



27th Scientific Annual Congress

**INFORMATION ON NATIONS' DIETS:
NEEDS AND USES
- EXPERIENCES FROM THE PAST,
LESSONS FOR THE FUTURE -**

**October 13 - 14, 2005
BfEL, Karlsruhe, Germany**

FEDERAL RESEARCH CENTRE FOR NUTRITION AND FOOD

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27th Scientific Annual conference of AGEV
in Cooperation with the Federal Research Centre for Nutrition and Food

October 13 - 14, 2005

**Information on Nations´ s Diet: Needs and Uses
Experiences from the Past, Lessons for the Future**

Programme

Thursday, October 13, 2005

Session 1:

10:00 Opening and Welcome
Bernhard Tauscher, Federal Research Centre for Nutrition and Food,
Karlsruhe
Georg Karg, AGEV
Ulrich Eidenmüller, Mayor of Karlsruhe
Chairperson: **Georg Karg**

10:15 Knowledge transfer from science into society - a permanent challenge
(**Andrea Holzmann-Jenkins**, Wien)

11:00 Information on nutritional behaviour in Germany
(**Ulrich Oltersdorf**, Karlsruhe)

11:45 A short history of collecting information on the national diet in England:
Some speculative observations
(**Anne Murcott**, Nottingham)

12:30 **Lunch Break**

Session 2: National Nutrition Surveys and Monitoring: Examples for the Current Status

Chairperson: **Kurt Gedrich**

14:00 Experiences from the Finbalt Health Monitor project
(**Ritva Prättälä**, Helsinki)

14:45 Nutrition monitoring in Germany and the National Nutrition Survey II
(**Christine Brombach**, Karlsruhe)

15:30 **Poster Session A - Nutrition Surveys**
incl. Coffee Break Chairperson: **Christine Brombach**

Session 3: Use of National Nutrition Surveys in Sciences

Chairperson: **Achim Bub**

- 16:30 The DAFNE initiative and individual based nutrition surveys:
Is there a link?
(**Androniki Naska**, Athens)
- 17:15 The Germans' diet: from single factors to a complex model
(**Ingrid Hoffmann**, Giessen)
- 18:00 **AGEV-Membership meeting**
- 20:00 **Evening Event**

Friday, October 14, 2005

Session 4: Use of National Nutrition Survey for the Market

Chairperson: **Ulrich Oltersdorf**

- 9:00 The view of Public Health Institutions
(**Barrie Margetts**, London)
- 9:45 How do food suppliers use such databases and how can they contribute
to them
(**Detlev Müller**, BLL; Procter & Gamble; Schwalbach/Taunus)
- 10:30 **Poster Session B – Nutrition Surveys and Software**
incl. Coffee Chairperson: **Brigitte Klamt**
Break
- Poster Session C – Results of Surveys**
Chairperson: **Marianne Eisinger-Watzl**
- 12:00 **Lunch Break**

Session 5: Use of National Nutrition Survey for the Information Society

Chairperson: **Angelika Meyer-Ploeger**

- 13:00 The mass media perspective
(**Anja Dannenberg**, Köln)
- 13:45 The educational perspective
(**Barbara Methfessel**, Heidelberg)
- 14:30 Final Discussion and Closing Remarks
- 15:00 Closing

Oral Presentations

Knowledge transfer from science into society - a permanent challenge

A. Holzmann Jenkins

Vienna Centre for Urban Knowledge Management and Institutional Learning (WZW), Vienna, Austria

This presentation will deal with both new challenges and international examples of good practice in the broad area of science communication.

First of all, we will focus on recent changes in the societal framework in which science takes place and on the shifts in the relationships between science and the public. We will argue that these changes are leading to the requirement of more and improved science communication. We will discuss a number of good reasons for communicating science to the public. With reference to several EU documents and initiatives, we will also discuss the target groups and the objectives of science communication, as well as opportunities for communicating science into society and their limits.

We will then present a few examples of good practices in science communication from all over Europe, covering both temporary science events like science festivals and permanent institutions for science communication like science parks or university programmes for the public.

Challenges associated with putting science communication into practice and promising ways of meeting such challenges will be discussed from the perspective of a science event organiser: How to deal with issues like stimulating acceptance for the need for science communication in science/within the scientific community, in politics and in business; raising public awareness of science issues and science events; identifying the right target groups; “translating” science into a language understandable by the public; creating appropriate and attractive events and settings for science communication; including children and young people in science events; encouraging interdisciplinary presentations; combining art and science; paying attention to the “psychology” of science communication, etc.



Andrea Holzmann-Jenkins

Research Areas:

Action Research in Knowledge Management and Science Policy for the Vienna Region: theoretical aspects, methods, implementation

Curriculum Vitae:

Since 2000 - Research Director of Wissenschaftszentrum Wien (Vienna Centre for Urban Knowledge Management and Institutional Learning (WZW) (founded in 1999); Consultant for the European Commission, DG V
1997-1999 - Research Manager of Sozialökonomische Forschungsstelle in Vienna (founded in 1997) Consultant on labour market policies, welfare policies and equal opportunity policies to political decision makers (Public Administration, Members of Parliament, White Collar Employees' Union)
Consultant for Social Reconstruction to CARE International in Bosnia-Herzegovina
1996-1997 - Free Lance Researcher in Great Britain
1991-1996 - Researcher and Lecturer at the Vienna University of Economics and Business Administration, Department of Social Policy; Consultant to various Austrian provincial and federal government departments
1988-1991 - Administrator of the WHO-Project “Health and Hospitals” at the Ludwig Boltzmann-Institute for Medical Sociology

Information on nutritional behaviour in Germany

U. Oltersdorf

Federal Research Centre for Nutrition and Food, Karlsruhe, Germany

According to the used broad definition of nutrition behaviour and the used bio-psycho-socio-ecological model, which integrates different theories on nutrition behaviour the huge frame for investigations is outlined first. The information on nutrition behaviour for a country is filled by investigating within a matrix with the following dimensions:

- The food chain from points of sale to points of eating (the meals), which are flows of resources.
- The information chain – the communication processes – reaching the consumers and influencing their behaviour (“consumer insights”).
- The personal dimensions; the biography of consumers and their characteristics (their roles; their “types”) and their “settings”.

A further general dimension is the time; behaviour changes are interrelated with changes within the society; thus longitudinal studies are needed too.

The research on nutrition behaviour in Germany is documented by AGEV (Working Association of Nutrition Behaviour). The available information show that there is information on aggregated information, like agrar-statistics (food balance) and household budget surveys. Commercial market studies on buying behaviour is available, but not on free access. Compared with the size of the research field, there is insufficient capacity in nutrition behaviour research institutions. There are gaps; a major deficit can be perceived concerning actual information on eating behaviour, therefore a new National Nutrition Survey is starting at the end of 2005. Further surveys are needed concerning nutrition information and communication; and other topics of consumer insights. The time dimensions is not yet recognised since there are no monitoring systems established yet. In the 4years-periodic German Nutrition Reports there are some time lines on food statistics, but not on nutrition behaviour in the broad sense.



Ulrich Oltersdorf

studied biochemistry at the University Stuttgart (Dr. rer. nat) and nutrition at the Justus-Liebig-University Giessen (Dr. oec.troph.habil). He is since 1991 director of the Institute of Nutritional Economics and Sociology of the Federal Research Centre of Nutrition and Food, Karlsruhe, Germany. His main field of scientific experiences and publications are related to human nutrition behaviour research (methods, meal pattern), nutrition epidemiology, nutrition system (interdisciplinary nutrition research), interaction between nutrients and non-nutrients and nutritional problems in the third world.

A short history of collecting information on the national diet in England: Some speculative observations

A. Murcott

University of Nottingham & City University, London, UK

Organised chronologically this talk describes key points in the history of the collection of dietary information in England. It begins with reference to seventeenth century origins in 'political arithmetic' to outline a history of the development of official statistics. This outline provides a background against which to consider the development of nutrition statistics and dietary surveys which will include consideration of the surveys by B.S. Rowntree (*Poverty: a study of town life London: Macmillan 1901*) and by John Boyd Orr (*Food Health and Income: a survey of adequacy of diet in relation to income London Macmillan 1936*). Moving to the second half of the twentieth century, the discussion will focus on National Food Survey and include record of the National Diet and Nutrition Surveys which are currently running.



Anne Murcott

holds an MA in Social Anthropology from the University of Edinburgh and a PhD in Sociology from the University of Wales and is author of numerous articles in sociology on various aspects of food, health and culture. She has edited and co-authored six books, including *The Sociology of Food: eating, diet and culture* with Stephen Mennell and Anneke van Otterloo. Serving as Director of the Economic & Social Research Council (UK) Research Programme "The Nation's Diet": the social science of food choice' (1992-1998) she also edited an associated volume under the same title, published in 1998 by Longman.

Currently she is Honorary Visiting Professor at City University in London, Honorary Professor, Department of Sociology, University of Leicester, Special Professor at the University of Nottingham, and Professor Emerita in Sociology at London South Bank University.

EXPERIENCES FROM THE FINBALT HEALTH MONITOR PROJECT

R. Prättälä

Department of Epidemiology and Health Promotion
National Public Health Institute, Helsinki, Finland

Finbalt Health Monitor is a collaborative system for monitoring health behaviour in Estonia, Finland, Latvia and Lithuania. The system was launched in the 1990s. All the countries have conducted a mailed questionnaire among a random sample of adult population every second year since 1998. The purpose of the system is to disseminate information and expertise between the countries in order to serve national health policies and health promotion efforts and to carry out comparative analyses on subjects of major public health interest. The system has been funded by national sources such as ministries. Coordination and maintenance of the collective data bank have been supported by the National Public Health Institute and the Finnish Ministry of Social Affairs and Health.

