

# Trends in food availability in Germany – the DAFNE IV project

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## **Introduction**

There is a growing evidence of a strong relationship between nutrition and health (WHO 2003; KEY et al. 2004; REDDY & KATAN 2004; STEYN et al. 2004). Therefore, many countries considered it necessary to develop a nutrition policy (e.g. KJERNES 2003; OLTERSDORF 2003; PRÄTTÄLÄ 2003). The German nutrition policy (NN 1996), for instance, has the aim to improve the general health status of the population by motivating the people to adopt a healthy lifestyle. In order to pursue this target, a valid monitoring system is required, which in Germany is not (yet) established. There are data from some dietary surveys, but either they are not representative for the whole country or they are conducted with different dietary assessment methods and therefore hardly suitable for the monitoring of trends in food consumption.

The most suitable data for monitoring food consumption trends are those provided by household budget surveys (HBS) which offer a unique set of advantages: The surveys are undertaken on a regular basis, apply standardized methodology, and are nationally representative.

Furthermore, they are conducted in many different countries using a comparable methodology, which enables not just longitudinal comparisons within a country, but also cross-country comparisons of trends in food consumption

## **Material – Methods**

### **Material**

The aim of the German HBS is to assess all types of income and expenditures of private households (STATISTISCHES BUNDESAMT [STBA] 1994). Therefore it is named “Einkommens- und Verbrauchsstichprobe” (abbreviated as EVS) which literally means “Income and Consumption

Sample”.

The EVS has a rather long tradition. It was first conducted by the “Statistische Bundesamt (StBA)” (Federal Statistical Office) in 1962, and since 1973 it is repeated every 5 years. The latest EVS data available for scientific research are those from 1988, 1993 and 1998, respectively. These three datasets are the basis of this analysis of trends in food consumption in Germany.

The EVS is based on a nationwide quota sampling, which is defined according to the size and income of the households and the professional status of the respective main income holders. The sample sizes amounted to approx. 50 000 households in 1988, 70 000 households in 1993 (after the German reunification in 1990) and 62 000 households in 1998. Details regarding food consumption, however, are only reported by a randomly chosen subsample (35 % of all the participating households in 1988, 25 % in 1993 and 20 % in 1998) ( STBA 1994; STBA 1997; CHLUMSKY & EHLING 1997).

### **Methods**

The EVS data are collected in two steps. Firstly, an interviewer contacts the participating households, explains the survey's objectives and methodology and does an introductory interview with the person responsible for keeping the household. Secondly, the household members keep diaries of their consumption. They are requested to report the kinds of food they acquire as detailed as possible and to provide data on food quantities as well as expenditures related to the food acquisition. Food consumption away from home, however, is assessed without differentiation of the kind of food and only as expenditures (CHLUMSKY & EHLING 1997; KREBS 2002).

In the following, the term “consumption” will be avoided in order to prevent misunderstandings, because the data collected in the EVS refer to food acquisition at household level, rather than actual intake. Thus, instead of “consumption” the term “availability” will be used (according to the DAFNE approach).

After data collection the Federal Statistical Office aggregates the reported kinds of food to approximately 100 food groups. For the majority of them, the Federal Statistical Office provides data on the acquired quantities and related expenses, but for the rest of the groups (approx. 30 % of

the food groups given in the 1988 and 1993 datasets and approx. 45 % of the groups in the 1998 dataset) only data on related expenses are available.

For the latter groups, the unknown quantities need to be estimated. A simple estimate would be

$$q_{ih} = x_{ih} / p_i \quad (1)$$

with

$q_{ih}$  availability of food item  $i$  in household  $h$ ,

$x_{ih}$  expenditures for food item  $i$  in household  $h$ ,

$p_i$  average price of food item  $i$  (as published, for instance, by the Federal Statistical Office).

Since households of different social status tend to pay different prices for a certain unit of a food item (possibly due to different shopping preferences), Eq. (1) may yield biased estimates of the unknown food quantities. They would thus be expected to be over-estimated for households of higher social class and under-estimated for other households.

The bias can be avoided when the unknown food quantities are estimated as

$$q_{ih} = x_{ih} / (L_{ih} p_i) \quad (2)$$

with

$L_{ih}$  relative price level paid by household  $h$  for food item  $i$ , with  $L_{ih} = 1$  for an average price level,  $L_{ih} < 1$  for relatively low price levels and  $L_{ih} > 1$  for relatively high price levels.

The calculation of the relative price levels  $L_{ih}$  requires information on the prices households pay for a unit of food item  $i$ . Since this information is not available for all the food items, an appropriate estimate is required: If food items are combined to food groups, such that quantitative data are available for at least some items of the group, then the relative price levels can be calculated for these items and adopted for other items of the group that do not have quantitative data given.<sup>1</sup>

In order to enable valid comparisons between EVS-data and data stored in the DAFNE databank, a process of harmonizing the data delivered by the national statistical offices was required. This refers to the definition of foods and foods groups as well as to the understanding of socioeconomic

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<sup>1</sup> Further methodological details regarding the estimation of quantitative data of food availability are published by GEDRICH (2005).

variables. Methodological details are presented by TRICHOPOULOU & LAGIOU (1997; 1998). As results of this process food availability is considered on the level of 58 food groups, which can be further aggregated to 15 major food groups, respectively.

## **Results**

Unlike food balance sheets, HBS provide the opportunity to analyse the association of the food availability within households with their socio-economic characteristics in order to identify person groups that should be targeted with public health intervention measures, because of their high risks of diet related diseases. The available data enable three types of analyses:

- cross-sectional analyses (based on data from different survey years) of the association of food availability with socio-economic characteristics,
- analyses of time trends in food availability by different socio-economic characteristics,
- combined cross-sectional and time-trend analyses of the development of the association of food availability with socio-economic characteristics.

In the following, results of all the three types of analyses are presented. The first part of this chapter gives an overview of the food availability in Germany without consideration of any further characteristics of the population. In the second part, results on trends in food availability by socioeconomic characteristics are presented.

Data on the mean availability of main food groups are provided in Table 1. It shows that on the average cereal and cereal products and milk and milk products dominate the diets of Germans, whereas fish and seafood as well as pulses are of minor importance. Considering the development of the mean food availability in Germany from 1988 to 1998, Table 1 clearly shows considerable increases in the availability of fruits and vegetables (cf. Fig. 1), and the same holds for the corresponding juices. But compared to the recommended consumption of at least 400 g of fruits and vegetables per person and day, the actual average availabilities are still quite low; also considering that waste was not subtracted from the reported quantities. The recommended amounts would only be met, if also fruit and vegetables juices were included in the calculations. The availabilities of potatoes and cereals appear to be interrelated: an increase for cereals was associated with a decrease in potatoes and vice versa. Among the foods of animal origin, the availability of eggs and meat

decreased, whereas the availability of milk products and fish (incl. seafood) did not show a clear tendency. The average availability of sugar (incl. sugar products) remained quite stable during the period under consideration. The same seems to be true for alcoholic beverages and added lipids, but a closer look reveals that there were shifts in the availability of the different types of foods within that groups. Within the group of alcoholic beverages, there is an increasing availability of wine, while the availability of other alcoholic beverages (beer, spirits) decreased. Among the added lipids, a slight decrease in availability of animal fats can be seen, if the 1988 and 1993 datasets are compared. The availability of vegetable lipids hardly changed in the 10 years period considered, but this can be attributed to a considerable decrease of margarine availability accompanied by an increasing availability of vegetable oils (data on different sub-groups within the main food groupings are available in the DafneSoft application tool, cf. [www.nut.uoa.gr](http://www.nut.uoa.gr)).

