Changes at the other end of the chain;
Everyday consumption in a multidisciplinary perspective

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Printed in The Netherlands.

ISBN 90-423-0182-1
Shaker Publishing BV
St. Maartenslaan 26
6221 AX Maastricht
Tel.: 043-3500424
Fax: 043-3255090
http:// www.shaker.nl

Preface

It is with great pleasure that we present this book with contributions of research on changes in daily life, well-being, health and safety of consumers and their consequences for production chains. They are the accepted, peer-reviewed presentations of the International Congress 'Changes at the other end of the chain' organised and sponsored by Household and Consumer Studies, Wageningen University and Research Centre in May 2001.

The congress and publication would not have been possible without the help of several persons and organisations. We thank the peer reviewers for their input and remarks to the authors, the different helping hands for the organisation and the following organisations for their financial contributions: Ministry of VROM, KNAW, LEB fund ('fonds Landbouw Export-Bureau 1916/1918'), Wageningen University and Unilever.

Organising Committee

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Part 1

Introductions

Introduction

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The other end of the chain

In the late 1990s it became clear that the focus of Wageningen University and Research Centre had to change. In a Strategic vision the chain approach was introduced. The increasing need for food in the world together with developments in food production techniques and better conservation of natural resources, ask for other priorities. The new path has two dimensions. One dimension concerns the quality of green space; the other is the agro production chain: breeding, processing, sale and utilisation of the final product (Strategic vision, 1998).

As a major part of the University staff carries out research on the production and the processing of agricultural products, it is not surprising that that part of the chain receives the greatest attention. The elaboration of the strategy shows that there is a major concern for the production system, leaving the consumer fully dependent on the end of the chain at which he may perceive and appreciate the final product (Strategic vision, 1998). This is a top-down approach. Although consumer emancipation is mentioned in the Strategic vision, the consumer is not pictured as a responsible customer of end products, with his own resources, ties and infrastructures.

The group Household and Consumer Studies at the University has a different approach. Its research concerns the consumer who acts, as is formulated in the title of this publication, 'at the other end of the chain'. Consumers may be individuals, but most consumption takes place in households where everyday life happens. Households are not linked to the production-consumption chain in a passive way. The group Household and Consumer Studies approaches the problems by focusing on households, which form a particular framework for consumption at micro level. Because of our concern with everyday life we are able to discern the complexity of life at the other end. For a better understanding of consumption one must take a closer look at this part of the chain.

Households and consumers

Because households are units of interacting and interdependent personalities, who mostly have common goals, who have a commitment over time and who share resources and living space (Hook and Paolucci, 1970; Åberg, 2000), they form a specific context for decisions and activities in everyday life concerning consumption. Household consumption is therefore not simply a sum of individual consumption patterns. Households produce goods and services themselves with their common resources like money and time, skills and knowledge, their appliances and other

goods, to satisfy their daily needs as well as possible. Sometimes they draw goods directly from professional production chains or they use facilities and services from outside organisations. Households have goals, views and ideas about the way they should live, which are partly formed by values and standards from the outside world. Human resources are as important as money or market goods to realise the household goals.

On the other hand, decisions in the production chain may influence housekeeping and consumption. Changes in the technology of food production, for example a shift from traditional food to convenience food, will result in less preparation time at home. But developments in society, not necessarily related to consumption, have as much or even more impact on housekeeping and the way households consume.

Changes and developments

Developments such as more women having a paid job, insufficient child care facilities, changes in public transport, more environmental awareness or residential areas at a distance from shopping centres, seem far away from influencing consumption. But they do make differences for housekeeping and consumption. Households perform activities with means, which carry results. When it comes to changes affecting the other end of the chain, they may be situated at the input side of the household, in the means for satisfying consumer needs, or at the output side, in the effects of the activities.

Changes affecting the input occur mostly in relation to resources of the household. There may be a shortage in human resources, because paid labour takes too large a share of time, limited skills for particular activities or disabilities. But material resources may also be the cause of changes as can be imagined when a product or its performance changes considerably. Changes in facilities and infrastructure have their impact on resources. So do childcare arrangements, new requirements for catering, etc.

The effects of consumption on the environment or on health are part of the output. Customary consumption patterns may prove to be a burden for the environment, when all their side effects are taken into consideration. New insights in nutrition and health may show how bad certain eating habits are in the end. But not only the available knowledge is of importance. In a society where awareness of environmental pollution and health hazards is developing, people will include such considerations in their decisions.

The contributions in this book will show that it is sensible to take into consideration changes in households and in the context of consumption, whatever their origin, in the production-consumption chain. It is to be hoped that the contributions will arouse interest for 'the other end of the chain'.

Parts in the book

The contributions in this book focus on the consumer and user of products. They were presented in the International Congress 'Changes at the other end of the chain' held in Wageningen in May 2001. The papers, which have been accepted after a (blind) peer-review, have been included in this book.

The immediate cause for the Congress was the 50th anniversary of the academic study of Home Economics in Wageningen. To strengthen international co-operation in the field of study, the Congress was organised in association with the International Federation of Home Economics (IFHE). But researchers from other fields concerning households or consumers were encouraged to participate. Several members of the Association of Commodity Science (IGWT) were welcomed. For that reason the words of welcome spoken by the chairs of both associations have been included.

Changes in everyday life are a broad subject that has to be restricted in order to allow handling. Three fields of study have been selected: Food patterns, Provision and use of care and Energy and environment. They are covered in separate sections in the book. The three fields are treated in relation to consumption itself and to certain effects of consumption like those on health and safety or on the environment.
The beginning of every section consists of two leading papers. The first provides an overview of the field of study; the second comments on the first. Papers that show current research in mostly European countries follow them.

Food patterns

In her paper about food patterns, *Leonhäuser* discusses differences in food choices between European countries. Quality and freshness was most important for all European consumers, but aspects as price and health receives different ratings in different countries. Socio-economic factors are of influence on food patterns, but availability and cultural factors carry most weight. The amount of fresh vegetables, fruit and different types of meat and fish, for instance, varies strongly between the countries. But to explain the differences information about meal patterns, time of food supply and eating habits in households is needed.

Van Otterloo, on the other hand, doubts whether households will be important for food choices in the future. She takes a historical approach and discusses innovations in eating habits during the last three centuries. These innovations are not only determined by cultural and socio-economic changes, but also by technical developments like mechanisation and 'chemicalisation'. Nowadays, consumers have high expectations of food. Quality problems seem to have multiplied. Quality however has many dimensions: in times with lack of hygiene, hygiene and health were most important quality factors, in times when the environmental movement became important food had to be 'natural' etc. All these quality dimensions together produce inconsistencies, which will become problematic in the future.

The research papers in this section deal mostly with research on requirements for healthy food, on nutritional values of food patterns of various groups of people, on influences of product assortment and types of food on eating habits and on risk perception of new foods.

Provision and use of care

Niehof concentrates on the concepts of care, notably care for the ageing. Increasing life expectancies in the welfare state result in a larger number of elderly people needing care. On the other hand there is a decreasing care potential in households because of the increasing number of women involved in the paid labour market. When care is considered in an analytical way, it appears that households are not the only organisations which contribute to care, but they alone cover all aspects from recognition and taking responsibility to providing and receiving care. Especially the most gender-determined aspect: 'giving care' is situated in households. Because gender roles do not change easily, this unpaid, undervalued work in the private sphere will probably prevent Dutch women to exchange their part-time paid work for full-time jobs in the future.

Van Dongen has a different view. He doubts if it is possible to define care and to distinguish it from other activities. In his concept all activities are seen as productive: they all have input elements that are transformed into qualitatively different output, which is input again for other activities. Output can have a financial value but also a personal, social or material value. A paid job does not only provide money, one may draw social relations, social assets or means for personal development from it. Besides, human and material activities occur both in the so-called care-related activities as in activities unrelated to care. So it is not a question of defining care and no-care activities and if they are genderised or not. What matters is an equal division of activities and means between the male and female population in the long run.

The research topics concerning care cover a wider scope than that of ageing or division of labour. They show studies on changes in infrastructure in countries in transition (e.g.childcare in Slovenia) or special effects of ICT-developments on the household, the market and the production chain. In other studies household characteristics, important for the demand for housekeeping services, are determined. But there are also studies dealing with sufficiency in resources when caregivers are (temporarily) disabled or with special emotional support for those who care for psychiatric patients. One paper focuses on the history of the science of Home Economics and the position of everyday life 'in the chain'. It is argued that consumption in everyday life should be at the beginning of the chain, not at the end. At a time when market-oriented thinking takes over in our society, one has to be prepared for negative effects on daily life and the family as well as on the concern for the environment.