The core of the system is the collectively prepared questionnaire. The questionnaire covers several dimensions of health behaviours and can, therefore, include only few questions on food. The survey does not provide quantitative information on food consumption but the data can be used in identifying extreme groups, such as “high” and “low” users of certain foods and in following trends of food habits in the populations and their subgroups. A short food questionnaire can provide valuable information from large population groups at relative low cost and can be applied also by others than trained nutritionists. On the other hand, food habits questionnaires cannot be used in estimating nutrient intake. Choosing the right questions requires careful planning and pilots carried out by nutrition experts. A specific problem in the use of food habits questionnaires is that foods relevant for public health vary by nations, regions and cultures. For example, foods common in one country can be practically unknown in the neighboring areas.

In order to prepare internationally comparable questions that at the same time are relevant for national conditions, multidisciplinary research teams familiar with national cultures, diets and dietary problems are needed. In Finbalt Health Monitor a special emphasis has been laid to face-to-face meetings with the national experts and detailed discussions on the feasibility of all questions. The food-related results of Finbalt Health Monitor have been used as background material for nutrition policy planning and they have also been reported in several scientific analyses.

Ritva Prättälä

PhD, senior researcher, adjunct
professor
Department of Epidemiology
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National Public Health Institute
Helsinki, Finland

Nutrition Monitoring in Germany and the National Nutrition Survey

C. Brombach

National Food Consumption Survey II, Federal Research Centre for Nutrition and Food, Location Karlsruhe, Germany



Christine Brombach

Background: In Germany there is a lack of representative, current, reliable and valid data on the dietary intake of the German population. The first representative National Nutrition Survey dates back almost 20 years and concerned the West German States only. Since the last survey there were major changes in our society in respect to food supply, food and meal preparation, places of eating as well as diversification of working-, leisure- and consumer behaviour. Nutrition Monitoring is based on nutrition sciences and provides data for nutrition policy.

Methods: Data for the National Nutrition Survey will be collected on the individual level. The sample will encompass 20,000 German speaking residents aged 14 to 80 years. The sample will be randomised and recruited by the registry offices of the sample points. Eight mobile teams will visit 500 sample points in Germany within a twelve months period. In order to depict seasonality, the survey will be carried out in four waves. Participants are invited to research centres which are built up in each sample point. Each participant is requested to carry out a computer assisted personal interview (with the software DISHES 05) to describe the usual dietary intake. Each participant will have body weight and height measured. A questionnaire is handed out in the research centre and two 24-h recalls (EPIC-soft) will be carried out by telephone at least two weeks later. The field phase will start in November 2005 and end in November 2006.

Conclusions: Until today no nutrition monitoring exists for Germany. The data of the National Nutrition Survey will provide sound understanding of the nutritional status of the individual and the German population. This information will form the background for evaluation, implementation, and nutrition related programmes for the German population.

Since 11/2003: project coordinator of the National Consumption Survey at the Federal Research Centre for Nutrition, Karlsruhe,

2001-2003: research scholarship of the Federal State of Hessa,

2000-2001: research assistant at the Institute for Nutrition, University of Giessen,

1998-2000: postdoc research funded by the German Research Foundation (DFG),

1998: PhD at the Institute for Nutrition, University of Giessen,

1991-1996: research assistant at the Institute for Rural Sociology, University of Giessen,

1994: degree in education,

1990: M.Sc. and second major in Gerontology at Kansas State University)

1989: diploma in nutrition and home economics University of Giessen,

1987: internship at the Cherokee Indian Reservation, Cherokee, North Carolina (USA),

1984-1985: study at University of Tennessee, Knoxville, Tennessee (USA),

1982-1989: study of nutrition and home economics, University of Giessen.

Research area:

Consumer and nutrition behaviour, dietary intake, food and meal patterns, nutrition in life course, nutrition epidemiology, nutrition monitoring

The DAFNE initiative and individual based nutrition surveys: Is there a link?

A. Naska, E. Oikonomou, V. Foukas, K. Tsiotas, A. Trichopoulou
Department of Hygiene and Epidemiology, School of Medicine, University of Athens, Greece



Androniki Naska

2003: Lecturer of Hygiene and Epidemiology at the University
1998-2002: PhD entitled: Nutrition in Greece : Data collected in the Greek Household Budget Survey of 1994 and in the Greek component of the EPIC study, Department of Hygiene and Epidemiology, Medical School, University of Athens.
1996-97: MSc in Human Nutrition to the King's College, University of London.
1989-95: Graduate Chemist to the Department of Chemistry, University of Athens.

The European Union (EU), in the realm of actions in the field of public health, set up a programme of action aiming at establishing a Community Health Monitoring System that would provide information for measuring and monitoring health status in the EU and further support the planning and evaluating of strategies and actions at the Community, national and local level. Within this context, the European Commission has been supporting the Data Food Networking (DAFNE) project, in order to develop a European nutrition monitoring system based on data collected through the national household budget surveys (HBS). The project has been successful in harmonizing information on household food acquisitions, collected through the country representative HBS, and in integrating these standardised and comparable data in a food databank of currently 16, and soon 24, European countries.

At the European level, the undertaking of harmonized individual-based surveys is demanding and not yet feasible, since a common methodology has not yet been unanimously accepted. Hence, the harmonization of the HBS data according to the DAFNE methodology has been recognised as an alternative for following and comparing food choices at national and European level.

Over the years, the DAFNE databank has been recognised as a reliable source of dietary data, and together with the food balance sheets and the individual-based dietary surveys is considered in the process of monitoring and comparing trends and patterns in nutritional practices. In these comparisons, authors either select to directly compare the data retrieved from the various sources or to take into consideration the properties that data hold and the measurement errors operating in often different directions. The direct comparisons reveal a generally ambiguous picture, while elaborate analyses through complex modelling point towards an agreement mostly between the HBS-derived and the individual-based dietary data. A sound and realistic way, however, for evaluating the correlations between household food availability and individual food intake is by undertaking an individual-based dietary survey among the members of the households participating in the national HBS. Such surveys have been undertaken in certain European settings and results show a reasonable agreement between purchased and eaten amounts, particularly for aggregated food groups.

The Germans' diet: from single factors to a complex model

I. Hoffmann, I. Brunn, B. Cwik, E. Mertens¹

Institute of Nutrition Science, Giessen University, Germany

“The Germans eat too fatty, too salty, too sweet, too much.” Statements like this are often based on nutrition surveys comparing intake data on single food constituents to recommendations or correlating them with blood concentrations of nutrients or risk factors. However, studying single aspects or a combination of few aspects of such a complex theme like the Germans' diet may lead to formally and scientifically correct conclusions but still provide a very restricted and biased view of reality.

National consumption studies are designed to depict a nation's nutrition and to provide a base for decision makers and other professionals to implement changes of dietary habits and to solve nutrition-related problems. Both objectives necessitate taking into account the multitude of interrelated aspects of nutrition influencing each other. Neglecting the interrelatedness and multilayeredness in the process of problem-solving may result in further disturbances caused by side-effects and in multiplying the original issue - even when interventions had been planned carefully. This means that the data of national consumption studies should be used to capture diet as a whole instead of solely its parts. This allows to deduct new and promising problem-solving approaches.

Nutrition ecology is a rather new research area which may be applied to consider the multilayeredness and interrelatedness of nutrition and nutrition-related problems. In the concept of nutrition ecology nutrition is considered as a complex system encompassing the dimensions health, environment, society and economy.

The additional insights that may be gained by depicting the Germans' diet as a complex model instead of considering single factors will be demonstrated by presenting the result of a course within the Bachelor program for nutrition (“Special aspects of nutrition ecology”) at the Institute of Nutrition Science at the Giessen University.

¹Further contributors: Grötsch, N., Heidenbluth, K., Heller, R., Lamberts, V., Michels, I., Ndia Nimpa, J., Schreiber, N., Stang, K., Wittig, F., Schneider K., Meng B. (participants and supervisors of the course “Special aspects of nutrition ecology”)



Ingrid Hoffmann

Research areas:
Effect of different dietary regimens on health, environment and society, conceptual development of nutritional ecology, transfer and application of complex systems theory on nutrition, transdisciplinarity, nutritional epidemiology

Curriculum vitae:
since 9/2003 Professor for Nutritional Ecology, Institute of Nutritional Sciences at the University of Giessen, Germany,
2002 – 2003 Visiting scholar at the Department of Nutrition, School of Public Health, Loma Linda University, California (USA),
2000 – 2002 Visiting scholar at the Federal Research Center for Nutrition and Food, Institute of Nutritional Economics and Sociology, in Karlsruhe, Germany,
1996 – 2000 Research assistant at the Institute of Nutritional Sciences at the University of Giessen (responsible for the research area nutritional ecology),
1994 PhD; Thesis in the scope of the Giessen Wholesome Nutrition Study,
1981 - 1986 Study of Home Economics and Nutritional Sciences at the University of Giessen, Germany

The view of Public Health Institutions

B. Margetts

Institute of Human Nutrition, University of Southampton, UK

The question being addressed in this presentation is what is the role and value of a National Nutrition Survey from the perspective of Public Health Institutes. The question needs to be asked within the context of what is the role of a Public Health Institute, and what information is required to fulfil that role? If we assume that the primary role is to monitor the health of the population, then we need to define what we mean by health, how it is measured, and how progress is assessed over time. That is, what is required is a dynamic sense of progress or change, which means that health has to be defined and measured at several points in time, and that it has to be measured in an appropriate way to provide valid and reliable information. If a cross-sectional snap-shot approach is used assumptions have to be made about the circumstances that lead up to people being in a certain place in the distribution within the population, and also about the nature of causation.