### **Association of Food Availability with Socio-economic Characteristics**

The following socio-economic characteristics are regarded:

- urbanisation of the area where households are located,
- occupation of the heads of the households,
- education of the heads of the households,
- composition of the households.

**Urbanization:** With respect to the degree of urbanization of the participating residences, three groups are distinguished: rural, semi-urban and urban areas (cf. Table 2).

The cross-sectional analyses show that the average availability of meat and added lipids decreased with increasing degree of urbanization, whereas the availability of fruits and vegetables increased. This problem can be found in all the three datasets that are analysed. Furthermore, in the datasets of 1993 and 1998 a positive association was found for the availability of milk and dairy products and the degree of urbanization.

The longitudinal analyses show that the association of the availability of cereals with the degree of urbanization diminishes from 1988 to 1998 (cf. Fig. 2). In 1988, the average cereal availability is highest in rural and lowest in urban areas with a difference of approx. 10 %. In 1993, the same association was still seen, but the difference between the average availability in rural and urban

areas was smaller. And finally in the 1998 dataset, the average availability of cereals in rural, semi-urban and urban areas was almost equal.

The availability of potatoes shows quite a strong association with the degree of urbanization, but the type of association changed over time: In 1988, the potato availability clearly increased with the degree of urbanization, amounting to approx. 92 g/p/d in rural areas and 106 g/p/d and 111 g/p/d in semi-urban and urban areas, respectively. In the two other datasets, however, the highest availability can be seen in rural areas, whereas the lowest is in the urban areas. The same results occurred when potato products were excluded from the analysis and only fresh potatoes were considered (data available in the DafneSoft application tool, cf. [www.nut.uoa.gr](http://www.nut.uoa.gr)).

**Occupation:** With respect to the type of occupation of the heads of the participating households, five groups are distinguished: non-manual workers, manual workers, unemployed persons, pensioners, and others, e.g. students, housewives (cf. Tables 3a, 3b).

In this context, occupation is a proxy for different determinants of nutritional behaviour. On the one hand, it reflects the level of formal education and prosperity, and thus can be interpreted as an indicator of socio-economic status (SES). It can be assumed that non-manually working people tend to have reached higher levels of education and, by inference, have higher income levels than manually working people or even unemployed ones. On the other hand, occupation can also be regarded as a proxy for age, since the status of being retired indicates that the corresponding persons – and most likely also the other members of their households – are older than persons living in households headed by persons with any other kind of occupation.<sup>2</sup>

With this in mind, cross-sectional analyses of food availability by the kind of occupation of the heads of the participating households showed that non-manual work and thus probably higher levels of SES were associated with a higher availability of juices and a lower availability of eggs,

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<sup>2</sup> Of course, occupation also reflects physical activity, since manual work, for instance, is more strenuous and thus more energy demanding than non-manual work. But the data available only refer to the type of occupation of household heads and it seems questionable whether this attribute can validly be transferred from household heads to other household members. Therefore, the aspect of physical activity is not further regarded in the context of occupation.

potatoes, added lipids and sugar (incl. sugar products). The availability of fruits and vegetables (cf. Fig. 3) also appeared to be associated with SES, but this mostly refers to the differences found for households headed by non-manual workers versus households headed by manual workers with the first consuming higher quantities than the latter. If households headed by unemployed persons are also taken into consideration, the association between fruit and vegetable availability and SES seems to vanish, because quite high availabilities of fruits and vegetables were recorded in households headed by unemployed persons, sometimes even higher than the availability in households headed by non-manual workers. For this, two possible explanations can be found: The fact that food consumption away from home is not recorded does not equally affect employed and unemployed people. It can be expected that employed people eat a considerable amount of vegetables away from home during their lunch breaks, which is not reflected by the data presented here. In households headed by unemployed persons the availability of meat might be substituted by vegetables (e.g. cabbage) for economic reasons, which would lead to relatively high availabilities of vegetables.

The availability of added lipids was lower in households headed by non-manual workers than in households headed by manual workers. If the various types of lipids are differentiated, households headed by non-manual workers acquired less margarine than any other group, but their availability of animal fat (e.g. butter, lard) was higher than that of households headed by manual workers (data on different types of added lipids available in the DafneSoft application tool, cf. [www.nut.uoa.gr](http://www.nut.uoa.gr)).

Considering the availability of alcoholic beverages differentiated by occupation, no clear association can be detected. But if the different kinds of beverages are distinguished, it clearly shows that in households headed by non-manual workers the availability of wine is higher and the availability of beer lower than in households headed by manual workers (data on different kinds of beverages available in the DafneSoft application tool, cf. [www.nut.uoa.gr](http://www.nut.uoa.gr)).

Furthermore, the cross-sectional analyses show, that among the considered groups, elderly people (i.e. household headed by retired persons) have the highest per capita availability of most of the food items regarded (except juices). On the one hand, this finding would explain the high prevalence of overweight in this group of persons (BENEKE & VOGEL 2003), but on the other hand it has to be assumed that in households of elderly people the differences of the amounts of food

reported been acquired and those actually eaten by household members are larger than in other households. The need to avoid running out of certain foodstuffs, together with the very act of being surveyed have often been reported as stimulating over purchasing among elderly individuals, particularly among women living alone (PLATT ET AL. 1964; NELSON ET AL. 1985; CHESHER 1997).

Exemplarily, the Figures 3 and 4 depict the availability of vegetables and meat in the years 1988, 1993 and 1998, differentiated by the occupation of the heads of the households. They show, that the increase of vegetable availability (cf. Fig. 3) is a general trend that can be found independent of SES or age of the persons. The decrease of meat availability, however, is not such a common trend (cf. Fig. 4). It mostly refers to households with manually or non-manually working heads or households with unemployed heads, but in households headed by retired persons, the average meat availability did not considerably change between 1988 and 1998.

**Education:** In the datasets available, there is hardly any information on education of the participants of the surveys: In the 1988 and 1993 datasets, such information is completely missing, and in the latest dataset of 1998 just the kinds of vocational training are given, whereas general educational levels (like completion of high school or any other type of secondary school) is also lacking.

Based on the information provided in the 1998 dataset, a categorization of the heads of the households by elementary, secondary or higher education was attempted. In this way, only 3 % of the household heads were judged as having elementary education, while almost two thirds have secondary education and about one third higher education.

Given this categorization, it showed that the level of education was clearly positively associated with the availability of nuts, cereals, fruits, fish, juices and alcoholic beverages and negatively associated with the availability of potatoes, eggs, meat, added lipids, non alcoholic beverages (excluding juices) and sugar products (cf. Table 4 and Fig. 5).

**Household Composition:** Six different types of households are distinguished, according to their composition (cf. Tables 5a, 5b), namely: households with or without children, and those with children include either one or two adults. Households without children are either single households



or households consisting of a couple. In either case, it is distinguished, whether or not the households are made up by elderly people (above 65 years of age). Other possible types of households are also included in the datasets, but are not considered here.

If households with one or two adult members are considered, the cross-sectional analyses of mean food availability by household composition showed that the per capita availability of some foods increased with increasing household size. This holds for potatoes, meat and alcoholic beverages. The opposite was true for milk, non-alcoholic beverages and to some extent also for cereals and juices. Two effects could possibly explain these observations:

The preparation of some dishes is quite demanding and people tend to think, it is the more worth the efforts, the more persons will be there to share it. Examples for such demanding foods are potatoes and meat, whereas there is a tendency of preferring cereals when people are on their own. Some items – especially alcoholic beverages – seem to be more enjoyable when consumed in company than alone, whereas other items – like milk, non-alcoholic beverages and juices – are rather consumed when people are alone.

