04	52	1.03	52	1.03
	At home	50		50		50	
Pulses	Out of home	85	1.27	82	1.06	83	1.16
	At home	67		77		71	
Cereals	Out of home	180	1.01	183	1.02	182	1.02
	At home	178		180		179	
Potatoes	Out of home	81	1.08	71	0.81	74	0.92

Food Group	Place of consumption	Female		Male		Total	
		kcal/100g	Ratio	kcal/100g	Ratio	kcal/100g	Ratio
	At home	76		87		81	
Nuts	Out of home	578	1.16	627	1.20	591	1.16
	At home	501		522		508	
Total added lipids	Out of home	812	1.01	827	1.02	821	1.02
	At home	801		807		804	
Meat	Out of home	230	1.03	240	1.08	237	1.07
	At home	224		221		222	
Fish	Out of home	124	1.08	121	0.91	122	1.00
	At home	115		132		123	
Eggs	Out of home	156	0.99	156	1.00	156	0.99
	At home	158		157		157	
Milk	Out of home	106	0.96	113	0.94	110	0.95
	At home	111		121		115	
Ice cream	Out of home	94	0.89	120	1.09	103	0.96
	At home	105		110		108	
Sugar	Out of home	366	1.00	368	1.01	367	1.01
	At home	366		362		364	
Chocolate	Out of home	471	0.99	491	0.97	478	0.98
	At home	473		505		488	
Sweet cereals	Out of home	386	0.96	410	0.99	395	0.97
	At home	403		412		407	
No Alcohol	Out of home	1	1.00	1	1.00	1	1.00
	At home	1		1		1	
Soft drinks	Out of home	40	0.96	41	0.96	40	0.96
	At home	42		42		42	
Alcohol	Out of home	63	1.03	45	0.97	48	0.97
	At home	61		47		49	
Misc	Out of home	149	1.33	106	0.97	124	1.12
	At home	112		109		111	
Total	Out of home	54	0.83	62	0.79	59	0.82
	At home	65		78		71	
	Total	62		71		67	

Table 29 shows the energy densities and energy density ratios separated by BMI. Generally, the energy densities were similar out of home and at home (1±0.05) and consistent within BMI groups. The total energy density of foods consumed by the participants was higher out of home in the food groups ‘pulses’ (1.19), ‘nuts’ (1.42), and ‘miscellaneous’ (1.19), and lower out of home than at home in the food groups ‘fruits’ (0.92), ‘potatoes’ (0.93), ‘eggs’ (0.62) and ‘miscellaneous’ (0.88).

Table 29 Energy density (kcal/100g) of all food groups consumed out of home and at home, as well as ratio calculated by dividing the out-of-home energy density by at-home energy density, according to the BMI of participants (n=2,248).

Food Group	Place of consumption	BMI (WHO) Group								Mean/ Food Group	
		<18.5		18.5-24.9		25-29.9		>30			
		kcal/100g	Ratio	kcal/100g	Ratio	kcal/100g	Ratio	kcal/100g	Ratio	kcal/100g	Ratio
Fruits	Out of home	63		64		63		62		63	
	At home	78	0.81	64	1.00	64	0.98	66	0.94	68	0.92
	mean/BMI group	73		64		64		64		66	
Vegetables	Out of home	23		22		21		21		22	
	At home	20	1.15	21	1.04	21	1.02	21	0.99	21	1.05
	Total	21		21		21		21		21	
Fruit & vegetable juices	Out of home	50	1.08	52	1.05	50	0.98	55	1.08	51	1.05
	At home	46		50		51		51		49	

Food Group	Place of consumption	BMI (WHO) Group								Mean/ Food Group	
		<18.5		18.5-24.9		25-29.9		>30			
		kcal/100g	Ratio	kcal/100g	Ratio	kcal/100g	Ratio	kcal/100g	Ratio	kcal/100g	Ratio
	Total	48		50		50		52		50	
Pulses	Out of home	86	0.95	85	1.17	79	1.24	84	1.44	84	1.19
	At home	91		73		64		58		70	
	Total	90		76		68		65		74	
Cereals	Out of home	179	1.06	180	1,00	185	1.03	181	0.97	181	1.02
	At home	169		179		179		186		178	
	Total	171		179		181		184		179	
Potatoes	Out of home	69	0.82	73	0.90	87	1.13	69	0.93	73	0.93
	At home	84		81		77		74		78	
	Total	78		79		79		72		77	
Nuts	Out of home	633	1.87	584	1.12	586	1.15	610	1.56	597	1.42
	At home	339		522		510		392		421	
	Total	360		538		524		422		448	
Total added lipids	Out of home	820	1.02	819	1.02	817	1.01	818	1.01	818	1.02
	At home	807		801		806		811		806	
	Total	811		806		809		813		809	
Meat	Out of home	231	1.03	237	1.04	234	1.00	235	1.00	234	1.01
	At home	224		228		234		234		231	
	Total	227		231		234		234		232	
Fish	Out of home	92	0.96	124	1.06	112	0.86	135	1.04	122	1.01
	At home	96		117		131		130		121	
	Total	96		119		126		131		121	
Eggs	Out of home	155	1.04	158	0.65	156	0.66	152	0.15	156	0.62
	At home	158		245		236		1003		251	
	Total	154		176		173		186		171	
Milk	Out of home	103	0.73	108	0.98	111	0.92	164	1.46	120	0.99
	At home	141		110		121		113		121	
	Total	132		110		118		125		121	
Ice cream	Out of home	94	1.05	105	1.02	103	0.84	86	0.91	95	0.95
	At home	90		102		122		94		101	
	Total	90		104		119		87		99	
Sugar	Out of home	331	0.92	368	1.01	375	1.03	363	0.99	351	0.97
	At home	358		365		364		365		363	
	Total	347		366		367		364		359	
Chocolate	Out of home	504	1.07	471	0.97	486	1.01	497	1.01	490	1.02
	At home	472		484		481		491		481	
	Total	487		479		483		493		485	
Sweet cereals	Out of home	390	0.92	393	0.97	379	0.94	404	0.99	391	0.96
	At home	423		405		405		409		409	
	Total	400		400		398		407		401	
No Alcohol	Out of home	0	1.00	1	1.00	1	1.00	1	1.00	0	1.00
	At home	0		1		1		1		0	
	Total	0		1		1		1		0	
Soft drinks	Out of home	50	0.94	40	0.94	45	1.13	33	0.84	39	0.88
	At home	53		42		40		39		44	
	Total	52		41		42		36		42	
Alcohol	Out of home	54	1.09	50	0.95	47	0.96	51	1.04	50	1.00
	At home	50		53		48		50		50	
	Total	52		52		48		50		50	
Misc	Out of home	146	1.32	125	1.11	147	1.45	118	0.94	134	1.19
	At home	111		113		102		126		113	
	Total	122		116		116		123		119	
Total	Out of home	51	0.72	58	0.83	57	0.80	57	0.80	55	0.88
	At home	71		70		72		71		63	
	Total	64		65		51		65		60	

Table 30 shows the energy densities and energy density ratios separated by age. Generally, the energy densities were similar out of home and at home (1±0.05). The

total energy density of foods consumed by the participants was higher out of home in the food groups ‘pulses’ (1.27), ‘fish’ (1.07), and ‘miscellaneous’ (1.21), and lower out of home than at home in the food group ‘potatoes’ (0.88).

Table 30 Energy density (kcal/100g) of all food groups consumed out of home and at home, as well as ratio calculated by dividing the out-of-home energy density by at-home energy density according to the age of the participants (n=2,318).

Food Group	Place of consumption	Age						Mean/ Food Group	
		18-<25		25-<51		51-64			
		kcal/100g	Ratio	kcal/100g	Ratio	kcal/100g	Ratio	kcal/100g	Ratio
Fruits	Out of home	65	1.04	64	0.97	62	0.98	64	0.99
	At home	63		66		63		64	
	mean/BMI group	64		65		63		64	
Vegetables	Out of home	21	0.96	22	1.04	22	1.04	22	1.02
	At home	22		21		21		21	
	Total	14		23		29		20	
Fruit & vegetable juices	Out of home	49	1.00	53	1.06	53	1.03	50	1.01
	At home	49		50		51		50	
	Total	49		51		51		50	
Pulses	Out of home	97	1.39	80	1.13	83	1.26	88	1.27
	At home	70		71		66		69	
	Total	78		73		69		73	
Cereals	Out of home	187	1.06	180	1.02	179	0.95	183	1.01
	At home	177		177		188		181	
	Total	180		178		186		181	
Potatoes	Out of home	69	0.67	79	1.01	69	1.00	72	0.88
	At home	103		79		69		81	
	Total	91		79		69		79	
Nuts	Out of home	574	0.93	609	1.26	483	0.80	560	1.03
	At home	618		485		602		546	
	Total	599		509		571		550	
Total added lipids	Out of home	830	1.02	819	1.02	807	1.02	819	1.02
	At home	813		804		794		803	
	Total	819		808		797		807	
Meat	Out of home	240	1.01	235	1.02	233	1.03	236	1.02
	At home	237		230		227		231	
	Total	238		232		229		233	
Fish	Out of home	126	1.18	121	0.99	136	1.11	126	1.07
	At home	107		122		123		119	
	Total	114		122		125		121	
Eggs	Out of home	151	0.99	157	0.99	156	1.01	154	0.99
	At home	153		159		154		155	
	Total	152		158		154		155	
Milk	Out of home	112	1.09	106	0.92	124	1.06	112	1.01
	At home	103		115		117		112	
	Total	106		112		118		112	
Ice cream	Out of home	162	1.41	102	0.96	101	0.95	105	0.96
	At home	115		106		106		109	
	Total	119		104		104		107	
Sugar	Out of home	352	0.97	369	1.01	377	1.02	363	1.00
	At home	361		364		369		365	
	Total	358		365		371		364	
Chocolate	Out of home	473	0.99	476	0.98	475	0.99	474	0.98
	At home	479		485		481		481	
	Total	476		482		480		479	
Sweet cereals	Out of home	398	0.96	394	0.97	376	0.94	390	0.96
	At home	415		405		402		407	
	Total	407		401		393		400	
No Alcohol	Out of home	1	1.00	1	1.00	1	1.01	1	1.00
	At home	1		1		1		1	
	Total	1		1		1		1	
Soft drinks	Out of home	48	1.05	39	0.96	30	0.79	42	0.97

Food Group	Place of consumption	Age						Mean/ Food Group	
		18-<25		25-<51		51-64			
		kcal/100g	Ratio	kcal/100g	Ratio	kcal/100g	Ratio	kcal/100g	Ratio
	At home	46		41		38		43	
	Total	47		40		33		42	
Alcohol	Out of home	46	0.96	50	0.99	49	0.95	49	0.95
	At home	49		51		52		51	
	Total	47		50		51		50	
Misc	Out of home	134	1.00	121	1.12	164	1.57	139	1.21
	At home	134		109		105		114	
	Total	134		112		120		122	
Total	Out of home	67	1.06	56	1.04	57	1.15	60	1.07
	At home	79		69		67		71	
	Total	74		64		64		67	

4.3 Discussion

The specific food groups are discussed separately in the following section, taking into consideration the recommendations of the Austrian food pyramid [BMG-HOME, 2010]. Results for quantity, energy, proportional percentages (including the out of home / at home ratio) and energy density were included.

The calculation of the amounts of specific food groups recommended in the food-based dietary guidelines result in part to estimated values due to the fact that some of the recommendations are based on weekly amounts (e.g. meat and fish recommendations), or vary greatly in terms of quantity (e.g. cereals or milk products) [BMG-HOME, 2010]. The recommended value is marked with red lines in the figures; the calculation is described separately for each food group.

Some food groups consist of foods and meals that are tolerated in small amounts but not recommended for daily diet (high-sugar foods, soft drinks, alcoholic beverages) [BMG-HOME, 2010]. In fact, these food groups are consumed by Austrian adults in considerable amounts and are therefore discussed, but no recommended intake level has been declared since they are not necessary for - and are actually contrary to - a diet that promotes health [DGE, 2012] and [ELMADFA et al., 2009a].

With regard to the figures that deal with the out of home / at home ratio, the thicker black line always correlates to the value 1, and is therefore an orientation tool. Values

above the red lines indicate that larger proportional quantities or amounts of energy have been consumed out of home; values below the red line indicate the opposite.

4.3.1 Discussion of predominantly vegetable foods

Two of the seven food groups in the Austrian food pyramid (fruits and vegetables; cereals and potatoes) and six of the HECTOR food groups (fruits; vegetables; fruit and vegetable juices; pulses; cereals and cereal products; and potatoes and other starchy roots) are predominantly vegetable foods [BMG-HOME, 2010] and [HECTOR, 2010].

The Austrian food pyramid and '5-a-day' recommend the approximate amount of 600 g/d of fruits and vegetables (including pulses and fruit and vegetable juices), while the WHO recommends at least 400 g/d for all ages, genders and BMI groups [BMG-HOME, 2010] and [5xamTag, 2007] and [WHO, 2004b]. The majority should come from vegetables (about 350 g/d, including legumes), and the remaining approximately 250 g/d should come from fruits. Depending on what kinds of fruits, vegetables or pulses are chosen one serving is, about 125 g (most fruits) up to 200 g (cooked pulses and vegetables). One serving (200 ml) of fruit and vegetable juices instead of fruit or vegetables is tolerated [BMG-HOME, 2010].

The importance of the 'food and vegetable group' is based on the very low energy density (high contents of water and fibre) and thus the weight regulating effect. Furthermore, many micronutrients, which have health promoting features, are contained in foods and meals that are included in this group [ELMADFA, 2004].

As shown in Figure 19, Austrian adults achieve the recommendations of the WHO but not the Austrian recommendations (food pyramid, '5-a-day') [BMG-HOME, 2010] and [5xamTag, 2007] and [WHO, 2004b]. The group of underweight individuals has the highest consumption of these food groups (approximately 550 g/d), whereas male and younger participants reported the lowest intakes (about 450 g/d). These results include all six predominantly vegetable food groups.

In most of these food groups the major proportion of consumption took place at home, with the exception of fruits.

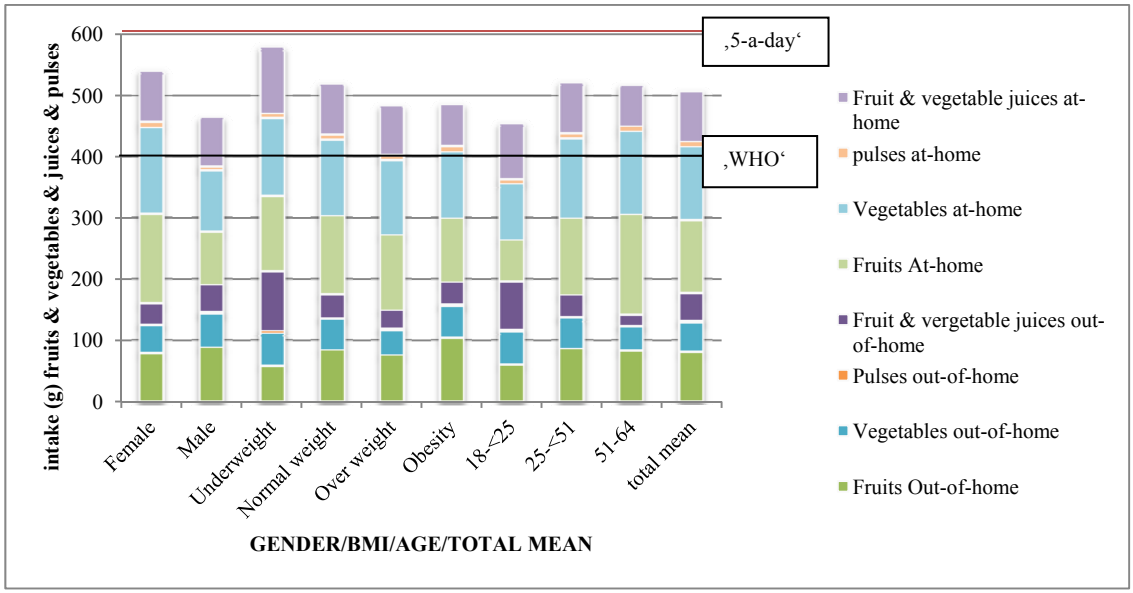


Figure 19 Overall fruit, vegetable, pulse, and fruit and vegetable juice consumption (g) of Austrian adults, by gender, BMI, age groups and total average (out of home, at home) modified according to [BMG-HOME, 2010] and [5xamTag, 2007] and [WHO, 2004b].

The other major food group that is part of the predominantly vegetable food groups, is ‘cereals and potatoes’, as shown in Figure 20. Austrian adults do not achieve the overall recommendation of approximately 500 g/d [BMG-HOME, 2010]. This result was also found in the literature [ELMADFA et al., 2009a]. The majority of consumption took place at home for both cereal (and cereal products and potatoes and other starchy roots). This results have also been found Europe-wide [ORFANOS et al., 2007].