In terms of nutrition related health it is often assumed that the frames of reference are dietary goals or guidelines, expressed as foods, nutrients, dietary patterns etc. It may be that the aim is also to assess food safety, where the requirement for the method is to establish the proportion of people eating above an agreed safe upper limit. The aims of the survey dictate the methodology that is appropriate. If the aim is to assess the proportion above or below an agreed cut-off, then some measure of misclassification around that cut-off is required. If individual level data are required then a measure of within person variation is required (such as repeat measures of diet using 24 hour recalls or records); if a population mean is required then a simpler method that does not require individual within person estimates, will suffice. If the aim is to assess nutritional status, it is assumed that this can be defined, and that the Nutrition Survey can measure nutritional status in the population. If the aim is to measure 'risk factors' such as serum cholesterol or blood pressure, then these need to be measured appropriately.

Another issue for consideration is the sampling frame and methodology of recruiting a sample that is generalisable to the population. The sample size needs to be sufficiently large to allow sub-groups analyses, to identify potential at-risk sub-groups.

If data are collected inappropriately, they will be of little value to public health policy.



Barrie Margetts

Current Positions: Course director and head of group in Public Health Nutrition, Institute of Human Nutrition, University of Southampton, and Visiting Professor North West University, South Africa
trained in nutrition and epidemiology, currently registered public health nutritionist, and fellow of the faculty of public health.
Editor-in-chief Public Health Nutrition
Recently co-edited text on Public Health Nutrition, and revising third edition of design concepts in nutritional epidemiology.
Research interests cover broad spectrum of public health nutrition areas working in UK and Europe, India, Bangladesh, South Africa and Lesotho, focusing on problems of under, over and malnutrition, mainly in deprived and vulnerable groups.
I have been involved in methodological development in nutritional epidemiology, including the design and analysis tools for national surveillance and monitoring and in the formulation of policy for action

How do food suppliers use such databases and how can they contribute to them

Detlev Müller

German Federation of Food Law and Food Science (BLL),
Procter & Gamble; Schwalbach/Taunus, Germany

(no abstract available)

The mass media perspective

A. Dannenberg

Freelance Journalist, Cologne, Germany

Worldwide, hundreds of very interesting studies and enormous amounts of press releases about nutrition have been published. But how do editorial departments find out about those survey results? And what objectives are pursued by broadcasting a certain feature story? It is especially difficult to catch the attention of a TV-journalist with a press release about a scientific survey, because these surveys have the image of being “dry”.

It is in the nature of mass media that they only want to cover themes, which are interesting for a large group of people. Conversely television films and documentaries can initiate public interest. This aim creates a specific challenge for the journalists. With regard to nutrition surveys this means a result should be surprising, outstanding, and up to date.

There are two options, how TV can cover surveys: Either a survey itself takes centre stage or the study results are called in simply as verification or for additional facts. Good communication with the responsible scientists is important in either case. One challenge for TV-journalists is the need for visual stimuli, another one is the time factor. It takes a couple of days to produce a comprehensive film. Other problems are: Because a new task intervenes, previously commissioned filming permits are cancelled with short notice; interviewees don't show up at the appointed time; experts often make statements which are too scientific, too technical to be understood by laymen who consequently lose interest in the survey.

For me as a TV-journalist arising questions are: How do I visualise a survey, which has been actually finished without demanding too much time of the scientists and yet staying close to reality? How can I report a study in a plausible way? How do I produce interest, maybe even dismay in the viewer? It has to be communicated that these “dry” data are not only important for science, but relevant-for-everyday-life and therefore regard everyone.

Pursuing the aims of transforming results from nutrition surveys into nutrition programs, to change people's behaviour or even affect politics, industry or education systems - then one should think precisely of what to expect from mass media, because media is an important key in approaching these objectives. A close co-operation with the media has to be enhanced and means to reach this target should be stated and communicated more precisely as it is the case today.



Anja Dannenberg

Radio and television journalist since 1997; freelance activities mainly with Westdeutscher Rundfunk (WDR)
Awarded with the journalist price of the German Society for Nutrition (DGE) in the years 2000 and 2002, in the field television

1998, Graduated in
Oecotrophology (Applied
University Münster)

The educational perspective

B. Methfessel

University of Education Heidelberg, Germany



Barbara Methfessel

Teaching nutrition in school includes – whether openly or hidden – a reflection on personal food habits. Nutrition education should provide support for a lifestyle that helps along personal and social welfare. To succeed in providing this support new didactical orientations¹ require

- interaction between teacher and students that respects the sociocultural food heritage of students
- didactical and methodical approach that makes possible the linking of new knowledge to familiar and personal food habits.

Therefore teachers need actual information on food habits

- to know and to understand them and
- to know and to reflect the problems involved.

Social changes are largely associated with alterations of habit and lifestyle. Especially the spheres of nutrition and consumption show clearly which changes are implicated by the scientific, technological, political, social and economic variations which are experienced throughout everyday life. In order to know and to reflect on the change of eating culture and of food habits it is not only important to have information on consumed groups of food and their nutritional value but also to get differentiated information on the way this food is obtained, prepared and combined to dishes, as well as on eating patterns depending on situations.

Teachers are prejudiced and limited by their own sociocultural patterns – just like every body else. School classes include children of very different groups. In order to open the teacher's mind there is a need for information on different food habits p. e. of men and women, different age groups, cultural and religious groups or social classes. This knowledge could help to manage diversity and to understand that diversity is a cultural capital for educational processes.

Studies in Nutrition and Home Economics (Diplom-Oecotrophologie) University of Bonn; Dissertation on Housework (Women's studies in Home Economics), University of Dortmund; since 1989 professor at University of Education in Heidelberg (Nutrition and Home Economics und Didactics).

Actual research: nutrition and eating culture; nutrition education and didactics; nutrition in schools; nutrition, eating culture and time.

¹Results are available on www.evb-online.de (German language).

Poster Session

(A) Nutrition Surveys

A1 Comparability of Dietary Data in Countries of the European Union

I. Elmadfa, E. Weichselbaum, H. Freisling
Institute of Nutritional Sciences, University of Vienna, Austria

Background: In general, food and nutrient intake is assessed in several member states of the European Union on a more or less regular basis. The European Nutrition and Health Report 2004 (ENHR) was the first report compiling and comparing such data. However, there may be some limitations concerning the comparability of these data between countries.

Methodology: To get an idea about the comparability of nutritional data in countries of the European Union, the data included in the ENHR was analysed.

Results: Data for showing trends in food supply were taken from the food balance sheets (FBS) of the FAO. The methods used for creating those agricultural statistics and thus the obtained data are generally comparable between the different countries. However, a major limitation is that food supply data do not show the actual food intake of different population groups. Also the food availability data based on household budget surveys (HBS), which were acquired from the Data Food Networking (DAFNE) database, deliver comparable data but do not reflect the intake of food at the individual level either but only its availability at the household level.

For the assessment of food and nutrient intake at the individual level different methods (e.g. 24-h recall, food frequency questionnaire, and dietary records) have been used in the countries participating in the ENHR project. This leads to a decreased comparability of such data between countries.

Due to the fact that information about food supply, availability and intake is based on different methods, these data are not comparable either. In general, food supply is clearly above actual intake and availability. This fact was shown in the ENHR by comparing fruit and vegetable supply (353 and 262 g/d, respectively), availability (192 and 142 g/d, resp.) and intake (183 and 148 g/d, resp.) in Austria.

Conclusions: Comparisons between dietary data based on FBS, HBS and surveys carried out at the individual level should be made carefully. To increase the comparability of food and nutrient intake data between countries, standardised assessment methods should be used across the European Union.

A2 European Food Information Resource Network (EuroFIR)

A. Vásquez-Caicedo, S. Bell, J. Erhardt, B. Hartmann, C. Brombach

Federal Research Centre for Nutrition and Food (BFEL), National Nutrition Survey II,
Location Karlsruhe, Germany

The European Council has adopted a programme of community action on 'health monitoring' within the framework for action on 'public health' (1400/97/EC). In order to fulfil this decision, an effective food and nutrition monitoring system at the EU level, as well as the standardisation of data collection methods, food composition tables and analytical methods are required. The European Food Information Resource Network (EuroFIR) is an EU financed project. It aims to build and disseminate a comprehensive, coherent and validated databank providing an authoritative source of food composition data in Europe for nutrients and newly emerging bioactive compounds, as a basis for all food and health research in Europe. General information about this network and its relationship to the German Food Code Nutrient Data Base are presented in this poster.

A3 EsKiMo - The nutrition module for children and adolescents as part of KiGGS

A. Bauch, C. Vohmann, H. Hölling, H. Heseke, G.B.M. Mensink

Robert-Koch-Institute, Berlin, Germany

KiGGS is the first nationwide representative health survey among children and adolescents in Germany. It is conducted from May 2003 to May 2006 by the Robert Koch-Institute (RKI) and addresses a two-stage stratified randomised clustered sample of girls and boys 0-17 years of age. In an age stratified subgroup of about 2400 randomly selected participants aged 6-17 years, we will assess dietary habits in detail. This part of the study will be carried out between January and December 2006 in cooperation with the University of Paderborn, Department of Nutrition and Consumer Education.