Energy and environment

Henderson observes that the energy use of households is rising all over Europe. Energy is a commodity which provides essential services, and it has a low income and price elasticity. However, it is possible to reach the reduction targets agreed in Kyoto. Much can still be achieved by means of technical efficiency measures and legislation. But for a sustainable energy use in the long term, more reduction and new thinking are needed. This is only attainable by a multidisciplinary approach with greater involvement of social scientists, more attention to the impact of energy use on the environment and its economic consequences, a less materialistic idea about the quality of life and the supply of information on green consumption in order to enable consumers to make better choices.

Terpstra links up with the multidisciplinary approach and with greater attention to social sciences. He focuses on understanding of the household system and the mechanisms in household consumption. Using models in Home Economics and Consumer Technology, he shows the dynamics of the system. After interventions in the system households will try to regain a new equilibrium in an acceptable level of living. They may use the strategy of the 'citizen as a consumer' by trying to repair the performance level of the activity or act as the 'concerned citizen' by adapting the standards of consumption to a lower performance level. He too sees solutions in trying to loosen the self-evident relationship of consumer satisfaction and material consumption.

Because concern for the environment is still quite a new topic in consumer research, a number of presentations in this section are dealing with digging up the effects of customary consumption patterns on the environment. The effects on energy consumption or environmental pollution are not always clear. Neither have the effects of washing habits, food patterns, energy and water consumption and maintenance activities been properly calculated before. Options for more efficiency are discussed, shopping behaviour of households for regionally produced food and some of the studies deal with acceptance of energy-saving behaviour. Sometimes a strong economic-technical approach to consumption is shown.

Epilogue

In the end *Röling* renders a picture of all papers together. He recognises several integrative components. Multidisciplinarity of the contributions is prominent. In recent years the integration of social and natural sciences has also been developed in other domains of Wageningen University, making the whole more interesting. This also adds to the developments in system thinking, which is present in many presentations. Röling classifies system thinking from hard to soft. There is a clear development from hard system thinking like in a techno-centric system through eco-centric thinking, taking the ecosystem into account to holo-centric thinking, where people are the key elements. Work on solutions in all three of these systems will produce optimal solutions.

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Changes at the other end of the chain. Everyday consumption, food, care and environment

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It is a great privilege and pleasure for me to open this congress on behalf of the International Federation for Home Economics. I would like to thank the organising committee most sincerely, particularly Ans Groot-Marcus, the initiator of the Congress.

Ans has been a member of the International Federation for Home Economics for many years. She chaired the IFHE Research Committee on several occasions and made a significant contribution to the success of the world congresses in Ghana and Bangkok.

I would like to pass on regards and best wishes to everyone attending the Congress from IFHE members all over the world.

The subject of the Congress: **"Changes at the other end of the chain. Everyday consumption, food, care and environment"** *is very topical.*

It has now become very important to focus a professional debate on the consumer, who forms the last link in a production and marketing chain.

Rapid changes in our society, the continuing growth in our economy, modern technology and other developments all determine or affect our everyday lives. It is therefore essential for home economics and domestic science to deal with this subject in detail and accept its share of responsibility for this development process.

Let us consider the Central European consumer. The pace of change in external circumstances and way of life is felt to be more and more stressful. People's uncertainties in their social and economic environment have increased significantly. A few examples of this are: growth of the individualisation process, pressure for lifelong learning, high divorce rate, job losses, etc.
It is necessary to investigate the constraints in peoples way of life and to determine how daily life can be improved in these situations

There has been an increase in mobility requirements on the one hand and demands for personal mobility on the other. The range of products and services supplied is now more varied and often more confusing. Consumers have got accustomed to this confusion and have learned to accept it without really being able to deal with it.

The process of globalisation cannot be halted in the face of global free trade, cheap transport, the associated worldwide freedom to travel, pleasure in consumer goods, the rise of multicultural societies etc., but the decision on the scope of globalisation lies with the consumer.

Globalisation also exists in parallel with regionalisation and has a compensatory relationship with it. It is supported by the growing need for identity, guarantees of origin and safety, especially for food. Protection of the environment, animals and landscapes is also gaining popularity. We can detect an increasing desire among many people for transparency and a regional base, particularly in Europe. This trend gives the regions a good opportunity to strengthen their identities and develop their markets with regional products.

The scandals of recent years (BSE, dioxin, hormones etc.) have made consumers feel very insecure. As globalisation progresses, more work is required to give consumers information and advice.

New framework

A stronger consumer policy, better consumer research and more consumer education is required throughout Europe.
There is a need for knowledge about real consumers and effects of consumption as well as for confident, well-informed consumers whose purchasing decisions represent a vote for consumption which is socially, ethically and environmentally responsible.

No less a person than John F. Kennedy declared to the US Congress in March 1962: "We are all consumers. Consumers represent the largest economic group. They influence nearly every public and private sector decision and conversely are affected by each of these decisions. And yet they are the only important social group that is often not heard at all."

One could even say that they are even not asked what they really want.

Article 153 of the Amsterdam Treaty gives grounds for hope because it states "that consumers have a fundamental right to adequate consumer education".

In the Charter of Fundamental Rights published in December 2000, the European Union also deals with the importance of consumer protection, in Article 38 and sustainability, in Article 37.

Consumer research – what do consumers want?

To find out what consumer want, about their needs, their attitudes and values and how these reflect the production chain, we do need research.
There are several factors affecting the consumer choice, like the size of income, and the prize of goods and services, the production itself and the impact on environment.

The consumer behaviour is basically dealt with the principle of human behaviours. The behaviour of every individual is influenced by the group he or she belongs to (society structure, culture and the perceived value).
There are many questions to be asked, to be answered. The research provides the information for example concerning the consumer behaviour, the consumption but also provides the basic knowledge to develop strategies for consumer policy, production, market, etc.

This Research Conference will provide many answers to many questions concerning this theme.
There is a big need of research in home economics related fields, in sustainability and management of household resources which allows a multidisciplinary and interdisciplinary approach.
One of the points in the IFHE Mission Statement reads: "To support research areas relevant to home economics (individuals, households and family issues related to the satisfaction of physical and psychological needs which expand the understanding of the ecological view of individuals families and households in the larger environment."

Consumer education - a challenge for educationalists

Consumer education is a consumer policy task that is wanted and needed throughout Europe and must be demanded more forcefully. Young people and adults alike must be given the skills to articulate and advocate their interests as consumers to the suppliers of products and services. They must be capable of informing themselves about the market, evaluating products critically and selecting them according to need, and be able to consider and take their decisions on the basis of environmental, ethical, economic and social factors. These are essential everyday skills.

Therefore it is imperative that all schools and educational institutions at all levels face the challenge of giving consumer education and training the status it deserves as an interdisciplinary principle of teaching at every stage and type of school.
Consumer education needs base subjects. A home economics education creates the best foundation.

If the theoretical and practical coverage forming part of home economics education is to be relevant, it must help to teach everyday skills, i.e. the ability to make conscious and sustainable use of consumer knowledge.

In addition to consumer education, i.e. teaching core skills on handling the market, we must also ensure that consumer affairs are dealt with appropriately in teaching and research.

Increased demand for consumer policy

An effective consumer policy seeks a balance between government regulations to protect the consumer and activation of consumers. Government ideas of omnipotence have no place in the

economy, which is subject to its own dynamism of growth and also to the "constraints" of standardisation in the Single Market and under a World Trade Agreement. Consumer policy can improve the position of consumer education in the market. It can provide information and a say in decisions, prevent or at least restrain the worst developments and transfer the risk of dangerous products to the manufacturer by stricter product liability.
Consumers are also free to fight for a stronger position themselves.

To achieve this position, consumers must be given the home economics skills necessary for action, to help them make a better assessment of the market and the range of goods and services from the following standpoints:

- **Requirement transparency**

i.e. to determine and assess the needs of the household in everyday life and the family cycle, and the cost of these.
People in western industrialised countries each collect 10,000 things around them in the course of time. At the same time we know that members of the Navajo Indian tribe manage with only 250 things.
A mentality of extravagance has become widespread, along with a desire for comfort. The affluence requirements of most people (in the western world at least) have long been satisfied. Markets are fragmented. Modern businesses fight redistribution battles in markets already conquered. The companies of the new generation are no longer seeking new markets, they are examining how best to satisfy customer requirements. Artificial needs are being created, and products are taking ever more bizarre forms (e.g. mobile phones with innumerable features).

This market trend demands

- **Market transparency**

Market products and services must be examined more closely, evaluated for quality, service and cost and presented in a way that the consumer can understand. We must ask the question: For what products and services is there a market, what are the target groups etc.?

And last but not least, there needs to be clear

- **Product transparency**

There has to be a debate about quality, service, location, and price in relation to market products and services.

To help consumers in this complex debate with the market and their own means and resources (time, money, budgeting ability and skills), there are institutions such as consumer advice centres, product testing organisations etc. that offer relevant information and advice.