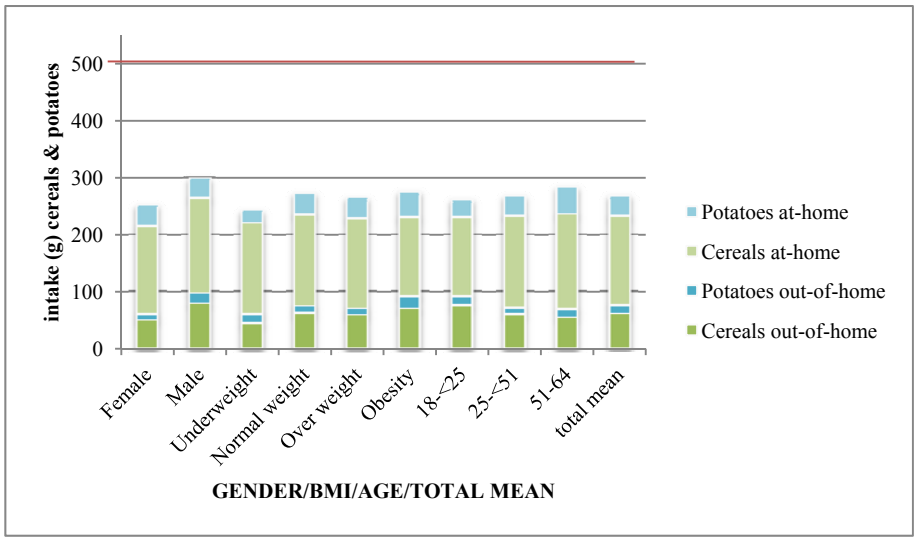


Figure 20 Overall potato and cereal and cereal product consumption (g) of Austrian adults by gender, BMI, age groups and total average (out of home, at home). The red line indicates 'Austrian Food pyramid' (approximately) recommendations modified according to [BMG-HOME, 2010] and [5xamTag, 2007].

4.3.1.1 Fruits – fresh and processed

The results for the "fruits" food group show that Austrian adults (with the exception of individuals between 51-64) do not achieve the recommendation of approximately 250 g/d [BMG-HOME, 2010] and [5xamTag, 2007]. The total average consumption of all participants is 200 g/d, as shown in Figure 21. The red line marks the '5-a-day' and 'the Austrian food pyramid' recommendation.

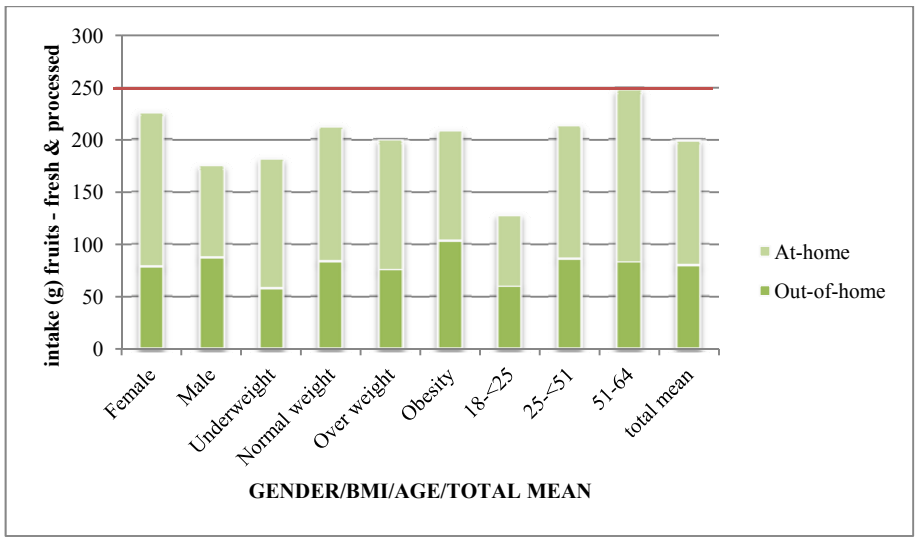


Figure 21 Fresh and processed fruit consumption (g) of Austrian adults by gender, BMI, age groups and total average (out of home, at home). The red line indicates 'Austrian Food pyramid' (approximately) recommendations modified according to [BMG-HOME, 2010] and [5xamTag, 2007].

As shown in Figure 22 the out of home / at home ratios for energy and quantity consumed by Austrian adults have values above 1 (with the exception of underweight individuals), which means that proportional consumption in this food group is higher out of home than at home.

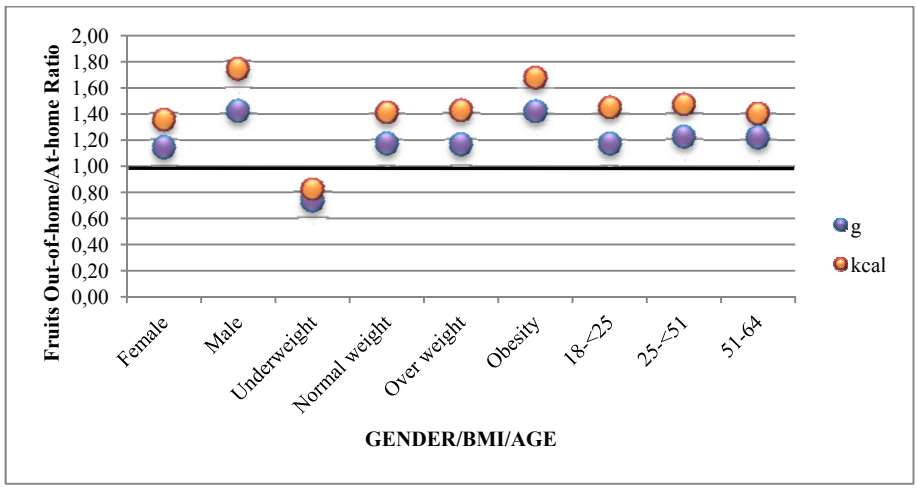


Figure 22 Out-of-home/at-home fruit ratio for energy (kcal) and quantity (g).

As shown in Table 28, Table 29 and Table 30, the energy density is around 63 kcal/100g fruits in gender, BMI and age groups. The out-of-home/at-home ratio for energy density was 1±0.05, almost the same out of home as at home. Underweight individuals were an exception with a ratio of 0.81, which indicates that in this BMI group the energy density was lower in fruits consumed out of home.

4.3.1.2 Vegetables – fresh and processed and pulses

Neither in the pulse nor in vegetable group Austrian do adults achieve the recommendations of '5-a-day' or the Austrian food pyramid of approximately 350 g/d (compare with Figure 42 in the Appendix) [BMG-HOME, 2010] and [5xamTag, 2007]. The participants' total average vegetable consumption was about 175 g/d including pulses, which is only about half of the recommended amount and therefore not satisfying.

Generally, the participants consumed more vegetables and pulses at home than out of home in terms of proportional energy and quantity, a result which has also been found in the literature [ORFANOS et al., 2007]. Only underweight individuals had proportionally more energy intake from out-of-home vegetables, while only overweight individuals had proportionally more from pulses (compare with Table 28, Table 29 and Table 30 in Food group choices of Austrian Adults – Energy density, as well as Figure 43 and Figure 45 in the Appendix).

Energy density (compare with Table 28, Table 29 and Table 30 in Food group choices of Austrian Adults – Energy density) is around 21 kcal/100g vegetables for gender, BMI, and age groups. The out-of-home/at-home ratio for energy density was 1±0.05 and almost identical out of home and at home. Underweight individuals were an exception with a ratio of 1.15, which indicates that in this BMI group energy density was higher in vegetables consumed out of home.

The energy density of pulses was between 58 kcal/100 g (overweight individuals at home) and 97 kcal/100 g (young participants out of home). Generally, the energy density of this food group was higher out of home than at home. With 0.95,

underweight individuals had the only out-of-home/at-home energy density ratio that indicated that the same energy density had been consumed at home and out of home (1±0.05). The highest ratio (1.44) was found in overweight participants. All other ratios for pulses were above 1.05 but below 1.44.

4.3.1.3 Fruit and vegetable juices

'Fruit and vegetable juices' may be consumed as a serving (200 ml) of fruits or vegetables in accordance with the recommendations of '5-a-day' and the Austrian food pyramid [BMG-HOME, 2010] and [5xamTag, 2007]. Only underweight participants achieved this amount. The total average consumption of all persons in the study was approximately 130 ml (compare with Figure 45 in the Appendix).

As shown in Figure 23, most of the participants consumed almost the same amounts of energy (proportionally) out of home as at home and less amounts in terms of quantity at home. An exception was observed in underweight individuals and participants between 18-25 who reported higher consumption out of home in terms of both proportional quantity and energy, as well as in overweight individuals and participants between 51-64 who consumed less amounts of energy and quantity out of home than at home.

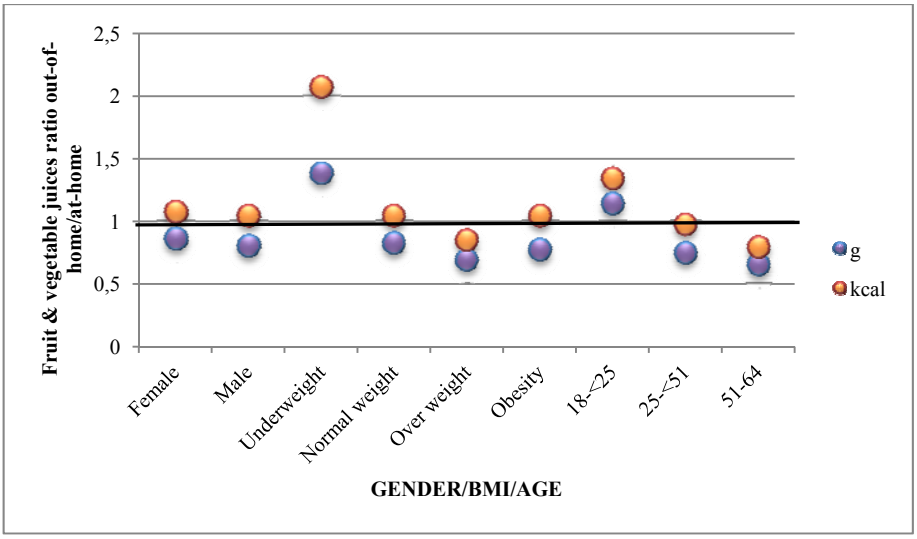


Figure 23 Out-of-home/at-home fruit and vegetable juice ratio for energy (kcal) and quantity (g).

The energy density was about 50 kcal/100 g of fruit and vegetable juices and the out-of-home/at-home ratio was 1±0.05 for both genders, for both normal weight and overweight participants, and for all age groups, and slightly higher (1.08) for

underweight and obese individuals; thus it may be surmised that the same energy densities were consumed outside their own household as at home.

4.3.1.4 Cereals and cereals products (excluding sweet and savoury bakery products)

The participants did not achieve the recommendations of the Austrian food pyramid (approximately 300 g/d) [BMG-HOME, 2010]. The total average intake was about 220 g/d. At about 250 g/d, male participants consumed the largest amounts; female persons in all age and BMI groups consumed between 200 g/d and 220 g/d (compare with Figure 46 in the Appendix).

All individuals consumed proportionally more cereals and cereal products (in terms of quantity and energy) at home than out of home (compare with Figure 47 in the Appendix).

The energy density of the food group cereals and cereal products ranged between 169 kcal/100 g (underweight individuals at home) and 188 kcal/100 g (participants between 51-64 at home). The out-of-home/at-home energy density ratio was 1±0.05 for both genders, overweight and obese persons and participants older than 25 years. Younger and underweight persons (1.06) as well as individuals with normal weight (1.09) consumed foods in this group out of home, which resulted in a little higher energy density than those consumed at home, as shown in Table 28, Table 29 and Table 30 in Food group choices of Austrian Adults – Energy density.

4.3.1.5 Potatoes and other starchy roots

The recommendation of the Austrian food pyramid to have 200-250 g/d of potatoes (and other starchy roots) [BMG-HOME, 2010] was not achieved by the participants. The total average consumption was about 50 g/d. At 70 g/d, obese participants consumed the greatest amounts of this food group. The smallest average amount was consumed by underweight individuals at under 40 g/d (compare with Figure 48 in A).

Generally, the participants consumed proportionally more potatoes and other starchy roots (in terms of quantity and energy) at home than out of home. An exception was

observed in underweight individuals who consumed greater amounts of energy and quantity out of home than at home (compare with Figure 49 in A).

The energy density ranged between 69 kcal/100 g and 103 kcal/100 g of potatoes and other starchy roots. Foods from this group with approximately similar energy densities (ratio = 1±0.05) were consumed by individuals older than 25. Foods with higher energy densities (ratios > 1.05) were chosen on out-of-home consumption occasions by overweight and female participants. All others (male, young individuals, underweight, normal weight and obese participants) ate foods made out of potatoes with lower energy densities at home than out of home, as shown in Table 28, Table 29 and Table 30 in Food group choices of Austrian Adults – Energy density.

4.3.2 Discussion of predominantly high-fat foods

The food group of the Austrian food pyramid ‘added lipids, nuts and seeds’ (HECTOR food groups included therein are ‘total added lipids’ and ‘nuts’) predominantly consists of high-fat foods [BMG-HOME, 2010] and [HECTOR, 2010]. This food group is characterized by the high energy density of the relevant foods [ELMADFA, 2004] and [KOFRÁNYI et al., 2011]. No more than approximately 20 g/d of these foods should be consumer to avoid high energy intakes [BMG-HOME, 2010]. The participants exceeded this limiting recommendation by around 15 g/d, as shown in Figure 24.

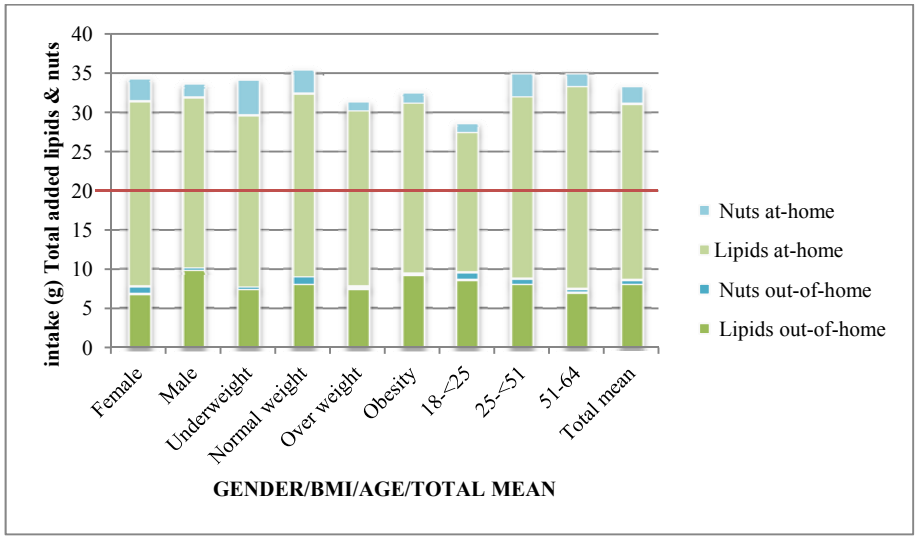


Figure 24 Overall high-lipid food (added lipids and nuts) consumption (g) of Austrian adults by gender, BMI, and age groups and total average (out of home, at home). The red line indicates 'Austrian Food pyramid' (approximate) recommendations modified according to [BMG-HOME, 2010].

The majority of both the quantity and energy of total added lipids and nuts were consumed at home, a finding which also was shown in the literature [ORFANOS et al., 2007]. An exception was observed in the fact that individuals between 18 and 24 consumed more nuts out of home than at home in terms of energy and quantity, as shown in Figure 25 (See Figure 50 Total added lipids out-of-home/at-home Ratio for Energy (kcal) and Quantity (g). in A).

The energy density of Total added lipids was between 800-830 kcal/100 g and the ratios (1±0.05) for all participants indicated that the same energy densities were consumed out of home as at home.

The energy densities of nuts were diverse and ranged from 340 kcal/100 g to 630 kcal/100 g. The energy density ratios (> 1.05) indicate that most participants tended to nuts with higher energy densities out of home rather than at home. Exceptions were observed in individuals under 25 (ratio = 0.93) and over 51 (ratio = 0.80) who consumed nuts with higher energy densities at home, as shown in Table 28, Table 29 and Table 30 in Food group choices of Austrian Adults – Energy density.

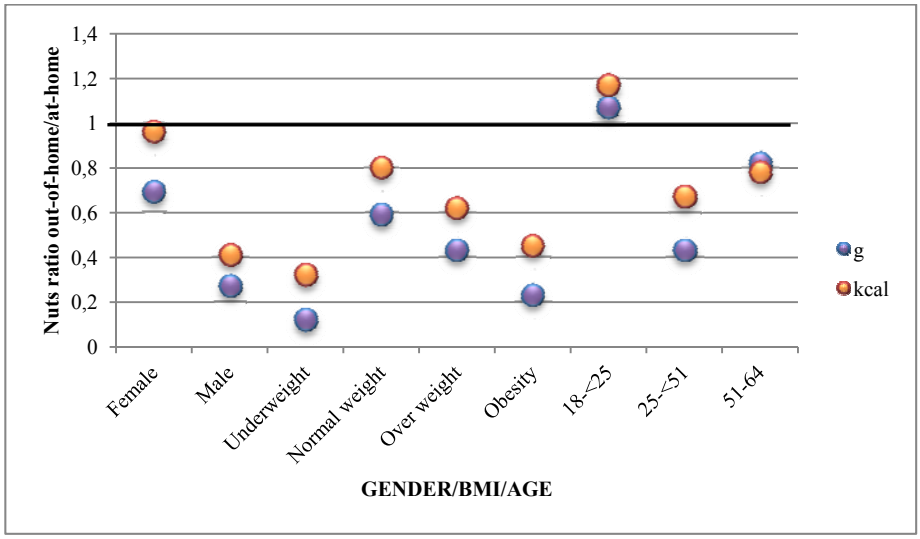


Figure 25 Out-of-home/at-home nut ratio for energy (kcal) and quantity (g).