The parents of children aged 6-11 years will be asked to keep a 3 day estimated dietary record. This method has been previously applied in the VELS study (Food consumption survey to determine food intake by infants and small children for the estimation of the acute toxicity risk from pesticide residues) among parents of young children below 5 years. The record booklet will be adapted to the specific age group including a comprehensive instruction manual.

Participants aged 12-17 years will be interviewed about their dietary habits within the past four weeks, using the dietary assessment software DISHES. This instrument is a modified diet history measuring the usual dietary intake by meal based information of food intake. Memory recall is stimulated by this structure and by mentioning all typical food groups for each meal. In order to estimate portion size, tableware models as well as a picture book will be used. DISHES was previously used in the adult German Nutrition Survey 1998 and is currently being updated for use in the National Nutrition Survey II. In KiGGS, we will use this updated version with some adaptations for adolescents.

Allowing estimates of food and nutrition intake (based on the German Food Code and Nutrient Data Base, BLS), the nutrition module of KiGGS will close the information gap regarding nutritional habits among 6-17 year old Germans. This information will be used to identify target groups for nutritional counselling.

Since these instruments will also be used in the National Nutrition Survey II a comparison of dietary intakes among children, adolescents and adults is possible. Through comparison with data from the National Nutrition Survey I (1985-89) which included adults as well as children older than 4 years and adolescents, time trends in dietary behaviour can be analysed.

The collection of dietary intake data will complete the comprehensive data gathered in KiGGS on health status, health behaviour, life circumstances, life quality and socioeconomic status. In addition, data on environmental exposure are collected for about one third of the participants. Thus, the inclusion in the KiGGS survey allows for multivariate analyses of the relationship between nutrition, other health-related risk factors (e. g. physical activity) and prevalent health status, such as obesity and allergic disease.

A4 Second Nutrition Survey in Saxony

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Objectives: In 1999, the first nutrition survey in Saxony has been performed. After a five years period, the second survey has been initiated by the State Ministry for Agriculture and Environment and the State Ministry for Social Affairs.

The aims of the study were:

- To analyze the current eating habits in the Saxony population
- To compare the results of both the first and the second nutrition survey, and
- To develop strategies for consumer information and nutrition counselling.

Methods: We used the following research instruments:

- A standardized questionnaire concerning nutrition and health related behaviour, nutrition attitudes and knowledge, food shopping patterns - especially regional food, genetically modified food, and enriched and functional food,
- A 3-day-record to explore energy and nutrient intake.

Design and sample: The study was performed from November 2004 to July 2005. Following the protocol of the first nutrition survey, the second one was designed as a representative cross-sectional study. A random sample of 1317 persons was requested to complete the questionnaire.

Results: A total of 1118 person responded to the questionnaire (85%). Data are now completed for analysis and the first results will be expected for presentation in December 2005 at the 1st congress on prevention in Dresden. A comprehensive report will be published in 2006.

A5 Nutritional Situation in Southern Germany: The Bavarian Nutrition Survey II (2002/03) - Methodology and Selected Results

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Background: Persons' psycho-social environment, their behaviour and their nutritional and health status are linked in a complex relationship, that is still insufficiently understood. Therefore, the Bavarian Nutrition Survey II aimed at collecting recent and representative data on the nutrition related behaviour, its major determinants and health consequences for the Bavarian population.

Methodology: Over a period of 10 months in 2002/03, 1050 study participants were selected from the population of 13 to 80 year old German-speaking residents of the Southern German state of Bavaria. A random route procedure was applied for recruiting participants. In a computer-aided personal interview, participants were asked about their shopping preferences, eating habits, nutritional knowledge, medical history and sleeping behaviour. Within 14 days after the introductory interview, information on participants' food consumption and physical activity was collected by means of three 24h recalls on randomly selected days. The recalls were conducted on the telephone using the computer software EPIC-SOFT (IARC/Lyon) as dietary assessment tool. Additionally, 568 adult participants were willing to undergo anthropometry and donate blood samples.

Results: 896 participants provided reliable information within the introductory interview and the 24h recalls. Among these, 7 % were underweight, 40 % normal weight, 39 % pre-obese and 12 % obese. The BMI was $25,1 \pm 4,5$ kg/m² (mean \pm SD). A significantly lower BMI was found among participants who exercised (at least occasionally) and had a higher socioeconomic status, whereas participants suffering from sleep disorder or depression had a significantly higher BMI.

Conclusion: The Bavarian Nutrition Survey II confirmed a high prevalence of overweight and obesity among the Bavarian population, especially among persons with low socioeconomic status. Studies dealing with the genesis and prevention of overweight should not only focus on nutrition, but intensively regard the aspects of physical activity and mental disposition, as well.

A6 National nutrition surveys - spectrum of applications at the BfR

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The Federal Institute for Risk Assessment (BfR) is the German national superior agency for risk assessment of chemicals, pesticides, biocides, microorganisms and for food safety. The latter implies the consideration of the different existing regulations. A main part of the regulation is the calculation of intake of chemicals and micro-organisms based on food consumption studies. Approaches for intake assessment within the above mentioned regulations depend on the source and path of contamination of foods and characteristics of the agents. This poster gives an overview of special aspects in using food surveys for several regulation procedures at the BfR.

For example, an intake assessment is required in National and European authorisation processes for pesticides, as well as in monitoring programs for the surveillance of maximum residue levels e.g. mycotoxins, food additives, pesticides, environmental chemicals and microorganisms.

Assessment of intake of contaminants entering the food chain via environmental pollution considers nearly all food groups. In contrast to food additives (e.g. colourants, sweeteners), fortification of foods (e.g. long chain unsaturated n-3 fatty acids, phytosterol), microbial risk assessment (e.g. listeria monocytogenes, campylobacter) considers only single foods or selected food groups. Often these are also rare consumed foods producing special problems with regard to sample size and variation of estimates.

Most risk assessments for chemicals are aimed to identify chronic effects. For authorisation of e.g. pesticides, acute effects have to be taken into account, also in microbiological risk assessments short-term exposure is the relevant value for calculation.

There is evidence from epidemiological studies to consider special risk groups, such as children, pregnant women, older people or immigrants having special eating habits. For risk communication and risk management it is necessary to identify those risk groups in the intake assessment from food surveys.

A detailed reporting of food characteristics is of great importance for realistic assumptions in risk assessment. Aggregation of foods to rough food groups may lead to extreme overestimation of consumption and risks. In risk assessments of food additives information on processing of food and brands are needed. Preparation of food by e.g. heating during manufacture may lead to different concentration levels for different brands such as shown for acrylamide in industrial prepared food. Calculation of intake of chemicals that migrate from packaging materials into food the proportion of packaged food against bulk food is an essential parameter.

Preparation of food in households can substantially increase or decrease risks. For many chemicals factors (e.g. acrylamid, pesticides, mycotoxins) exist accounting for alterations as a result of cooking, washing, peeling or storage. Especially in microbial risk assessments cross-contamination is sometimes (e.g. campylobacter) a relevant exposure route. Therefore quantification of such kind of information is additionally important for the calculation of exposure.

There are manifold applications in the field of risk assessments considering food exposure with special requirements for national food surveys. It can therefore be concluded that the quality of data from food surveys has major impact on assessment, communication, and risk management in the food chain.

A7 THE DIET OF DUTCH YOUNG ADULTS: NATIONAL FOOD CONSUMPTION SURVEY 2003

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Objective: To monitor the diet of Dutch young adults with emphasis on the consumption of vegetables and fruit and the fatty acid profile in the diet.

Methods: Among 750 Dutch young adults (aged 19-30), two computerized 24-hour dietary recall interviews were conducted on independent days by telephone.

Results: Response of the survey was 42%. The study population was representative with regard to age, level of education and region. Subjects living in areas with high population densities were slightly underrepresented, which was adjusted in the data.

Given the recommendation of 150-200 g vegetables per day, only 2% of the research population consumed 150 g daily. Less than 10% of the population consumed the recommended 200 g of fruit per day. Over half of the respondents consumed a diet containing less than 35 energy% fat. The recommendation to use a diet with less than 10 energy% saturated fatty acids was met by 11% of the men and 6% of the women. Almost 60% of the men and 28% of the women used a diet that contained less than 1 energy% from trans fatty acids.

Conclusions: Consumption of vegetables and fruits among Dutch young adults is grossly inadequate. Intake of saturated fats is still too high, whereas intake of trans fatty acids stands at the recommended level for most men but not women.

Recommendations: Based on these results we recommend that nutrition policy remains focused on increasing vegetable and fruit consumption, and decreasing intake of saturated fatty acids.

A8 Time use for daily eating and meal preparation activities in the course of ten years (1991/91 – 2001/02)

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The increasing number of women and mothers in paid employment (in 2003 65%) as well as the rising extent of paid employment of women and men exert decisive influence on the pattern of nutrition behaviour of German family households. It also has impact on the arrangements of the gender specific division of work in the field of food provisioning. The professional life of women in family households with children entails a decrease in the amount of time spent on shared meals at home compared to families with non-employed mothers. Nevertheless shared mealtimes are still an inherent part of family life and play an important role in the socialisation of household members and the familial communication. Under the consideration of societal changes the primary interest of this specific analysis of the time budget data (2001/02 vs. 1991/92) of the German Federal Statistical Office focuses on the changes of time use in the field of eating and drinking as well as meal preparation activities. The changes in the allocation of time for eating/drinking at home and eating/drinking outside the home as well as for changes in the patterns of gender specific work in the field of meal preparation depending on status of employment and household and living arrangements are analysed. Additionally the extend and the changes of children's involvement in this special field of domestic work were examined.