The government must provide general conditions to enable the transparency mentioned above to be achieved. The outstanding political questions of product quality and production technology

(food, housing, textiles), transport systems, energy supply, the environment (waste dumps, packaging, harmful substances etc.) and services of all kinds have to be resolved.
We are all involved in the debate with the market and consumption and bear public, private and general social responsibility through our everyday economic action.

Economic action then becomes political action and political responsibility.

Assuming that we are at the other end of the production chain, which means that we as consumers do not just consume the products and services that the market offers and that we expect from the market, or consider how to cover our needs, but that we develop the right ratio of consumption to use by our personal attitude and action. This demands more personal responsibility and life skills.

Home economics and domestic science provide the necessary everyday skills through education, teaching, research, and advice. We as home economists must bring our influence to bear to ensure that products and services contribute to the public good, improve our quality of life and respect the principle of sustainability.

The International Federation of Home Economics, a forum and platform for home economics experts, accepts responsibility for helping to mould society, humanity and the well-being of every member of our society.

This scientific congress is a further milestone for the IFHE and its organisations and institutions for expression of this home economics responsibility.

The IFHE will hold the World Home Economics Day on 21 March 2002 on the subject of "The Risks of Consumption related to Health and Welfare". This campaign is intended to contribute globally to the creation of an awareness of responsible consumer behaviour, consumer education and consumer policy.

As President of the International Federation, I would like to wish the organisers and all those attending a very successful congress.

Speech by J. Koziol
President of IGWT

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Respectable Chairman, Dear Presidents of the National Societies for Home Economics and all Participants of this Congress.

It is my honour and a privilege to address you on behalf of the Presidium of the IGWT (Internationalle Gesellschaft für Warenwissenschaften und Technologie) at the very beginning of the third millennium.

It is to be expected that you, the members of the largest societies of home economics, scientists and teachers in this and related areas, will keep the leadership in undertaking efforts of initiation new activities necessary to meet the challenges of the XXIst century. Now we know that the solution of all basic economical and consequently also social and political problems can be reached by implementation of the good quality priority of goods, services, our activities etc., what summarizes in good quality of our lives. You have named your congress "Changes at the Other End of the Chain" – please accept the greetings from people who try to act at the beginning of the chain, along the whole length of the chain and also a the "Other end of the Chain". The true field of interest of our societies is implementation of good quality priority and the name of our society should be rather changed to "Quality science", "Qualitology" or similar.

We and all the members of our society know that we are not alone in our attempts to enforce the good quality priority for the benefit of the consumer, who is and will forever remain the most important object in the economy – without the consumer and his needs it would not be necessary to undertake any economical activities. In modern societies, approaching the level of sustainable economy with all the regulations brought in with the ISO standards and TQM or similar systems of quality management, reaching good technical quality is rather a trivial task. Also maintenance of good quality of products exposed as commodities for sale, owing to new achievements in packaging and logistics causes no serious problems. What remains and should be the most important task is how to secure the highest possible delight of using good quality products by the consumers. The consumer has to be informed and educated how to choose good quality, how to exploit optimally the product's utility, how to dispose what remains after use with a profit for himself, for the natural environment and for the society.

We know that home economics is playing a leading role in helping the consumer in rational explanation of the good quality of purchased products, please accept our cooperation in this task. Your well-established approach has more sociological, economical and even philosophical character when compared with our activities centered on rather technological and environmental problems.

This latter issue should be given top priority in concordance with the demands formulated in the fifties by the Club of Rome and its members also belonging to the commodity science and home economics societies. Now we are wiser by over three decades of experience and we are facing again an oil crisis, doubts raised by the results and perspectives of globalisation, fears connected

Concerning food patterns in a comparative way

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Abstract

Introduction: In the highly industrialized societies of Europe the food habits and the nutritional behaviour have never changed so fundamentally and rapidly as during the last fifteen years. The European food market became more and more harmonized. Most of the agricultural products reach the consumers as processed food produced by the food industry. What kind of consumer choice can be expected? Are there still origin food habits in the European countries or does exist a European-wide standardized nutrition style? Are there differences in food patterns determined by different socio-economic conditions? How do various factors affect consumer behaviour?

Method: To clarify these questions selected European studies done by social scientists and in the field of marketing research will be analysed. The knowledge of a Pan EU Survey of consumer attitudes to food, nutrition and health will be included.

Results: The results are focussed on the influences on food choice and food behaviour that consider personal and social factors, the market context and the context of eating. The discussion will contribute answering the question, if there are differences in food patterns in European countries. A model of the process of the food choice will be introduced.

Conclusion: The result might be useful to researchers as well as to nutrition and home economics practitioners and policy makers interested in nutrition interventions and nutrition education.

1 Introduction

In the highly industrialized societies of the world the food habits and the nutritional behaviour have never changed so fundamentally and rapidly as during the last fifteen years. Over the past decade dramatic events have changed the global political order, brought technological progress, information and communication technology and shifted economic policies. Globalisation, a dominant force in the last decade of the 20th century, is shaping a new area of interaction among nations, economies and people. It is increasing the contacts between people across national boundaries – in economy, technology, culture and governance. But it is also fragmenting production processes, labour markets, political entities and societies. So, while globalisation has positive, innovative, dynamic aspects – it also has negative, disruptive, marginalizing aspects (UNDP, 1999).
The world today faces backlogs of deprivation and inequality that leave huge disparities within countries and regions. Poverty is everywhere. In the richest industrial countries of the world, one person in eight is affected by some aspect of human poverty: long-term

unemployment, a lifespan of less than 60 years, an income below the national poverty line or a lack of the literacy needed to cope in society (UNDP, 1999).
Within the process of globalisation the European Unit plays a very important role as an economic partner. In last few decades the European food market has become more and more harmonized. And we know that nearly 90% of the agricultural products reaches the consumers as processed food offered by the food industry. In Europe the leading companies in the field of food production are Nestle, Unilever, Diageo Guiness + Grand Metropolitan and Danone with a turnover of 45 Mill., 24 Mill., 19 Mill. and 14 Mill. US$ in 1997 (Tappeser, 1999).

Table 1 The ten worldwide leading food companies

Company	Country	food sale (1997 in Mio. US $)	food sale (in percentage of the total)
1. Nestlé S. A.	Switzerland	45.380	95%
2. Philipp Morris Inc.	USA	31.890	44%
3. Unilever PLC/NV	NK / UK	24.170	50%
4. Con Agra Inc.	USA	24.000	100%
5. Cargill Inc.	USA	21.000	38%
6. PepsiCo Inc.	USA	20.910	100%
7. Coca-Cola Co.	USA	18.860	100%
8. Diageo Guiness + Grand Metropolitan	UK	18.770	93%
9. Mars Inc.	USA	13.500	100%
10. Danone	France	13.970	94%

As Table 1 shows: the sales of the European food companies are not small in comparison with those in the USA. There the global players are Philipp Moris Inc., Con Agra Inc., PepsiCo Inc., Coca Cola Co. and Mars.

Against this background it is a question of what kind of consumer choice can be expected. Are there still original food habits in the European countries or does a European-wide standardized nutrition style exist? Are there differences in food patterns determined by different socio-economic conditions? How do various factors affect consumer behaviour?
Before clarifying these questions selected national and European studies done by nutritional and social scientists and representatives by the marketing research will be analysed.
First of all I would like to present an integrated conceptual model of the food and nutrition system (Sobal et al., 1998):

	Resource Inputs
Producer Subsystem	Production (input) Processing (transformation) Distribution (output)
Consumer Subsystem	Acquisition (input) Preparation (transformation) Consumption (output)
Nutrition Subsystem	Digestion (input) Transport (transformation) Utilization (output)
	Health Outcomes

Figure 1: Food and Nutrition System: Subsystem and Stages

This model uses a systems perspective (systems theory) to present relationships between agriculture, food, eating, and health. The core of the model emphasizes a linear flow, where each subsystem and stage flows into the subsequent one. The linear flow components of the system include three subsystems: producer, consumer and nutrition. Each subsystem involves three stages that accomplish input, transformation and output. Nine stages represent key

processes in the overall system: production, processing, distribution, acquisition, preparation, consumption, digestion, transport and metabolism. Raw materials are transformed into crops which are processed into foodstuffs that are distributed to consumers who cook and eat food that contain nutrients which have health outcomes.

Figure 2 shows the food and nutrition system operating within a context consisting of other systems that can be differentiated into biophysical and social environments. Feedback loops and webs of relationships operate within the system and between the food and nutrition system and the systems that make up its environments (Sobal et al., 1998).