4.3.3 Discussion of predominantly animal foods

The two major food groups of the Austrian food pyramid, which consist of predominantly animal foods, are ‘fish, meat, meat products and eggs’ and ‘milk and milk products’ [BMG-HOME, 2010].

The recommendations for the food group ‘fish, meat, meat products and eggs’ are weekly amounts [BMG-HOME, 2010], which have been divided by seven so as to make the amounts comparable on a daily base.

The recommendations for ‘milk and milk products’ are made in daily intake amounts but differ substantially in quantity amounts (e.g. cheese, which should be consumed in less amounts than ‘white milk products’ such as milk, yoghurt and similar) [BMG-HOME, 2010]. An approximate value was calculated to mark the recommended amount (indicated by the red line in the graphs).

4.3.3.1 Meat and meat products

Since meat often has relatively high saturated fatty acid and cholesterol content and meat products are often rich in fat, the recommendation of approximately 40-65 g/d is a maximum intake value [ELMADFA, 2004] and [KOFRÁNYI et al., 2011]. The recommendation is made on a weekly base (maximum 450 g/week) [BMG-HOME, 2010]. As was found in the literature [STATISTIK AUSTRIA, 2012a], Austrian adults who participated in this study exceeded the recommendation, as shown in Figure 26.

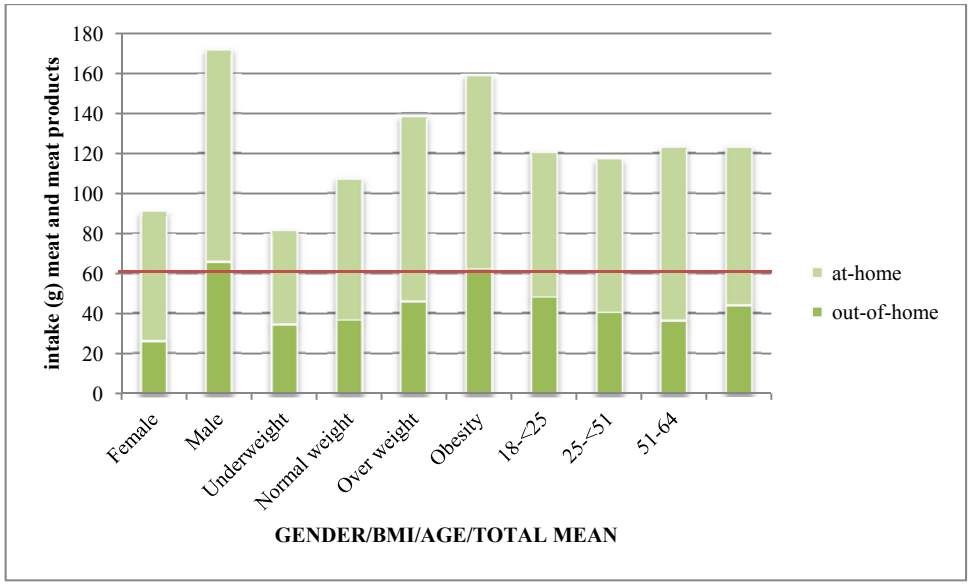


Figure 26 Meat and meat product consumption (g) of Austrian adults by gender, BMI and age groups and total average (out of home, at home). The red line indicates 'Austrian Food pyramid' (approximate) recommendations modified according to [BMG-HOME, 2010].

At about 120 g/d, the total average intake of all participants was double the recommended amount of meat and meat products [BMG-HOME, 2010]. At 80/90 g/d, underweight and female individuals had the lowest intake amounts, while male and obese individuals had the highest intakes with 160-170 g/d.

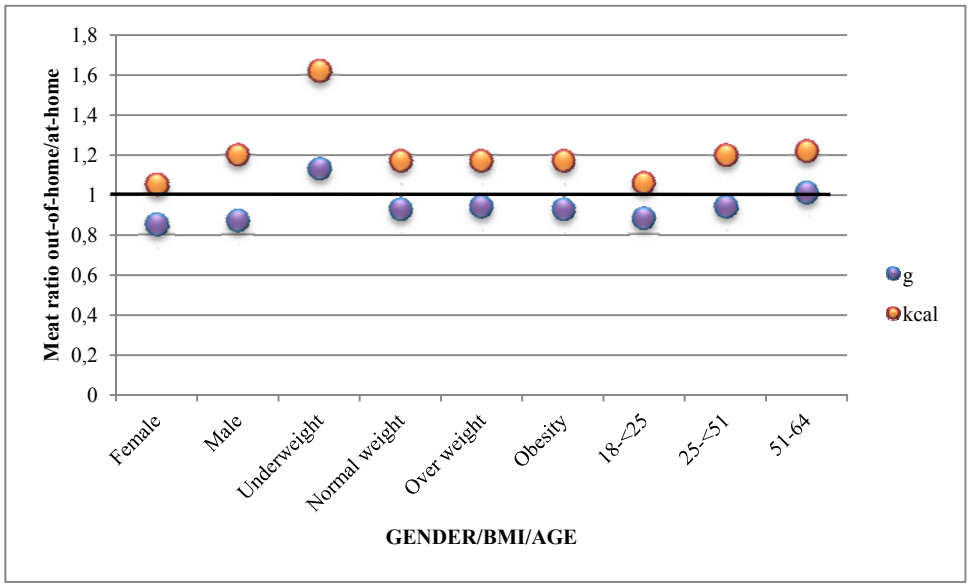


Figure 27 Out-of-home/at-home meat ratio for energy (kcal) and quantity (g).

Figure 27 shows that in terms of quantity the proportional consumption of meat and meat products by most Austrian adults was higher at home or ranged in the same amounts at home and outside one's own household, as also found in the literature [ORFANOS et al., 2007]. An exception was observed in underweight individuals who consumed generally more meat and meat products outside of their own household.

In terms of energy, the tendency toward proportional intake (kcal) was higher out of home than at home. The energy density of the consumed meat and meat products was between 220-230 kcal/100 g. The energy density of consumed foods was higher out of home in men (1.08), but similar energy densities (1±0.05) were found in all other determinants.

4.3.3.2 Fish and seafood

The importance of the 'fish and seafood' food group is explained by the high-quality protein, micronutrients and polyunsaturated fatty acid these foods contain [ELMADFA, 2004] and [KOFRÁNYI et al., 2011]. The recommendation for fish and seafood is also

on a weekly base, but - in contrast to the meat recommendation - this is a minimum value for recommended intake [BMG-HOME, 2010]. The recommended amount of approximately 50 g/d (350 g/week) [BMG-HOME, 2010] is not achieved by Austrian adults, as shown in Figure 28.

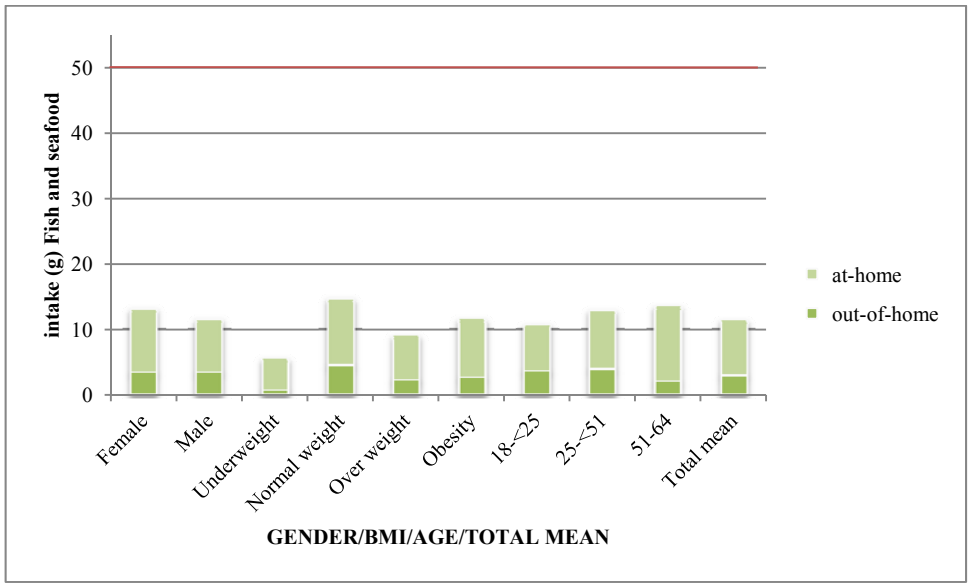


Figure 28 Fish and seafood consumption (g) of Austrian adults by gender, BMI and age groups and total average (out of home, at home). The red line indicates 'Austrian Food pyramid' (approximate) recommendations modified according to [BMG-HOME, 2010].

The majority of fish consumption takes place at home in terms of energy and quantity (compare with Figure 51 in A, or Food group choices of Austrian Adults – out-of-home/at-home ratio), a finding which is also represented in the literature [ORFANOS et al., 2007].

The energy densities ranged from 110-140 kcal/100 g of fish and seafood and were higher out of home than at home for female participants (1.08), normal weight individuals (1.06), and individuals under 25 (1.18) and over 51 (1.11), and lower out of home than at home for male participants (0.91) and overweight individuals (0.86).

4.3.3.3 Eggs

The recommendation for a maximum of three eggs is a weekly basis [BMG-HOME, 2010]; assuming that one egg has approximately 60 g [ELMADFA et al., 2009a], Austrian adults are allowed to have about 25 g/d. Austrian adults do not reach this

maximum value. The total average intake is about 15 g/d (compare with Figure 52 in A).

The proportional intake of eggs in terms of energy and quantity was lower out of home than at home for all determinants (compare Figure 53 in A).

4.3.3.4 Milk and milk products

Milk and milk products are not only an important source for calcium, but also for other essential micronutrients such as iodine [ELMADFA, 2004] and [KOFRÁNYI et al., 2011]. The literature also found that Austrian adults do not reach even half of the recommended daily amounts [ELMADFA et al., 2009a]. According to the Austrian food pyramid recommendation, 400 g/d of 'white milk and milk products' and 50 g/d of 'yellow milk products' should be consumed [BMG-HOME, 2010]. The approximate value of 450 g/d [BMG-HOME, 2010] was not achieved by Austrian adults in this study. The total average intake of all participants was about 160 g/d, which is far below the desirable value (compare with Figure 54 in A).

As found in the literature [ORFANOS et al., 2007] the proportional intake of milk and milk products in terms of energy and quantity was lower out of home than at home for all determinants (compare Figure 55 in A).

The energy density of milk and milk products consumed by the participants was between 100-160 kcal/100g. Male individuals chose milk products at home with slightly lower energy densities when compared to their out-of-home selection (0.94), as did overweight individuals (0.92), between 25 and under 51 (0.92) and underweight individuals (0.73). Higher energy densities of foods from this group were observed in obese individuals (1.46) and in individuals younger than 25 (1.09) and older than 51 (1.06).

4.3.4 Discussion of predominantly high-sugar products

High-sugar products such as sweets and chocolate, sweet cereals and products, ice cream and sugar and sugar products are not recommended for the daily diet, but since they are consumed, they are tolerated in small daily amounts [ELMADFA, 2004] and

[KOFRÁNYI et al., 2011] and [BMG-HOME, 2010]. Sweets and sugar regularly have relatively high energy densities [KOFRÁNYI et al., 2011]. Since the major energy delivering macronutrients of foods contained in these food groups are mono- and disaccharides, the energy density is approximately 400 kcal/100 g [ELMADFA, 2004]. The only foods with higher energy densities are high-lipid foods such as total added lipids and nuts [KOFRÁNYI et al., 2011]. The reason why there is no recommendation for high-sugar foods - in contrast to high-fat foods - is that fat can be highly valuably for the human physiology and metabolism (polyunsaturated fatty acids) whereas mono- and disaccharides should be replaced by complex carbohydrates, e.g. from cereals (whole wheat) or vegetables and fruits [ELMADFA, 2004] and [BMG-HOME, 2010].

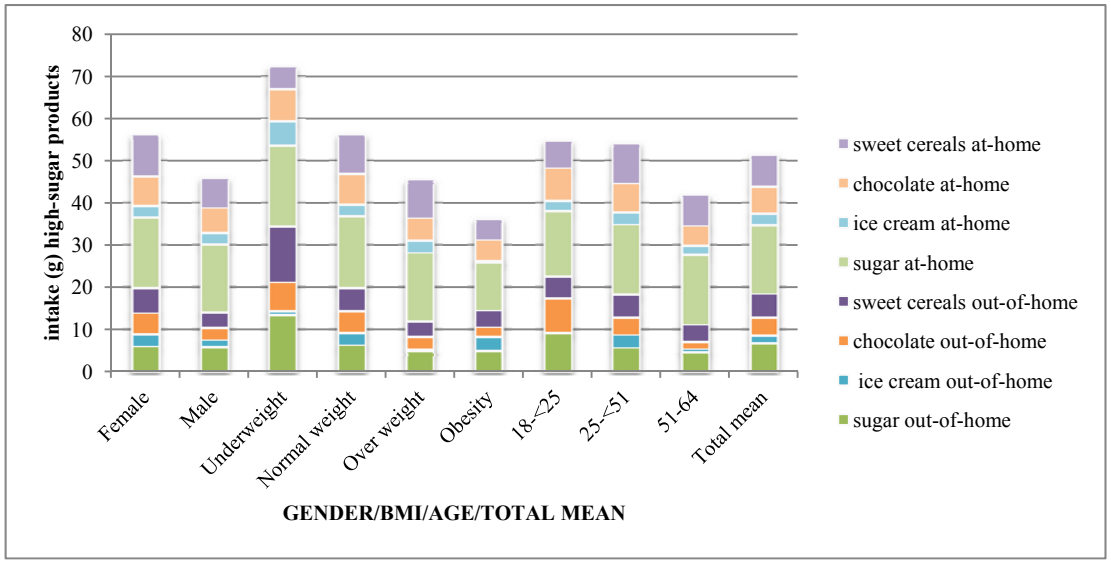


Figure 29 Overall high-sugar food (ice cream, sugar and sugar products, sweets and chocolate, sweet cereals and products) consumption (g) of Austrian adults by gender, BMI and age groups and total average (out of home, at home).

The distribution of high-sugar product intake among the determinants of age, gender and BMI is shown in Figure 29. At approximately 50 g/d, the average total daily intake of the participants was relatively high.

Female participants (55 g/d) consumed slightly more high-sugar products than male participants (45 g/d). The literature also found that the consumption of high-sugar products slightly decreases as BMI increases [ELMADFA et al., 2009a]. The 51- 64 age group consumed fewer (40 g/d) high-sugar products than younger individuals, which also was also stated in the literature [ELMADFA et al., 2009a].

4.3.4.1 Ice cream

The participants consumed on average about 4.5 g/d of ice cream. Underweight individuals had the highest average intake value (6.5 g/d), whereas individuals between 18 and 24 had the lowest average intake (2.5 g/d). Female participants consumed 5.5 g/d, slightly more than the 4.5 g/d consumed by male participants (compare with Figure 56 in A).

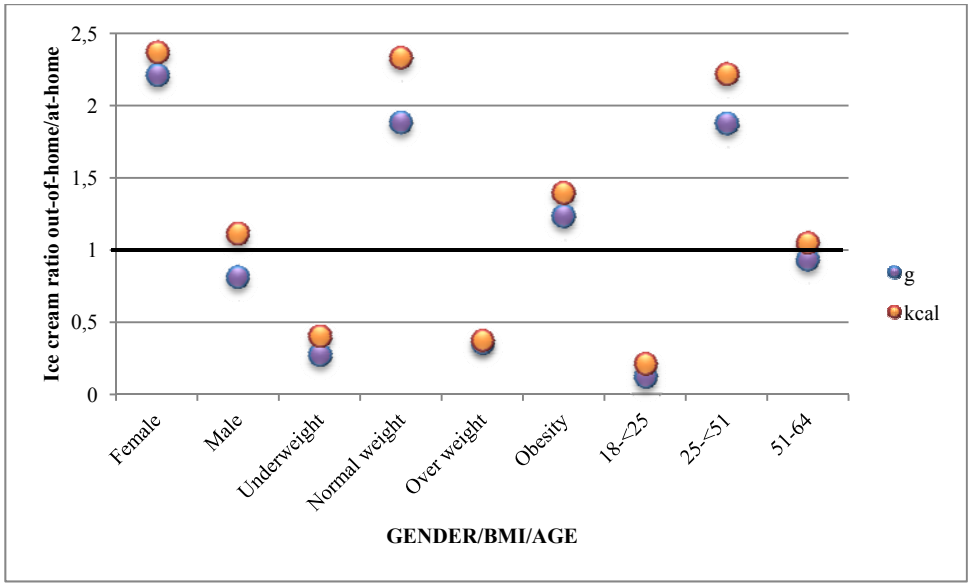


Figure 30 Out-of-home/at-home ice cream ratio for energy (kcal) and quantity (g).