To a certain extent, vegetables can also be counted among those foods that require quite laborious preparation (cf. Fig. 6). But this can clearly be seen only in households with one or two adult members below the age of 66 years. In these households, the effect of the demanding nature of vegetables is probably even intensified by the habit that females tend to take care of the health of their male partners and have them eat more vegetables than the males would consume if they lived on their own. In households consisting of elderly members these effects are concealed by the fact that the lonely living elderly are predominantly females, due to their longer life expectancy and the effects of World War II. Since females generally tend to consume bigger amounts of vegetables than males, the mean vegetable availability of single elderly is altogether higher than the availability of households consisting of a couple of elderly persons.

Regarding sugar and sugar products the lowest per capita availability can be seen in households with children (probably due to their lower per capita energy requirement), whereas the availability of sugar and sugar products was highest in households of elderly people. Furthermore, it seems that on the average females consume higher amounts of sugar and sugar products than males, because in

lone parent households (predominantly with female, but without male adults) the per capita availability was higher than in households with children and a parent couple and in households of lone elderly (who are predominantly females) it was higher than in households of a couple of elderly people.

## **Discussion**

The presented results on trends in food availability are in good agreement with analyses of food availability trends based on food balance sheets, as published by the German Society of Nutrition (Deutsche Gesellschaft für Ernährung, DGE) in their “Nutrition Report 2004” (DGE 2004). Fig. 7a and 7b show some examples of the trends found in that report: Since about 1990, the availability of meat is slowly decreasing which is mostly to be attributed to beef and calf, since the availability of pork was quite stable during that time. The availability of potatoes decreased tremendously during the second half of the last century, but since about 1990 the decrease slowed down, such that the availability of potatoes is now almost constant. The opposite is true for the availability of vegetables, which steadily increased during the last decades, and this increase has even been intensified since about 1990.

Furthermore, the food balance sheets confirm a decreasing availability of eggs, margarine, beer and spirits and an increasing availability of fruits, vegetable oils and wine (DGE 2004).

Considered from a public health point of view, most of the trends found are favorable, since the availability of foods of animal origin as well as alcoholic beverages seems to decline, whereas the availability of foods of plant origin increases. This leads to decreasing intakes of saturated fatty acids and ethanol as well as to increasing intakes of unsaturated fatty acids, vitamins (like folate, vitamin C and E) and bioactive phyto-chemicals (like carotenoids, flavonoids, phyto-steroids or phenolic acids). But the analyses of trends in food availability by socioeconomic variables also show, that the desirable changes of food habits are not evenly distributed in the population.

Generally, people of higher socioeconomic status make healthier food choices than people of lower socioeconomic status. This reveals again, that campaigns promoting healthy diets do not reach people of low socioeconomic status efficiently and still innovative approaches are necessary to establish a healthy lifestyle in the whole population.

The analyses also show some shortcomings in the HBS data available:

The first one refers to food consumption away from home (FCAH), which is assessed only as total expenditures without differentiation of the kinds of food consumed. Thus, the presented results are exclusively based on data on food availability at home. This would not cause considerable problems, if FCAH could be assumed to be constant over time and evenly distributed in the population. Both assumptions, however, can easily be rejected. For instance, FCAH is associated with the food supply to employed persons and thus is directly affected by changes of the unemployment rate. Furthermore, FCAH can be counted among luxuries, which has consequences for time series as well as for cross-sectional analyses. In the first case the implication is that FCAH increases in times of economic growth and decreases otherwise. In the latter case, the nature of FCAH as a luxury means that it is positively associated with SES, and by this not evenly distributed in the population. Altogether, however, it should not be concluded, that HBS data are inappropriate for nutrition monitoring, because FCAH accounts for quite a small percentage of the overall food consumption. An individual dietary survey conducted in Germany in 1998, which specifically focused on FCAH revealed that only about 4 to 16 % of the energy intake, can be assigned to FCAH, depending on age and gender (DGE 2000). Thus, the HBS data represent the major share of the total food consumption and can therefore be considered as an acceptable approximation of the total. For future dietary analyses of HBS data attempts are made to estimate kinds and quantities of the missing FCAH (GEDRICH 2005; GEDRICH ET AL. 2005), but an assessment of the validity of this approach is not yet available.

The second shortcoming of the analyses presented here is the fact that the populations of the 1988 survey and the surveys of 1993 and 1998 are not identical, due to the German unification in 1990. So differences in mean availability between 1988 and 1993 are not necessarily caused by changes of dietary habits. They also need to be attributed to the fact that the population under consideration grew in 1990 from some 65 million to about 80 million inhabitants. The latter is probably responsible for the steep increases of the availability of potatoes, fruits, non-alcoholic beverages and juices, which are observable if the mean availabilities of 1988 are compared to the corresponding figures of the 1990s. Nevertheless, the structural break in the data available is not necessarily to be seen as a shortcoming, because it also provides the advantage of a comparison of the food habits in the Western and Eastern part of the unified Germany. But it is obvious as well, that further analyses

are required to better understand the different food habits in both parts of the country and their individual development over time.

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**Table 1:** Overall mean food availability in Germany, by survey year, (quantity/person/day).

| <b>Food Group</b>                           | <b>Mean availability</b> |             |             |
|---|--------------------------|-------------|-------------|
|   | <b>1988</b>              | <b>1993</b> | <b>1998</b> |
| <b>Eggs (pieces)</b>                        | 0.5                      | 0.3         | 0.4         |
| <b>Potatoes and other starchy roots (g)</b> | 105                      | 125         | 115         |
| <b>Pulses (g)</b>                           | 0.9                      | 0.8         | 0.6         |
| <b>Nuts (g)</b>                             | 4.9                      | 7.4         | 7.5         |
| <b>Cereals and cereal products (g)</b>      | 202                      | 195         | 217         |
| <b>Milk and milk products (g)</b>           | 321                      | 306         | 311         |
| <b>Meat, meat products and dishes (g)</b>   | 145                      | 132         | 132         |
| <b>Vegetables (fresh and processed) (g)</b> | 134                      | 143         | 180         |
| <b>Fish, seafood and dishes (g)</b>         | 13                       | 22          | 16          |
| <b>Fruits (fresh and processed) (g)</b>     | 159                      | 181         | 182         |
| <b>Total added lipids (g)</b>               | 41                       | 37          | 37          |
| <b>Alcoholic beverages (ml)</b>             | 195                      | 210         | 200         |
| <b>Non alcoholic beverages (ml)</b>         | 728                      | 950         | 915         |
| <b>Sugar and products (g)</b>               | 58                       | 59          | 59          |
| <b>Juices (fruit and vegetable) (ml)</b>    | 88                       | 123         | 123         |