The essence of the two representative German Time Use Surveys (2001/02 and 1991/92) is the diary method. In both surveys respondents recorded their primary activities as well as possible simultaneous activities, location of the activities and participating persons. These unique data allow a comparison of time use over the course of time, analyzing the main activities with relevance to nutrition provisioning activities (meal preparation and eating and drinking). Explicit information on the allocation of time use for these activities of employed (fulltime/part-time) mothers and their partners in family households can be extracted. Data analyses was done with SPSS.

Surprisingly the amount of time spent on eating and drinking increased in the last ten years significantly. More people ate away from home at least once a day, but meals at home were still dominant. Moreover the Germans still follow the traditional meal pattern with three main meals a day. Nutrition provision of families is still shouldered mainly by women despite of a total rise in mother's participation in paid employment. In 2001/02 46% of all German men are completely catered by their mothers, grandmothers, wives and/or partners. In the group of 20 to 25 year old males a even higher percentage of men (72%) is not engaged in any of the meal preparation activities on a daily base. Merely in family households with high income, high level of education and with mothers working full time, men show greater participation and temporal engagement in meal preparation activities. In East Germany the results prove a retraditionalization of the typical gender related division of provisioning work which is attributed to the decline of women working full-time. Finally it is noticeable that children are even less frequently involved in the daily routine of provisioning tasks than ten years ago.

A9 Regional patterns in Portuguese household food and beverages availability

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Background: The aim of this study was to analyse trends and disparities in regional household food/beverages availability in Portugal. Data collected within the Portuguese Household Budget Surveys (HBS) of 1989/90, 1994/95 and 2000/01 were used. The DAFNE classification scheme was applied to food/beverages groups. The mean availability (quantity/person/day) (g/p/d) for the overall population and by the Portuguese regions (North, Centre, Lisbon, Alentejo, Algarve, Madeira and Azores) was estimated for 15 main food/beverages groups.

Results: Between 1990 and 2000, the Portuguese household availability showed a general decreasing pattern for most of the studied food and beverages groups. Exceptions were noticed for non-alcoholic beverages, nuts and the main protein supplying groups (meat/products, fish/seafood, milk/products). With few exceptions, results showed that this same pattern was also observed for the 5 mainland regions of Portugal but not for the Madeira and Azores islands, where a general increasing pattern was noted during the same time period. Regional disparities in household food availability have faded away between 1990 and 2000. Nevertheless, in the year 2000 some regional discrepancies were still noticeable. The highest availability values of cereals/products were observed in Alentejo (278 g/p/d) and Azores (272 g/p/d) and the lowest in Lisbon (219 g/p/d). The mean availability of pulses was 15 and 14 g/p/d in the Centre and Alentejo but 2 g/p/d in Madeira. Lisbon recorded the highest availability for vegetables (156 g/p/d) and fruits (244 g/p/d) and Azores the lowest (103 g/p/d and 114 g/p/d, respectively). For fats and oils, the maximum value was found for Alentejo (55 g/p/d) and the minimum for Madeira (30 g/p/d). The mean availability of meat/products was 168 g/p/d in the North and Lisbon regions but 80 g/p/d in Madeira. The highest value for fish/seafood was found in Algarve (105 g/p/d) and the lowest in Madeira (40 g/p/d). Azores presented the maximum value for milk/products (317 ml/p/d) and Madeira the minimum (212 ml/p/d). The availability of non-alcoholic beverages was higher in Algarve (260 ml/p/d) and that of alcoholic beverages was higher in the North (171 ml/p/d), while the lowest values for both were found in Madeira (77 and 25 ml/p/d, respectively).

Despite the substantial changes in Portuguese economic development and society, regional household foods' and beverages' availability patterns can still be tracked. Regardless of some methodological constraints, household budget survey data have contributed to better documenting Portuguese food habits at national and regional level. Analysed in conjunction with regional morbidity and mortality data they may contribute in shedding light on health inequalities in Portugal and thus constitute a basis for developing regional nutrition policies.

Poster Session

(B) Nutrition Survey Instruments and Software

B1 Adaptation of DISHES and EPIC-SOFT to the objectives of the National Nutrition Survey II

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Background: The National Nutrition Survey (NVS II) is a cross-sectional representative study for the German speaking population. Twenty thousand people aged 14 to 80 years are examined over the course of 13 month. The survey starts in November 2005.

The software DISHES 98 and EPIC-SOFT are used to determine the food consumption as well as meal structure and meal patterns. Both programmes had to be adapted to the specific objectives and questions of the NVS II; the adaptation of EPIC-SOFT was performed in cooperation with IARC.

Methods: DISHES 98 was developed by the Robert Koch Institute. It was used for the German Federal Health Survey of 1998. Consumption over the last four weeks is obtained through a modified dietary history in a standardised way. The updated version which is used for the NVS II is called DISHES 05.

EPIC-SOFT was developed within the scope of the cohort study 'European Prospective Investigation into Cancer and Nutrition' (EPIC), to carry out standardised 24 hour recalls.

Different aspects were considered for the modification of the programmes. Food choice was adapted and completed to the target groups (a broad age range), consumption habits and the actual availability of different foods. New foods will be integrated into the German Food Code and Nutrient Data Base (BLS) for the analysis of the NVS II data.

In DISHES 05 the places of consumption were asked in more detail similarly to EPIC-SOFT.

In the DISHES 05 interview a non user list was integrated to allow general conclusions about non consumers of specific foods.

In DISHES 05 a picture book especially developed for EPIC-SOFT is used to quantify foods in addition to the tableware models.

EPIC-SOFT was adapted to the NVS II so that no other pictures besides those of the picture book are shown in the programme. Missing values for weights of different bread shapes were completed and calculated. Information on packaging was added for the food group sauces.

Conclusion: In a pilot study all instruments will be tested, so that changes or necessary adaptations can be integrated. In addition four more updates are planed during the main survey period.

B2 German Food Code and Nutrient Data Base (BLS)

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Background: The German Food Code and Nutrient Data Base (BLS) was developed as a standard instrument for the assessment of nutritional surveys in the Federal Republic of Germany. The BLS covers values of 11.000 food items with 140 nutritional values per food.

The BLS contains research results of German Federal Research Centres, universities and analytical values compiled from nutritional science literature. In addition German, American, English, Swedish, Danish and Dutch food nutrient tables and analytical values from food producing firms were used. National data was wherever possible preferred.

The analysed data correspond mostly to unprocessed food items. In order to obtain the nutrition values for composite dishes and processed food as well, methods of calculation were developed. That means that nutritional data in the BLS was predominantly generated by algorithms and model calculations.

BLS and NVS II: The BLS is the data basis for the data collection software DISHES used for the interviews in the National Nutrition Survey (NVS II) and for the final evaluation of the data generated by interviews with the software EPIC-Soft. Thus the BLS plays a major role for the final data quality of the NVS II. An update of the BLS is planned for 2006 in order to provide the software and the evaluation with current data.

A BLS-update is essential to correspond to:

- The needs of market and science since there are continuously new products on the food market.
- New research areas, which are emerging and requiring the incorporation of substances like selenium and bioactive compounds in the data base.
- The acquirement of accurate nutritional values trough revised analysis methods.

BLS and EuroFIR: The BLS is being used as part of the European project European Food Information Resource Network (EuroFIR). Therefore it is planned to improve the Code-Structure in the BLS, substituting the current one trough a LanguaL-based structure with facets and descriptors. This structure will enable a flexible description of food stuffs giving information for example about product type, food source, cooking method and packing medium.

Aims in this field:

- The BLS will be part of a new emerging European Food Composition Data Base.
- The BLS should be compatible to other European Data Bases.
- The comparison between European Food Consumption Surveys will be possible.

B3 Food frequency questionnaire and biochemical parameters in KIGGS

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Background: In Germany, no representative data concerning the health situation and dietary behaviour of children and adolescents exist. Therefore, the Robert Koch Institute is currently conducting the first German National Health Interview and Examination Survey for Children and Adolescents (KIGGS).

Methods: Over a period of three years (May 2003 to May 2006), a representative sample of 17 500 children and adolescents aged between 0 and 17 years are examined at 167 sample points in Germany. Participants are sampled based on a two-staged randomized clustered design stratified by age. The study protocol comprises a self-administered questionnaire (for parents and participants aged 11 years and older), a computer-assisted, physician-conducted interview (parents or adolescents aged 14 and older) regarding specific medical history, and an extensive physical examination. Information from the questionnaire relate to sociodemographic background, subjective health, previous and current health problems, physical activity, tobacco, alcohol and substance abuse, health care utilization, living conditions, family climate, and social networks. Objective health data include anthropometric measures (height and weight, body mass index, sub scapular and triceps skin fold, waist and hip circumference, blood pressure), thyroid ultrasound, and various blood and urine analyses (e. g. serum levels of lipids, folic acid, vitamin B12, iron and 25-hydroxy-vitamin D). In addition, a newly developed, semi-quantitative food frequency questionnaire will be used. This instrument covers questions about portion sizes, supplement use, consumption of enriched, light and probiotic foods. It is available in two versions adapted to two different target groups: parents of children aged 1-10 years and adolescents aged 11-17 years.