As shown in Figure 30, female, normal weight, obese individuals and individuals between 25 - 50 consumed proportionally greater amounts of ice cream out-of-home than at home in terms of energy and quantity. Underweight and overweight individuals and individuals under consumed proportionally greater amounts of ice cream at home. Male and elderly individuals had the same proportional intakes at both places. The literature shows that sweets are Europe-wide consumed more often out of home compared with the intakes at home [ORFANOS et al., 2007].

The energy densities ranged from 85 kcal/100 g up to 160 kcal/100 g. Individuals under 25 (1.41) and male participants (2.09) consumed foods from this group with higher energy densities out of home. Lower energy densities out of home than at home were observed in female participants (0.89) and overweight (0.84) and obese individuals (0.91).

4.3.4.2 Sugar and sugar products

As shown in Figure 31 the average daily intake of sugar and sugar products was approximately 20 g/d. The highest consumption was observed in underweight individuals, who at the same time were the only group in which out-of-home consumption was higher than at-home intake in proportional terms (compare with Figure 57 in A).

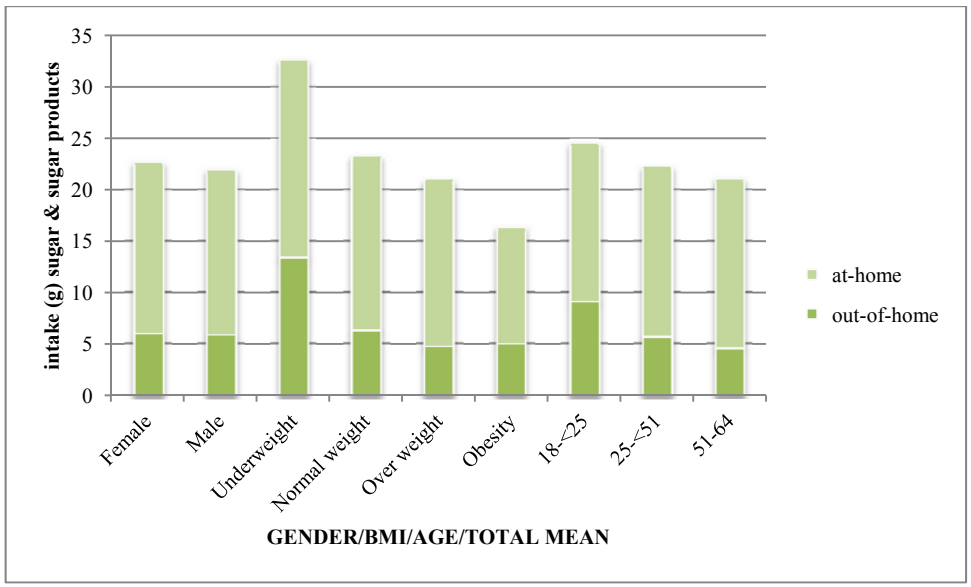


Figure 31 Sugar and sugar product consumption (g) of Austrian adults by gender, BMI and age groups and total average (out of home, at home).

Energy density was about 370 kcal/100g and lower at home than out of home in underweight individuals. All other participants chose equal energy densities (1±0.05) at both places of consumption.

4.3.4.3 Sweets and chocolate

The total average intake of sweets and chocolate was approximately 10 g/d, as shown in Figure 32. The highest amounts (15 g/d) were consumed by individuals under 25; a decreasing intake was observed with increasing age. Female participants (12 g/d) consumed more of this food group than male individuals (8 g/d). Furthermore, slightly decreasing sugar consumption was observed with increasing BMI.

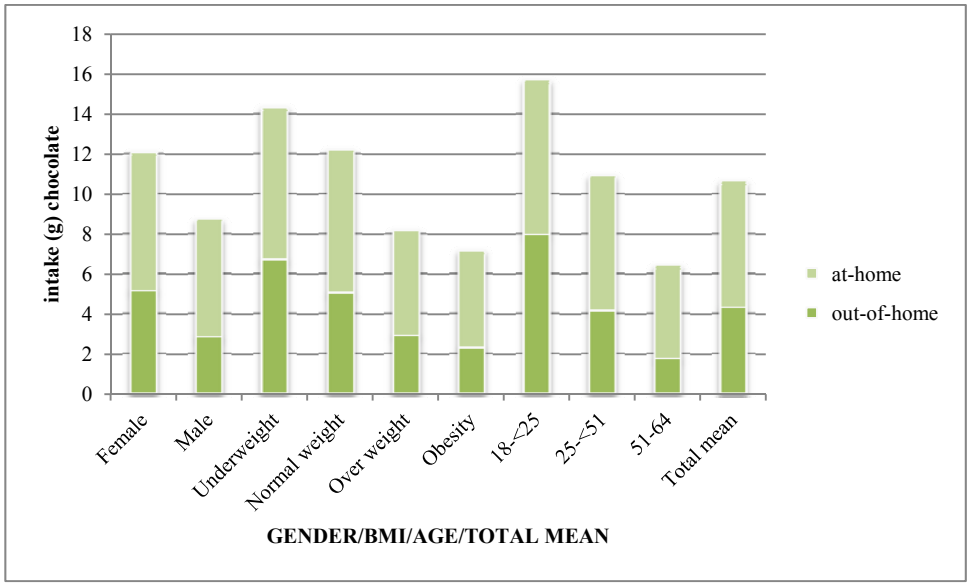


Figure 32 Sweet and chocolate consumption (g) of Austrian adults by gender, BMI and age groups and total average (out of home, at home).

Most participants had higher energy intakes and quantitative amounts of sweets and chocolate out of home than at home in proportional terms, as shown in Figure 33. Exceptions were observed in men and obese individuals, who consumed more at home than out of home. Individuals over 51 had the same proportional energy intake at home as out of home, and overweight individuals had similar quantitative intakes at both places. The literature shows that sweets are Europe-wide consumed more often out of home compared with the intakes at home [ORFANOS et al., 2007].

Energy density was between 470-500 kcal/100 g. With regard to underweight individuals, a higher energy density was observed in intakes outside of one's own household. All other individuals chose foods with similar energy densities at home and out of home.

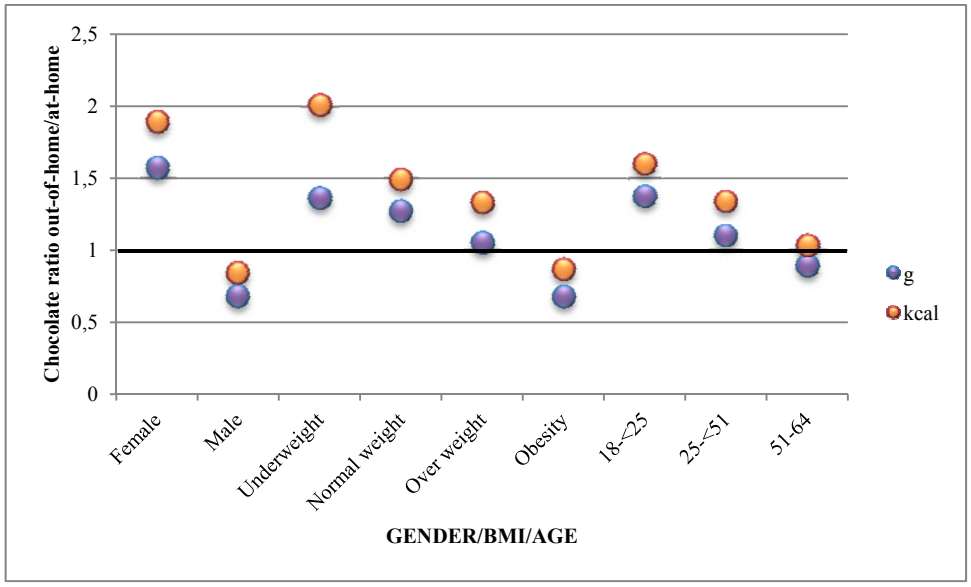


Figure 33 Out-of-home/at-home chocolate ratio for energy (kcal) and quantity (g).

4.3.4.4 Sweet and savoury cereals products

On average the participants consumed 13 g/d of sweet and savoury cereal products. Underweight individuals consumed the highest average intake amounts at 18 g/d; a decreasing consumption of this food group was found with increasing BMI. At approximately 16 g/d, female individuals consumed more than male participant, who consumed about 11 g/d. Individuals between 25 50 consumed approximately 15 g/d, while individuals who were younger or older consumed about 11 g/d, as shown in Figure 34.

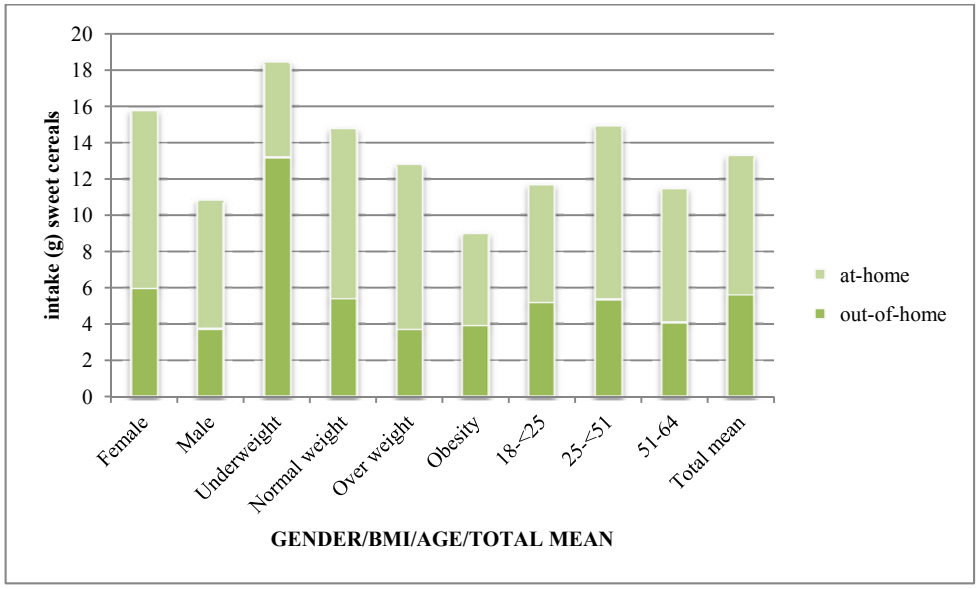


Figure 34 Sweet cereal and product consumption (g) of Austrian adults by gender, BMI and age groups and total average (out of home, at home).

As shown in Figure 35, underweight individuals consumed greater proportional amounts out of home than at home in terms of energy and quantity; this was also observed in female participants and individuals who were older than 51. All other participants consumed approximately the same amounts at home and out of home.

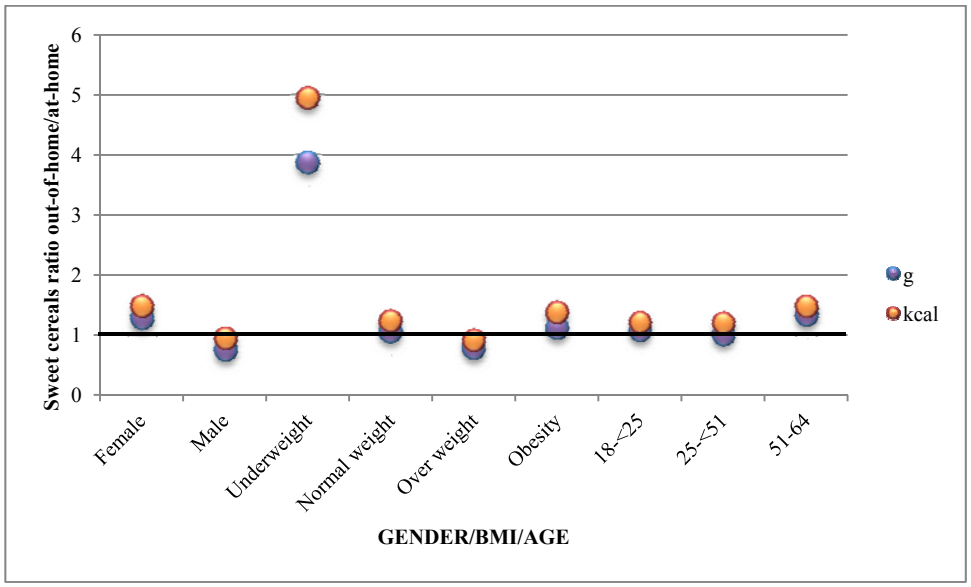


Figure 35 Out-of-home/at-home sweets cereal ratio for energy (kcal) and quantity (g).

The energy density of this food group was around 400 (±15 kcal)/100 g. Underweight (0.92) and normal weight individuals (0.94), as well as individuals older than 51 (0.94) chose foods with slightly lower energy densities out of home. All other participants had similarly average energy densities from sweet and savoury cereals products at home and out of home.

4.3.5 Discussion of beverages

The human body is comprised of about 60 % water, which is an important solvent and transport medium for the human organism; thus the intake of sufficient amounts of low-energy beverages and the highest quality drinking water is necessary [ELMADFA, 2004] and [KOFRÁNYI et al., 2011] and [BMG-HOME, 2010].

The recommendation for the daily fluid intake through beverages is in the range of 1.2-1.5 litres for adults [DGE, 2012] and [BMG-HOME, 2010]. Soft drinks and alcohol are not real thirst quenchers and therefore are not recommended for daily intake, but are

tolerated in moderate amounts [ELMADFA, 2004] and [KOFRÁNYI et al., 2011] and [BMG-HOME, 2010].

4.3.5.1 Soft drinks

Soft drinks such as fruit juice drinks, fruit spritzers, lemonades and sherbets contain fluctuating amounts of energy and sugar and are therefore a transitional form between sweets and beverages [KOFRÁNYI et al., 2011]; thus, they are not recommended for daily intake but are tolerated in moderate amounts. They do not count as real thirst quenchers and although they provide significant energy amounts they make no considerable contribution in terms of saturation, which complicates weight and energy balance regulation [ELMADFA, 2004] and [KOFRÁNYI et al., 2011] and [BMG-HOME, 2010].

The total average intake of the participants was between 80-90 g/d, as shown in Figure 36. The highest intakes were observed - in contrast to the high-sugar foods - in participants under 25 years (140 g/d), obese individuals (130-140 g/d) and male individuals (110-120 g/d). An increasing consumption of soft drinks with increasing BMI was observed, as was a decreasing intake with increasing age. Male participants consumed greater amounts than female individuals.

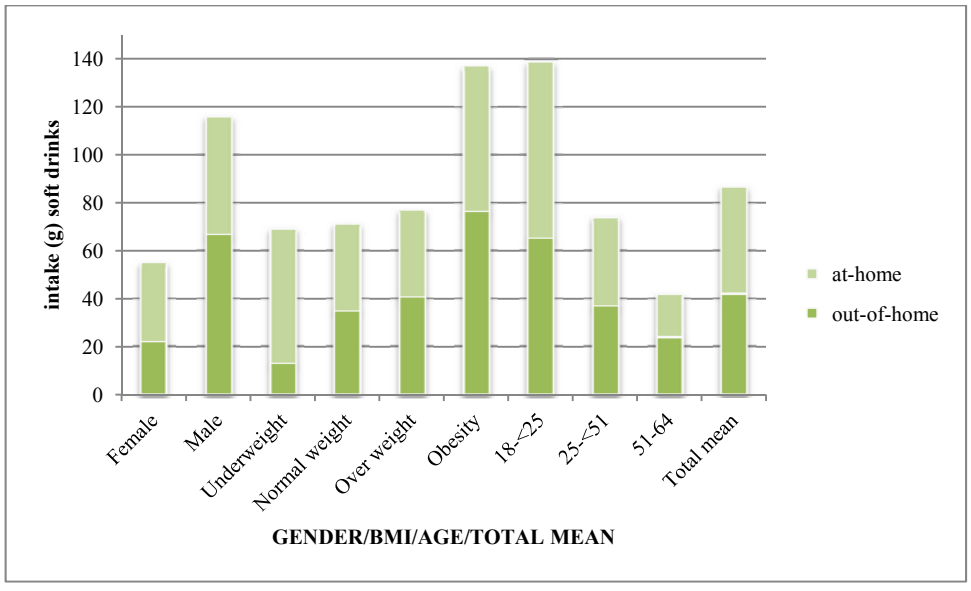


Figure 36 Soft drink consumption (g) of Austrian adults by gender, BMI and age groups and total average (out of home, at home).

Soft drinks were generally consumed in greater proportional amounts out of home than at home in terms of energy and quantity. An exception was observed in underweight individuals, who consumed the greater fraction of this food group inside their own households, as shown in Figure 37.