**Table 2:** Mean food availability in Germany, by locality of the dwelling and by survey year, (quantity/person/day).

| Food Group                           | Rural |      |      | Semi-Urban |      |      | Urban |      |      |
|--------------------------------------|-------|------|------|------------|------|------|-------|------|------|
|                                      | 1988  | 1993 | 1998 | 1988       | 1993 | 1998 | 1988  | 1993 | 1998 |
| Eggs (pieces)                        | 0.5   | 0.3  | 0.4  | 0.5        | 0.4  | 0.4  | 0.5   | 0.3  | 0.3  |
| Potatoes and other starchy roots (g) | 92    | 137  | 123  | 106        | 126  | 120  | 111   | 116  | 100  |
| Pulses (g)                           | 0.7   | 0.7  | 0.5  | 0.9        | 0.7  | 0.7  | 0.8   | 0.8  | 0.6  |
| Nuts (g)                             | 5.0   | 6.1  | 6.0  | 5.2        | 7.6  | 8.3  | 4.3   | 7.9  | 7.6  |
| Cereals and cereal products (g)      | 213   | 205  | 219  | 205        | 195  | 218  | 191   | 189  | 216  |
| Milk and milk products (g)           | 324   | 296  | 299  | 317        | 308  | 313  | 326   | 310  | 318  |
| Meat, meat products and dishes (g)   | 153   | 138  | 145  | 146        | 136  | 131  | 139   | 123  | 122  |
| Vegetables (fresh and processed) (g) | 103   | 119  | 166  | 131        | 141  | 181  | 154   | 160  | 190  |
| Fish, seafood and dishes (g)         | 11    | 19   | 14   | 12         | 21   | 16   | 16    | 25   | 19   |
| Fruits (fresh and processed) (g)     | 138   | 155  | 177  | 157        | 179  | 186  | 172   | 200  | 180  |
| Total added lipids (g)               | 41    | 38   | 38   | 41         | 37   | 36   | 40    | 35   | 36   |
| Alcoholic beverages (ml)             | 190   | 200  | 195  | 197        | 216  | 195  | 195   | 205  | 213  |
| Non alcoholic beverages (ml)         | 658   | 882  | 867  | 736        | 941  | 911  | 755   | 1005 | 961  |
| Sugar and products (g)               | 59    | 60   | 58   | 59         | 60   | 60   | 55    | 57   | 58   |
| Juices (fruit and vegetable) (ml)    | 89    | 128  | 126  | 90         | 124  | 126  | 83    | 119  | 116  |

**Table 3a:** Mean food availability in Germany, by occupation of the household head and by survey year (quantity/person/day).

| Food groups                          | Manual |      |      | Non manual |      |      | Unemployed |      |      |
|--------------------------------------|--------|------|------|------------|------|------|------------|------|------|
|                                      | 1988   | 1993 | 1998 | 1988       | 1993 | 1998 | 1988       | 1993 | 1998 |
| Eggs (pieces)                        | 0.5    | 0.3  | 0.4  | 0.4        | 0.3  | 0.3  | 0.5        | 0.3  | 0.4  |
| Potatoes and other starchy roots (g) | 96     | 114  | 92   | 78         | 92   | 87   | 131        | 151  | 155  |
| Pulses (g)                           | 0.8    | 0.6  | 0.5  | 0.7        | 0.7  | 0.6  | 0.9        | 0.6  | 0.8  |
| Nuts (g)                             | 4.5    | 6.5  | 5.4  | 5.2        | 7.9  | 8.2  | 3.6        | 5.7  | 6.4  |
| Cereals and cereal products (g)      | 202    | 190  | 212  | 181        | 179  | 212  | 190        | 197  | 214  |
| Milk and milk products (g)           | 319    | 296  | 301  | 311        | 298  | 302  | 297        | 285  | 307  |
| Meat, meat products and dishes (g)   | 156    | 141  | 141  | 124        | 116  | 115  | 143        | 134  | 131  |
| Vegetables (fresh and processed)(g)  | 116    | 124  | 158  | 131        | 140  | 166  | 133        | 138  | 187  |
| Fish, seafood and dishes (g)         | 11     | 18   | 13   | 12         | 19   | 15   | 12         | 21   | 17   |
| Fruits (fresh and processed) (g)     | 139    | 156  | 145  | 150        | 172  | 163  | 136        | 172  | 168  |
| Total added lipids (g)               | 39     | 36   | 37   | 34         | 31   | 31   | 41         | 39   | 37   |
| Alcoholic beverages (ml)             | 194    | 207  | 198  | 192        | 211  | 196  | 195        | 191  | 203  |
| Non alcoholic beverages (ml)         | 710    | 899  | 912  | 676        | 894  | 888  | 721        | 876  | 921  |
| Sugar and products (g)               | 55     | 55   | 55   | 51         | 51   | 54   | 51         | 55   | 57   |
| Juices (fruit and vegetable) (ml)    | 94     | 127  | 129  | 102        | 137  | 137  | 79         | 128  | 112  |



**Table 3b:** Mean food availability in Germany, by occupation of the household head and by survey year (quantity/person/day).

| Food groups                          | Retired |      |      | Others |      |      |
|--------------------------------------|---------|------|------|--------|------|------|
|                                      | 1988    | 1993 | 1998 | 1988   | 1993 | 1998 |
| Eggs (pieces)                        | 0.5     | 0.4  | 0.5  | 0.5    | 0.3  | 0.3  |
| Potatoes and other starchy roots (g) | 130     | 181  | 182  | 135    | 149  | 90   |
| Pulses (g)                           | 1.1     | 1.1  | 0.8  | 1.1    | 0.6  | 1.0  |
| Nuts (g)                             | 5.4     | 8.0  | 9.1  | 4.2    | 7.5  | 6.6  |
| Cereals and cereal products (g)      | 219     | 230  | 236  | 218    | 198  | 207  |
| Milk and milk products (g)           | 332     | 340  | 340  | 339    | 304  | 316  |
| Meat, meat products and dishes (g)   | 152     | 154  | 156  | 161    | 119  | 100  |
| Vegetables (fresh and processed) (g) | 146     | 171  | 228  | 154    | 147  | 171  |
| Fish, seafood and dishes (g)         | 16      | 31   | 22   | 14     | 21   | 15   |
| Fruits (fresh and processed) (g)     | 187     | 230  | 263  | 169    | 187  | 149  |
| Total added lipids (g)               | 48      | 47   | 47   | 47     | 37   | 33   |
| Alcoholic beverages (ml)             | 204     | 223  | 220  | 186    | 184  | 134  |
| Non alcoholic beverages (ml)         | 771     | 1145 | 981  | 821    | 908  | 830  |
| Sugar and products (g)               | 68      | 78   | 74   | 63     | 62   | 52   |
| Juices (fruit and vegetable) (ml)    | 68      | 90   | 95   | 82     | 137  | 110  |

**Table 4:** Mean food availability in Germany, by educational level of the household head in 1998 (quantity/person/day).

| Food Group                           | 1998                                    |                           |                        |
|--------------------------------------|---|---------------------------|------------------------|
|                                      | 1. Illiterate/<br>Elementary Education* | 2. Secondary<br>Education | 3. Higher<br>Education |
| Eggs (pieces)                        |   | 0.4                       | 0.3                    |
| Potatoes and other starchy roots (g) |   | 117                       | 103                    |
| Pulses (g)                           |   | 0.6                       | 0.8                    |
| Nuts (g)                             |   | 7.1                       | 9.1                    |
| Cereals and cereal products (g)      |   | 216                       | 224                    |
| Milk and milk products (g)           |   | 307                       | 322                    |
| Meat, meat products and dishes (g)   |   | 137                       | 114                    |
| Vegetables (fresh and processed) (g) | N/A                                     | 176                       | 192                    |
| Fish, seafood and dishes (g)         |   | 16                        | 18                     |
| Fruits (fresh and processed) (g)     |   | 177                       | 197                    |
| Total added lipids (g)               |   | 37                        | 34                     |
| Alcoholic beverages (ml)             |   | 199                       | 212                    |
| Non alcoholic beverages (ml)         |   | 925                       | 887                    |
| Sugar and products (g)               |   | 59                        | 56                     |
| Juices (fruit and vegetable) (ml)    |   | 120                       | 134                    |

\* In the case of the education of the household head, results will not be presented for the Illiterate/Elementary category since it represents 3% of the total population