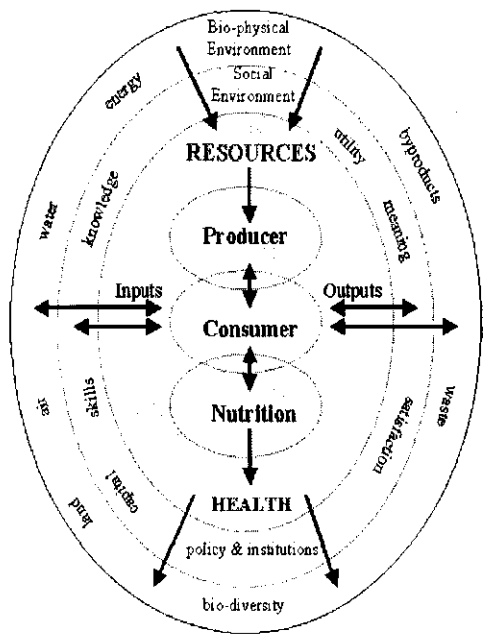

Figure 2: The Food and Nutrition System

The systems perspective allows us to analyse food and nutrition activities as part of a larger context and identifies linkages among the many disciplines that deal with food and nutrition focussed on the consumer. The authors mark the concept as "food and nutrition system" instead of simply "food system" or "food chain" in order to emphasize the vital links between food production, food consumption and nutritional health. Food serves many purposes, including providing pleasure, earning a livelihood, maintaining social traditions and supplying nourishment.

2 Food patterns

Coming to the term "- food patterns"- we have to recognize that it is a subject of socio-economics and of sociology. Food patterns are a particular way in which food supply, food choice, food preparation, and eating practices are usually done or organised. As a part of food or nutritional behaviour it assembles various phenomena from everyday life, defines and

arranges them according to natural and technical sphere (environmental and natural conditions like climate, light, topography etc.) and to human sphere, esp. to the sphere of individual and social action (peoples`- role and positions with the corresponding social status; patterns of action in purchasing, handling, preparing, serving, consuming foodstuff; psycho-physical states such as fatigue, stress, humour) (Bodenstedt, 1983). In addition to the social science approach the physical milieu, the social structure of human relationships, and the cultural system of values, norms, goals and expectations are to be mentioned (Edema, 1983).
Nearly twenty years ago the well-known scientist Johanna Edema from the Netherlands already discussed the necessity to construct a model of the household based on the assumption that within the household, behaviour is directed by a set of five values (Edema, 1983):

- The household must function as a recognizable and addressable unit both from within and from outside.
- It should watch over the physical welfare of all its members.
- It should watch over the spiritual welfare of all its members.
- It should regulate the participation of each member of the household in other social institutions.
- It should regulate the behaviour of each member of the household so that the above can be realized.

Figure 3: A set of five values

The viability of the household rests on its economic web, its social structure and its cultural system.
We know that the economic web refers to the capital goods which a household possesses and to the available human energy, time, money, knowledge and skills of the individual members of the household. The social structure is defined as the network of relationships between the members of the household and it is assumed that this network depends on the division of rights and duties, knowledge and skills, organizational and executive tasks between the members of the household as this division regulates the interaction between them. The cultural system is defined as a connected system of values, of norms, of goals and of expectations (Edema, 1983).
As the human resources, social needs and cultural norms of the members of a household change as a consequence of life cycle, changes occur in its economic web, the social and cultural system. It is clear that households change with time and that there are a number of social-cultural determinants influencing their decision-making.
The described approach opens up avenues in the field of home economics research and allows formulating hypotheses on the causes of different food patterns linked to the daily challenges of household management.
The European congress "-changes at the other end of the chain: every-day consumption, food, care and environment-" -here in Wageningen- will be a pioneering contribution for future research in our European IFHE community.

3 Food patterns and food choice in Europe

Differences in food patterns and food choices are caused by differences in ethnodietetics, in culinary art, in the art of serving food and in the doctrine of courtesy. Nowadays food-related lifestyle plays a very important role as well. Food-market research has established three different types of lifestyle- oriented nutritional behaviour (Litzenroth, 1995).

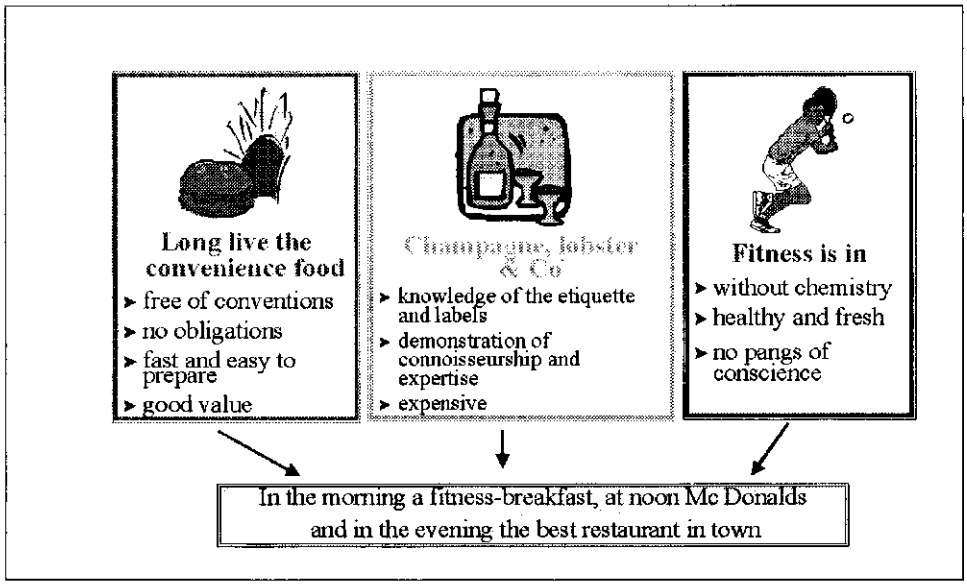

Figure 4: Three archetypes of nutrition behaviour

These three original types (Figure 4) reflect the range of the motives and attitudes of "convenience", "luxury", "hedonism", "wellness", "health" and "fitness". Eating patterns seem to be frequently contradictory, and many individuals`- nutritional behaviour is no exception. "They carefully monitor the calorie and fat content of their main dishes, eating salads and lean entrees, and the splurge with a super rich dessert" (Senauer et al.: 6, 1991). The simultaneous purchases of low-calorie products and calorie-rich, high-fat desserts and snack products, are causing the producers to do very well.
The explanation for these patterns is provided by the many roles food plays beyond simply filling nutritional needs and by the fact that consumers have become more and more heterogeneous, with distinctly different food consumption habits.
Clarifying psycho-social determinants of eating and drinking is very important for food companies. They need to target products at particular market segments.

Beside the studies carried out by food-market researchers different European scientific groups have analysed and worked out a number of food and nutrition studies, for example: a review of research in 15 European countries: "disparities in food habits" (Finland 1999), "a pan – EU survey of consumer attitudes to food, Nutrition and health" (Ireland 1996), and the "network for the pan-European food data bank based on household budget surveys" (Greece/Brussels 1997, 1998).

The pan – EU survey of consumer attitudes looks at influences on food choice, definitions of healthy eating, sources of information on healthy eating and the level of credibility in such sources, dietary changes and the perceived barriers and benefits of a healthy diet. All in all some fourteen questions were asked of 14,331 people across the EU. Approximately 1,000 adults, aged 15 years and upwards, in each member state were selected to complete the face-to-face interview-assisted questionnaire. In each member state, subject selection was quota-controlled to make the samples nationally representative (IEFS, 1996).

Table 2 Which of the following are among the three main factors influencing your choice of foods?

	Quality or Freshness	Price	% Taste	Trying to eat healthily	Family constraints
Austria	90	**54**	25	50	32
Belgium	76	34	46	37	29
Denmark	64	39	29	**48**	22
Finland	67	**62**	41	40	17
France	77	**57**	42	25	21
Germany	76	**40**	31	31	29
Greece	75	18	47	32	**38**
Ireland	49	30	45	35	**36**
Italy	84	29	40	25	36
Luxembourg	68	18	49	24	18
Netherlands	73	**36**	41	28	**36**
Portugal	66	38	40	34	24
Spain	80	**52**	22	32	25
Sweden	73	**59**	37	30	31
UK	59	43	49	40	30
EU average*	75	43	38	32	29

*Weighted according to population size **boldface: second/third main factor**

The most frequently selected influences are shown in Table 2. Overall "quality or freshness" was selected by 75 % (EU average) as having the most important influence. In Austria, Finland, France, Germany, the Netherlands, Spain and Sweden "price" is the second most important factor. "Family constraints" influence food choice more in Greece, Ireland, Italy and the Netherlands than in other member nations.
"Trying to eat healthily" was only mentioned by Danish people in second place. The statement takes third place in Austria and Germany.