Results: The study is still in the field phase; hence final results are not yet available. The overall response rate is 65 %. Food frequency questionnaires are completed by 97% of the participants. Thus, KIGGS will permit to assess the relationship between dietary habits, socioeconomic background, other health-related behaviour, and subjective as well as objective health measures. In the context of a PhD thesis project, we will specifically determine the distribution and determinants of vitamin D status among children and adolescents in Germany. Previous studies among the adult population in Germany and other countries have shown that dietary vitamin D intake falls considerably below the recommended level. Limited sunshine exposure may contribute to the large seasonal variations in serum 25-hydroxy-vitamin D observed in countries of northern latitudes. Additional factors, e. g. a sedentary lifestyle, medication use, and particular dress codes (veiling) among women with a migrant background may play a role in low serum vitamin D levels. Considering that even moderate vitamin D insufficiency has been implied in the pathogenesis of diabetes mellitus and other chronic diseases, the study will provide insight into the magnitude of a putative health problem and help to identify high risk groups.

B4 Comparison of the nutrition software DISHES 05 and EPIC-SOFT

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Background: Within the National Nutrition Survey II two nutrition investigation programmes DISHES 05 and EPIC-SOFT are used to assess food consumption. Applying both programmes usual as well as actual dietary intake can be assessed. In the following both programmes will be compared in the following considering different aspects e. g. food classification, guidance of the interviewer, assistance by the estimation of the portion size, recall of the consumed food, kind of recipes and plausibility control. Both programmes use different time frames (four weeks vs. 24 hours).

Results: In EPIC-SOFT foods are sorted in alphabetic order and can be searched in the food list by food groups. In DISHES 05 the most often consumed foods are available on the screens. This is complemented by second choice screens as well as a search function within the German Food Code and Nutrient Data Base (BLS) by means of key words.

Both programmes are structured by meals. In DISHES 05 the consumed foods and beverages are described by meals and are quantified in a later state. In addition the wordings on the screen structure probing questions. EPIC-SOFT offers a quick list of all meals of the day and all foods are described and quantified at a later stage.

In DISHES screens with special additives (e. g. fat, sugar) or other foods (e. g. desserts) appear automatically by special foods or meals. In EPIC-Soft there are probes within the quick list. In addition on the screen food description and quantification there is the possibility to ask in detail for special foods like fat used when preparing meals.

For estimating portion sizes in EPIC-SOFT a picture book with different dishes and portion sizes is used. This picture book is applied for DISHES interviews in addition to the tableware models. Both programmes offer household measurements and standard units (e. g. weight per unit) as well as standard portions.

Both programmes offer standard recipes. In DISHES 05 recipes are chosen by recipe name, the single ingredients are not shown. In EPIC-SOFT ingredients of recipes are shown. If the participant knows the recipe, the ingredients can be changed and adapted individually.

At the end of the interview in EPIC-SOFT as well as in DISHES 05 energy and nutrient intake of fat, protein and carbohydrates are listed and compared with recommendations for nutrient intake. Additionally EPIC-SOFT offers a maximum intake level.

Conclusion: Both programmes provide different objectives. The usual habitual consumption is assessed by DISHES 05. Thereby frequency and quantity of the consumed foods and beverages over the last four weeks is assessed and averaged. In the scope of EPIC-SOFT the accurate consumption over the last 24 hours is obtained reflecting the present consumption. To describe the nutritional behaviour it is necessary to make statements of both the actual and the usual consumption.

B5 Questionnaire and computer assisted personal interview of the National Nutrition Survey II

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Background: The National Nutrition Survey II is a nationwide representative survey on diet and nutrition of German adolescents and adults. Within the scope of this study the food consumption as well as other aspects of consumption behaviour, general health and socio-demographic variables is obtained. A computer assisted personal interview (CAPI) and a questionnaire are implemented.

Methods: There is a focus on nutrition and shopping behaviour in addition to food consumption data which is assessed by DISHES 05 and EPIC-SOFT. Questions about important factors for food choice and methods of food processing are asked. Other focuses are nutrition knowledge and physical activity. On the one hand the questions for the physical activity are used to calculate the physical activity level (PAL). On the other hand this provides data to define types of activity. Health aspects include data on smoking and intake of supplements. In addition questions for education, occupation, household structure and income are used to characterise the socio-economic status of each participant.

Following aspects were considered when distributing the questions to CAPI or the questionnaire. The CAPI is the first investigation. Every study participant is conducted through the programme by means of the interviewer. Thereby a complete collection of data of all study participants is obtained. The interviewer has an impact on the responses of the interviewee. Another aspect for the distribution of questions was the practicability. This means that structure and length of the questions was considered. Therefore the question about the intake of supplements was integrated in the CAPI, because in this way it can be asked by support of a database.

Conclusion: First versions of the questionnaire and the CAPI were applied in a feasibility study. This led to an adaptation and changes of single questions and offered answering possibilities. About 80 percent of the participants needed less than 45 minutes to fill out the questionnaire, whereas for the CAPI an average time of 10 minutes was necessary. The time frame was accepted by two thirds of the participants of the feasibility study. Before starting the main study all instruments will be re-tested in a pilot phase.

B6 Underreporting in nationwide dietary surveys

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Aim: National dietary surveys are an important aspect of nutritional monitoring and the development of food and nutrition policies. In Denmark nationwide dietary surveys have been conducted in 1985, 1995 and on a continuous basis from 2000. As seen in other dietary surveys underreporting of dietary intake occurs and comparisons between the Danish surveys show increased underreporting of dietary intake over time, especially among adults. The aim of this study was to characterise underreporters in the surveys of 1995 and 2000-2001 and evaluate the degree of underreporting.

Methods: The study population was a nationwide sample (age 15-75 years) of 1746 participants in 1995 and 1818 participants in 2000-2001. The surveys used a 7-day estimated record with a personal interview of social background, attitudes, level of physical activity and general information on dietary habits. For evaluating the energy intake the ratio of energy intake/basal metabolic rate (EI/BMRest) and physical activity level (PAL) was calculated and compared with respect to gender, age and Body Mass Index. The number of participants with EI/BMRest less than 1.1 was calculated and the dietary intake of underreporters and non-underreporters was described.

Results: From 1995 to 2000-2001 the number of underreporters (EI/BMRest < 1.1) has increased from 14 to 24% and mean EI/BMRest has decreased from 1,53 to 1,38. In 1995 a higher proportion of women than men underreported their energy intake in contrast to 2000-2001 where men and women underreported equally. With increasing BMI there is a tendency to increased underreporting.

Conclusion: Underreporting of dietary intake is an increasing problem in dietary surveys and should be taken into account when planning survey method and analysing dietary data.

B7 A German version of the attitudes to chocolate questionnaire

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Chocolate is the most commonly craved food, has a uniquely attractive taste and is an outstanding example of a comfort food, i.e. a food consumed to improve mood. To explore the psychological mechanisms underlying chocolate intake, Benton et al. (1988) developed a questionnaire and identified "craving", "guilt" and a "functional approach" as factors that are associated with chocolate intake. Our first study tested a German translation of this questionnaire in a sample of 118 persons (57 women, 61 men). Exploratory factor analysis replicated the guilt and the craving factor of the original study. We also replicated the finding that craving, but not guilt was associated with higher reported intake of chocolate. Women reported more intense craving for chocolate than men. A second study explored the effects of eating a chocolate bar (50 g) on mood under real life conditions in thirty-seven women. A chocolate-induced elevation of mood was reported only by those women who did not associate the intake of chocolate with guilt. In other words, guilt appeared to deteriorate the elevation of mood induced by chocolate. In sum, our data indicate that the German version of the attitudes to chocolate questionnaire is a useful tool to examine the psychological factors underlying chocolate intake.

Reference:

Benton, D., Greenfield, K. & Morgan, M. (1998) The development of the attitudes to chocolate questionnaire. *Personality and Individual Differences*, 24, 513-520.

Poster Session

(C) Results of Surveys

C1 Micronutrient status in the Austrian population

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Objective: To assess the status of micronutrients (vitamins, minerals and trace elements) in different population groups in Austria.

Methods: The data sets are derived from the Austrian Study on Nutritional Status (ASNS). ASNS is a series of cross-sectional studies, conducted since 1991 in different Austrian population groups by the Department of Nutritional Sciences of the University of Vienna. In this presentation nutrition surveys carried out between 2000 and 2002 in all regions of Austria were considered. Nutrient intake was assessed in 3- to 6-year old pre-schoolers (n=151, 3-d-weighed record); in 6- to 15-year old schoolchildren (n=535, 7-d-weighed record); in 15- to 18-year old adolescents (n=102, 3-d-weighed record); in 19- to 60-year old adults (n=2580, 24-h-recall); in 55- to 85-year old elderly people (n=645, 24-h-recall); and in pregnant women (n=254, 24-h-recall).

Results: The mean intake of some micronutrients in several population groups was below the recommendations. Regarding the relevance for health promotion and for the reduction of nutrition-related diseases, following categories of declining significance are proposed: Critical nutrient intakes were found among all population groups for folate, vitamin D, iodine and calcium. Older people suffering from atrophic gastritis are also at risk regarding vitamin B12 absorption. Iron has to be considered as a critical nutrient especially in women of child-bearing age whereas vitamin A and vitamin B6 were found to be critical among lactating women. Further special attention has to be paid to the excessive sodium (chloride) intake in virtually all population groups.

Marginal nutrient intakes were found among some populations groups: for vitamin C, vitamin E, vitamin B1 and B2, magnesium, zinc in elderly people (55-85 y); for vitamin E, magnesium in pregnant women; for vitamin C, vitamin E, vitamin B1 and B2, magnesium in adolescents (15-18 y).

The intake of niacin, biotin, pantothenic acid, potassium, phosphorous, manganese, copper can be regarded as sufficient in all population groups.

Not yet exactly assessed: vitamin K, fluoride, selenium and carotenoids.

Conclusion: Based on the current nutrient based guidelines only folate, vitamin D, iodine and calcium are the most critical nutrients in Austria, which have to be considered in strategies to improve the nutrition and health status.