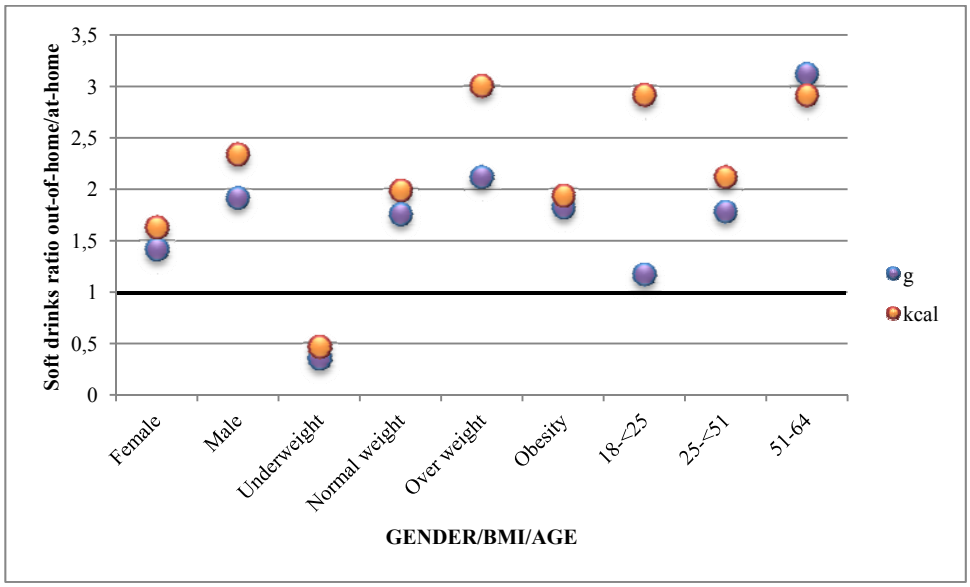


Figure 37 Out-of-home/at-home soft drink ratio for energy (kcal) and quantity (g).

The energy density of soft drinks ranged between 30-50 kcal/100 g. Individuals who older 51 (0.79) and obese individuals (0.84) had drinks with lower energy densities at home; by participants with underweight and normal weight participants (0.94) chose slightly lower-energy drinks at home. All others had approximately the same energy intake per amount of soft drinks at home and out of home.

4.3.5.2 Non-alcoholic beverages

This food group includes coffee, tea and water, which - according to the literature – were over-consumed out of home on a European level [ORFANOS et al., 2007]. The beverages included in this group count as real thirst quenchers, and are therefore an important part of human nutrition [ELMADFA, 2004] and [KOFRÁNYI et al., 2011] and [BMG-HOME, 2010]. The recommended intake level is marked in the figure with a red line [BMG-HOME, 2010].

The recommendation for 1.2-1.5 litres of non-alcoholic, low-energy beverages was achieved by the participants since the total average intake was approximately 1,250 g/d,

as shown in Figure 38. Male participants and individuals under 25 did not drink enough of this food group; however they had higher intakes in soft drinks compared to other individuals, which is not desirable.

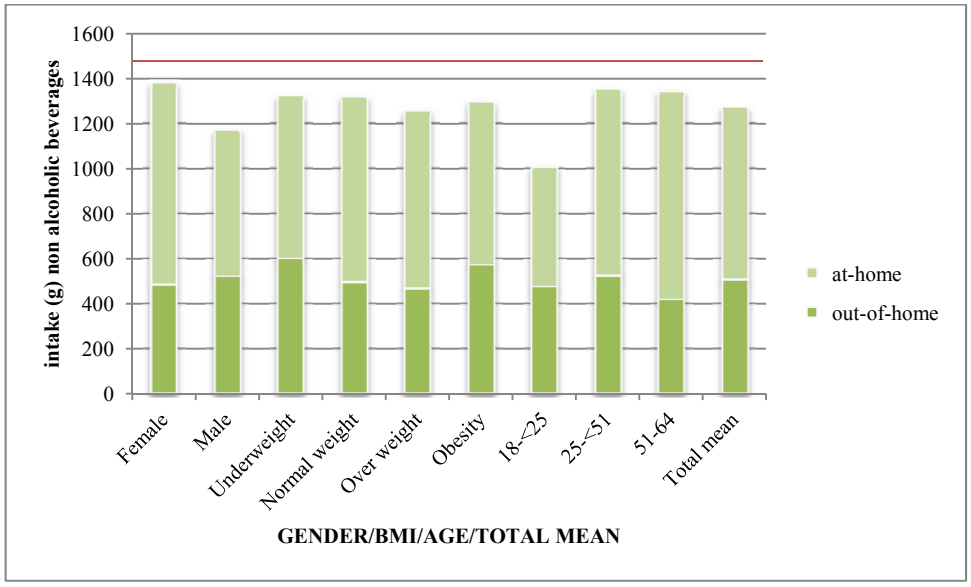


Figure 38 Non-alcoholic beverage consumption (g) of Austrian adults by gender, BMI and age groups and total average (out of home, at home). The red line indicates 'Austrian Food pyramid' recommendations modified according to [BMG-HOME, 2010].

In terms of quantity and energy all participants consumed higher proportional amounts out of home, as shown in Figure 39 and found in the literature [ORFANOS et al., 2007].

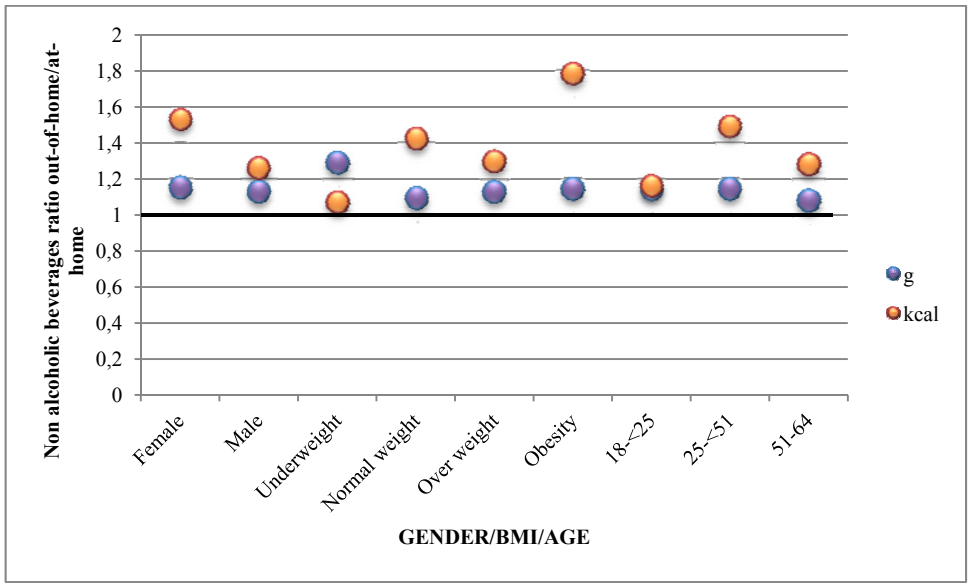


Figure 39 Out-of-home/at-home non-alcoholic beverage ratio for energy (kcal) and quantity (g).

At its highest the energy density was 1 kcal/100 g and was consumed approximately in the same energy-to-amount ratio at home and out of home.

4.3.5.3 Alcoholic beverages

Alcoholic beverages contain ethanol, which is appropriate in moderate amounts. They are not counted as real thirst quenchers, and intake is not recommended [ELMADFA, 2004] and [KOFRÁNYI et al., 2011] and [BMG-HOME, 2010]. With 700 kcal/100 g, pure alcohol provides relatively high amounts of energy and thus complicates weight regulation when consumed in high amounts [ELMADFA, 2004] and [KOFRÁNYI et al., 2011].

At 200 ml/d men consumed almost four times more alcoholic beverages than women did. An increasing intake of these beverages was observed in increasing BMI and age. The total average intake of the participants was 110 ml of alcoholic beverages per day, as shown in Figure 40.

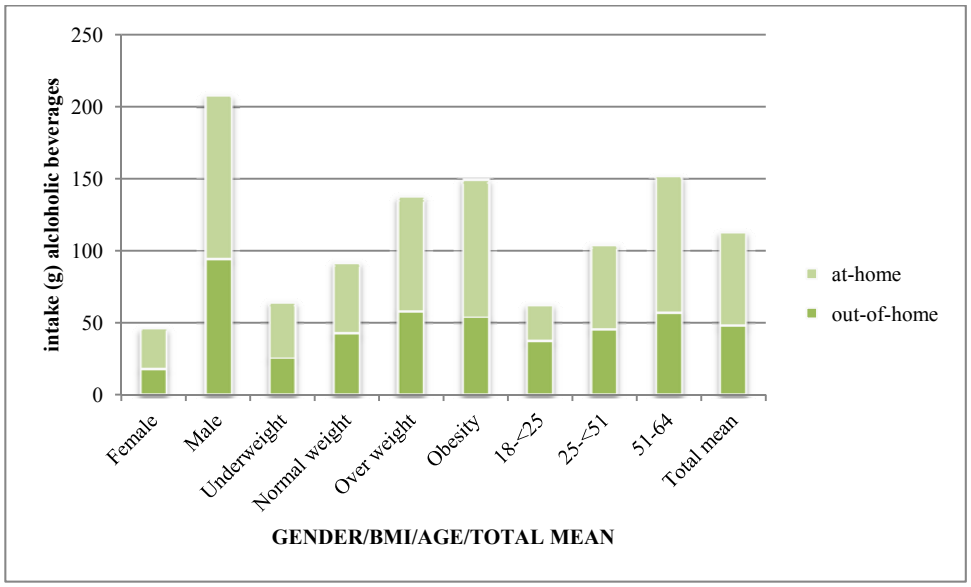


Figure 40 Alcoholic beverage consumption (g) of Austrian adults by gender, BMI and age groups and total average (out of home, at home).

As shown in Figure 41, obese individuals consumed proportionally greater quantities of alcohol at home than out of home, while underweight individuals consumed equal amounts at-home and out-of-home in quantitative terms, as did obese individuals in terms of energy intake. All other participants consumed higher proportional amounts of alcoholic beverages out of home than at home.

The energy density of alcoholic beverages ranged between 45-60 kcal/100 g. With the exception of underweight individuals who consumed drinks with higher energy densities out of home, the energy per drink was similar at home and out of home for all participants.

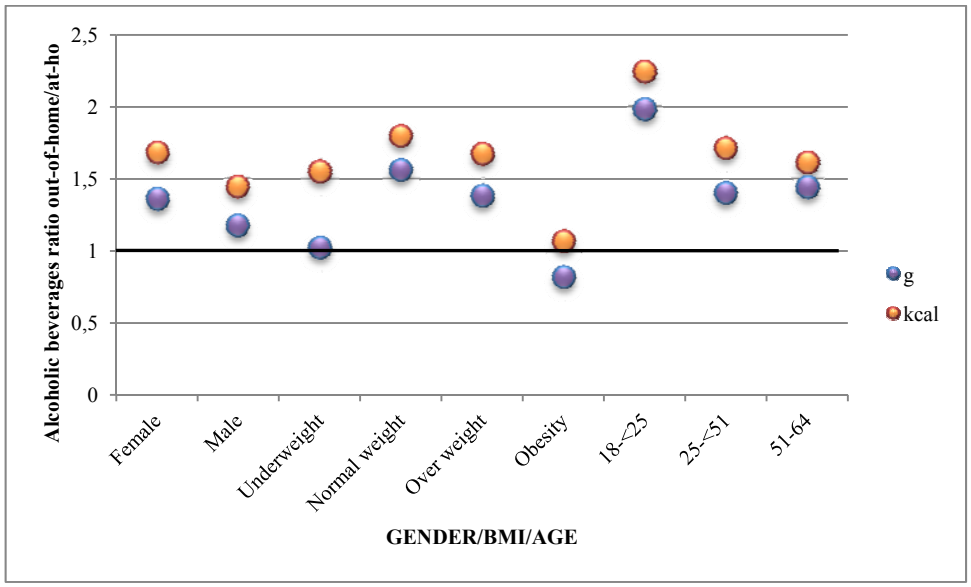


Figure 41 Out-of-home/at-home alcoholic beverage ratio for energy (kcal) and quantity (g).

4.3.6 Discussion of miscellaneous

This food group includes ready-to-eat sauces, spices and seasonings. The total average intake was 20 g/d, the intakes were consistent among the participants (compare with Figure 58 in the Appendix).

With the exception of females, underweight and overweight individuals and participants older than 51 - groups that consumed higher proportional amounts in terms of energy - all individuals in the study consumed proportionally larger amounts in terms of quantity and energy at home.

5 CONCLUSION

In this thesis the out-of-home (as well as at-home and total) consumption of 2,351 Austrian adults between the ages of 18 and 64 were analyzed with regard to their food group choices and compared with the recommendations of the Austrian food-based dietary guidelines. Questions formulated in the introduction are answered in this conclusion.

Generally, the participants consumed 2/3 of their daily dietary needs in terms of energy and quantity at home and 1/3 out of home. This distribution differs within the determinants (gender, BMI and age) and also among the food groups—some were 'over-consumed' out of home.

In order to assess the dietary quality of the Austrian adults who participated in this study, the total quantitative amounts in terms of determinants consumed (rough, overall averages) were compared to amounts recommended according to the Austrian food pyramid, or if necessary other Austrian food-based dietary guidelines.

The energy densities for both places of consumption and in total for all three parameters (age, BMI and gender) were also calculated to assess whether or not the foods chosen out of home differ from those chosen at home in terms of energy per amount of food consumed.

Vegetables, fruits, and fruit and vegetable juices are an important group in terms of health-promoting and weight-regulating effects. Austrian adults who participated did not achieve the overall recommendation. Fruit intake was closer to the recommendation than vegetable consumption. Fruits were generally 'over-consumed' out of home. The consumption of pulses was poor and should be promoted, since legumes are an important source of protein and fibre. The consumption of fruit and vegetable juices did not exceed the recommendations, which is positive, since they do not have the desirable saturating effects of a whole fruit. Female participants consumed more foods from this group than male participants: intake was lower as BMI increased, and younger individuals consumed less of these essential foods than older individuals.

Milk and milk products should be consumed in sufficient daily amounts. Austrian adults who participated in this study did not consume even half of the recommended amount. Given that this food group is an important source for calcium, which is important in terms of bone health and iodine – for which there is a risk of deficiency in Austria – this finding is not pleasant. With regard to the total energy quantity consumed at home or out of home, milk and milk products were generally consumed at-home in higher percentages. Obese individuals consumed foods from this food group with higher energy densities out of home than at home.

Animal foods – including meat, meat products, fish, seafood and eggs – comprise a diverse food group in which a distinction has to be made between minimum (fish and seafood) and maximum (meat, meat products and eggs) recommendations. The actual consumption of meat and meat products was twice as much as recommended. It was notable that male participants consumed higher amounts than female participants, and meat consumption increased as BMI rose. In proportional terms the energy intake from these foods was higher out of home than at home, but the consumed quantities were higher at home. The collective was far below the fish and seafood recommendation. Fish is an important source of poly-unsaturated fatty acids—in terms of health promotion and weight regulation, a decrease in meat consumption coupled with an increase in fish consumption would be a positive change. The consumption of eggs was within the recommended amount and - like fish and seafood - eggs were consumed proportionally in the same quantity and energy amounts at home and out of home.

The “added lipids” food group consists of fatty seeds and nuts as well as total added lipid. About 20 g/d of high-quality fats should be consumed. The participants exceeded the recommendation. No statement can be made about the quality of the consumed lipids. The majority of total added lipids and nuts were consumed at-home (in proportional terms). The energy density of nuts was higher when they were consumed out of home.

The “fatty, sweet and savoury” food group is on the top of the Austria pyramid. This group is absent in some food-based dietary guidelines because the intake of the

contained foods is not recommended but tolerated in moderate amounts. This food group includes sweets and chocolate, sweet and savoury cereals, sugar and sugar products, and ice cream. Female participants consumed more of them than male participants and younger individuals consumed more sweets than older participants. Ice cream as well as sweets and chocolate were especially ‘over-consumed’ out of home by female and underweight individuals, as well as younger individuals. Female participants quantitatively consumed more sweet and savoury cereals than male participants. In fatty, sweet and savoury foods it was observed that consumption decreased as BMI increased.

Soft drinks and alcoholic beverages do not count as real thirst quenchers; they are not recommended but are tolerated in moderate amounts. Both show higher intakes in men than in women and the consumed amounts rose with increasing BMI. Soft drinks were consumed in larger amounts by younger participants, and alcoholic beverages by older individuals. Both were ‘over-consumed’ out of home.

The strength of the study includes the relatively large collective of 2,351 participating individuals, the standardization of the protocols, and the consideration of Austrian recipes. The limitation is that participants filled in the information without an interviewer assisting them, which easily leads to misreporting but on the other hand no interviewer bias was introduced. No statements in terms of patterns can be made due to the fact that only one single day was evaluated per person.

Approximately 15-20% of the total energy consumption is contributed by food groups that have no significant nutritional benefits. Most of these food groups are ‘over-consumed’ out of home at least by parts of the collective. The only food groups that were ‘over-consumed’ out of home and are recommended in almost unlimited amounts were fruits and non-alcoholic beverages. Some food groups only showed higher rates of out-of-home consumption in specific aspects (energy and meat consumption out of home), while others were only ‘over-consumed’ out of home by some determinants (sweet and savoury cereals by female and underweight individuals).