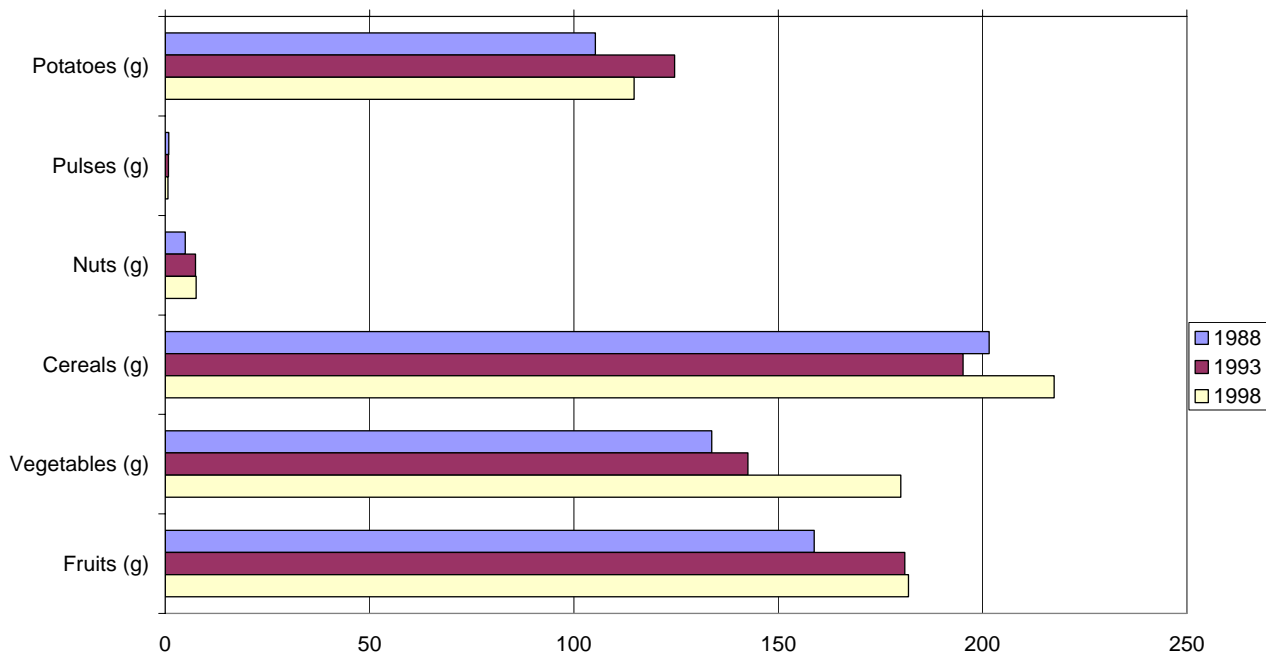
**Table 5a:** Mean food availability in Germany, by household composition and by survey year (quantity/person/day).

| Food groups                          | Single Adult Household |      |      | Adult HH-2 members |      |      | Adult + children<br>(lone parents) |      |      | Adult + Children |      |      |
|--------------------------------------|------------------------|------|------|--------------------|------|------|------------------------------------|------|------|------------------|------|------|
|                                      | 1988                   | 1993 | 1998 | 1988               | 1993 | 1998 | 1988                               | 1993 | 1998 | 1988             | 1993 | 1998 |
| Eggs (pieces)                        | 0.5                    | 0.3  | 0.4  | 0.5                | 0.4  | 0.4  | 0.4                                | 0.3  | 0.3  | 0.4              | 0.3  | 0.3  |
| Potatoes and other starchy roots (g) | 102                    | 111  | 104  | 130                | 151  | 131  | 80                                 | 91   | 71   | 76               | 89   | 77   |
| Pulses (g)                           | 0.8                    | 0.7  | 1.0  | 1.1                | 0.9  | 0.7  | 0.6                                | 0.5  | 0.6  | 0.7              | 0.6  | 0.5  |
| Nuts (g)                             | 4.8                    | 9.7  | 8.4  | 5.5                | 8.5  | 11.0 | 3.6                                | 6.1  | 4.7  | 4.6              | 6.2  | 5.8  |
| Cereals and cereal products (g)      | 218                    | 210  | 236  | 217                | 215  | 227  | 176                                | 170  | 212  | 179              | 170  | 205  |
| Milk and milk products (g)           | 357                    | 353  | 353  | 319                | 318  | 321  | 323                                | 286  | 301  | 302              | 278  | 289  |
| Meat, meat products and dishes (g)   | 133                    | 122  | 120  | 179                | 166  | 160  | 107                                | 93   | 92   | 128              | 112  | 110  |
| Vegetables (fresh and processed) (g) | 159                    | 171  | 201  | 168                | 179  | 224  | 114                                | 112  | 144  | 112              | 114  | 137  |
| Fish, seafood and dishes (g)         | 16                     | 29   | 19   | 17                 | 29   | 20   | 9                                  | 11   | 11   | 9                | 14   | 11   |
| Fruits (fresh and processed) (g)     | 181                    | 236  | 201  | 185                | 211  | 228  | 141                                | 154  | 126  | 127              | 140  | 125  |
| Total added lipids (g)               | 44                     | 38   | 38   | 46                 | 43   | 41   | 33                                 | 28   | 28   | 33               | 31   | 30   |
| Alcoholic beverages (ml)             | 241                    | 276  | 243  | 287                | 303  | 285  | 76                                 | 81   | 79   | 167              | 162  | 146  |
| Non alcoholic beverages (ml)         | 913                    | 1323 | 1159 | 838                | 1091 | 1033 | 682                                | 846  | 854  | 623              | 751  | 766  |
| Sugar and products (g)               | 60                     | 63   | 62   | 61                 | 63   | 63   | 55                                 | 54   | 51   | 49               | 48   | 50   |
| Juices (fruit and vegetable) (ml)    | 88                     | 132  | 132  | 76                 | 128  | 118  | 121                                | 141  | 130  | 103              | 131  | 137  |

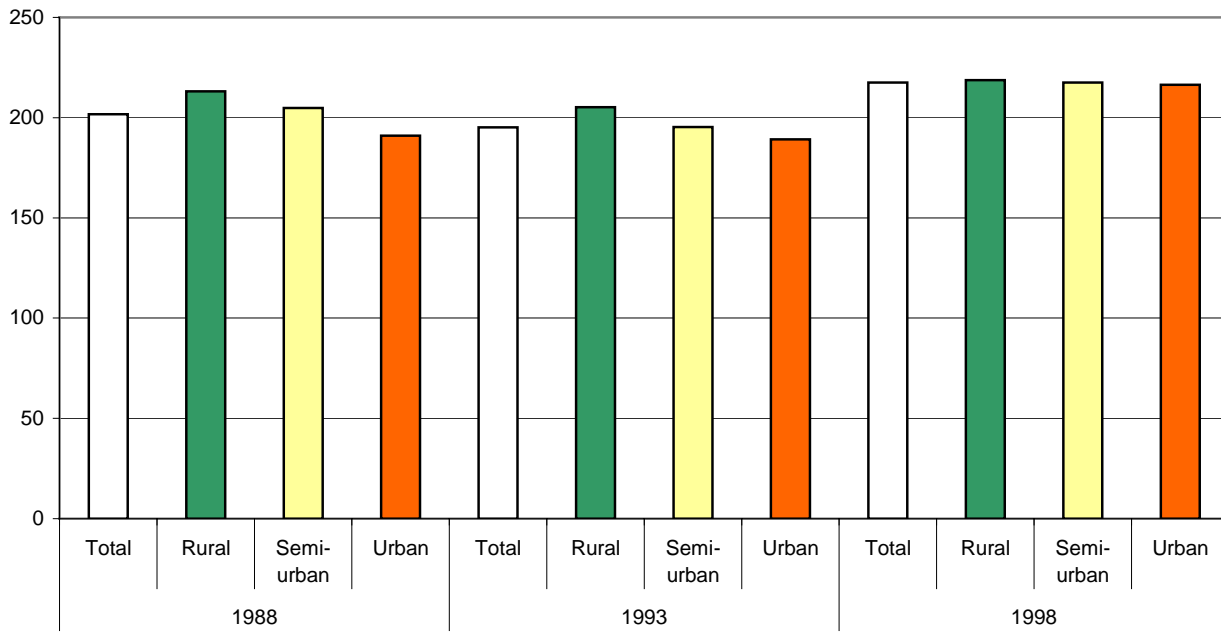
**Table 5b:** Mean food availability in Germany, by household composition and by survey year (quantity/person/day).