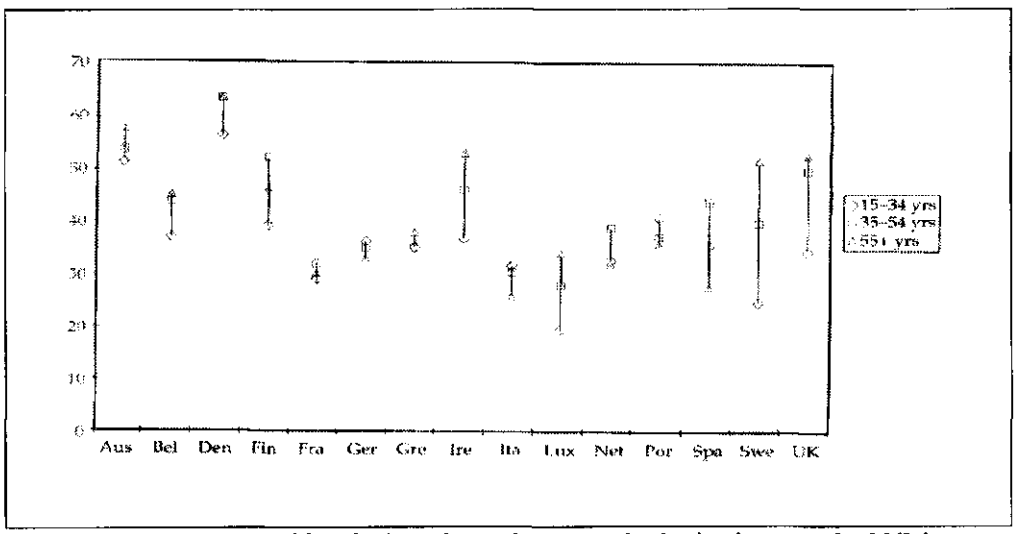

Figure 5: The percentage of females in each member state selecting `trying to eat healthily' as an important influence on food choice, by age

With regard to the selection of "trying to eat healthily" by females in different age groups, in Finland, Ireland, Luxembourg, Spain, Sweden and the UK for example, there were differences of more than 10% between the age groups whereas in other countries differences between the ages were smaller (IEFS, 1996).
Among young subjects the "convenience" factor was an important influence on their food choice, so it would appear that this overall EU pattern is upheld in most member states. Nonetheless there was still quite considerable variation, as in the difference between Austria and Denmark. As the range of convenience foods on the EU market has grown considerably in the last few years, it is not clear whether the perceived importance of convenience decreases as subjects age or whether there will be a cohort effect.

Table 3 % of subjects in each member state selecting 'price' as any influence on food choice by working status

	Total	Working	Housewife	Student	Unemployed	Retired
Austria	54	52	55	52	**68**	56
Belgium	34	31	**47**	38	34	29
Denmark	39	37	38	48	**52**	37
Finland	62	57	25	68	**75**	58
France	58	58	66	55	**77**	50
Germany	40	39	**44**	42	38	42
Greece	18	14	23	19	**25**	24
Ireland	29	28	**39**	18	38	25
Italy	30	22	24	21	21	**39**
Luxembourg	18	14	20	24	**36**	21
Netherlands	36	36	37	24	**49**	40
Portugal	38	32	**53**	22	46	47
Spain	52	48	53	46	54	**61**
Sweden	59	58	63	59	**65**	62
UK	43	41	45	47	**55**	42

We have already seen that the relative costs of food in different member states may have had at least some effects on the percentages of subjects regarding price as important.

Table 3 shows the percentage of subjects (classified by their working status) selecting price in each country. You can see, in nine of the member states, unemployed subjects were the most likely to select "price" when compared with other groups.
However, in Germany, unemployed subjects appeared to be the least likely to select "price" as important. In Italy and Spain it was retired subjects who selected "price" most frequently, while in Belgium, Germany, Ireland and Portugal, it was housewives. So, the effect of working status on the selection of "price" seems to be an important influencing factor on food choice varying across countries (IEFS, 1996).
In comparison to the European-wide survey of the Institute of European Food Studies in Ireland, there are other sources of data concerning food availability or intake. Examples are the nationally collected food balance sheets assembled by the Food and Agriculture Organisation (FAO) and the national household budgets in every European country.
It has long been recognized that the FAO food balance sheets data are a valuable resource for ascertaining trends of food availability over time. But as we know they are less satisfactory for inter-country comparisons.
A large amount of information concerning food and nutrition is collected at variable time intervals in almost all European countries by the National Statistical Offices through the *Household Budget Surveys*. Although they are not designed for nutritional purposes but in order to analyse economic implications of trends in food consumption, they represent a unique source of dietary patterns data, which make it possible to form an international, representative, regularly updated nutritional database.

In 1987 the *Data Food Networking (DAFNE)* was initiated and co-ordinated by the Greek colleague Antonia Trichopoulou. The DAFNE project was granted support by the European Commission. Eleven European countries were integrated.

The data of DAFNE firmly document the remarkable disparity of food patterns among the participant countries. Further, the influence of selected socio-demographic characteristics (educational level and residence) on the choice of food is tested.

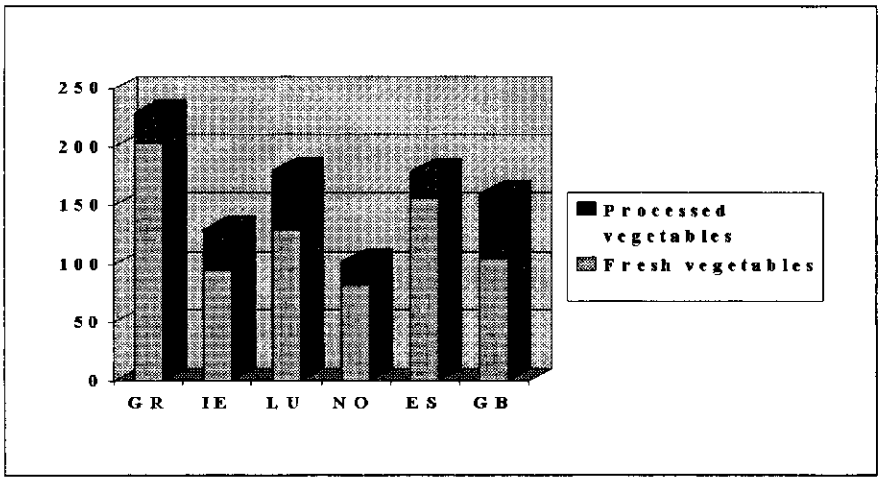

Figure 6: Average availability of fresh and processed vegetables in the DAFNE II countries, circa 1990 (g/person/day)

In the case of vegetables (Figure 6), the average availability is higher in Greece (229g/p/d), followed by Luxembourg (180g/p/d) and Spain (179g/p7d). The proportion of vegetables consumed fresh, however, varies between countries, ranging from 89% and 87%, in Greece and Spain respectively, to 66% in the United Kingdom.

Fruit availability follows a pattern similar to that established with respect to vegetables, with the Mediterranean countries being the leading consumers and Luxembourg following closely (European Commission, 1998).

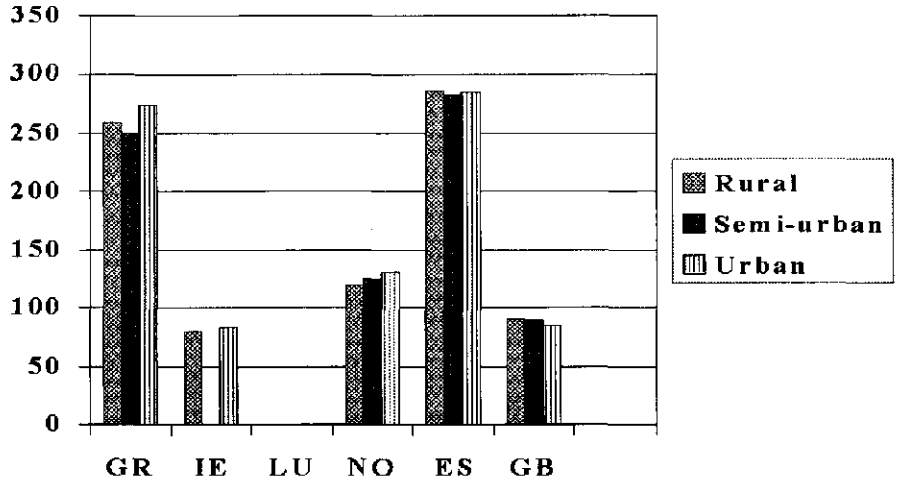

Figure 7: Fresh fruit availability by locality in the DAFNE II countries, circa 1990 (g/person/day)

Again, fruits (Figure 7) is mainly consumed fresh in Greece, 270 g /person/day (95% of total fruits) and Spain, 286 g/person/day (93%). In Ireland, availability of fruits barely exceeds 100g/p/d, with 79% of total fruits being consumed fresh. Disparities owing to the level of education and permanent residence within countries can also be detected, reflecting the influences of health education and different agro-economic systems.