The fact that there are certain food groups, which should not be consumed at all, or only in moderate amounts, are mainly consumed out-of-home, raises the question: why are these food groups especially often consumed out-of-home? The data of this present study provides no answer to this issue, but possible reasons could include the idea that costumers prefer ‘special foods’ at ‘special occasions’ (e.g. chocolate and lemonade when watching a movie at the cinema etc.), another reason could be that the foods and beverages offered out-of-home rarely include the healthy option, and also social situations (e.g. consumption of alcoholic beverages) could play an important role. For sure sometimes it is a combination of the afore-mentioned purposes. It could be important and interesting to evaluate the reasons for out-of-home consumption with a proper questionnaire and also to analyse how the situation has changed in the past 6 years, in order to initiate sensible and necessary interventions.

6 ABSTRACT

Out-of-home consumption was investigated in this thesis using 24-hour recalls filled out by 2,351 adult Austrians, with particular attention given to food group selection.

20 food groups were analyzed based on two locations of consumption - "at-home" and "out-of-home" - and using body mass index (BMI), gender and age determinants. In order to obtain a better overview of the quality of the foods chosen, the consumed amounts of the various food groups were compared to the amounts recommended by the Austrian food pyramid.

It was determined that the food groups that proportionally were more often eaten "out of home" in terms of the total energy or quantity consumed "out-of-house" and "at-home" included fruits, non-alcoholic drinks, sweets, high-sugar drinks (soft drinks) and alcoholic drinks. Thus, with regard to the abovementioned food groups, more energy and/or larger quantities were consumed out of home when compared to at-home consumption.

Not all food groups were consumed to the same extent with regard to the determinates analyzed (gender, age, BMI). Thus, with regard to the BMI groups, which were divided in accordance with WHO specifications, significant differences were observed in terms of energy intake in the food groups "nuts" (in both locations of consumption), "sweets and savoury cereal products" (only out of home) and "sugar and sugar products" (only at home).

When compared to the food-based guidelines (Austrian food pyramid) it was observed that the food groups that are significantly advantageous in terms of health - such as fruits, vegetables, cereals and potatoes, fish and pulses - are not consumed in the recommended amounts. However, the recommendations are exceeded in those food groups for which the recommendations are understood as a maximum value. Satisfactory results were observed in terms of low-energy drinks and egg consumption.

The food groups that are not recommended but are tolerated in moderate amounts - such as sweets, alcoholic drinks and high-energy drinks - are consumed more out of home and are overall consumed too much.

7 ZUSAMMENFASSUNG

In dieser Arbeit wurde anhand von 24-Studen Protokollen, ausgefüllt von 2.351 erwachsenen Österreichern, der Außer-Haus-Verzehr unter besonderer Berücksichtigung der Lebensmittelgruppen (LMG)-Auswahl ermittelt.

20 LMG wurden nach den beiden Verzehrorten ‚zuhause' und ‚außer Haus' und für die Determinanten Body Mass Index (BMI), Geschlecht und Alter ausgewertet. Um einen besseren Überblick über die Qualität der ausgewählten Lebensmittel zu erhalten, wurden die verzehrten Mengen aus den verschiedenen LMG mit jenen, die laut der österreichischen Lebensmittelpyramide empfohlen werden, verglichen.

Der prozentuelle Anteil an der ‚zu Hause' bzw. ‚außer Haus' aufgenommenen Gesamtmenge bzw. -energie ist in den LMG Früchte, alkoholfreie Getränke, Süßigkeiten, stark zuckerhaltige Getränke (soft drinks) und alkoholische Getränke ‚außer Haus' höher als ‚zu Hause'. Es wurde also tatsächlich im Vergleich zum Verzehr zuhause in den genannten LMG außer Haus mehr Energie und/oder größere Mengen konsumiert.

Nicht alle LMG wurden von Personen in den untersuchten Determinanten im selben Ausmaß verzehrt. So konnten z.B. zwischen den nach WHO eingeteilten BMI-Gruppen signifikante Unterschiede festgestellt werden in der Energieaufnahme aus den LMG Nüsse (an beiden Verzehrorten), süße und salzige Getreideprodukte (nur außer Haus) oder Zucker und zuckerhaltige Produkte (nur zuhause).

Beim Vergleich mit den lebensmittelbasierten Richtlinien (österreichische Lebensmittelpyramide) konnte festgestellt werden, dass jene LMG, die von großem gesundheitlichem Vorteil sind, wie Früchte, Gemüse, Getreide und Kartoffeln, Fisch und Hülsenfrüchte nicht in den empfohlenen Mengen konsumiert werden. Hingegen werden in jenen LMG, in denen die Empfehlungen als limitierender Wert zu verstehen sind (Fleisch und Wurstwaren, zusätzliche Fette), die Empfehlungen überschritten. Zufriedenstellende Ergebnisse waren bei energiearmen Getränken und im Konsum von Eiern zu sehen.

Jene LMG, die nicht empfohlen sondern nur in moderaten Mengen toleriert werden, wie Süßigkeiten, alkoholische Getränke und energiereiche Getränke, werden vermehrt außer Haus und insgesamt in zu hohem Ausmaß (vor allem im Sinne der Energiezufuhr) konsumiert.

8 BIBLIOGRAPHY

BELL EA. ROLLS BJ. Energy density of foods affects energy intake across multiple levels of fat content in lean and obese women. Am J Clin Nutr 2001;73:1010–8.

BIESALSKI HK. GRIMM P. Grundlagen. In: Taschenatlas Ernährung. Georg Thieme Verlag KG. 5. Auflage. Stuttgard. 2011; 2-44.

BINKLEY JK. EALES J. JEKANOWSKI M. The relation between dietary change and rising US obesity. Int J Obes 2000. 24(8):1032–1039.

BMG - BUNDESMINISTERIUM FÜR GESUNDHEIT. Schwerpunkte/ Ernährung/Empfehlungen. Home. Version current 2010. Internet: http://bmg.gv.at/home/Schwerpunkte/Ernaehrung/Empfehlungen/Die_Ern%C3%A4hrungspyramide_im_Detail_-_7_Stufen_zur_Gesundheit (accessed 18 July 2012).

BMLFUW - BUNDESMINISTERIUM FÜR LAND- UND FORSTWIRTSCHAFT. UMWELT UND WASSERWIRTSCHAFT. Lebensmittelbericht Österreichisch 2008. Wertschöpfungskette. Agrarerzeugnisse - Lebensmittel und Getränke. Wien. 2008; 138-160.

BMLFUW - BUNDESMINISTERIUM FÜR LAND- UND FORSTWIRTSCHAFT. UMWELT UND WASSERWIRTSCHAFT. Österreichischer Lebensmittelbericht. 2010. Wien. 2010; 87-100.

BURNS C. JACKSON M. GIBBONS C. STONEY RM. Foods prepared outside the home: association with selected nutrients and body mass index in adult Australians. Public Health Nutrition 2001;5(3):441-448.

CLEMENS LH. SLAWSON DL. KLESGES RC. The effect of eating out on quality of diet in premenopausal women. Journal of the American Dietetic Association 1999. 99:442–444.

DARMON N. DREWNOWSKI A. Does social class predict diet quality? The American Journal of Clinical Nutrition 2008; 87: 1107-1117.

DEUTSCHE GESELLSCHAFT FÜR ERNÄHRUNG (DGE). Vollwertig essen und trinken nach den 10 Regeln der DGE. Version current 2011. Internet: http://www.dge.de/modules.php?name=Content&pa=showpage&pid=15 (accessed 06 August 2012).

DEUTSCHE GESELLSCHAFT FÜR ERNÄHRUNG. ÖSTERREICHISCHE GESELLSCHAFT FÜR ERNÄHRUNG. SCHWEIZERISCHE GESELLSCHAFT FÜR ERNÄHRUNG. SCHWEIZERISCHE VEREINIGUNG FÜR ERNÄHRUNG (D-A-CH). Referenzwerte für die Nährstoffzufuhr. Neuer Umschau Verlag. 1. Auflage. 4. korregierter Nachdruck. Neustadt an der Weinstrasse. 2012.

ELMADFA I. Verschiedene Ernährungsformen. In: Ernährungslehre. Verlag Euger Ulmer GmbH & Co. Stuttgart. 2004; 230-242.

ELMADFA I. LEITZMANN C. Außer-Haus-Verpflegung/ Gemeinschaftsverpflegung. In: Ernährung des Menschen. Verlag Euger Ulmer GmbH & Co. 4. Auflage. Stuttgart. 2004; 625-627.

ELMADFA I. FREISLING H. KÖNIG J. et al. Ernährungszustand der österreichischen Bevölkerung. In: Österreichischer Ernährungsbericht 2003. 1. Auflage. Wien. 2003; 6-110.

ELMADFA I. FREISLING H. NOWAK V. HOFSTÄDTER D. et al. Österreichischer Ernährungsbericht 2008. 1. edition. Vienna. March 2009a.

ELMADFA I. AIGN W. MUSKAT E. FRITZSCHE D. Die große GU Nährwert Kalorien Tabelle. Gräfe und Unzer Verlag GmbH. München. 2009b.

EUFIC (European Food Information Council). Food based dietary guidelines in Europe. Eufic Review 10/2009. Version current 01 Augsut 2012. Internet: http://www.eufic.org/article/en/expid/food-based-dietary-guidelines-in-europe/ (accessed 03 Augsut 2012).

5xAMTAG. Information. Version current 2007. Internet: http://www.5xamtag.at/ (accessed 08 August 2012).

GIBNEY MJ. WOLMARANS P. Dietary Guidelines. GIBNEY MJ. MARGETTS BM. KEARNEY JM. ARAB L (Hrsg.) In: Public Health Nutrition. Blackwell Science. Oxford. 2004; 133-143.

GUTHRIE JF. LIN BH. FRAZAO E. Role of food prepared away from home in the American diet. 1977–78 versus 1994–96: changes and consequences. Journal of Nutrition Education and Behavior 2002;34(3):140–150.

HECTOR – healthy eating out. About. Version current 29 April 2010. Internet: http://www.nut.uoa.gr/hector/home.asp (accessed 03 June 2012).

HECTOR – healthy eating out. Home. Version current 29 April 2010. Internet: http://www.nut.uoa.gr/hector/home.asp (accessed 03 June 2012).

IRELAND J. VAN ERP-BAART AMJ. CARRONDIERE. UR. MØLLER A. SMITHERS G. TRICHOPOULOU A. Selection of a food classification system and a food composition database for future food consumption surveys. European Journal of Clinical Nutrition. 2002; 56. Suppl 2. S33 – S45.

KANT AK. GRAUBARD BI. Eating out in America. 1987–2000: trends and nutritional correlates. Preventive Medicine 2004;38(2):243–9.

KINSEY JD. Food and families socioeconomic-status. The Journal of Nutrition 1994; 124(Suppl. 9): S1878-S1885.

KOFRÁNYI E. WIRTHS W. FRÖLEKE H. Lebensmittellehre. In: Einführung in die Ernährungslehre. Neuer Umschau Verlag. 12. vollständig überarbeitete Auflage 2008. durchgesehener Nachdruck 2011. Neutstadt and der Weinstraße. 2011. 272-440.

LACHAT C. NAGO E. VERSTRAETEN R. ROBERFROID D. VAN CAMP J. KOLSTEREN P. Eating out of home and ist association with dietary intake: a systematic review of evidence. Obesity Reviews 2012 Apr;13(4):329-46.

LEHNER P. SGARABOTTOLO V. ZILBERSZAC A (BMG). NAP.e Nationaler Aktionsplan Ernährung inkl. Massnahmenu□bersicht und Planung 2012. Vienna. January 2012.

LIN B. FRAZAO E. GUTHRIE J. Away-from-home Foods Increasingly Important to Quality of American Diet. Agriculture Information Bulletin No. 749. Washington. DC: US Department of Agriculture. Economic Research Service. 1999; 1–22.

MÜLLER MJ. TRAUTWEIN EA. Grundlagen der Ernährungsepidemiologie. In: Gesundheit und Ernährung – Public Health Nutrition. Verlag Euger Ulmer GmbH & Co. Stuttgart. 2005; 40-123.

ÖSTERREICHISCHE GESELLSCHAFT FÜR ERNÄHRUNG (ÖGE). ÖGE-Gütesiegel. Version current 04 August 2012. Internet: http://www.oege.at/php/current/content.php?c=2124 (accessed 04 Augsut 2012)a.

ÖSTERREICHISCHE GESELLSCHAFT FÜR ERNÄHRUNG (ÖGE). Richtlinien. Version current 10 August 2012. Internet: http://www.oege.at/php/current/content.php?l=de&a=2326 (accessed 10 August 2012)b.

ÖSTERREICHISCHE GESELLSCHAFT FÜR ERNÄHRUNG (ÖGE). BMI. Version current 10 August 2012. Internet: http://www.oege.at/php/current/content.php?l=de&a=2351 (accessed 12 August 2012)c.

ÖSTERREICHISCHE GESELLSCHAFT FÜR ERNÄHRUNG (ÖGE). Leitlinie für Getreide- und Kartoffelprodukte der Österreichischen Gesellschaft für Ernährung zur Erstellung lebensmittelbasierter Ernährungsempfehlungen. Ernährung aktuell 2/2005. Sonderausgabe; 1-16.

ORFANOS P. NASKA A. TRICHOPOULOS D. SLIMANI N. FERRARI P. VAN BAKEL M. DEHARVENG G. OVERVAD K. TJØNNELAND A. HALKJÆR J et al. Eating out of home and its correlates in 10 European countries. The European Prospective Investigation into Cancer and Nutrition (EPIC) study. Public Health Nutrition 2007 Dec;10(12):1515-1525.

PAULUS K. DOSSINGER M. Außer-Haus-Verpflegung. In: DGE (Hrsg.) Ernährungsbericht 1988. Henrich GmbH. Frankfurt/Main. 1988; 229-257.

PHILIPP K. Veranstaltungsbericht – Essen in aller Munde Gemeinschaftsverpflegung im Trend. Einblicke Zeitschrift des Verbandes der Ernährungswissenschafter Österreichs. Jul 2012; 02/12:10-13.

RÜCKERT-JOHN J. Zukunftsfähigkeit der Ernährung außer Haus. BRUNNER K-M. SCHÖNBERGER GU (Hrsg.) In: Nachhaltigkeit der Ernährung Produktion-Handel-Konsum. Campus Verlag. Frankfurt/Main. 2005; 240-263.

SCHÄTZER M. Stellenwert von Obst und Gemüse in der Ernährung der erwachsenen Österreicher. Dissertation. Institut für Ernährungswissenschaften der Universität Wien. 2007.

STATISTIK AUSTRIA. Konsumerhebung 2009/10: Vergleich mit den Ergebnissen der Konsumerhebung 2004/05 – Haushaltsausgaben. Version current: 21 December 2011. Internet: http://www.statistik.at/web_de/statistiken/soziales/verbrauchsausgaben/konsumerhebung_2009_2010/index.html (accessed 29 July 2012).

STATISTIK AUSTRIA. Versorgungsbilanzen. Version current: 20 June 2012. Internet: http://www.statistik.at/web_de/statistiken/land_und_forstwirtschaft/preise_bilanzen/versorgungsbilanzen/index.html (accessed 10 August 2012)a.

STATISTIK AUSTRIA. Jahresdurchschnittsbevölkerung seit 2002 nach fünfjährigen Altersgruppen und Geschlecht. Version current: 11 June 2012). Internet: http://www.statistik.at/web_de/statistiken/bevoelkerung/bevoelkerungsstruktur/bevoelkerung_nach_alter_geschlecht/index.html (accessed 15 August 2012)b.

STEINEL M. Außer-Haus-Verpflegung und Gemeinschaftsverpflegung. In: Erfolgreiches Ernährungsmanagement – Praxisorientierte Methoden für Einsteiger und Profis (Hrsg). Verlag Neuer Merkur GmbH. München. 2008; 11-26.

WARDE A. MARTENS L. Eating Out: social differentiation. consumption and pleasure. Cambridge University Press. Cambridge. 2000.

WILLETT WC. Issues in Analysis and Presentation of Dietary Data. In: Nutritional Epidemiology, Oxford University Press, New York, 1998.

WORLD HEALTH ORGANIZATION (WHO). Obesity: preventing and managing the global epidemic. WHO Technical Report Series 894. Genf. 2000.

WORLD HEALTH ORGANIZATION (WHO). FOOD AND AGRICULTURAL ORGANIZATION OF THE UNITED NATIONS (FAO). Vitamin and mineral requirements in human nutrition. Sun Fung. 2nd edition. Hong Kong. 2004a.

WORLD HEALTH ORGANIZATION (WHO). FOOD AND AGRICULTURAL ORGANIZATION OF THE UNITED NATIONS (FAO). Fruit and vegetables for health. Report of a Joint FAO/WHO Workshop. 1-3 September. 2004. Kobe. Japan. 2004b.

WORM N. Macht fett fett und fettarm schlank? Dtsch Med Wochenschr; Georg Thieme Verlag Stuttgart/New York. 2002; 127:2743-2747.

