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English Summary





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Austrian Nutrition Report 2008

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Preface

With the Austrian Nutrition Report 2008, the Institute of Nutritional Sciences of the University of Vienna continues its extensive evaluation and documentation of the nutrition situation in Austria. Improved methods used for data collection and analysis make this report an accurate source of information qualified for being used in international comparisons on the nutrition situation.

Main emphasis is put in chapter 1 on the evaluation of the nutritional state of the Austrian population throughout the life course, also compared to the situation five years ago.

Chapter 2 informs about the consumption of the main food groups. Special attention was given to the role of dietary diversity and its contribution to a healthy diet.

A nutritional evaluation of new dietary trends and selected groups of food products is provided in chapter 3.

In chapter 4, different aspects of food quality and safety are summarised taking into account, among others, contaminants, novel foods, novel technologies, organic foods, and health claims.

Considering the increasing reliance of broad parts of the population on communal kitchens, chapter 5 of this report describes for the first time the physiological background of community nutrition and the quality of catering services available in Austria.

Chapter 6 on public health and health promotion deals with the calculated life expectancy and mortality rates from different causes. It also reports on the association between nutrition and certain chronic non-communicable diseases. Moreover, information on the measured physical activity level in Austrian adults and recommendations how to increase the daily energy expenditure are given.

Chapter 7 deals with possibilities of health promotion and disease prevention and gives food-based guidelines for maintaining health.

The Austrian Nutrition Report is intended to provide a basis for the work of all institutions responsible for nutrition and health policy and for food manufacturers, to improve the nutrition situation in Austria.

The Austrian Nutrition Report 2008 is based on research projects funded by the Federal Ministry of Health. The Institute of Nutritional Sciences acknowledges the various working groups for their expertise and the many highly motivated advanced students of nutritional sciences who assisted in fieldwork and data collection. Finally, we are much obliged to the outstanding authors and all the brilliant and patient colleagues who helped finalise this report successfully.

Vienna, March 2009

O. Univ.-Prof. Dr. I. Elmadfa





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Chapter 1: Nutritional status of the Austrian po- pulation

Background: The Austrian Study on Nutritional Status (ASNS)

As for the previous Austrian Nutrition Reports in 1998 and 2003, data on food supply and nutrient intake were obtained from the Austrian Study on Nutritional Status (ASNS, Österreichische Studie zum Ernährungsstatus, ÖSES) that has been conducted at regular intervals since 1991. In the Austrian Nutrition Report 2008, data collection included several representative sub-studies focussing on different population groups or special aspects such as physical activity and fluid intake. Based on individual questionnaires, it also provides a more detailed insight into actual food consumption (see table 1.1).

Overweight – a common threat to health

Overweight is one of the most common health issues in Austria, affecting all age groups. Indeed, body weight is above recommended ranges

Table 1.1: Studies and methods used for the assessment of nutritional status of the Austrian population

	Nutrition surveys	Anthropometry	Biochemical analyses	Eating behaviour
	N (sample size)			
Schoolchildren (6-15 y.)	780 ^a	984 ^c	-	-
Highschool attendants (14-19 y.)*	208 ^b	398 ^d	-	-
Apprentices (14-36 y.)*	1990 ^b	2823 ^d	143*	-
Adults (18-65 y.)	2123 ^b	2310 ^d	133*	823
Adults (18-65 y.)	459 ^e	-	-	-
Adults (18-65 y.)	288 ^f	-	-	-
Adults (18-65 y.)	719 ^g	-	-	-
Adults (over 55 y.)	423 ^a	816 ^c	102 ^h	-
Pregnant women	426 ^b	479 ^d	133*	-

* Viennese sample (does not represent whole Austria)

^a 3-day food protocol (estimate of food intake)

^b 24-h-recall

^c Measured data of body height and weight

^d Self-reported body height and weight (pooled data from the Adults' subsamples 18-65 y.)

^e 1-day-protocol of fluid intake (ÖSES.aqa07)

^f Questionnaire for the assessment of nutrient intake from supplements (ÖSES.nem07)

^g Questionnaire for the assessment of physical activity (ÖSES.pal07)

^h Sample from the Burgenland (does not represent whole Austria)

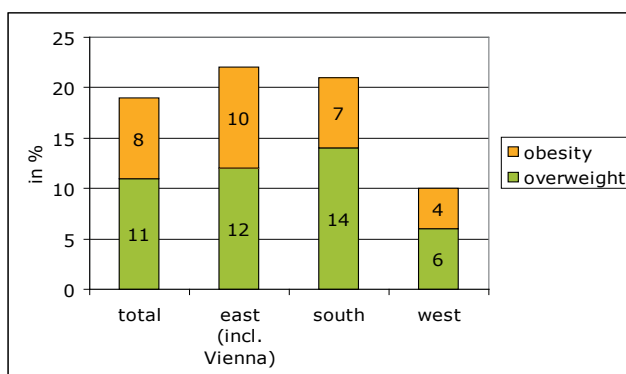


Figure 1.1: Distribution of overweight and obesity in Austrian schoolchildren (6 to 15 years), by region

BMI categories according to Kromeyer-Hauschild et al. [2001]

BMI (kg/m^2) was calculated from measured body height and weight data

East: Vienna, Burgenland, Upper and Lower Austria; South: Styria and Carinthia; West: Vorarlberg, Tyrol and Salzburg

in 19% of school children aged 6 to 15 years with 8% being obese (see figure 1.1). A slightly lower prevalence is seen in high school students. With increasing age, the prevalence rises further: 31% of 18 to 64 year-olds are overweight and 11% obese (see table 1.2). Among the elderly, aged between 65 and 100 years, 40% have a body mass index (BMI) above the reference

Table 1.2: Distribution of the Body Mass Index (BMI) in Austrian adults (aged 18-65 years), by gender, age and region (n=2.310)

			BMI categories ¹ in %			
		n	Underweight	Normal weight	Overweight	Obesity
Total		2310	2	56	31	11
Gender	Women	1461	4	65	22	9
	Men	849	1	47	39	13
Age	18-41 y.	1083	4	70	20	6
	42-65 y.	1218	1	45	39	15
Region ²	East	600	2	54	31	13
	South	622	3	57	30	10
	Vienna	502	2	57	31	10
	West	584	2	60	30	8

¹ according to World Health Organization [WHO, 2003]

BMI (kg/m^2) calculated from body height and weight self-reported by the study participants

²East: Burgenland, Upper and Lower Austria; South: Styria and Carinthia; West: Vorarlberg, Tyrol and Salzburg

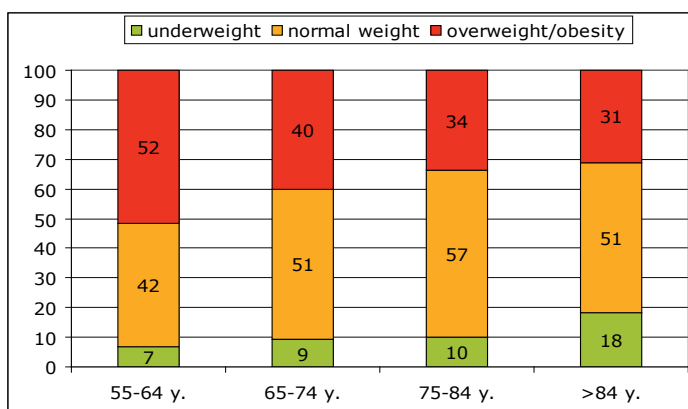


Figure 1.2: Distribution of Body Mass Index (BMI) of Austrian elderly adults (aged > 54 years), by age groups (n=816) (in %)

BMI categories according to National Research Council [NRC, 1989]

BMI (kg/m²) was calculated from measured body height and weight data

level. However, in this latter group, 10% are underweight (see figure 1.2). In pregnancy, 26% of women are classified as overweight or obese, but only 8% are underweight.