| Food group                           | Single Elderly HH |      |      | Elderly HH - 2 members |      |      |
|--------------------------------------|-------------------|------|------|------------------------|------|------|
|                                      | 1988              | 1993 | 1999 | 1988                   | 1993 | 1999 |
| Eggs (pieces)                        | 0.6               | 0.5  | 0.4  | 0.6                    | 0.4  | 0.5  |
| Potatoes and other starchy roots (g) | 117               | 194  | 140  | 211                    | 188  | 194  |
| Pulses (g)                           | 0.9               | 1.0  | 0.9  | 1.4                    | 1.3  | 0.7  |
| Nuts (g)                             | 4.9               | 7.0  | 8.2  | 4.7                    | 8.9  | 8.0  |
| Cereals and cereal products (g)      | 254               | 241  | 234  | 218                    | 230  | 225  |
| Milk and milk products (g)           | 366               | 352  | 359  | 318                    | 342  | 316  |
| Meat, meat products and dishes (g)   | 152               | 138  | 128  | 176                    | 156  | 155  |
| Vegetables (fresh and processed) (g) | 153               | 178  | 217  | 153                    | 162  | 206  |
| Fish, seafood and dishes (g)         | 18                | 32   | 20   | 21                     | 31   | 24   |
| Fruits (fresh and processed) (g)     | 228               | 265  | 269  | 200                    | 241  | 251  |
| Total added lipids (g)               | 57                | 46   | 48   | 55                     | 49   | 46   |
| Alcoholic beverages (ml)             | 166               | 160  | 140  | 243                    | 251  | 222  |
| Non alcoholic beverages (ml)         | 880               | 1299 | 985  | 781                    | 1065 | 924  |
| Sugar and products (g)               | 81                | 88   | 81   | 76                     | 75   | 74   |
| Juices (fruit and vegetable) (ml)    | 61                | 86   | 91   | 45                     | 80   | 84   |

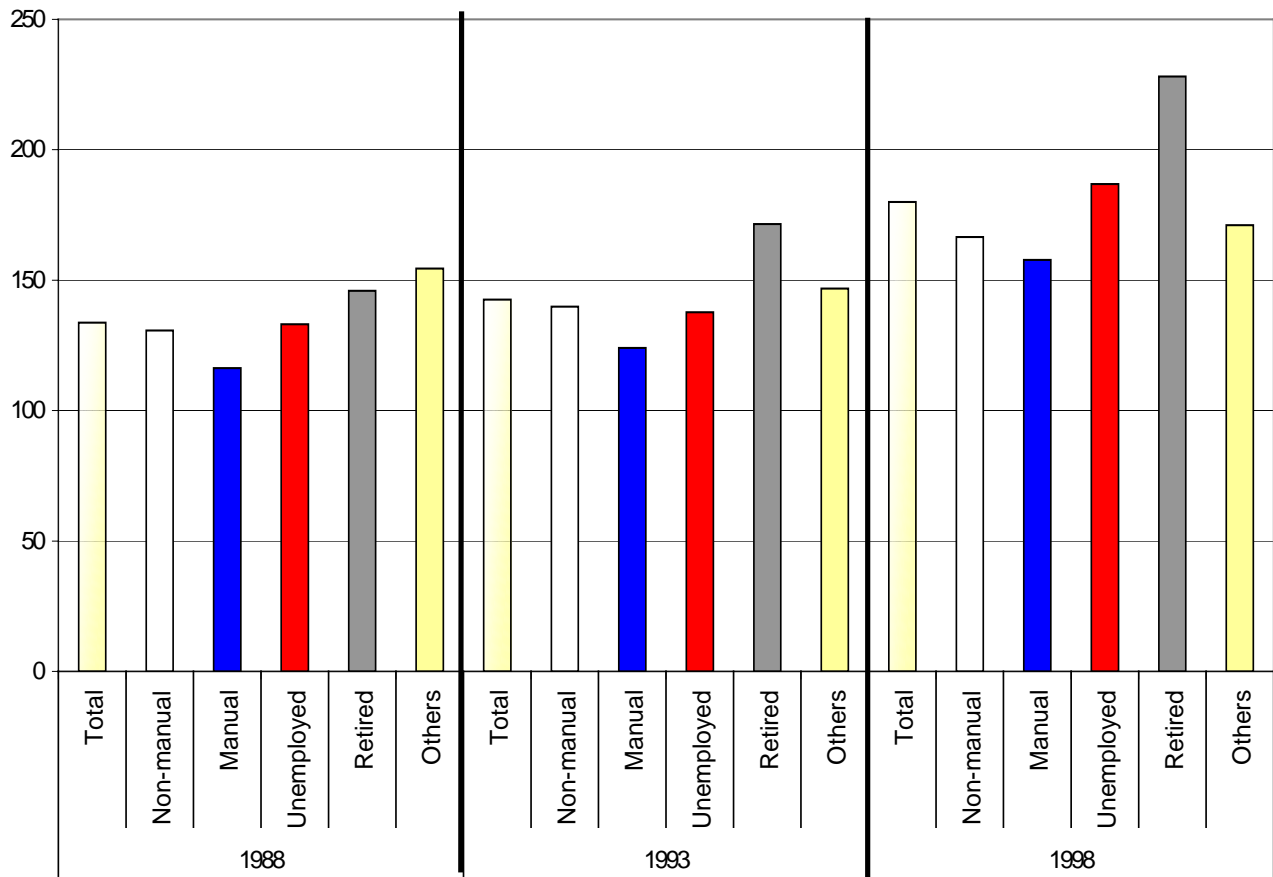
**Figure 1:** Mean availability of potatoes, pulses, nuts, cereal and cereal products, vegetables and fruits by survey year (g/person/day)