ZÖFEL P. Statistik für Psychologen im Klartext. Pearson Studium. München. 2003.

9 APPENDIX

Figures: predominantly vegetable foods

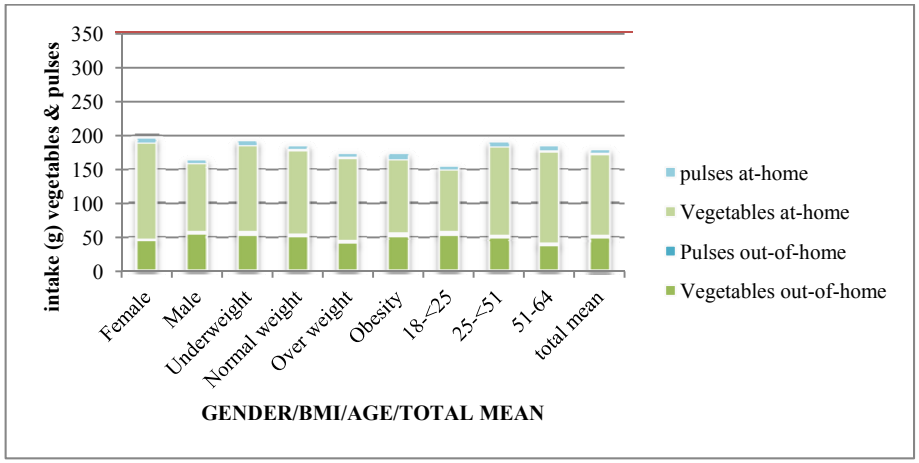


Figure 42 Vegetables – fresh and processed and pulses consumption (g) of Austrian adults, by gender, BMI-, age groups and total mean (out-of-home, at-home). Red line indicates 'Austrian Food pyramid' (approximately) recommendations.

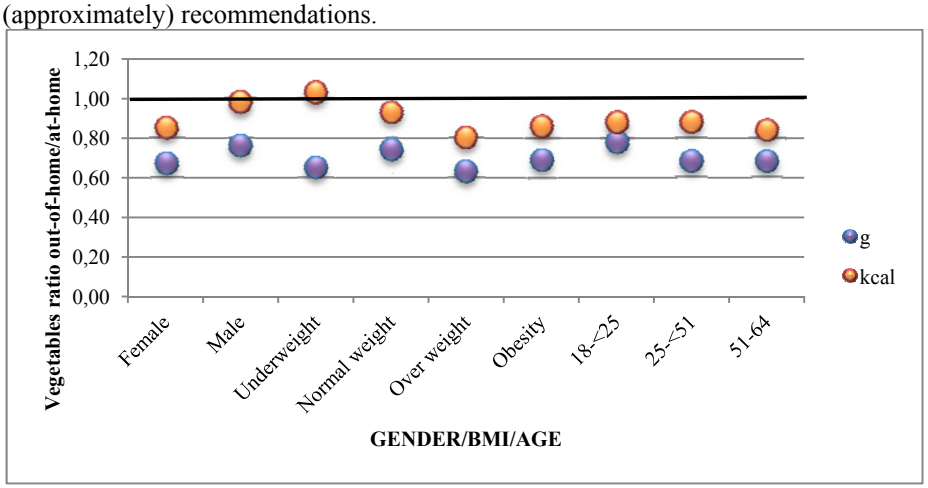


Figure 43 Vegetables out-of-home/at-home Ratio for Energy (kcal) and Quantity (g).

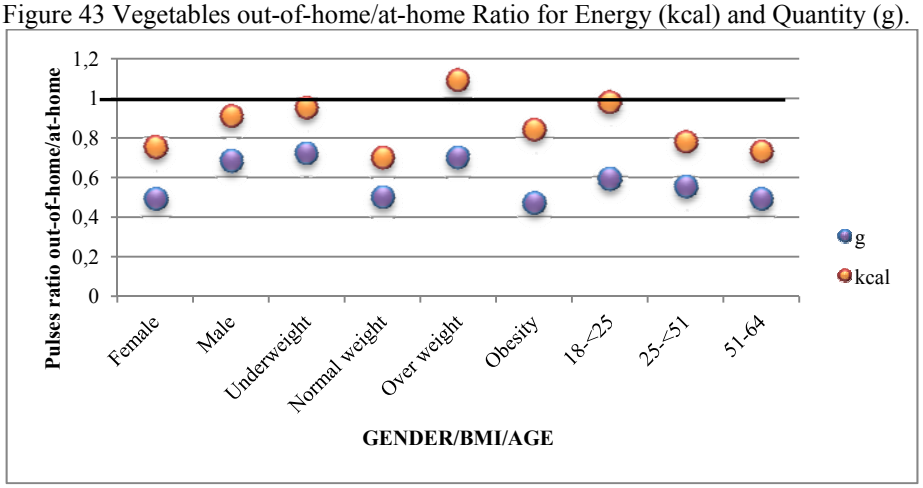


Figure 44 Pulses out-of-home/at-home Ratio for Energy (kcal) and Quantity (g).

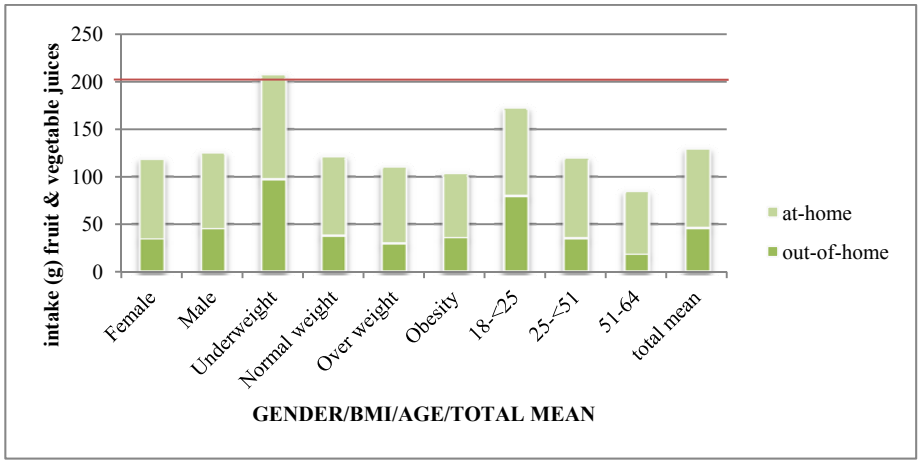


Figure 45 Fruit and vegetable juices consumption (g) of Austrian adults, by gender, BMI-, age groups and total mean (out-of-home, at-home). Red line indicates 'Austrian Food pyramid' (approximately) recommendations.

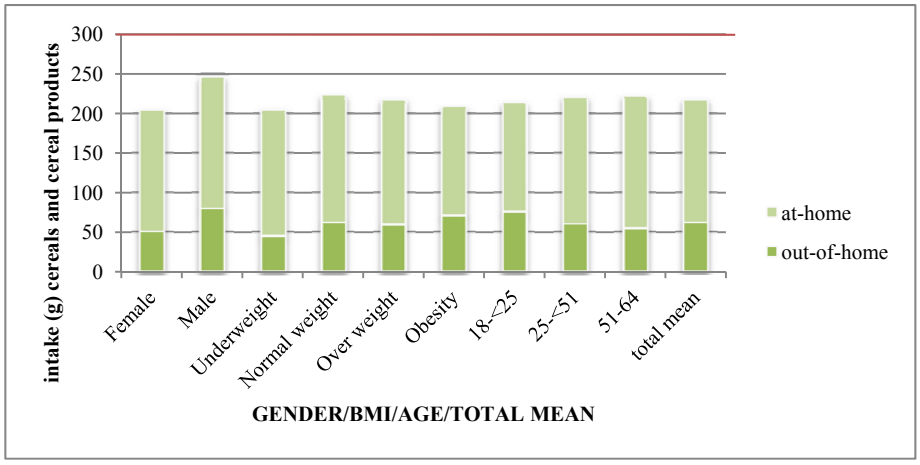


Figure 46 Cereals and cereals products consumption (g) of Austrian adults, by gender, BMI-, age groups and total mean (out-of-home, at-home). Red line indicates 'Austrian Food pyramid' (approximately) recommendations.

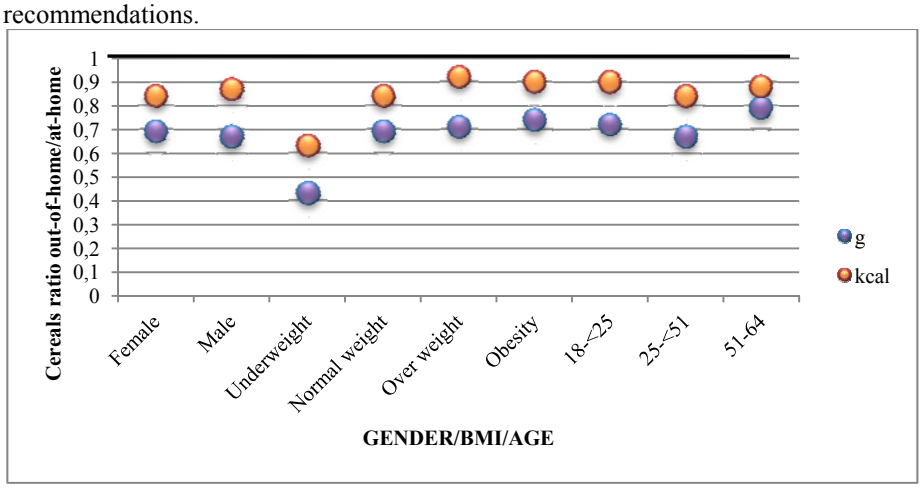


Figure 47 Cereals out-of-home/at-home Ratio for Energy (kcal) and Quantity (g).

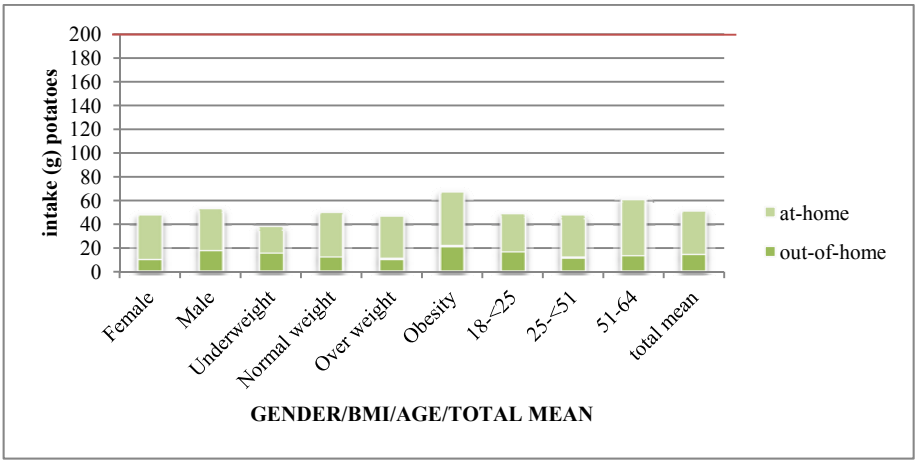


Figure 48 Potatoes and other starchy roots consumption (g) of Austrian adults, by gender, BMI-, age groups and total mean (out-of-home, at-home). Red line indicates 'Austrian Food pyramid' (approximately) recommendations.

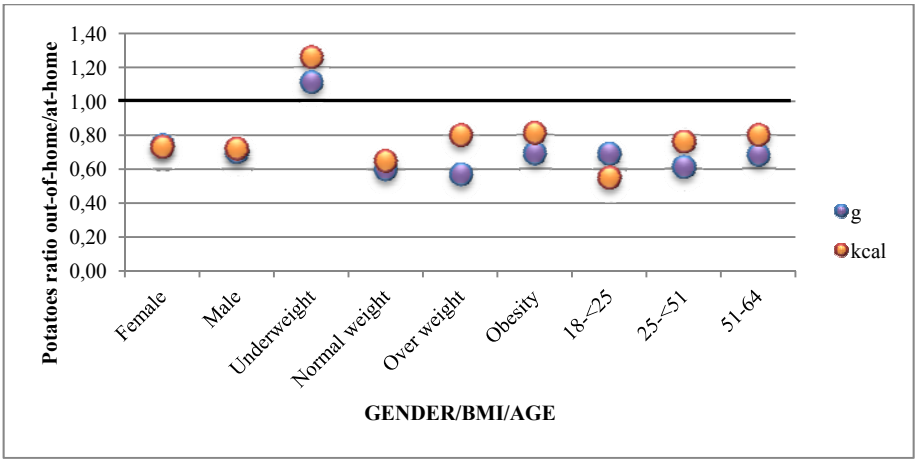


Figure 49 Potatoes out-of-home/at-home Ratio for Energy (kcal) and Quantity (g).

Figures: Total added lipids

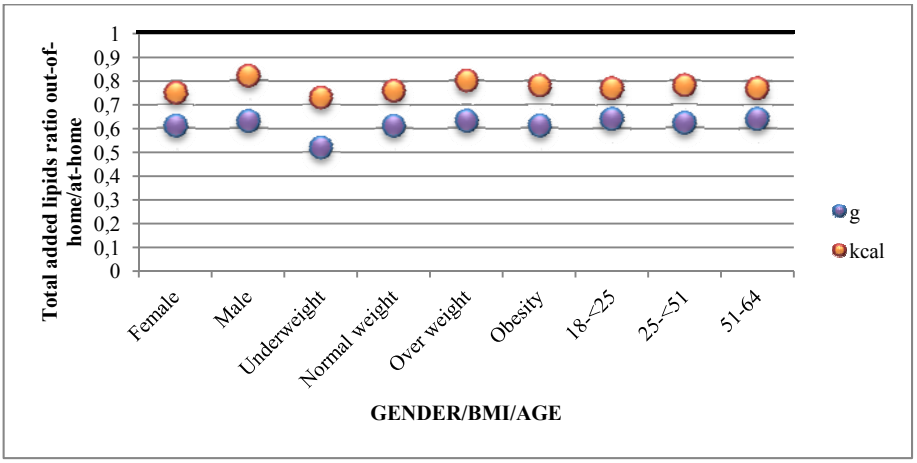


Figure 50 Total added lipids out-of-home/at-home Ratio for Energy (kcal) and Quantity (g).

Figures: predominantly animal foods

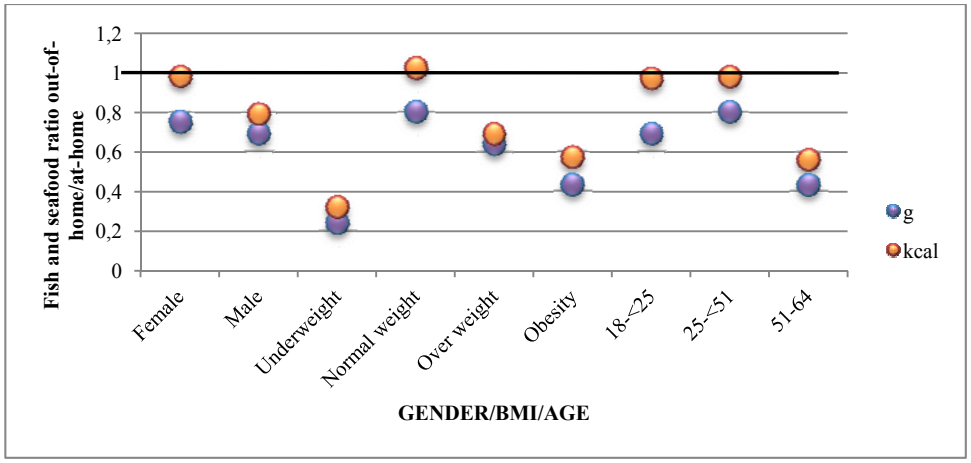


Figure 51 Fish out-of-home/at-home Ratio for Energy (kcal) and Quantity (g).

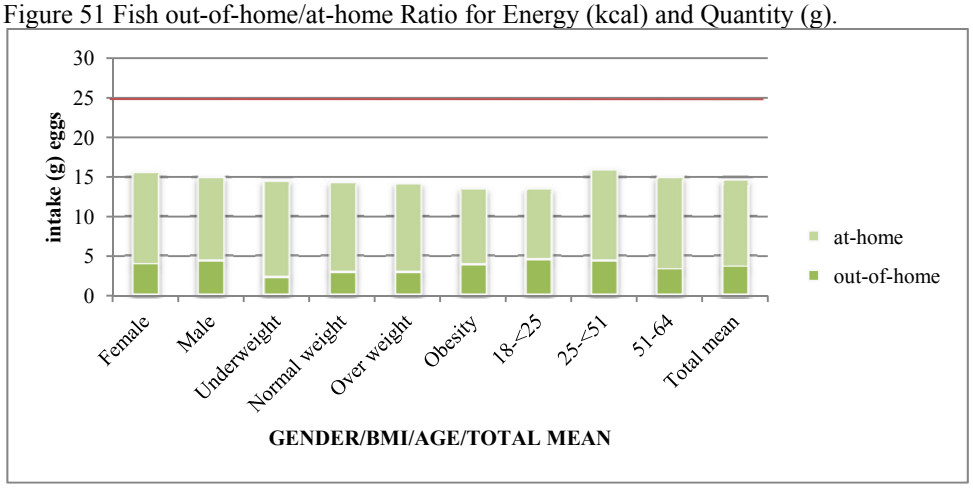


Figure 52 Eggs consumption (g) of Austrian adults, by gender, BMI-, age groups and total mean (out-of-home, at-home). Red line indicates 'Austrian Food pyramid' (approximately) recommendations.