The increasing prevalence of high body weight that is observed across

Table 1.3: Selected critical areas in nutrition habits of the Austrian population, by age groups and gender (mean daily intake)

Age group	Carbohydrates ¹ (E%)		Sugar ² (E%)		Dietary fibre ³ (g/d)		SFA ⁴ (E%)		Cholesterol ⁵ (mg/d)	
	w	m	w	m	w	m	w	m	w	m
7-9 y.	52	51	18	17	14	15	14	14	258	260
10-12 y.	52	51	17	18	14	15	14	14	233	270
13-14 y.	51	50	16	17	14	16	14	14	217	272
15-19 y.*	48	46	17	16	16	17	19	19	275	379
18-24 y.**	47	43	12	9	17	20	15	14	261	385
25-50 y.**	46	43	11	9	21	19	15	14	285	355
51-64 y.**	46	42	10	8	22	22	15	14	294	319
55-64 y.***	44	43	12	10	17	18	16	16	337	362
65-74 y.***	46	41	13	10	17	17	16	15	312	336
75-84 y.***	46	43	12	10	18	16	16	16	318	293
>84 y.***	46	40	12	13	18	21	17	19	357	433
Pregnant women	47	-	11	-	21	-	15	-	295	-

Recommendations: ¹ 50-55 E%; ² moderate intake; ³ min. 30 g/d for adults; ⁴ max. 10 E%; ⁵ max. 300 mg/d;

* Mean values extrapolated from high and vocational school attendants; ** Data from the study in adults (ÖSES.07); *** Data from elderly of the ÖSES.sen07-study; E%: Energy%; SFA: saturated fatty acids; w: women; m: men

all age groups and for both genders is of particular concern. Regardless of age, men and boys are more often overweight than women and girls. In 2008, as with previous nutrition reports, a west-to-east upward gradient is apparent.

Energy intake is lower than expected

Despite the high prevalence of overweight, average energy intakes are below recommended guidelines. In children, average intakes have declined since 2003. In adults, especially in women and the elderly, average energy intakes are also below reference levels. It must be noted, however, that reference levels are calculated based on moderate physical activity levels (PAL of 1.6), while most subjects describe a more sedentary lifestyle. Therefore, the relatively lower energy intake is not of concern and it can be assumed that even pregnant women are adequately supplied.

Macronutrient intake – too much fat, not enough carbohydrates and fibre

Protein supply is sufficient in all age groups, with respondents indicating intakes at the upper end of the recommended range of 10-15% of energy.

On the contrary, intake of metabolisable **carbohydrate** and **fibre** is lower than recommended, with the former contributing less than 50% of total

Table 1.4: Mean daily intake of polyunsaturated fatty acids in Austrians, by gender and age groups

Age group		LA		α-LA		AA	EPA	DHA
		(g/d)	(E%) ¹	(g/d)	(E%) ²	(mg/d)	(mg/d)	(mg/d)
6-9 y.	w	9.2	5.7	0.9	0.5	138	28	89
	m	9.6	5.4	0.9	0.5	153	37	103
10-12 y.	w	8.5	5.4	0.8	0.5	118	27	76
	m	9.5	5.3	0.9	0.5	164	36	101
13-15 y.	w	9.1	5.8	0.9	0.6	151	28	84
	m	11.2	5.6	1.1	0.5	157	28	81
18-64 y.*	w	14	7.2	1.1	0.6	216	71	180
	m	17	7.1	1.2	0.5	276	90	190
55-64 y.**	w	13.3	6.6	1.2	0.6	257	68	182
	m	12.2	5.4	1.2	0.6	335	51	199
65-74 y.**	w	10.8	6.0	1.1	0.6	169	72	171
	m	13.1	6.6	1.2	0.6	212	66	139
75-84 y.**	w	11.4	6.2	1.0	0.6	181	53	151
	m	11.9	6.5	1.0	0.6	134	50	110
>84 y.**	w	12.3	6.1	1.2	0.6	200	51	133
	m	14.0	6.5	1.4	0.6	317	79	207

¹ 2.5 E%; ² 0.5 E%; * Data from adults (ÖSES.07); ** Data from elderly in the ÖSES. sen07-study; E%: percent of energy; LA: linoleic acid; α-LA: α-linolenic acid; AA: arachidonic acid;

EPA: eicosapentaenoic acid; DHA: Docosahexaenoic acid; w: women; m: men



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Table 1.5: Mean daily alcohol consumption of Austrian adults, by gender and age groups (n=2.123)

	Total	18 to <25 y.	25 to <51 y.	51 to 64 y.	D-A-CH
Men (g)	11	9	10	15	20*
Women (g)	4	2	4	6	10*
*maximum and not every day					

energy intake. Only school children reach the recommendation with a mean 52% of energy stemming from carbohydrates. However, a high proportion is consumed as refined sugars, which on average account for 17% of energy intake. With 10-12% of carbohydrate energy coming from simple sugars, adult women and the elderly also slightly exceed the recommended maximum level of 10%. Accordingly, there is a lack of complex carbohydrates and dietary fibre in overall intake and consumption of both should be encouraged (table 1.3).

In adults and the elderly, total **fat** intake exceeds recommendations, accounting for more than 35% of daily energy intake. In school children, fat intake is within the upper reference range and shows a slight decline since 2003. However, the proportion of **saturated fatty acids** (SFA) is too high in all age groups, supplying 14 to 19% of total energy. Intake of **polyunsaturated fatty acids** (PUFA) meets the requirements, but the ratio of SFA to unsaturated fatty acids (FA) is inadequate. Children and adult women show cholesterol intakes below the recommended maximum of 300 mg. Adult and elderly men as well as pregnant and elderly women exceed this level. Decreased total fat intake with an increased proportion of high quality vegetable oils would therefore be desirable to improve the nutrient density (table 1.4).

Alcohol intake is below the tolerable upper level of 10 and 20 g/d for women and men, respectively, supplying about 3% of total energy. Across all ages, men consume higher amounts than women. Very low intakes of about 0.2% of energy are seen in pregnant women who should indeed avoid alcohol consumption (see table 1.5).

Micronutrient intake

An overview of micronutrient intakes in different age groups is presented in table 1.6. While the adequacy of intake varies between the different age groups, some critical micronutrients can be identified for the whole Austrian population. For instance, folate intake is much lower than the recommended level. This may be a reason for concern considering the important role of this vitamin in foetal growth and development as well as cardiovascular and mental health.

Similarly, recommended intake for calcium and vitamin D are not met in any of the age groups. While the latter can be synthesised in the body, low exposure to sunlight and impaired liver or kidney function can present problems, especially in the elderly. Contrary to intake levels of the aforementioned nutrients, sodium intake is excessive.