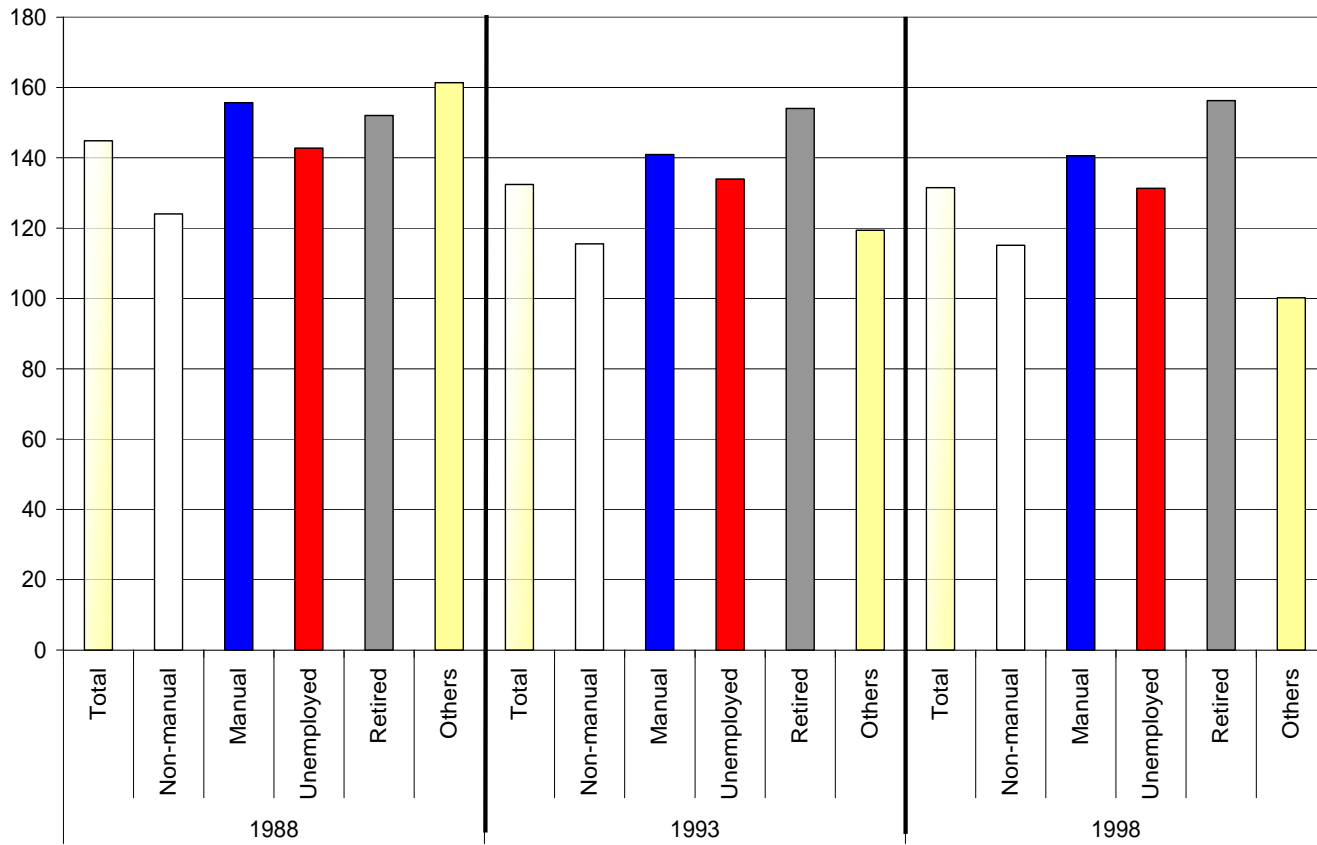
**Figure 2:** Mean availability of cereal and cereal products by locality of the dwelling and by survey year, (g/person/day)



**Figure 3:** Mean availability of vegetables by occupation of the household head and by survey year, (g/person/day)

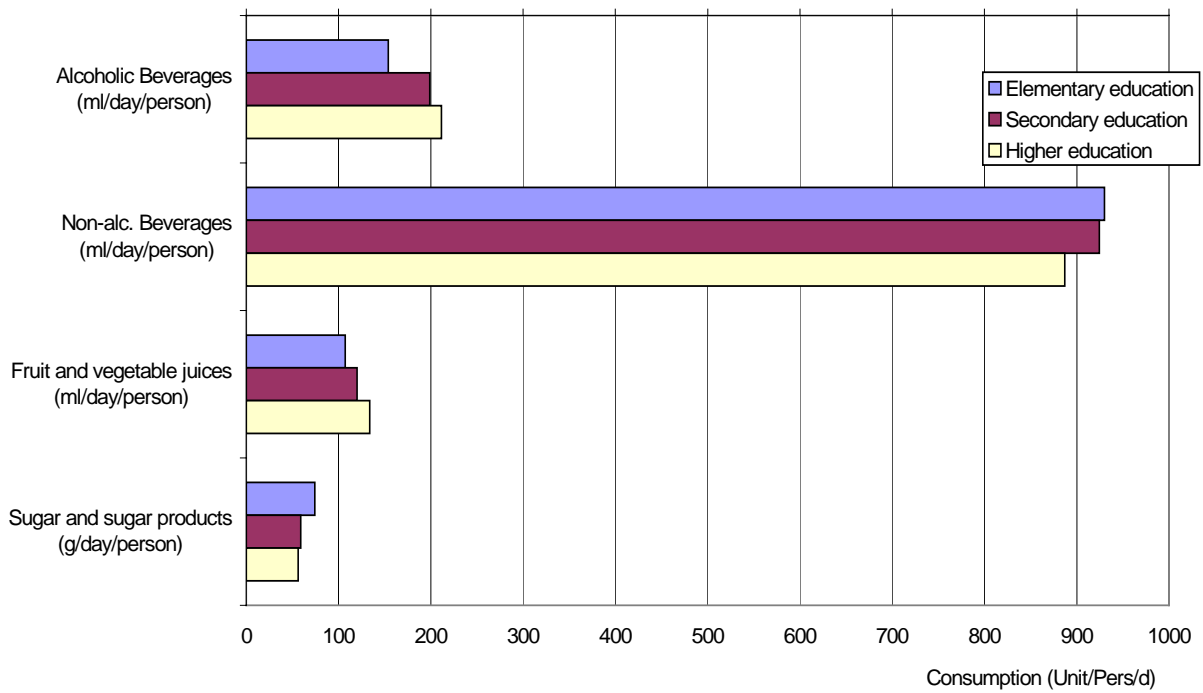


**Figure 4:** Mean availability of meat and meat products by occupation of the household head and by survey year (g/person/day)