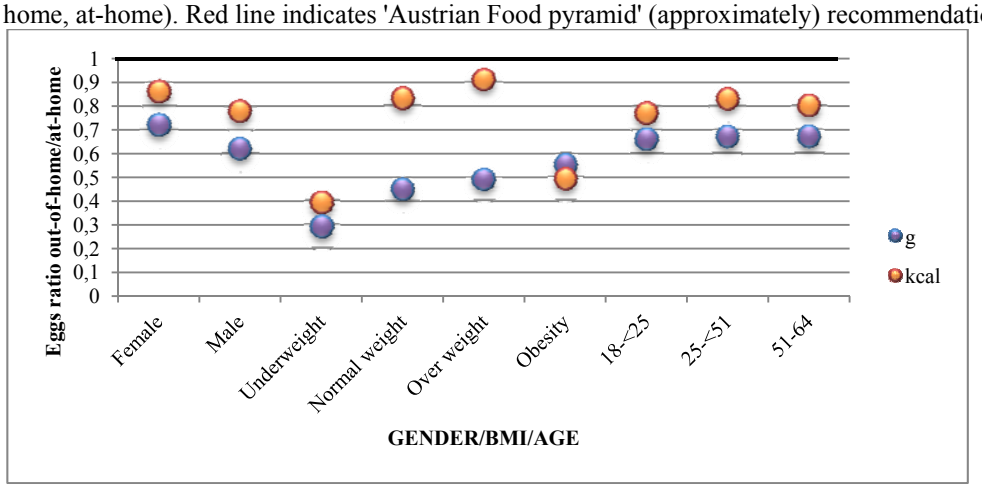


Figure 53 Eggs out-of-home/at-home Ratio for Energy (kcal) and Quantity (g).

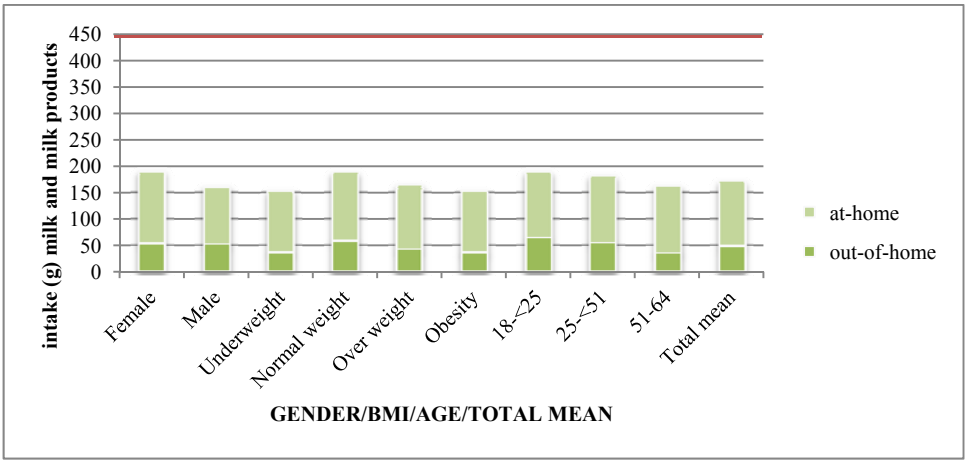


Figure 54 Milk and milk products consumption (g) of Austrian adults, by gender, BMI-, age groups and total mean (out-of-home, at-home). Red line indicates 'Austrian Food pyramid' (approximately) recommendations.

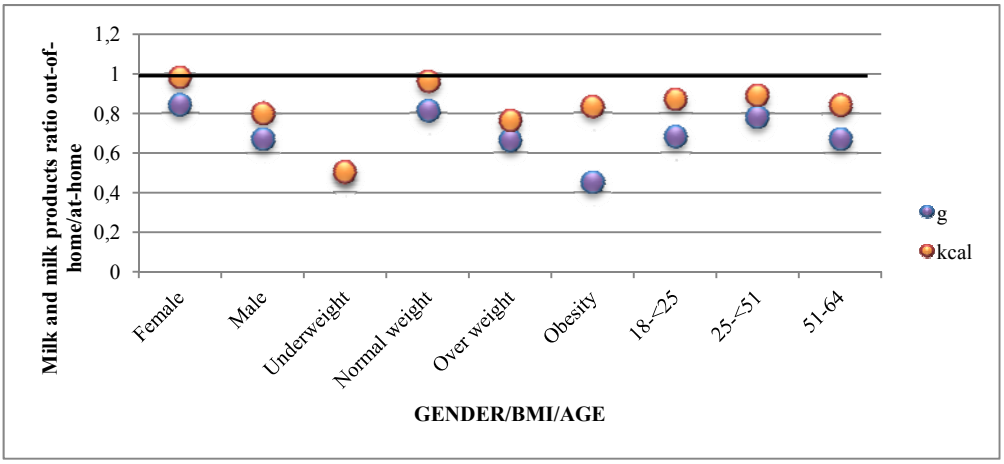


Figure 55 Milk and milk products out-of-home/at-home Ratio for Energy (kcal) and Quantity (g).

Figures: High-sugar products and miscellaneous

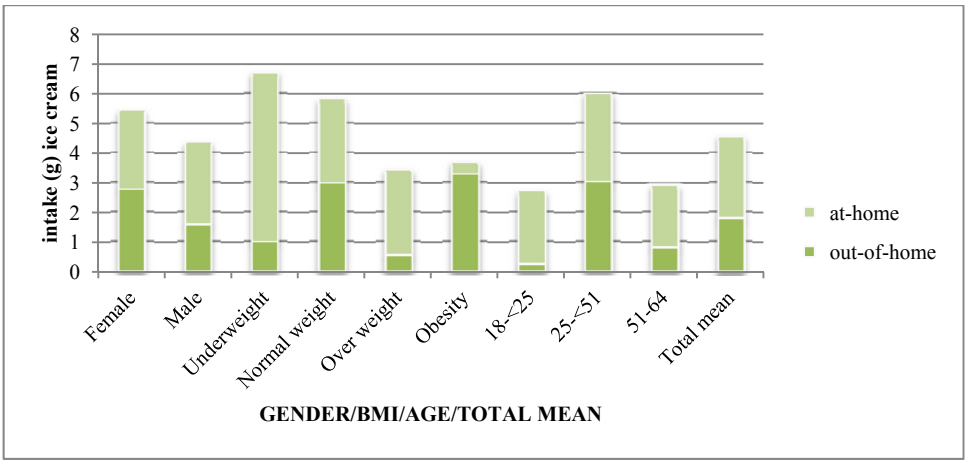


Figure 56 Ice cream consumption (g) of Austrian adults, by gender, BMI-, age groups and total mean (out-of-home, at-home).

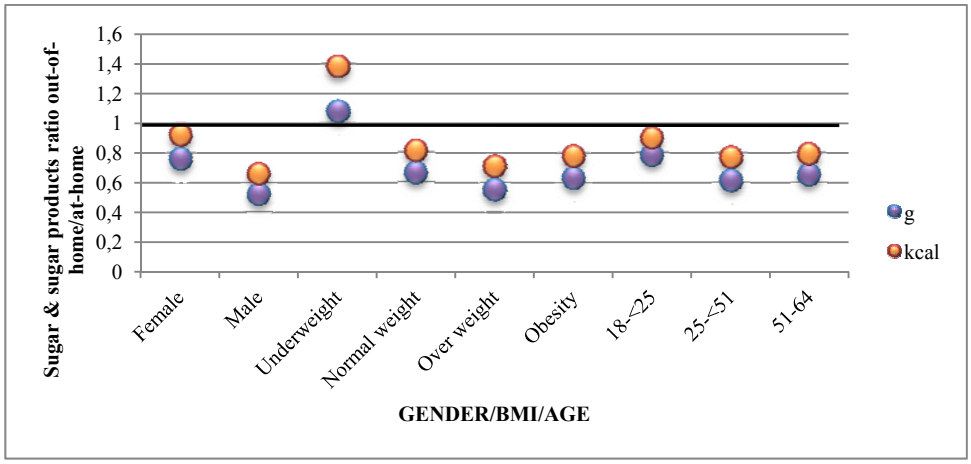


Figure 57 Sugar and sugar products out-of-home/at-home Ratio for Energy (kcal) and Quantity (g).

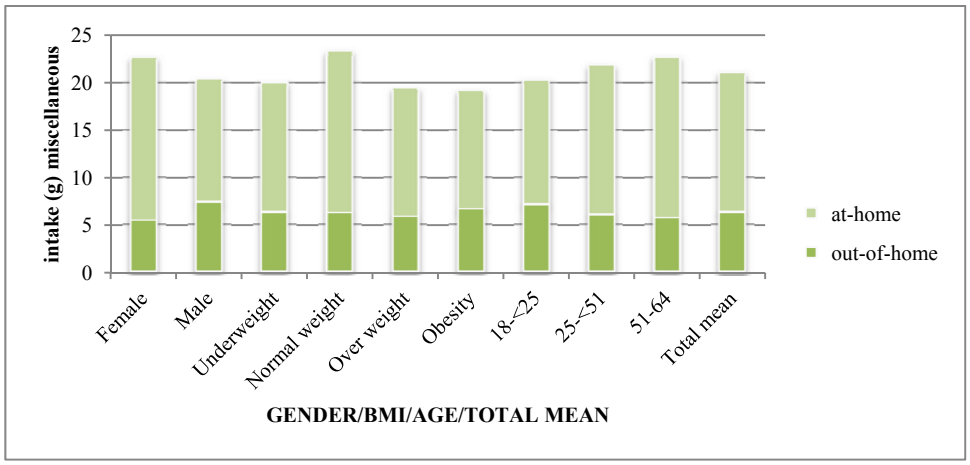


Figure 58 Consumption (g) of miscellaneous by Austrian adults, by gender, BMI-, age groups and total mean (out-of-home, at-home).

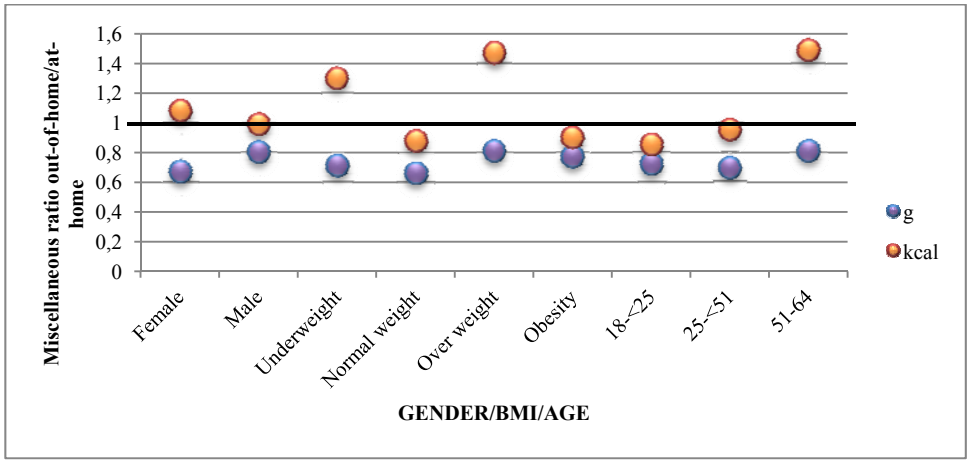
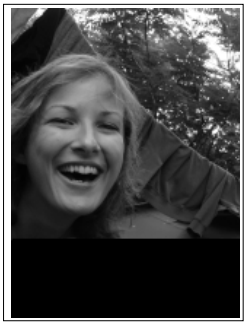


Figure 59 Miscellaneous out-of-home/at-home Ratio for Energy (kcal) and Quantity (g).

10 Curriculum Vitae



Bianca Kraft

1140 Wien
bianca.kraft@univie.ac.at
29. Juni 1982 in
Oberndorf/Salzburg, Österreich
♥ ledig, keine Kinder

Ausbildung

ab 2001	**Studium Ernährungswissenschaften (Uni Wien)** **Diplomarbeit:** Out-of-home Consumption: Food group choices of Austrian adults.
1992 - **2001**	AHS Diefenbachg. 19, 1150 Wien (Abschluss: **Matura**)
1988 - 1992	Volksschule (1. Jahr in Salzburg, ab dann in Wien)

Praktika und Projekte

SS 2009 – WS 2013	**Tutorium**, UE Lebensstil-/ernährungsassoziierte EK/ Diätetik
September 2011	**Kochkursleitung** ‚Burger und Saucen' VHS Wien
August 2011	**Kochkursleitung** ‚Richtige Ernährung im Büro' (auch für Vegetarier)
Juli/August 2011	**Kinderakademie** Kinderfreunde & VHS Wien – Gestaltung und Durchführung der **Gesunden Jausenpause**; **Ernährungsworkshops** (‚Obst & Gemüse' und ‚wünschenswerte Flüssigkeitszufuhr')
Juni/Juli 2011	Praktikum **Essen:z**. Ernährungsberatung & Kochkurse nach TCM, Sensorikschulung im Kindergartenalter, Kinder-Koch-Geburtstage;
April/August 2011	**Fragebogenerhebung zur Verpflegungssituation** für das Kuratorium Wiener Pensionisten-Wohnhäuser, Häuser zum Leben,
Juli 2010	**Kinderakademie** Kinderfreunde & VHS Wien – Gestaltung und Durchführung der **Gesunden Jausenpause**
April 2008	Projektmitarbeit an Wiener Schulen für **Sipcan** (Special Institute for Preventive Cardiology and Nutrition)
März 2008	**Lebensmittelgruppeneinteilung** (EFG – European Food Groups) mittels BLS auf Access Basis für das IfEW der Uni Wien
Jänner/Februar 2008	**Ernährungsbericht 2008:** Anthropometrische Erhebung, sowie Hilfestellung beim Ausfüllen der Ernährungsprotokolle an österr. Schulen.
Juli/August 2007	Dreiwöchiges Praktikum am **Institut f. Ernährungswissenschaften Wien** (Eingabe der Nährwertdaten von ‚Zotter-Schokoladen' nach Rezeptur & Berechnung dieser mittels BLS auf Access-Basis)
August 2006	Praktikum in der **Ernährungsmedizinischen Abteilung** der Rudolfsstiftung
Juni/Juli 2006	**Auslandspraktikum** in den Indianapolis, USA: Biomedical Research Internship (University of Indiana)
Juni - August 2003	**Gemeinschaftsverpflegung** (Kulinarik Gastronomie und Frischküche GmbH)

Weitere berufliche Erfahrungen

ab Februar 2012	Sachbearbeiterin SSC Lebenswissenschaften (Uni Wien)
Jänner 2010 - Juli 2011	Qualitätssicherung und Support (willhaben.at)
April 2007- Oktober 2010	Mitarbeit im Marketing (Privatbank Sal.Oppenheim)
März 2008 - August 2010	Promotionstätigkeit (ATV)
Jänner 2009	Promotionseinsätze in Tirol (Edelweiss)
Mai - August 2008	Kundendatenbank-Pflege (Profi-Reifen)
Dezember 2007	Eventmitarbeit Gasometer (Impacts)
November 2006 - März 07	Assistenz Sales & Marketing (Egoth Verlag GmbH)
April - September 2005	Ferienjob (Gastronomie, Tiergarten Schönbrunn)
April - Juni 2005	Marktforschung (Brainstudio)
April - Oktober 2004	Geringfügige Beschäftigung (Textilienhandel)
August 2002	Bürotätigkeit und Inventur (ÖVV)
Jänner 1999 - 2001	Promotion und Ticketverkauf (Campus-Group)
Juli - August 2000	Mitgliederwerbung für NPO (Dialog Direkt)
Juli 1999	Ferienjob bei Rewe
Juli 1998	Verkauf im Eissalon, Purkersdorfer Hauptplatz

Computerkenntnisse

Word	sehr gut
Excel	sehr gut
Power Point	sehr gut

Sprachen

Deutsch:	Muttersprache
Englisch:	Verhandlungssicher
Italienisch:	Grundkenntnisse
Spanisch:	Grundkenntnisse
Sprachkurse:	dreiwöchiger Aufenthalt in Bournmouth Juli 1997
	einwöchiger Aufenthalt in London April 1999
	einwöchiger Aufenthalt in Florenz Juni 2000
	zweimonatiger Aufenthalt in den USA 2006

Hobbies, Interessen, Qualifikationen

Für das Leibliche Wohl:	Kochen, Nahrung, Lebensmittel
	Fahrrad, Wassersport
Für die Geselligkeit:	Familie, Freunde, Kollegen Socializing, Sportevents, Abendveranstaltungen
Für das Geistige Wohl:	Filme mit Tiefgang und/oder Humor, Gute Bücher, Musik
Für die Mobilität:	Führerschein B