Table 1.6: Suggested categories of intake level for micronutrients in the Austrian population (evaluated on the basis of the D-A-CH reference values for nutrient intake [DACH, 2000])

Intake level	Applies to	Micronutrients
Critical nutrients (Category 1)	Whole population	Folate, vitamin D, calcium; excessive sodium intake (via table salt)
	Schoolchildren (6-15 y.)	Iodine
	Schoolchildren (13-15 y.)	Vitamin A, vitamin B ₁ , vitamin B ₂ , vitamin B ₆ , iron, potassium (girls)
	Women of childbearing age	Iron
	Pregnant women	Vitamin B ₆ , iodine
	Women aged 75-84 y.	Vitamin B ₁
	Men aged 55-84 y.	Vitamin A, magnesium
Nutrients of marginal intake (Category 2)	Schoolchildren (10-15 y.)	Zinc (boys)
	Pregnant women	Vitamins B ₁ , B ₂ , zinc
	Women aged 75-84 y.	Magnesium
	Men aged 55-84 y.	Vitamin B ₆
Nutrients of sufficient intake (Category 3)	Whole population	Vitamin E, vitamin C, niacin, biotin, pantothenic acid, copper, phosphorus, manganese
not yet assessed in Austria*	Whole population	Vitamin K, fluoride, selenium
Category 1: Intake more than 15% below the respective recommendation Category 2: Intake up to 15% below the respective reference level Category 3: Intake equal to/above the respective reference level * Can only be assessed through chemical analyses		

Trends in nutrient intake

In all age groups except the elderly, energy intake has declined since 2003. Although macronutrient intake patterns, especially dietary fat, as a whole did not change, 2008 results reflect a welcome tendency towards higher PUFA and lower SFA intakes. Cholesterol intake of all age groups has also declined with the exception of the elderly. In children, intake of most vitamins and minerals was lower compared to 2003. For some micronutrients such as calcium and iron, this decrease was also observed in adults and the elderly. In contrast, dietary iodine intake improved in all age groups.

Determinants of food choice

Food choice and nutrition patterns are influenced by a number of factors. Marital status and income appear to be less influential. However factors such as smoking, body weight, satisfaction with body weight, meal frequency and attitudes towards nutrition have a more pronounced impact on the diet of Austrians.

Chapter 2: Food Consumption in Austria

Food consumption and availability

Food balance sheets and findings of the household budget survey provide an overview of food supply and availability at a population level but do not allow assessment of individual intake in specific groups. Studying food supply over time helps discern trends.

The recent increase in bread cereals, vegetable, vegetable oil and fish supply is favourable. Cheese supply was also higher, while virtually no changes were observed in the supply of potatoes, fruit, meat, animal fats and sugar, the latter remaining at a higher than ideal level. Decreasing supply/consumption trends are seen for pulses, honey and beer (see figure 2.1).

Availability of potatoes, lipids and sugar at a household level was higher, those of fish and seafood, cereal products, vegetables and non-alcoholic drinks were lower in rural than in urban environments. Higher education levels are associated with lower availabilities (lower purchased amounts) of most foods except fish and seafood and non-alcoholic drinks.

Identifiable dietary trends

Novel food patterns are mainly influenced by foreign cultures and increasing health awareness. During the last years, far eastern cuisine and wellness trends like Traditional Chinese Medicine and Ayurveda are particularly popular.

Weight reduction remains another topic of interest even though most diets aimed at rapid weight loss are not based on scientific evidence.

Increasing health awareness is also mirrored in the wide array of light

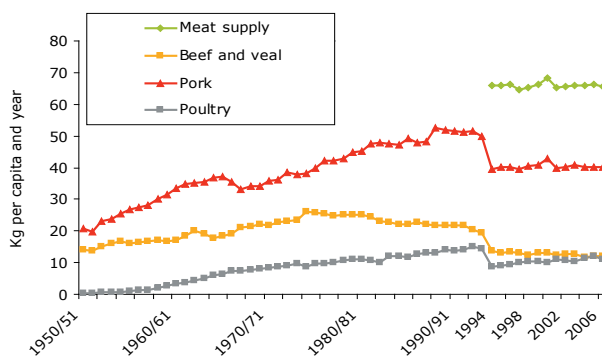


Figure 2.1: Supply of meat per year and person, 1950/51-2006

Concerning 1995: Following the entry of Austria into the EU on January 1st, 1995, methods for data acquisition were adapted to EU standards. Therefore, comparison to earlier time points is limited.

Table 2.1: Average daily fruit and vegetable intake of Austrians, by gender and age groups (in g)

	Fruits (g/d)			Vegetables (g/d)		
	total	women	men	total	women	men
Children						
6 to 9 y.	133	142	124	92	98	96
10 to 12 y.	117	122	113	80	83	77
13 to 15 y.	118	145	95	78	70	85
Adults (18-64 y.)	216	234	187	180	190	162
Elderly (>64 y.)	175	189	140	133	131	136

products, functional foods and the popularity of organic farming offered in the market.

Importance of selected food groups

Data on individual food intake of the participants in the Austrian Study on Nutritional Status provide more detailed information about consumption habits.

Thus, despite the increase in the consumption of **bread cereals**, actual intake of **bread** (about 120 g/d) is still below the recommended amount as is also the case for other starchy foods like **cereal products and potatoes**. In addition, the proportion of whole grain cereals is very low (only 13% of cereal consumption). These foods are important sources of complex carbohydrates, fibre, B vitamins and minerals such as zinc and magnesium, as well as having low fat content.

Although the consumption of **fruits and vegetables** is improving, the recommendation to consume at least 400 g daily is only reached by women aged 18 to 65 years while children, in particular, eat low amounts (see table 2.1). Generally, women and girls show higher intakes than their male counterparts do. Overall, fruits are preferred to vegetables. In adults, fruits and vegetables are the main sources of vitamin C and contribute to folate (20%) and fibre (25%) intake.

Table 2.2: Contribution of milk and milk products to calcium intake by age groups

Age group	Total Ca intake from all food groups (mg/d)	Ca intake from milk (products) (without cheese) (mg/d)	Ca from cheese (mg/d)	Ca from milk and cheese in % of total intake
6 to 9 y.	686	289	123	60
10 to 12 y.	651	249	129	58
13 to 15 y.	654	254	132	59
18 to 64 y.	776	171	236	53
> 64 y.	682	214	155	54

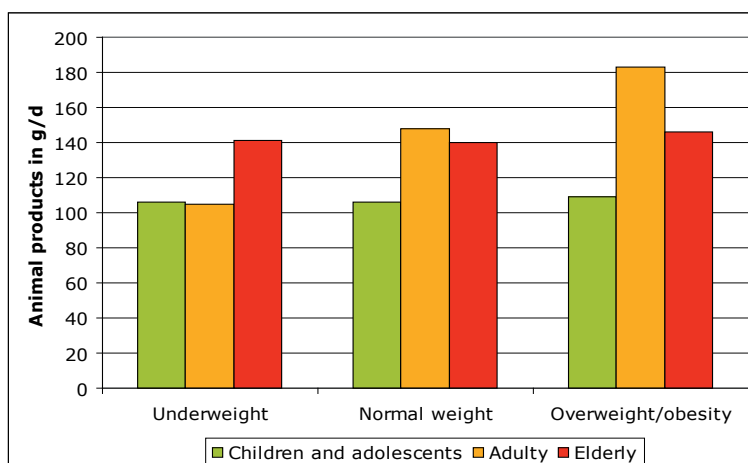


Figure 2.2: Average intake of animal products (except milk) (g/d) in different age groups by Body Mass Index (BMI) [Kromeyer-Hauschild et al., 2001; WHO, 2003; NRC, 1989]

Children: underweight <3rd percentile, normal weight 10-90th percentile, overweight/obesity >90th and 97th percentile, respectively
 Adults: underweight BMI <18.5, normal weight BMI 18.5-24.99, overweight/obesity BMI >25

Apart from **cheese**, consumption levels of **milk and milk products** have remained stable during the last years. The recommended amounts for dairy foods are not met in any age category. Milk products are the most im-