Table 4 Average availability of meat (by type) (g/person/day)

	Greece	Ireland	Luxembourg	Norway	Spain	United Kingdom
Pork	15	9.8	32	20	24	12
Beaf & veal	52	25	43	26	31	19
Poultry	37	31	30	12	58	34
Other meat & meat products	46	72	81	71	65	73
Total	**150**	**138**	**186**	**129**	**178**	**138**

The consumption of meat exceeds 186g/p/d in Luxembourg and Spain (178g/p/d), while in Norway, Ireland and the United Kingdom it is around 130g/p/d. It is worth noting that two Mediterranean countries, Spain and Greece, nowadays consume more meat than all the other countries but Luxembourg. There had been a dramatic increase in meat consumption in the Mediterranean countries during the last twenty years. It has been pointed out by other nutrition surveys.

Looking at table 4 you can see that consumption of different meat types varies among the participating countries. While Greeks seem to rely mainly on beef, Spaniards show a preference towards poultry. The lowest consumption of poultry appears in Norway where it does not exceed 10% of the total meat availability (European Commission, 1998).

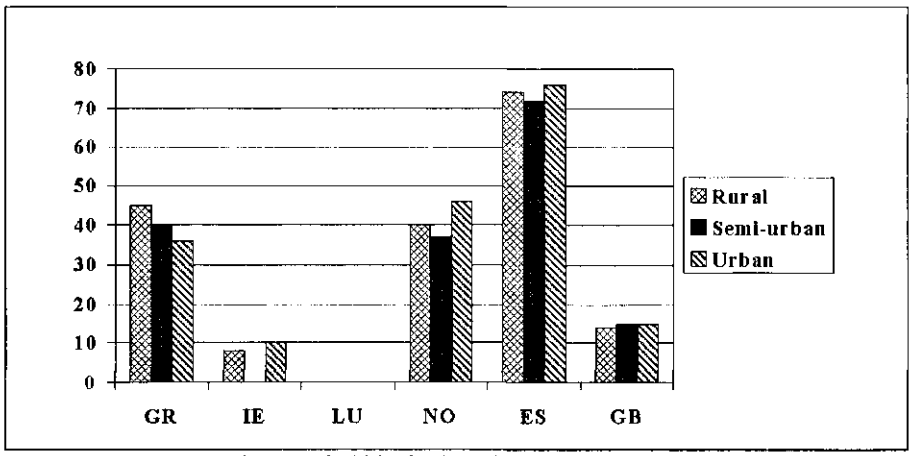

Figure 8: Fish and seafood availability in the DAFNE II countries, circa 1990 (g/person/day)

Concerning fish and seafood (Figure 8), Spain, as expected, has by far the highest fish availability (75g/p/d), followed by Norway (40g/p/d and Greece (38g/p/d). So, the Greeks eat on average 266g of fish during the week, which is less than the one to two portions of fish (300g/portion) that the population is recommended to eat, based on the Mediterranean Pyramid of Diet (Trichopoulou and Lagiou, 1997). A higher consumption of fish/seafood would contribute to iodine deficiency and its fat would be a good alternative to the animal fat that is consumed with meat.

No patterns can be identified in the availability according to education level or locality in Spain. While the fact that fish and seafood availability in Greece is getting lower as population groups are moving from the rural to the urban areas could be attributed to the immediate availability of sea products in the rural coastal areas and islands. Though one would expected better educated Greeks to be higher consumers of fish, market supply appears to be a stronger determinant of food choice in comparison to health education in this case: better educated Greeks are usually residing in the urban and not in the rural areas (European Commission, 1998).

4 Conclusion

In conclusion, data from Household Budget Surveys represent an important source of food information for national and international comparisons of dietary patterns in Europe and their socio-demographic determinants. The fact that they generate food data at regular time intervals in all European countries could make them -in contrast to unique nutritional surveys- useful for a reliable assessment of time trends (Kanellou, 1999).

Despite their limitations, Household Budget Surveys data could help identify issues such as cultural differences concerning food patterns among Mediterranean, Central/Eastern, Western and Northern countries. The data provide a valuable background for the conduct of a wide range of nutritional analysis and nutritional behaviour.

The pan-EU survey of consumer attitudes to food, nutrition and health will explore the degree of variability which exists geographically in peoples' attitudes towards and beliefs about

nutrition and health. "Such data will have a bearing on the development of any national and European-wide campaigns to improve peoples' diets and will benefit those in nutrition education by helping them target messages more appropriately" (Lappalainen: 467, 1998).
The findings of these first EU surveys, presented here very shortly, should also provide direction for future research in this area.
There are data available on socio-economic differences in food consumption and nutrient intake, but very limited data on eating and drinking behaviour and food habits in families and private households across Europe. To obtain a better understanding of disparities in food patterns future surveys should include at least the following variables measuring socio-economic status: education, occupation, and last but not least household composition and household management.

Inequalities in nutrition and health have been explained by differences as well in health and nutritional behaviour as in lifestyle. However the role of variation in behaviour and lifestyle among social groups is not well clarified (Roos and Prättälä, 1999). There is a lack of information on meals; to know them is very important for understanding food habits. More information on the time of food supply in private households, the social setting of meals, and kind of dishes consumed is needed.

For us as professionals in home economics and nutrition the main subject of our research in this context is to analyse systematically the process of food choice within the unit of private household and family. So, we need a conceptual model of the components in the food choice process.

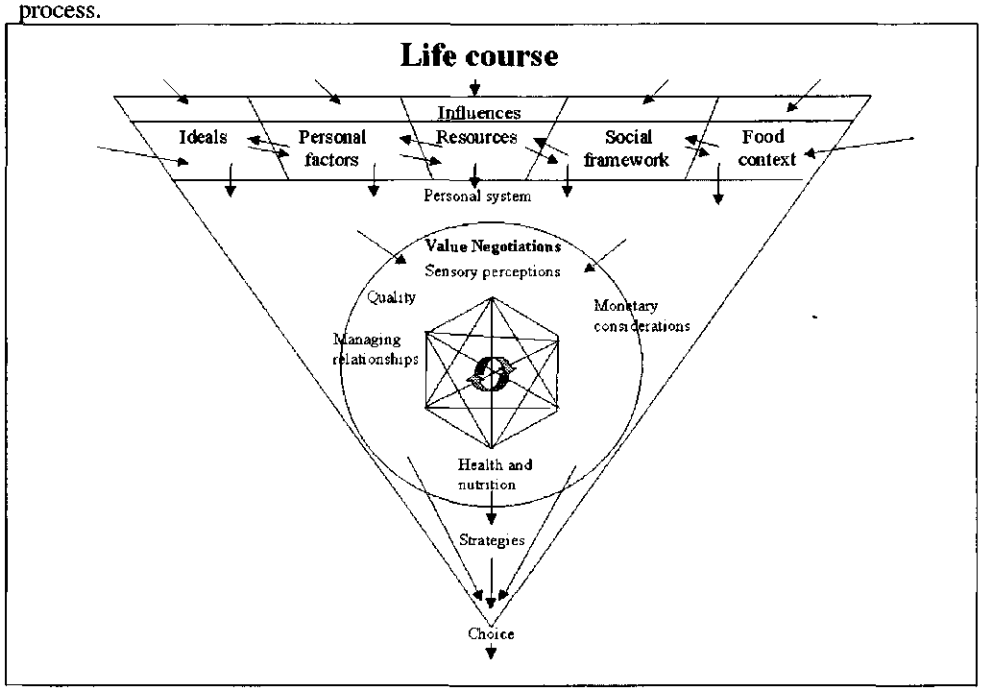

Figure 9: Food Choice
Figure 9 presents such a model, developed by colleagues of the division of nutritional sciences at Cornell University in the State New York. It represents the types of factors and the process involved in a single choice event. Factors involved in food choice were grouped into three major components: "Life course", "influences" and "personal system". The relationship

of these components to one another generates the process or pathway leading to the point of choice (Furst, 1996).
The model reflects a holistic perspective on the central point, scale and scope of food and nutrition systems strengthens social science work on food, consumers and health.
It allows understanding linkages between the network of people and processes that constitute the food chain.

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The Other End of the Food Chain in long-term perspective

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Abstract

In this contribution I will slightly go into the view of recent European food surveys, given by professor Ingrid-Ute Leonhäuser. The main goal is to complete her presentation of the contemporary and short-term state of the art with an image of the long-term history of food and meal patterns in Europe in social context. Next and more specifically, the history of the food chain and its relationship to food and meal patterns is touched at. Problems of food quantity and especially of food quality are connected to the development of the chain and to rising expectations of consumers. Finally some general conclusions are posed.