C2 Dietary and lifestyle differences between female adolescents in professional training and secondary school - consequences for health campaigns

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Background: In adolescence important lifestyle choices, that influence the risk of suffering from serious long-term health damages, are made. The knowledge about dietary habits and lifestyles of young people with different educational level is still scarce. Especially for girls, the entry into the labour market is sometimes connected with difficulties to find an appropriate apprenticeship training position. This critical life transition may cause dissatisfaction with their life and may influence forming their lifestyle and therefore female apprentices might be a group at particular risk.

Subjects and method: In 2003 and 2004 two cross-sectional studies in Vienna, using the same questionnaire, were carried out to collect data on nutritional habits and health related behaviours of adolescents. Participants were young women from secondary schools and vocational schools. For this analysis data from female adolescents who are working in typical female professions like hairdresser (168 participants), office clerk (126 participants) and retail saleswoman (166 participants) as well as female pupils from secondary schools (208 participants) were compared.

Results: Concerning body weight and also the satisfaction with their own weight no significant difference was shown between female apprentices and female pupils. Although only 4.0% and 2.5% of all female adolescents were classified as overweight and obese, respectively, 21.5% of the young women think that they were fat and even 41.8% think that they were not fat, but they still want to loose weight. The cigarette consumption as well as physical activity showed significant differences (pupils: 32.3% smoker, apprentices: 71.2% smoker). 18.4% of the female pupils and 59.1% of the female apprentices reported to never/rarely do body exercise ($p < 0.001$). Breakfast is skipped regularly on weekdays by 26.4% female pupils and 38.3% female apprentices ($p < 0.01$). The fruit and vegetable consumption is very low among female apprentices. 29.4% of apprentices never/rarely consume fruits and even 46.5% never/rarely eat vegetables in comparison to female pupils (6.9% and 12.9%).

Conclusion: Some health compromising behaviours are very common especially among female apprentices. Usually apprentices are a disadvantaged group when it comes to the implementation of health campaigns. Networks should be created involving settings of apprentices' social life, like schools, workplaces and communities to improve health-related behaviour of young women.

C3 Dietary decision-making: Simple strategies for choosing lunch

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Dietary guidelines and health campaigns try to promote healthy eating by improving nutrition knowledge. Yet little is known about how nutrition knowledge is translated into everyday eating behavior. This study aims to describe the strategies that students use when they choose lunch at the university canteen and to what extent information about the nutritional value of the food is relevant to them. 150 students received a questionnaire directly after they had chosen one of six main courses and were asked to explain how they arrived at their choices and what information from the environment they had taken into account (e.g., price, choices made by friends). Students reported relatively simple strategies with one or two cues. Taste and attractiveness of a food were the most frequent cues used. Nutrition-related information ranked clearly lower in overall reported frequency, but was mentioned more often by students who aimed to control body weight. A second study that aims to replicate these findings in a school cafeteria is underway. Learning more about people's strategies in everyday dietary decision-making will allow us to better understand when nutrition knowledge is applied and how healthy eating can be promoted more effectively.

C4 Assessment of study designs from a risk assessment perspective

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The advantages and disadvantages of study designs for food surveys are discussed in many ways. Requirements to study design from the point of view of risk assessment will be discussed in detail considering three types of study design: weighed records, dietary history and 24h recalls. These types of study design will be applied in the ongoing German Nutrition Survey. Some examples given illustrate the influence of study design on the quality of risk assessments. Within the scope of risk assessment the margin of hazard and exposure is calculated. In case of food as relevant exposure route national nutrition surveys represent the main data source to calculate the intake of chemicals and micro-organisms. Different kinds of hazards implicate different estimation procedures for exposure and therefore also for the study design of nutrition surveys.

The method of intake assessment is governed by toxicological properties of agents. Most risk assessments for chemicals aim to depict chronic effects and consequently use average long-time consumption data for exposure assessments. However, in the authorisation of pesticides also acute effects have to be taken into account. In such cases and also in the case of microbiological risk assessments, the details of the amounts consumed on single days are also necessary in order to calculate the maximum intake over short periods.

The consideration of intra- and inter-individual variability depending on acute or chronic effects has major implications for the needed survey duration. In case of microbiological risks and acute risks from chemicals, the intra-individual variability plays an important role. This can not be sufficiently taken into account by a dietary history design, asking for usual food intake of last month. Both other study designs have to be conducted over several consecutive and non-consecutive days. This is connected with high costs and a burden of interview persons. Alternatively, a combination of these designs with long-term food-frequency-questionnaires may be performed. However, this yields a major disadvantage of only rough food groups for long-term measurements with FFQ.

The number of relevant foods/ food-groups has substantial influence on the variability of the estimate. In chemical and microbiological risk assessment significant differences in contamination of food for high degrees of details of food description has to be taken into account. Thus food surveys have to provide detailed characterisation of foods. Some kind of these information can only be collected with the prospective method of weighed records.

It should be kept in mind that the sample sizes depends also on the fraction of non-consumers. This means that the expected sample size of these risk groups has to be large enough to make valid conclusions. Sometimes an over-sampling of these groups is an adequate method to avoid non-practicable sample sizes for the whole sample.

Requirements for data needed to perform an exposure assessment differ when evaluating an average scenario, a worst-case scenario or distribution based estimation. With mathematical methods it is possible to derive distributions from all three study types. But for all three study designs, requirements towards sample size, representativeness and degree of detail of food description should be taken into account. It can be concluded that only a combination of several studies with different design matches all requirements for intake estimations in risk assessments. Therefore, there is a great advantage having a combination of all three study types in the planned German National Nutrition Survey.

C5 Use of Principal Component Analysis for the Identification of Dietary Patterns Pregnant Women

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Introduction: Analysing dietary intake is complex and related to psychosocial and behavioural factors. Research in this area has recently been directed towards exploring dietary patterns which has been reported to be an alternative and more useful indicator of diet quality than traditional methods of investigating an individual's food and/or nutrient intake. Principal component analysis (PCA) allows the identification of dietary patterns, and facilitates the study of foods. PCA is a technique used for identification of components that represent the relationship among a set of interrelated variables. We attempted to identify the main types of dietary behaviour of a population of pregnant women using PCA.

Methods: Dietary data were collected from a non-random sample of pregnant women (n=250) aged 15-43 yr using a 62-item semi-quantitative food frequency questionnaire (FFQ). PCA with varimax rotation was used in order to achieve a simpler structure and interpretability. The Eigenvalue, screen plot and % of variance explained by each factor were used for determination of the number of factors to retain.

Results: The PCA identified two main components that accounted for 66.5% of the variance. In order to emphasize the food items with stronger association (the larger the factor loading, the greater association) with the identified the dietary pattern, food items with factor loadings <0.30 were not considered in the interpretation. The first component had strong positive loadings with green leafy and root vegetables, salad, rice, pasta, fruits and fish and was strongly related with increased vitamin and iron intakes. Foods with negative loadings were chips and sugar. The second component was characterised by positive loadings with biscuits, chocolate/bars, crisps, pizza etc. This component was related to increased energy, sugar and fat intake.

Conclusions: The findings of the analysis suggested that the PCA provided a practical insight of the dietary behaviour of the population. Two main types of dietary behaviour were identified; the first characterised by food items often reported being part of a healthy diet and the second strongly related to food items reported being part of an unhealthy diet. The results of this study about dietary patterns confirm previous observations using PCA in other populations. Further analysis is needed so as to correlate the dietary patterns to socio-demographic and behavioural characteristics of the sample.

C6 CHANGES IN WORKSITE LUNCH PATTERNS AMONG EMPLOYED FINNISH ADULTS, 1979-2001

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Finnish have a long tradition of having lunch at staff canteen during workdays. There is, however, a lack of knowledge of trends in the staff canteen use during past two decades, when Finland went through an upward economic trend and a deep recession. Concurrently both urbanization and educational level increased. It could be assumed that economic and social changes have influenced the use of staff canteens. The aim of this study was to examine the trend of staff canteen use among Finnish adults between 1979 and 2001. A further aim was to describe sociodemographic patterning of canteen users.

The data are derived from the 'Health Behaviour and Health among Finnish Adult Population' survey conducted annually since 1978. The respondents received a mailed questionnaire including sociodemographic factors and food habits. The pooled data include 24 292 employed men and 24 746 employed women aged 25 to 64. Worksite lunch pattern was used as an outcome variable in the logistic regression models. Age, educational level, place of residence, and survey year were independent variables. Separate models were fitted for both sexes.

Frequency of staff canteen use has been fairly stable in Finland over the two studied decades. Women used the staff canteen more often than men. Differences by education and place of residence have remained relatively stable. People living in the capital area and having a higher level of education used staff canteens more often.

The Finnish habit of having lunch at staff canteen has resisted major changes in working and living conditions and social structures during the past two decades.

C7 LACK OF INFORMATION OF OLDER PEOPLE USING "MEALS ON WHEELS"

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Objective: The Food in Later Life study⁽¹⁾ investigates the relationship between nutrition and quality of life in older people living in their own homes in eight European countries. The research area: "Satisfaction with food-related services available to seniors" addresses the issue of an adequate supply of very old and frail people receiving "meals on wheels" (MoW). In particular user satisfaction with different dimensions of the delivery service, like for example choice, ingredients, temperature or procedures of registration and ordering were investigated.