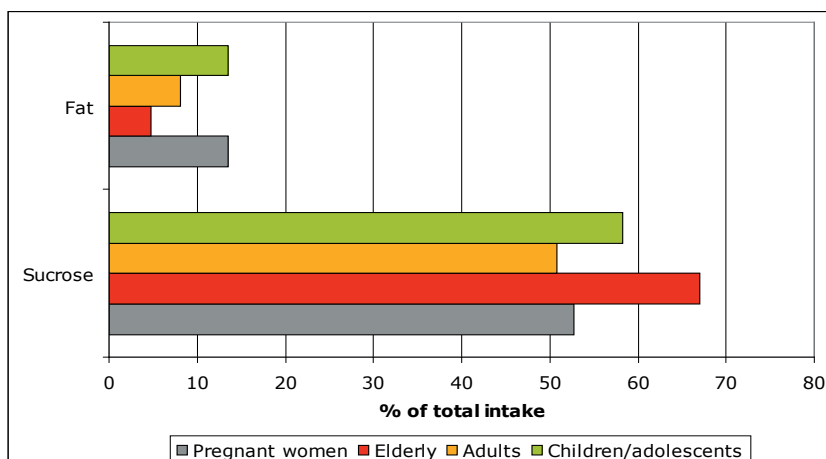


Figure 2.3: Contribution of pastries, sugar, sweets and chocolates to the mean daily intake of fat and sucrose in different age groups in Austria



portant source of calcium providing more than 50% of total calcium intake (see table 2.2). Moreover, they are rich in high quality protein, vitamin B₂ and contribute to iodine and vitamin B₁₂ supply, especially in vegetarians. However, high content of fat and saturated fatty acids (up to 5% of energy) as well as sodium in cheese calls for fat and salt-reduced products.

In turn, other animal products like **meat, meat products and eggs** are generally consumed too abundantly in all age groups. On average, adult Austrians eat 127 g of meat and meat products per day instead of the recommended 65 g, with men consuming greater amounts than women. Meat is a good source of protein, iron, zinc and many B-vitamins. However, depending on the cut, it can also contain high amounts of fat mostly in the form of saturated fatty acids and cholesterol. On the contrary, fish intake is too low (13 g/d) considering its importance as a rich source of iodine, vitamin D and n-3 fatty acids. Only consumption data of the elderly reach the lower end of the recommended intake range (22 g/d).

Fats, oils and sweets are another food group that is generally consumed in excessive amounts. This is true for animal fats like butter and those from meat products however consumption of vegetable oils should be increased. Substitution of animal fats by high quality vegetable oils would improve the dietary contribution of essential PUFAs and reduce that of SFA and trans fatty acids.

Intake of foods rich in refined **sugars** is particularly high in children and adolescents and is associated with overweight in this group.

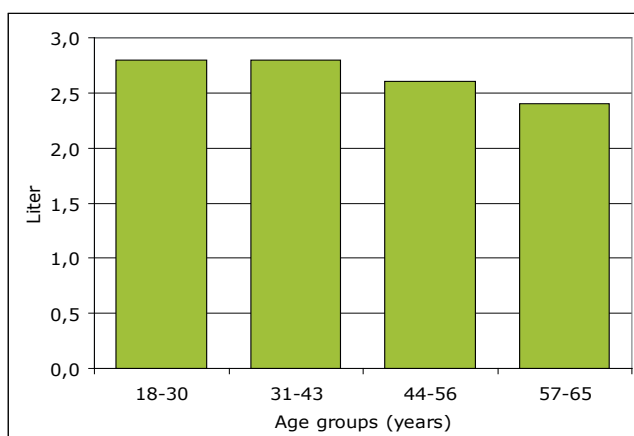


Figure 2.4: Average daily fluid intake (including milk, caffeine-containing and alcoholic beverages) of Austrian adults, by age groups





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Tab. 2.3: Average daily intake of tap water in Austrian adults by region

	Tap water intake (in l) (mean \pm SD)	Confidence interval (95%)
Region 1 (Vienna) (n=107)	1.08 \pm 0.85	0.90, 1.24
Region 2 (East) (n=124)	0.85 \pm 0.78	0.73, 0.97
Region 3 (South) (n=120)	1.09 \pm 0.75	0.94, 1.24
Region 4 (West) (n=106)	1.02 \pm 0.78	0.86, 1.18

Drinking behaviour and fluid intake

The recommendation to drink 1.2 to 1.5 l per day is exceeded in all age groups, even the elderly that are generally prone to dehydration. Average fluid intake is 2.6 l in women and 2.8 l in men if coffee, milk and alcoholic beverages are included (see figure 2.4). Without these, it is still 2.1 l and 2.0 l, respectively. Water, especially from the tap, is the most common and popular beverage. Again, regional differences are apparent as, in eastern Austria, tap water is consumed less than in other regions (see table 2.3). Energy intake from beverages is rather low, especially if contributions from milk and alcoholic products are excluded (338 kcal with milk and alcoholic drinks included and 177 kcal without them), the latter being the major energy contributors. Accordingly, overweight people report significantly higher consumption of alcoholic drinks.

Beverages, depending on the source, contain nutrients such as sodium, magnesium, calcium and fluoride. Fruit juices also supply vitamin C.

Overall, the Austrian population's knowledge about the quality of their drinking water was satisfactory and the majority of respondents were confident of the high quality of Austrian drinking water.

Food diversity – hallmark of healthy nutrition

A varied diet is the cornerstone of healthy nutrition and considered protective against many diet-related diseases. In Austrian school children and the elderly, greater dietary diversity increases availability of various nutrients including critical ones such as folate, calcium and iodine. However, a complete and varied diet subsequently increases energy intake by up to 30% in the highest quartile. In children, high diversity of fruit and vegetables was especially beneficial as the increase in energy intake was less pronounced (only about 6%). Thus, high food diversity can contribute to a healthy diet, but must be carefully composed to limit energy intake.

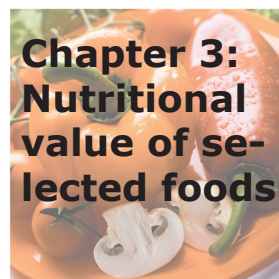




Increased health awareness has led to more functional foods or foods for specific target populations being offered.

Organic food products – are they really of superior quality?

For years, organic foods have gained great popularity in Austria, the leading producer within the EU. Organic foods have become widely available to consumers through the introduction of supermarkets' own organic product lines. Healthy nutrition and the desire for pollutant-free high-quality foods have replaced environmental concerns as the main reasons for buying organic. However, there is no scientific evidence for greater health value of organic foods. High food diversity and careful composition of the diet are the main determinants of healthy nutrition. The increasing popularity of highly processed organic foods in the market is an indication that many consumers are unaware of this fact.



Light and dietetic foods – are they useful?

In view of the high prevalence and greater awareness of overweight and diet-related diseases, "light foods" have become increasingly popular. In most cases, they are reduced in energy, fat and/or sugar, but the term is also applied to foods with lower content of salt, alcohol or other components. Precise definition criteria for nutrition claims have, for the first time, been considered in the new European regulation on nutrition and health claims made on foods (EC No 1924/2006).

The main motivation Austrians report for buying light products are the expected health benefits and reduction or maintenance of body weight despite the fact that scientific evidence for these effects is still lacking. Long-term weight reduction can only be achieved through permanent dietary behaviour modification in combination with increased physical activity.