1 Introduction

The Department of Home Economics was established at Wageningen University half a century ago. Inspiration and models for this new type of academic research and education were borrowed from the United States of America in the late forties and early fifties of the twentieth century. This post-war period was characterized by powerful ideals on progress and reconstruction. Teaching traditional and poorly equipped (farming and country) households to modernize their management and lifestyles was a way to realize these aims. The department comprised many fields at a time. During the fifty years past, however, the study of household economy, nutrition, food consumption and food technology turned into specialized disciplines and departments. This separation is remarkable, given the fact, that the scientific study of food has had an interdisciplinary character from the beginning. In many other European countries similar developments took place, each with its more or less unique combination of specialized fields. Today a counter-trend of disciplinary integration seems to manifest itself in the field of home economics and consumer studies. Food is at the heart of this field, which reflects both its high social relevance and the enthusiasm of academics to study it from a range of perspectives (1). It is a paradox however, that during these developments in the academic field, many (or even most) of the household tasks concerning food seem to gradually have disappeared from this primary unit of consumption. I will come back to this later.

Contemporary food researchers think and write in terms of the food chain. Therefore the overall theme of this book is appropriately named ' the other end of the chain', which means that it focuses on consumption and consumers instead of production and producers. The changing context of European integration moreover, stimulates comparative research into food choice and consumption in the household. The work of Ingrid-Ute Leonhäuser on European food patterns is an example of this development. In this chapter I will first, shortly go into her results (see *Leonhäuser*), and second, complete her picture of the condition of food consumption and eating habits at a given moment in time with a long-term view on food and

meal patterns in Europe. This view is based on a range of historical and sociological studies on the important role of food in society, including my own. The next two paragraphs deal with some results of my recent research into the history of the food chain, which is part of a major project dealing with the history of technology in the Netherlands in the twentieth century (2). Under the heading of ' the other end of the chain in long-term perspective' I will touch at the following related topics:

- Contemporary European food patterns
- European food and meal patterns in social context 1500-1900
- Food patterns and the history of the food chain in the twentieth century
- Food quantity and food quality: the rise of consumer demands and expectations

Finally some concluding remarks will be made.

2 Contemporary European food patterns

Why do people eat what they do eat? To answer this question several analytic models circulate among researchers in the social and behavioural food sciences. These models are aimed at the inclusion of all the relevant factors, however seen from different angles. Ingrid-Ute Leonhäuser refers to some of them and gives us an interesting view of recent large-scale quantitative surveys in Europe. She ends with an evaluation and discussion of lacking data, arguing for the need to focus research endeavours especially at the level of the household (see *Leonhäuser*). Multipurpose food research In Europe appears to reveal heterogeneous and contradictory results as to motives, attitudes, actual food choices and resulting meal patterns. Market research offers three types of food-life-styles: *quick and easy*, *luxury and gastronomy*, and *fit, healthy and natural*. (Post) modern consumers however, alternate these styles freely during the day or the week. Therefore it is no easy task to connect specific social groups to these different types of eating habits, a thing which she admits.

The several types of academic European food surveys consist of large-scale, representative and comparative studies, done in the nineties of the twentieth century. The data comprise mainly consumer attitudes, supposedly influencing food choice. Research into actual selection of foods presented seems to be chiefly measured by availability in kilograms (person/day). From the three main attitudinal factors, influencing food choices in Europe *quality or freshness* comes first (75% EU-average), followed by *price* and *family constraints*, while *trying to eat healthy* turns up as a minor influence (see table 2, *Leonhäuser*). To my opinion the important question is, which explanatory meaning may be ascribed to these descriptive attitudinal qualifications, suggesting European similarities (in some countries more than in others)? The concept of *quality* has many dimensions, each with its own socio-cultural history, as will be exposed later. This question is left unanswered by Leonhäuser. The same is true for a problem I see in the use of data on disparities between European countries in actual choices and food patterns, measured by indication of availability of certain groups of food products (see fig. 6,7,8 *Leonhäuser*). These type of indicators seem to me too crude to be useful (Van Otterloo, 1990). Moreover the differences in the consumption of vegetables, fruit, meat and fish mentioned, remain for the most part unexplained. To be able to ascribe meaning to such data they need to be placed into the wider socio-cultural context that may be different for each European country.

The quantitative results reviewed by Ingrid-Ute Leonhäuser may be seen as interesting points of departure to further research into the explanation of food choices, food patterns and their changes. Traditional lines of segmentation: nation, class, age and household characteristics

today time and again appear not to work as influencing forces as they did twenty or thirty years before. She also pleads for new research, taking into account socio-economic variables and, first and foremost, the various dimensions of household and family. These dimensions should, she maintains, be comprised into a holistic analytic household-model of food-choices. Considering the rapid changes in composition and behaviour of households and their members in Europe during the last thirty or forty years, I have some doubts at the feasibility of such a model of the household. Although budget studies remain important sources of information they only give expenditures. The gradual disappearance of food-related household functions, mentioned above, even has reached the phase of consumption. One may therefore think, that inclusive food choice models at any rate should reckon with the complicated relationship of 'household behaviour' to actual behaviour of individual and individualized (post)modern consumers. Be that as it may, historical and social description and analysis of food and meal patterns may offer part of the explanation searched for.

3 Changes in European food and meal patterns 1500-1900

European food and meal patterns never have been static ways. They always changed, even during the Middle Ages. Pace and scope, though, were different over time. Food consumption everywhere in the continent was determined by such natural influences as the regional type of soil, climate, season and the geographical position. The accessibility of the region to channels of distribution, the demographical, political and socio-economic situation of the population and its cultural, technical and knowledge potential in addition were of utmost importance (3). At the household level a deep gulf existed for centuries between a very small group of rich consumers (emperors, kings and accompanying nobles) and a mass of mainly poor producers, who tilled the land. As peasants and farmers they were responsible for the surplus food enabling the elite group to eat and drink abundantly. Luxury foods from abroad, like sugar exclusively were available to them. With the growth of cities the number of food producers dropped, while the group of food consumers increased. Differences in food habits between city and country became more pronounced. An example is the city preference for bread (seen as a luxury) above gruel. For the time being grain remained the basic staple food, used in a variety of dishes, soups and porridges (Jobse-van Putten, 1995).

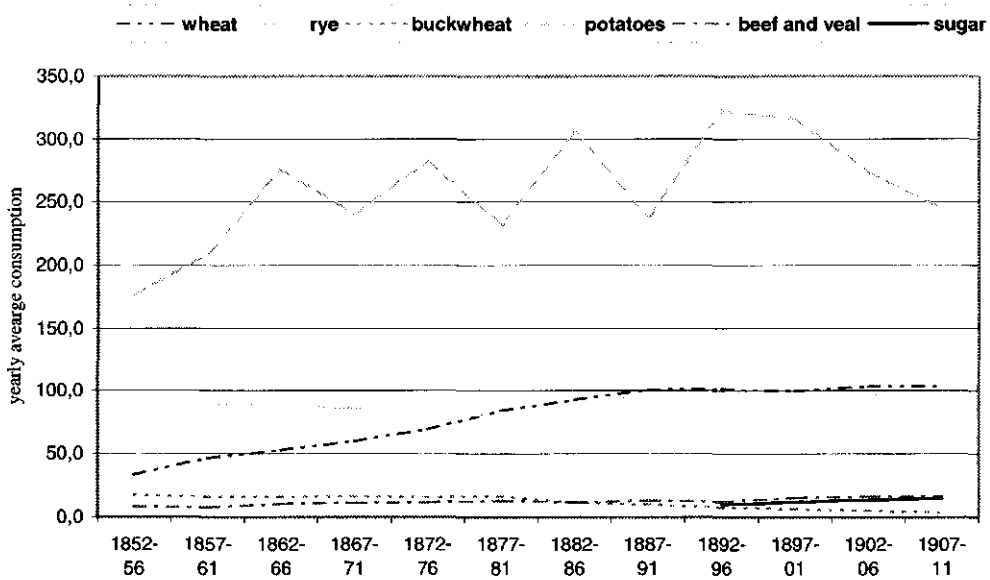
Several long-term social and economic changes took place after 1500, influencing the food level in the household among elite and non-elite groups alike, but not at the same pace. In the end the innovations even reached the lowest classes in city and country. The discovery of America (1492) and an increasing trade with other continents in the East and the West brought new food products and food habits to Europe. At the same time the European centre of economic and political power shifted from the Mediterranean South (Italy and Spain) to the Northern and Western European countries (De Vries and Van der Woude, 1995). The Netherlands as an old trading nation took the lead in the seventeenth, while England got the power in the eighteenth century. National culinary cultures in Western Europe slowly came into existence in a period of over three centuries, between 1500 and 1800. These changes made a start in the upper layers of society at the European courts. The development of distinctive national culinary cultures in England and France has been well-documented (Mennell, 1985).The stratified structure of early-modern society and the different position of the kings, courts and nobles in both countries have been main forces in the appearance of a 'high' culinary culture in France, while such a pattern was absent in England. Since the end of court society (1800) these national food patterns trickled top-down to lower social strata. The

Dutch bourgeois culture at the time marked the traits of simplicity and a relative lack of refinement (Van Otterloo, 2000a).