Methods: Qualitative, guided interviews were conducted with five key informants from government, food industry and welfare organisations and with 20 members of staff from commercial or non-commercial meal-providers (10 on the managerial level and 10 on operational level). 28 interviews were carried out with male and female seniors using MoW, aged 79,9 years on an average and living alone (18) or with their partners (10). This group also filled out a number of standardised questionnaires with background information e. g. on food shopping and preparation, food-related quality of life, social characteristics as well as their health (SF 36). The "Critical Incident Technique" was applied in the user and provider interviews. Country specific current literature (white and grey) was reviewed according aforesaid objective.⁽²⁾

Results presented are focusing Germany. In general satisfaction with the MoW services is very high. However, the results allow to identify areas in which the users of MoW lack information or are ill-informed. They know for example little about origin, production or nutritional content of the meal or their possibilities to switch between different offers. In some cases given information is too little or too complex, in other cases it is asked too much of the seniors to understand and keep in mind the given information. This lack of information influences on the one hand the seniors satisfaction with their daily meals in a negative way and on the other hand it shows the need of specific ways to address the very old aged as a target group for nutritional information.

⁽¹⁾ [The project is funded by the European Commission (QLK1-CT-2002-02447)]

⁽²⁾ [Methods developed by Dr. Margaret Lumbers, University of Surrey, UK]

C8 CHANGES IN MEAL HABITS OVER THE LIFE-COURSE

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Background: Older people living in their own homes represent an inhomogeneous and increasingly important population group. Within the scope of "Food in Later Life"-Study data on the relationship between food intake, nutritional well being, health and quality of life among older people was collected in eight European countries.

Objectives and methods: The main objective of the research area "Determining the Role of Meals in Later Life" was to investigate the meaning of meals among older people focusing on changes in meal habits over the life-course and their effects on the respondents' food-related quality of life. Therefore in-depth interviews were carried out with 80 seniors, consisting of eight subgroups (women, men, 65-74 and 75+, living alone and living with a partner). In addition to that the interviewees filled out a number of standardised questionnaires with background information e.g. on food preparation, food-related quality of life, social characteristics as well as their health (SF 36 questionnaire).

The results represented focus on Germany. They show considerable differences between women and men in the food-related quality of life and the ability to adapt to changes which are caused by life-cycle or other specific events. All these changes (in particular leaving the parental home, marriage, birth of children, children leave the home, divorce or death of partner) can have an outstanding effect on the respondents' personal food infrastructure and therefore their access to adequate nutrition. For example, changes in life-cycle had a deeper impact on men's nutrition, because men are more dependent on the nutritional care, they get by others. In many cases they have no skills to prepare healthy and diversified meals and/or are not interested in cooking. In contrast, for many women the phase after moving out of their parents' home and getting married, is mainly described as the time of drastic transition. Like the men, they had often not acquired cooking skills when leaving their parents' home but had to meet the challenge to feed their families with healthy and tasty meals. If they succeeded in overcoming these difficulties, the meals of women are more affected by continuity over their life cycle.

C9 Adaptation of the VELS-study for a pesticide exposure model

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In the authorisation process of pesticides the Federal Institute for Risk Assessment (BfR) is the responsible agency related to consumer protection. The intake assessment of residues occurring from pesticide application is an important part in the risk evaluation process of plant protection products. Until 2004 the exposure assessment had to be done with two different exposure models. For chronic exposure a model with a "girl aged 4-6 years" was used, which was based on German consumption data collected in 1980. The acute model was based on British consumption data for toddlers (1.5 to 4.5 years) and adults. In the meanwhile both models are outdated and do not reflect current consumption habits in Germany.

The VELS-study¹ is a multicenter consumption survey with over 800 children aged 6 months up to below 5 years. The University of Paderborn conducted the VELS-study from 2001 to 2003 at nine sampling points all over Germany. Weighed food records at 3 consecutive days was used and repeated after 3 to 6 months in infants and after 4 to 8 weeks in babies. Therefore the food intake was recorded for every child at a total of 6 days. The VELS-study was financed by the Federal Ministry of Consumer Protection, Food and Agriculture (BMVEL).

This poster gives an overview of the requirements that need to be fulfilled by a model for intake assessment in pesticide regulation. Based on these requirements the VELS-study was used to create a uniform deterministic model for the exposure assessment of pesticide residues. A calculation module for chronic as well as for acute exposure was generated from the VELS-data.

An important part of this data is the way in which processed products were incorporated into the calculations. The majority of residue data is generated in raw agricultural commodities. Therefore transformations are needed to combine consumption figures and concentration data. The former models included only consumption data for very few processed foods (e.g. apple and orange juice, flour, cooked potatoes). In models based on VELS-data most of the consumed food items could be decomposed to their basic agricultural components. In relation to the authorisation of pesticides this is a new aspect for the exposure assessment and has a great impact to calculated intakes.

For the first time it is now possible to perform a deterministic chronic and acute exposure assessment based on realistic and current German consumption data. The model was published in January 2005 and will be implemented in the authorisation process in September 2005.

¹VELS is the acronym for: Verzehrstudie zur Ermittlung der Lebensmittelaufnahme von Säuglingen und Kleinkindern für die Abschätzung eines akuten Toxizitätsrisikos durch Rückstände von Pflanzenschutzmitteln

C10 Specific needs of German consumption studies from microbiological point of view

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Consumption studies are a central data source for estimations of exposure of food with specific contaminants in microbiological exposure assessment.

Study type and degree of detailing in the collection of consumption data determine decisively the accuracy of the exposure assessment.

Depending on the selected food-bacterium combination for which an exposure assessment is to be carried out, differentiated additional information must be taken into account.

For example:

- specific risk groups (e.g. pregnant women in case of Listeriosis) and their representation in German food surveys
- estimation of growth or inactivation of bacteria between the point of purchase and the point of consumption with the help of storing duration or expiration date
- information on food characteristics (e.g. packaging) for estimation of microbiological contamination of food
- information on handling of food at home, with respect to cross-contamination when preparing of food
- problems coming from rare consumed foods.

Mostly the requisite information is not contained in consumption studies so that in some cases only insufficient or no statements to the estimate of exposure is possible. [and it must be revert to other data sources].

Regarding these parameters consumption studies are analysed and the specific needs from microbiological point of view are represented.

C11 Parental influencing factors of fruit and vegetable intake among 10-12-year-old children in Austria

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Introduction: Many studies have shown that children are consuming less fruit and vegetables than recommended. As all eating habits, the consumption of fruit and vegetables is a complex phenomenon influenced by personal, social and environmental factors. Knowledge about possible influencing factors is important to promote adequate fruit and vegetable intake levels and to implement effective intervention strategies.

Aims: The present paper aims to give an overview about the parental behavior as a potential influencing factor of the fruit and vegetable consumption of their children in Austria.

Methods: The study covering 3793 participants (complete child-parent matches) was part of the Pro Children cross-sectional survey carried out in October/November 2003. Self-administered questionnaire were used to measure fruit and vegetable intakes as well as personal, social and environmental factors.

Results: The results showed that the average fruit and vegetable consumption of both - children and parents was below recommendations. Nevertheless, the fruit and vegetable intake of children increased with the intake levels of their parents. The average intake of children was significantly higher in those children whose parents showed adequate consumption levels. In general, modelling was the most consistent social-environmental predictor of daily fruit and vegetable intake in Austrian children (ORFruit=2.15; ORVeg=1.15). A significant increase ($p < 0.001$) could additionally be observed when parents consumed fruits and vegetables together with their children. Another important predictor was family facilitation such as peeling or cutting up fruits and vegetables. Children ate significantly more fruits and vegetables ($p < 0,001$) if the food was prepared.

Parenting styles such as active encouragement and allowance family rules showed little effect on the fruit and vegetable intake of children. Significant differences could only be observed for vegetables, if parents demanded their children to eat vegetables every day.

However, all parental predictors showed more influence on fruit than on vegetable consumption.

Conclusion: Due to these results it is important to increase the parent's awareness of their own fruit and vegetable consumption. Especially serving as a role model for their children as well as being involved in the children's dietary practices the parents have an important impact on the eating behaviour of their children.

C12 Product Loyalty and Variety Seeking as Habitual Patterns of Food Purchase Sequencies

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Background: Conceptually, most researchers may agree, that the behavioural core of product loyalty (vs. variety seeking) has to be based on the dynamic process of individual or household purchase decision series. But in empirical research mostly cross-sectional relative frequency measures are used to indicate the repetition process of purchases, very often based on only some few products. In our study we used longitudinal continuous time data of purchases to explore product loyalty and variety seeking by analysing purchase sequences in 38 food products in a one year time interval.

Methods: We used data from the German GfK consumer panel, in which data on product purchases of households are continuously collected with diaries. For each purchased product, specific information are measured, e.g. date of purchase, product (sub-) category, quantity and price. The panel data cover 38 product groups of food (e.g. milk, frozen food, desserts, cheese, pasta etc.). The quota sample consists of 9064 household. Further, there are data on the socio-economic and demographic status of the households, as well as data on nutrition attitudes of the household keeping person. Data from 1995 are used in the present study.

For each of the 38 product groups and for each product purchase in six consecutive purchases in 1995, it was coded, if the product purchased was the same as before or not. Diverse patterns of these binary sequence combinations were found.

Results: Food purchases are dominated by habitual variety seeking. Prevalence of variety seeking and product loyalty depends on the product type. Habitual product loyalty is less affected by socio-demographical and attitudinal characteristics than habitual variety seeking behaviour. Health related nutrition and high aspiration attitudes of the housekeeper reduce habitual variety seeking. Convenience and price oriented attitudes increase habitual variety seeking. Further comparative research on purchase sequence patterns in specific product groups is needed.

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