While light products are intended for the general and mainly healthy population, dietetic foods are developed for persons with special requirements. While their use may be justified in the case of certain metabolic disease such as phenylketonuria or coeliac disease, there is no need for such foods for diabetic patients. Indeed, foods for diabetics are often rich in fat, while in fact general recommendations for healthy nutrition can also be applied for diabetics.

The potential of functional foods

The offer of foods with additional beneficial functions beyond mere nutrition is still increasing. Recently, criteria for health claims have been defined in the above-mentioned regulation of the EU. According to this regulation,





a distinction is made between claims suggesting improved body function and claims implying a reduction of a certain disease risk by the functional ingredient. Both types must be based on sufficient scientific evidence. The beneficial effects of n-3 fatty acids or phytosterols are generally accepted. However, these compounds are found in natural foods. Fruit, vegetables, whole grain cereals, nuts and fish all offer a broad choice of functional ingredients.

One particularly popular group are probiotics, specific bacteria (mostly lactobacilli) with health promoting potential. Among other effects, they are credited with stimulating and modulating the immune function. While there is sufficient evidence for this effect, it appears not to be confined to special probiotic cultures but can also be obtained through conventional strains. Therefore, a diverse diet rich in natural foods like fruit, vegetables, cereals, nuts, fish and fermented products can provide sufficient functional compounds to improve health.

What are the merits of low calorie diets?

So called Low calorie or Very low calorie diets are intended as therapy for massive obesity when rapid weight reduction is indicated. Depending upon previous habitual intake, energy supply is reduced to 1.000-2.400 kcal for men and to 1.000-2.000 kcal for women. Very low calorie diets go even further with energy intakes of merely 450-800 kcal. To this end, meal replacement formula products are frequently used. Due to their ability to achieve a rapid weight loss, their main application is as a preparation for surgical interventions or an introduction to other weight reducing programmes. However, these diets should only be used for a short period and patients should be monitored by a physician to prevent undesirable side-effects. Long-term and sustainable weight reduction is only achievable through permanent dietary behaviour modification and sufficient physical activity.

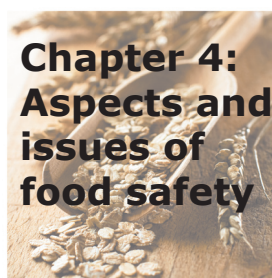
What about the quality of convenience foods?

Modern lifestyle with increasing numbers of working women and single person households is accompanied by a higher demand for convenience and ready-to-eat meals. To study the quality of these products, a selection of soups and main dishes was analysed with regard to sensorial, microbiological and nutritional aspects. Special attention was given to the content of food additives like taste enhancers, preservatives, as well as pollutants such as polycyclic aromatic hydrocarbons, furan or heavy metals. Despite the highly heterogeneous sample, quality was good or at least satisfactory. Neither toxicological nor microbiological hazards were identified. In conclusion, presuming a careful selection and supplementation of the diet with fresh foods, ready-to-eat meals can contribute to a healthy nutrition.



Generally, the health risks from food perceived by consumers differ from those seen by scientists.

From a microbiological point-of-view, the most common and relevant food-borne infections such as campylobacteriosis, salmonellosis, viral infections and those caused by shigatoxin-producing *Escherichia coli*, are due to insufficient hygiene when handling contaminated raw materials of animal and plant origin. Despite declining incidences of some infections, the number of cases of campylobacteriosis has markedly increased over the last years (see figure 4.1).



The **mycotoxins** patulin, ochratoxin A and aflatoxin occur in a variety of foods. However, although analyses of food samples revealed some contamination, in most cases, concentrations remained below the statutory upper levels for the respective substances. Overall, from the analyses in 2003 to 2007, the health risk from ingestion of patulin, ochratoxin A and aflatoxin seems low for the Austrian population.

Polycyclic aromatic hydrocarbons (PAHs) enter the food chain via a variety of ways, one of which is environmental pollution. They can also be generated during food processing and preparation when food is heated or dried. The majority of analysed food samples (54.9%) showed no contamination with PAHs.

Residuals of herbicides in fruit, vegetables and other plant foods have been monitored for over ten years through a number of national or EU-coordinated programmes with relatively constant results. Increased number of

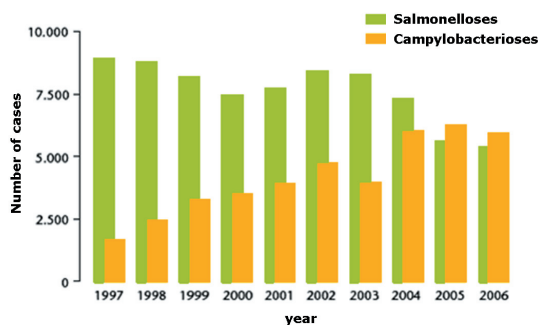


Figure 4.1: Number of cases of microbiologically confirmed campylobacteriosis (until 2002, reported cases) compared to those of salmonellosis in Austria from 1997 to 2006, taken from the AGES brochure "Report of zoonoses and their causes in Austria in 2006"

Table 4.1: *Approved artificial sweeteners with E numbers*

E 950	Acesulfame K (acesulfame)
E 951	Aspartame
E 952	Cyclohexane sulfamic acid and its Na and Ca salts (cyclamate)
E 954	Saccharin and its Na, K and Ca salts (saccharin)
E 957	Thaumatococin
E 959	Neohesperidine DC
E 955	Sucralose
E 962	Aspartame-acesulfame salt (twinsweet)

positive findings also with regards to multiple residues are mainly due to more refined and specific analytical methods.

The majority of samples of meat, honey, eggs and aquaculture products taken between 2003 and 2007 did not contain **residuals of veterinary drugs**. Milk was also not contaminated. Considering the low overall exposure, an immediate health threat for consumers is not to be expected.

Issues arising from food additives

The results gained from analyses of **artificially sweetened** soft drinks between 2003 and 2007 as well as the consumption patterns of Austrian adults and children do not justify intervention. Children consuming large quantities of such products containing cyclamate may exceed the acceptable daily intake (ADI) level. According to the ADI concept, occasionally exceeding this level is tolerable, however restricting the use of cyclamate to less consumed products might be considered.

No major risk ensues from the mean exposure to **sulfites** from dried fruit, wine and fruit jam. However, intolerances to these compounds can occur in sulfite-sensitive individuals like asthmatics. In addition, regular consumption of foods containing high amounts of sulfites may result in exceeding the ADI level (see table 4.2).

Since the implementation of more rigorous inspection measures in the EU, ongoing analyses show a decline in prohibited **food colourings** detected in products from third countries. This has considerably lowered the risk for the European population.

The discussion about **coumarin** and its potential effects on health is

Table 4.2: *Exposure to sulfites following moderate and high consumption of wine with a content of 337 mg SO₂/l (rounded values, Bw: bodyweight)*

	Moderate consumption		High consumption	
	women	men	women	men
Content in mg/l	337	337	337	337
Exposure in mg/person	42	44	126	174
Exposure in mg/kg Bw	0.7	0.6	2.1	2.2
% ADI	100	78	301	310

Table 4.3: Mean daily TFA intake of Austrian apprentices

	Range	Mean	Median	P 95
TFA [g] ¹	0.0 – 15.2	0.97 ± 1.3	0.57	3.6
TFA [g] ²	0.0 – 13.5	0.61 ± 1.2	0.31	2.2
TFA [g] ³	0.0 – 56.0	2.60 ± 4.0	0.80	11.5
Mean TFA [% energy]	0.0 – 5.7	0.39 ± 0.5	0.23	1.4

¹ Calculated from the mean contents of various food product groups

² Calculated from the minimal contents of various food product groups

³ Calculated from the maximal contents of various food product groups

ongoing particularly as children and adolescents regularly consuming large amounts of breakfast cereals and sweet rice with cinnamon may be subject to high exposure. Proposals for interventional measures have been made at a national and European level.