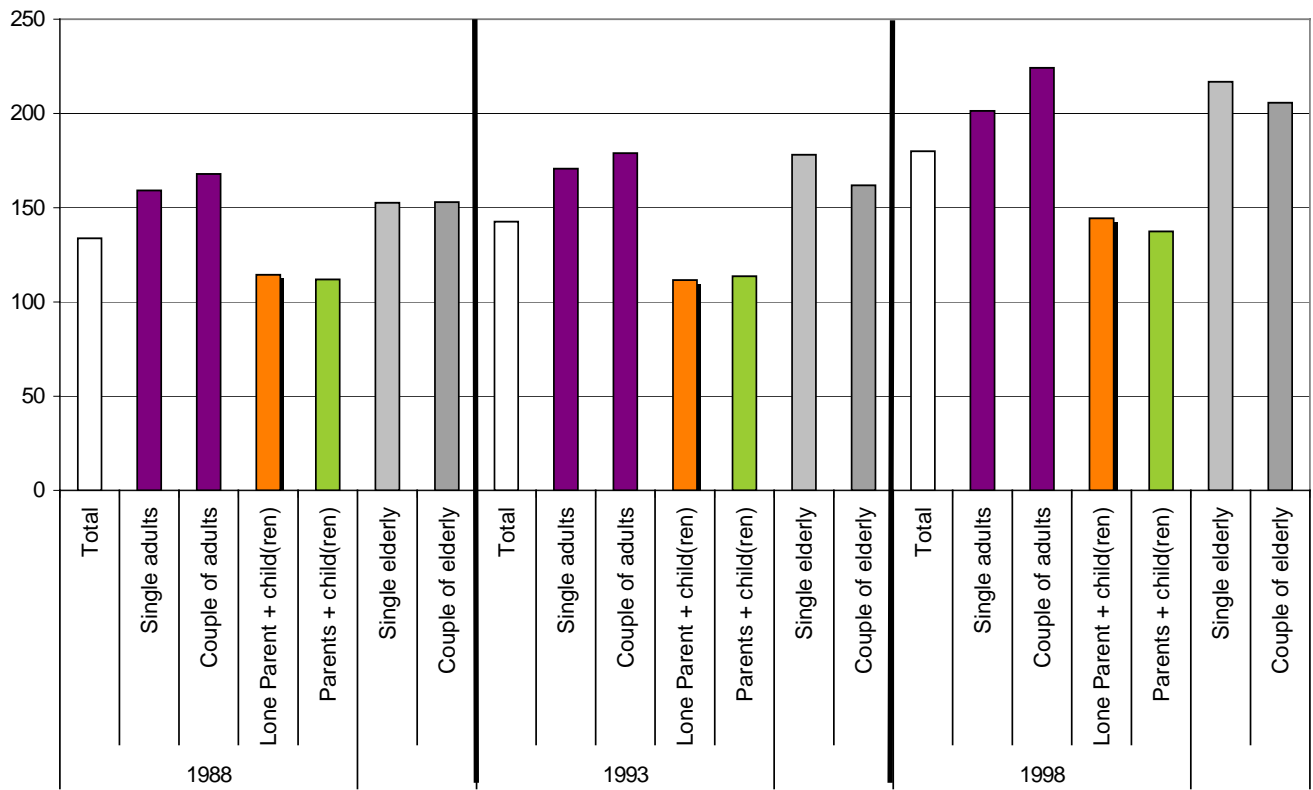




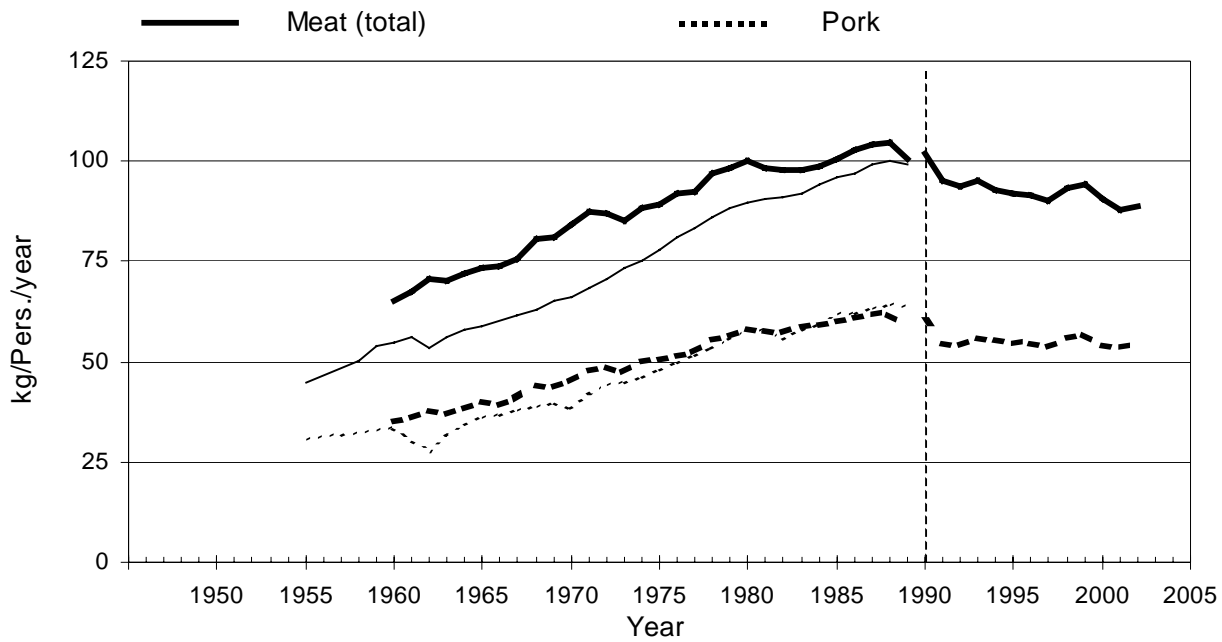
**Figure 5:** Mean availability of alcoholic and non-alcoholic beverages, sugar and sugar products by education level of the household head in 1998 (g/person/day)



**Figure 6:** Mean availability of vegetables, by household composition and by survey year, (g/person/day)

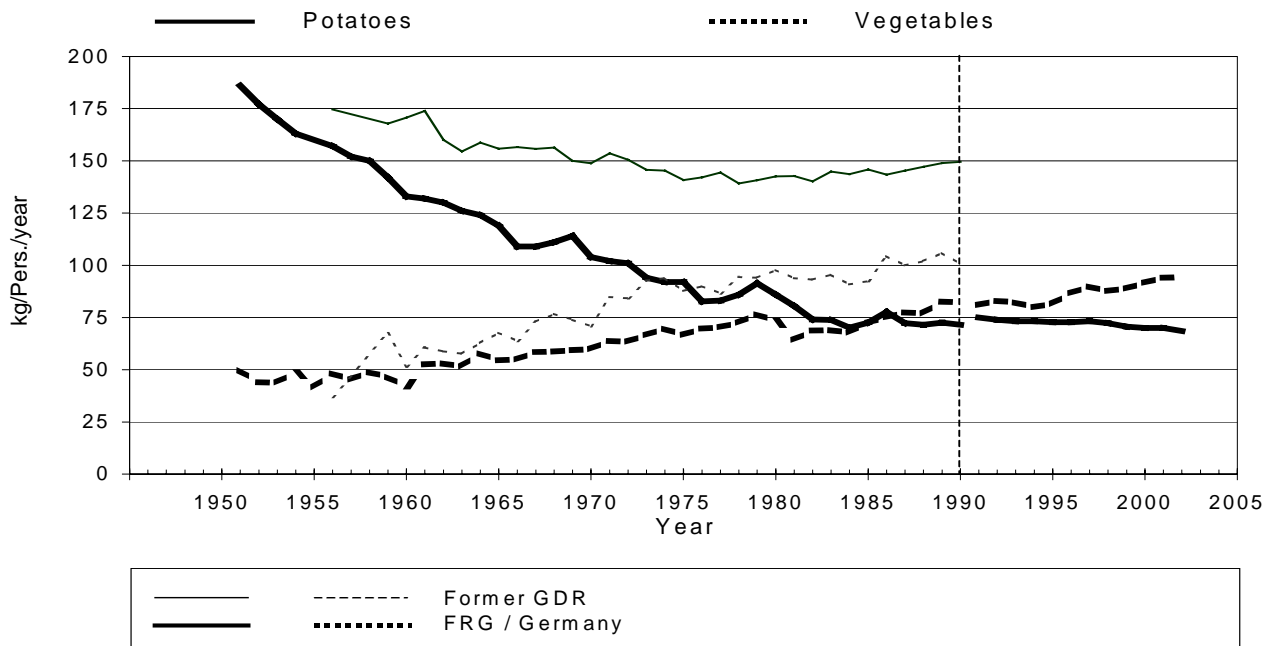


**Figure 7a:** Mean availability of meat and meat products during the last 50 years, according to food balance sheets, (kgr/person/day).



Source: Deutsche Gesellschaft für Ernährung [DGE] 2004

**Figure 7b:** Mean availability of potatoes and vegetables during the last 50 years, according to food balance sheets, (kgr/person/day).



Source: Deutsche Gesellschaft für Ernährung [DGE] 2004

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