Over the past five years, more than 300 foods in Austria have been analysed for their content of **trans fatty acids**. The worldwide trend towards reduction was confirmed, but very high concentrations were still encountered in single samples across all food groups (see table 4.3).

Apart from isolated cases, exposure to **phthalates** from freshwater fish, spicy condiments and cooking oil remains below the tolerable upper intake level. Thus, under normal conditions, contents of phthalate do not give rise to concerns over health effects. Levels exceeding the tolerable upper level may be caused by the use of inappropriate and illegal materials for the processing of fat-containing foods.

Food irradiation is a physical means of food preservation and germ reduction. So far, evidence of treatment with ionising radiation was found in only 0.6% of food samples analysed on an annual basis by the Austrian Agency for Health and Food Safety (AGES).

In Austria, **safety assessment of novel foods** and novel food ingredients based on the specifications and documents supplied by applicants is the exclusive responsibility of the AGES. The Agency also surveys **food supplements** with regard to regulation of labelling, claims concerning specific effects and composition giving rise to concerns. The novel EU regulation on health claims not only presents a challenge for food producers but also to food surveillance authorities.

Foods produced by organic farming, using genetic engineering or novel technologies

Austria is among the world leaders in **organic agricultural production**. 11.6% of Austrian farms are organic, cultivating 14.5% of the country's total agricultural area. A further increase up to 20% is expected by 2010.

The authorisation of **genetically modified organisms** (GMO) is regulated by a number of European laws. Sampling and action plans ensure the efficient monitoring of seeds, foods and animal feeds in Austria. In 2005,

Tab. 4.4: Results of the main campaign about genetically modified foods in Austria

Year	Sample size	Soy	Maize	Soy and maize	negative ¹⁾	positive	samples exceeding the declaration threshold	Complaints with regards to genetic modification
2001	153	59	54	40	144	9	4	2.6%
2002	251	162	61	28	222	29	1	0.4%
2003	250	141	102	7	192	49	1	0.4%
2004	241	145	87	9	233	8	2	0.8%
2005	242	140	96	6	237	5	0	0.0%
2006	249	148	101	0	249	0	0	0.0%
2007	212	112	100	0	146	66 ²⁾	0	0.0%

¹⁾ referring to the limit of detection of 0.02%

²⁾ below the limit of detection of 0.1%, five probes contained 0.1%, one 0.22%, and another 0.29%

no objections concerning labelling of GM food were made (see table 4.4). Risk awareness in Austria is characterised by a strong opposition towards GM foods.

Novel technologies such as **nanotechnology** and cloning also prompt scientific discussions not only regarding the technological challenges but also analytical issues and the necessity of new strategies for testing and risk assessment. Nanomaterials may indeed exert hitherto unknown effects on human health or the environment.

The European dimension of food safety

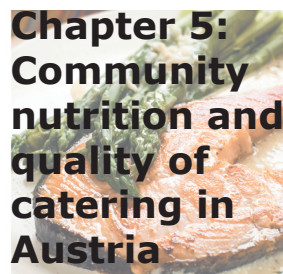
European consumers expect high safety standards especially regarding their foods. The European Rapid Alert System for Food and Feed (RASFF) contributes significantly to national and Europe-wide food safety by providing regulatory authorities with an effective tool for the exchange of information about serious potential hazards arising from foods or feeds. As an EU member state, Austria is incorporated into this system with the AGES' Institute for Food Control being the central contact point for administrative transactions.

Overall, the results of analyses, surveys and risk assessments indicate a high level of food safety and a low risk for Austrian consumers. This is proof of responsible food production and the efficient food safety control to protect consumer health and prevent deception.



Modern lifestyle, a higher proportion of women employed and greater number of single households have all increased the relevance of eating-out and catering. The rapidly ageing population contributes to this trend as an increasing number of the elderly are in need of professional care. Children and adolescents also increasingly receive their meals at school.

Thus, significant parts of groups potentially at risk of developing nutrient deficiencies get at least some of their meals from canteens and other communal kitchens. Special attention must therefore be paid to the quality and wholesomeness of the food offered, particularly as in most cases meals are prepared by people without extensive nutritional knowledge and economic factors play an important role in menu planning.



Are there any guidelines for good catering? By whom are they established?

Nutrition societies such as the German and the Austrian Nutrition Society (DGE and ÖGE) and the Research Institute of Child Nutrition in Dortmund (FKE) have established food-based guidelines to facilitate the composition of a healthy adequate diet. The guidelines suggest the frequency of various meal components so they can easily be put into practice and applied to different requirements and budgets.

Additionally, the guidelines also serve as a reference to evaluate meal plans.

How is the nutritional quality of meals in school and workplace canteens?

By way of example, the meals prepared by a caterer for schools in eastern and western Austria were evaluated. Overall, the offered menus were in accordance with the recommendations for optimized mixed diet for children and adolescents by the FKE (OptimiX). However, there is still room for improvement in terms of the amount of fresh fruits.

Meals prepared by a company catering for an inner city office with employees performing predominantly sedentary jobs were assessed for nutritional quality and also rated well. The vegetarian meals, in particular, complied with the guidelines, while the more traditional meal line showed greater need for improvement. However, offering a sufficient selection of salads and the sparing use of fat were commendable characteristics of both meal lines. Although it may not be representative of workplace canteens in Austria, this example proves that healthy catering is possible.

Catering for the elderly

Preparing meals for elderly people especially for those in need of care





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Table 5.1: Food consumption of Austrian primary school children (aged 6-15 y) (mean of amount [g], energy [MJ] and energy density [kcal/g], rounded values), depending on the location of consumption (n=780)

Food groups*	Amount			Energy			Energy density (kcal/g)	
	Total (g)	% AH	% OH	Total (MJ)	% AH	% OH	AH	OH
Cereals and cereal products, potatoes	167	74	26	1.2	72	28	1.7	2.0
Vegetables, legumes	73	80	20	0.1	81	19	0.3	0.3
Fruits, nuts	180	69	31	0.5	70	30	0.7	0.7
Milk, Milk products	224	85	14	0.9	82	18	1.1	1.9
Animal products**	80	74	26	0.7	72	28	2.1	2.5
Fats, oils	15	79	22	0.5	78	22	8.1	8.1
Sweets	61	71	29	0.9	72	28	3.6	3.5
Non-alcoholic beverages	628	72	28	0.2	60	40	0.1	0.1
Total	1917	75	25	6.6	74	26	0.8	1.0
* Food groups do not comprehend all foods								
** Except milk and milk products								
AH: at home, OH: out of home								

presents a particular challenge. The catering offered in nursing homes and residences for aged persons varies significantly between the respective institutions and is also influenced by the degree of dependency. Residents of nursing homes receive all their foods and drinks from the institutions. In turn, most residences whose inhabitants are generally independent only serve main meals.

Seniors still living in their own household may also rely on outside assistance for food preparation. Mobile meal services like "meals on wheels" deliver ready-to-eat meals with some of them owned and managed by charitable organisations to make them accessible to deprived people.

A high proportion of meat dishes are evident in the meal lines offered in two Viennese care homes and by meals on wheels. All caterers offer various meals including vegetarian and lighter alternatives but the former are often sweet dishes to suit the taste preferences of this particular consumer group. The recommended amount of fruits, vegetables and milk products were not reached in any instance. Supplementing these food groups enables an adequate supply. Meal quality in nursing homes and residences depends largely on the individual knowledge and initiative of the responsible staff members.

What about the food in University and Army canteens?

The meals offered in the canteens of the Austrian army (Bundesheer) were diverse and adequate to meet the diverging needs of soldiers as well as civil staff. This is facilitated by the use of a componential system allowing meal composition according to individual requirements. Thus, adherence to vegeta-





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rian diets and religious practices is possible.

In Austria, student restaurants are not restricted to students but offer affordable meals to everyone. A wide choice of vegetarian and small light dishes reflects the food preferences of the main target group. The lighter of two meal lines was broadly in accordance with the recommendations for a healthy diet even though the offer of milk products, fruits, vegetables, salads and fish could still be increased in some locations.

The sparing use of cooking fat is laudable. The second, more traditional meal line included less salad and vegetables and contained more fat. The offer of milk products and fruits should be increased as well. An adequate diet is achievable, particularly by consumers with an interest in and basic knowledge of healthy nutrition.

In conclusion, the examples given show that catering and eating-out can contribute to the adequate nutrition of the consumers. Special quality seals allotted by the DGE and, in the near future, the ÖGE to distinguish healthy meal offers provide guidance for consumers and an enticement to caterers to include such dishes in their range.





Chapter 6: Public health /Health pro- motion/Di- sease pre- vention

Public Health – Determinants and activities

The goal of Public Health is the promotion and preservation of health at a population level, the focus being on disease prevention. Particular attention is given to general health and disease factors such as body weight, smoking, nutrition and physical activity.

In light of the increasing prevalence of overweight and obesity, the EU encourages its member states to take measures to improve the nutritional behaviour of their population. In Austria, health promotion projects are mainly sponsored by the Fonds Gesundes Österreich (Fund for a Healthy Austria) providing 7.25 million € in funding sourced from the VAT. Target groups are exclusively social entities. So far, 725 projects from the areas of health promotion and primary prevention have been supported.

Since 2007, Vienna is the official seat of the Worldwide Public Health Nutrition Association (WPHNA). Initiatives concerning the education and training of professionals and practitioners have also been started. Public Health Nutrition is one of the modules in the new masters course Nutritional Sciences at the University of Vienna. Additionally, the Institute of Nutritional Sciences at the University of Vienna participates in the European Masters Programme Public Health Nutrition. Other education and training programmes are offered in the area of nutrition.

Institutional capacity building in Austria is offered in the form of bachelor and masters study programmes as well as PhD studies at the Institute of Nutritional Sciences at the University of Vienna. Some other universities of applied sciences offer their own masters programmes related to nutrition or health.

Nutrition-associated chronic diseases

Cardiovascular (CVD) and neoplastic diseases account for 69% of deaths in Austrian adults of both genders and are the second most common cause of disability (as measured by Disability adjusted life years, DALY) after neuropsychiatric diseases. Cancer and CVD are the most common causes of death in subjects aged 40 to 69 and over 70 years, respectively (see figure 6.1). Women more frequently die from CVD, but less often from cancer than men.

In men, the highest mortalities from cancer are observed for neoplasms of the respiratory tract followed by colon and prostate cancers. In women, mortality from breast cancer is highest, followed by cancer of the respiratory tract.

It is estimated that about 740.000 persons aged over 50 years suffer from osteoporosis.

Every fifth person in Austria aged 15 years and over is affected by



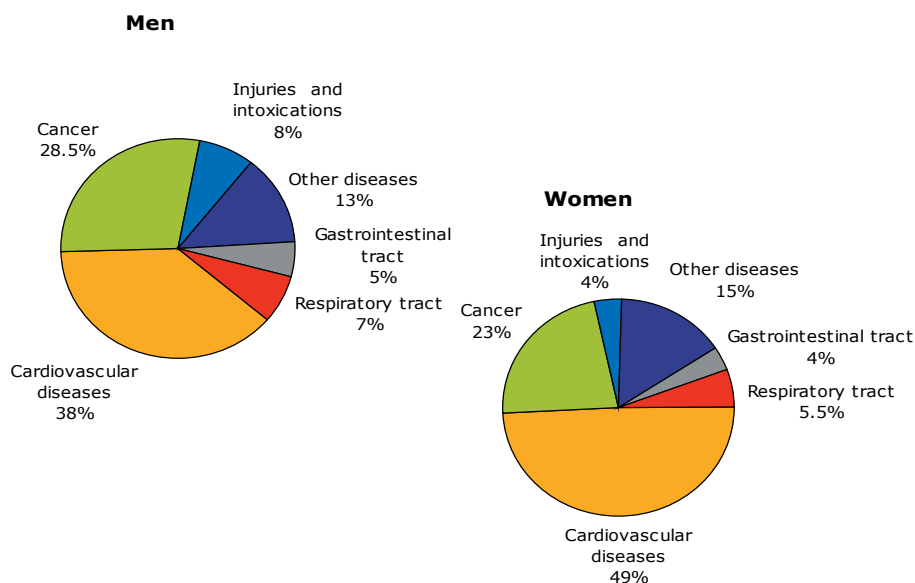


Figure 6.1: Death causes in 2007 for men and women in Austria (data from Statistik Austria, 2008) (rounded values)

allergy with a higher prevalence in women and in young people. Pollen are considered the most frequent sensitising substances, followed by animal hair, drug components and dust mites.

Physical activity and energy expenditure in Austria

For the first time, assessment of physical activity of Austrian adults

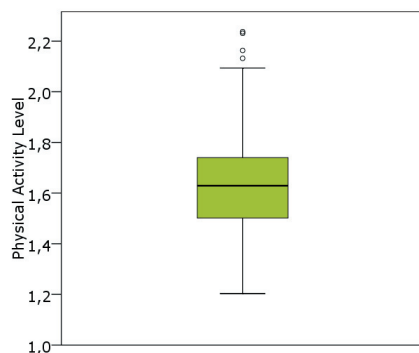


Figure 6.2: Physical activity level (PAL) of Austrian adults

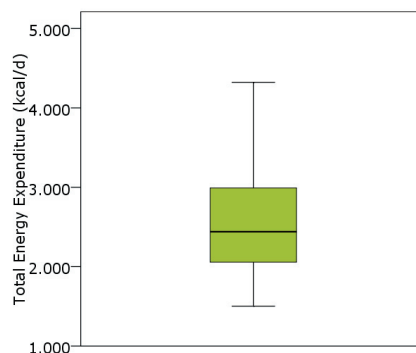


Figure 6.3: Total energy expenditure of Austrian adults



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Table 6.1: *PAL and total energy expenditure by gender*

	Mean in men, n=337	Mean in women, n=383
PAL	1.71	1.57***
total energy expenditure (kcal)	3068	2153***

*** P<0,001

and the factors influencing it were included in the Austrian Study on Nutritional Status with the aim of gathering representative data about the **physical activity level** (PAL, calculated as total energy expenditure/basal metabolic rate). The average PAL of Austrian adults was 1.64 (see figure 6.2). The WHO recommends a PAL of 1.7 as it is associated with a lower risk of overweight, CVD, diabetes mellitus type II and some forms of cancer. This level was reached by about 50% of men, but only 20% of women. Young women with medium educational level, predominantly sedentary occupations and little leisure time activity were shown to be a particular risk group regarding physical inactivity.

Mean total energy expenditure in men was 3050 kcal and 2150 kcal in women (see table 6.1).

Overall, there is a significant potential for health improvement by increasing the physical activity level of the Austrian population. Integrating physical activity in daily routine – for example by using stairs instead of escalators and elevators – would be the most simple and useful measure.



A surplus of food and drink consumption accompanied by a physically inactive lifestyle results in a positive energy balance and has consequences for bodyweight and health. Despite this plentiful supply, intake of certain nutrients is inadequate or even deficient in some population groups due to temporarily increased physiological needs (e.g. during pregnancy) or the need for a higher nutrient density when energy requirements are reduced (as in the elderly or young women with a sedentary lifestyle). Poor nutrition knowledge and inadequate access to accurate information are further reasons for micronutrient insufficiency.

Chapter 7: How to improve the nutritional status of Austrians

In such cases adding nutrients to food (fortification) or food supplements could help, as a short term and complementary strategy, improve the nutritional status.

The role of food supplements

About 39% of Austrian adults consume food supplements regularly. These consumers ingest, on average, up to 100% of the recommended intake

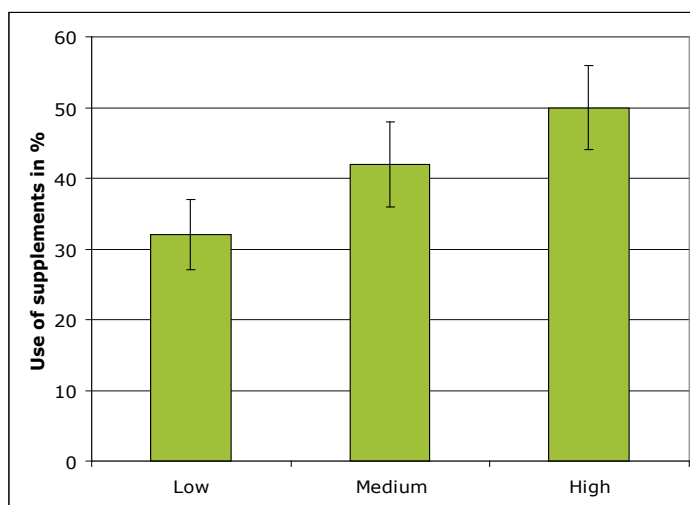


Figure 7.1: Use of nutrient supplements by Austrian adults depending upon the educational level (n=273)

error bars represent the 95% confidence intervals.

Educational levels: low: no, elementary or apprenticeship (n=118); medium: secondary vocational school (without graduation), vocational school with higher education entrance level with graduation (Matura), secondary school with graduation (Matura) (n=89); high: academic education such as pedagogical and vocational academy, university, university of applied sciences (n=66). Data include both genders from all regions of Austria.



1. Diversified diet

i.e. a varied diet in which no food is neglected or overemphasised

2. More foods and side dishes rich in complex carbohydrates (e.g. noodles, rice, potatoes, vegetables ...) – little fried foods

i.e. eat deep fried (breaded) foods only occasionally and in small amounts
reduce sugar – instead use dried fruit for cooking, sweetening and as snacks

3. Fruits and vegetables in plentiful supply – „Take 5 a day“

i.e. preferably with each meal and as an occasional snack in between
Fruit and vegetables juices as a complement

4. Small amounts of fat and fatty foods

i.e. fat should be used sparingly for cooking and fatty foods like sausages, cheese, mayonnaise, industrial salad dressings and diverse sweets etc. only be consumed occasionally.

5. Plenty of fluids – drink wisely

i.e. consume sweetened soft drinks, alcoholic drinks, coffee and black tea only occasionally

6. Enjoy your food

i.e. handle food consciously, caring for high quality, preparing and arranging meals carefully. Enjoy and appreciate food with all senses, concentrating on the sensual experience. Reserve chocolate, feast day roast and cream cake for special occasions.

7. Stay healthy with physical activity

i.e. integrate physical activity in daily routine, swap the car for the bicycle and stairs for escalators or elevators

Figure 7.2: 7 Guidelines for Healthy Nutrition

of vitamin A (only women), vitamin D, folate and niacin only from supplements. However, the risk of reaching the tolerable upper intake level is very low.

Food fortification – an efficient way to improve micronutrient status

Voluntary fortification of food in Austria is for the most part efficient. Nevertheless, impartial criticism in this regard seems reasonable as:

- fortified food is usually consumed by people with high health awareness who do not really need these products (contradictory to purpose of food fortification);
- these products are generally more expensive.

TV reports – the most frequent source of nutrition information

As TV reports are frequently used as a source of information by consumers, they could serve to communicate nutrition and food information. Ho-





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wever, they should be more consistent and made suitable to increase nutrition knowledge and have a positive impact on consumers' eating habits and nutrition behaviour.

Validation of food-based dietary guidelines

The "7 Guidelines for Healthy Nutrition", issued by the Institute of Nutritional Sciences of the University of Vienna, were tested by Austrian adults (see figure 7.2). The results reveal a clear discrepancy between subjective and objective perception of the users with significant impact on nutrition behaviour. This highlights the need to better explain and communicate food-based dietary guidelines.





An outlook – Goals and proposals to improve the nutritional situation in Austria

The Austrian Nutrition Report 2008 aims to describe and document the current nutritional situation in Austria. Based on data from most recent representative studies, nutritional problems are identified and strategies as to how to change unfavourable trends in eating behaviour are proposed. For a nutrition policy to address current problems in Austria, the following goals should be pursued:

Goal 1 Correct identification of malnutrition and unfavourable lifestyle at a population level.

- low physical activity and resultant low energy expenditure
- high fat intake
- unfavourable fat quality: too much saturated (animal) fat, too little unsaturated (plant) fats
- low intake of dietary fibre
- low intake of folate, vitamin D and calcium
- high intake of sodium (cooking salt)

Suggestions for improvement:

- reformulation of recipes used by caterers and gastronomy with regard to the content of fat, saturated fatty acids, sugar and in accordance with current guidelines for health promotion and disease prevention
- comprehensive use of iodised salt in food processing, catering and gastronomy
- selective and voluntary food fortification (folate, vit. D and/or calcium)
- reducing fat, sugar and salt content of ready-to-eat foods/meals
- promotion of formulation and implementation of food-based dietary guidelines (e.g. recommendation for diet diversification)

Goal 2 Improve and better communicate nutrition information.

Create a network of accessible nutrition information in Austria with the aim to formulate nutrition messages in a science-based, objective and clear manner

Goal 3 Emphasize the health promoting potential of foods.

When eating habits are adapted to current recommendations, food quantity and quality are sufficient to meet the requirements of energy and nearly all nutrients

Goal 4 Strive for a comprehensive description and analysis of the population's nutritional status

In addition to food and nutrient intake surveys, laboratory and biochemical assessment of the nutritional status is needed in order to be able to accurately and comprehensively describe the nutritional status of particular population groups.





The Austrian Nutrition Report 2008 shows the present nutritional situation in Austria and offers starting points for the improvement of the described deficiencies/insufficiencies. From the report the following goals for nutrition and health policy can be substantiated:

- Correct identification of malnutrition and unfavourable lifestyle at a population level
- Improve and better communicate nutrition information
- Emphasize the health promoting potential of foods
- Strive for a comprehensive description and analysis of the population's nutritional status

available from:

The report is available for free at the Ministry of Health,
Radetzkystrasse 2, A-1031 Vienna.

Telephon: +43-810/81 81 64

E-Mail: broschuerenservice@bmg.gv.at

Internet: <http://www.bmg.gv.at>

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