England and France became cultural and by implication also culinary models for other European countries, like Germany for distinct social strata. The bourgeois groups, rising in number and power, developed for instance a taste for cooked pudding. The elite groups imitated new French ways to prepare meat and compose sweet delicacies. This example is one of the five food innovations which – according to the German ethnologist Guenther Wiegelmann –diffused among the rising middle classes in (Middle-)Europe. The process of diffusion started after 1680 and accelerated from 1770 on. These innovations were basic for European food patterns and meals up to the twentieth century. They include the consumption of potatoes and coffee and tea. The new hot drinks were used with sugar and the diffusion was directly related to the increased scale of distribution and trade. In addition shifts in taste-preferences from sour and savoury to sweet took place, while new habits like the use of the fork and other tableware slowly turned into usual practice. Chinaware tea and coffee sets got the value of material status objects, in the city from the eighteenth century on, and afterwards also at the countryside (Teuteberg and Wiegelmann, 1986; Schuurman, 1989).

It goes without saying, that these innovations, except for the potato, already had become customary among the noble elite in the period long before 1680. These high-status circles constituted a breeding ground for the development of the new standards of cooking and eating. From that point in time, as just noted, cooking habits and table manners started to trickle down from city to countryside and from high to low along the social scale. Innovation went along with civilisation of manners. The potato, however, went the other way around and diffused from low to high. This tuber got only accepted in the Netherlands during the very bad socio-economic circumstances at the end of the eighteenth century. It made the start of its victorious passage though society as a lifesaver for the poor. In this way the potato replaced grain as a staple food, making up the base of the meal. During a large part of the nineteenth century potatoes were the main, or even the exclusive, dish composing all meals among the very poor (see figure 1). The European process of diffusion of the five main innovations mentioned, lasted nearly for two centuries. In the Netherlands it was completed only about the 1850's. At that time Dutch industrialization was just starting in some food sectors: potato flour, beet-sugar and margarine (De Jonge, 1976). At the end of the nineteenth century scarcity in the Netherlands slowly began to turn into intermittent affluence, taking a substantial shape only after the Second World War. The consumption of potatoes remained rather high at the beginning of and even until deep into the twentieth century. Its original connotation of poverty had disappeared.

Fig.1. Consumption of some foodstuffs by the Dutch population in kg/cap.yr (1852-1911)



The historian of the Dutch meal maintains that these long-term cultural changes influenced the trend to integration of the different meal patterns in the Netherlands at the countryside (Jobse-van Putten (1995). To my opinion drastic socio-economic and technical changes must be added to these innovations in order to complete the picture of the origination of food and meal patterns in the recent past. All in all the development of a new and integrated meal pattern may be seen as directly linked to the modernization and industrialisation of Dutch society (Van Otterloo, 2000b). In other European countries parallel processes took place, each with its own major or minor varieties (Oddy and Oddy, 1998). Industrialisation, made up of the two main processes of: mechanisation and 'chemicalisation', touched at ever more foods, one after the other. New production units went along with new ways and means of distribution and transportation. Food from the factory could not be distributed to every corner of the country, unless transport systems, retailing shops and other channels of distribution had been developed to reach every household. Thus the contemporary food chain came into being (see figure 2). The urban habit of eating three meals a day (one hot, two cold with coffee and tea) only has become general practise in the Dutch countryside only about 1950. The integrated Dutch meal pattern prescribed in addition a hot meal, consisting of three separately cooked dishes: potatoes, vegetables and meat. The habit of cooking dishes separately instead of cooking stews was based on new technical possibilities as well, to wit the diffusion of kitchen-ranges.

The nineteen-fifties mark the point in time when the first professor at the Wageningen Department of Home Economics made an inquiry into food preservation practices at home in the countryside (Willinge Prins-Visser, 1956). She found among other things, that traditional ways of home preservation of vegetables, fruits and meat were widely spread. Financial motivations to continue this type of hard feminine labour were very strong, in spite of the

establishment of the industrial era in the field of food. This means, that the level of affluence at that period in the country was not yet very high. This situation was to change very soon. After the sixties affluence stimulated, in concerted action with other forces, new and quicker processes of change in food and meal patterns. The development of the food chain was paramount to these continuing changes.

4 Food patterns and the history of the (Dutch) food chain in the twentieth century

Recently it has become popular among professionals in the contemporary food field to think and speak in terms of food chains. This is a new phenomenon. It is remarkable that food always has been produced, processed, distributed, prepared and consumed in every society without the aid of this concept. Why this situation has changed, how the chain is to be conceived and in what ways food and meal patterns are related to it? To begin with the last two questions, I propose the following definition. The contemporary food chain indicates a large system of interrelated phases and links (see figure 2). Food transforms in societies, which is a social process and in their members, which amounts to biochemical and physiological processes (4). Phases are: production, distribution, preparation, consumption and waste-disposal. *Production* is to be distinguished in primary and secondary production, referring to agriculture (growing) and the (luxury) food- industry, including delivery companies (processing). The route of transformation of food in society next passes the phase of *distribution*, including transport, trade and storage. *Preparation, consumption and waste-disposal* are further transformations. The links in the food-chain indicate the different *locations* of food-transformation (e.g. farm and supermarket). At these locations or links individuals, social groups and their organizations are actively involved in food transformation. Examples are farmers, traders, distributors, processors and caterers. Between these groups shifting relationships of power and dependency do exist over time (Van Otterloo, 2000b; Tansey and Worsley, 1997). The food-processing industry transforms raw agricultural materials into food products. Food products collectively may be named the *assortment* from which consumers make a choice to (prepare) and eat. The collective food choices of consumers must be conceived as *food- and meal-patterns*.

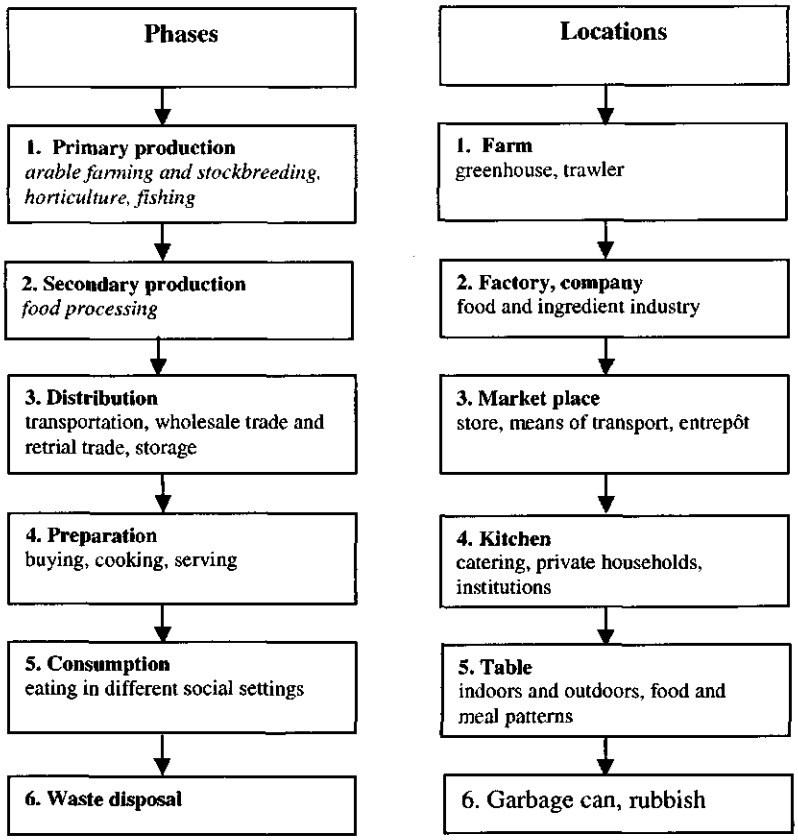


Figure 2: Food chain

Contemporary professional food researchers in Europe try very hard to understand how and why consumers choose as they do. Already I alluded to their endeavours above. These professionals work from the angle of a range of disciplines and for a gamut of different customers. Leonhäuser's review of available European surveys gives examples. The surveyors try to make meaningful interpretations out of their quantitative results on the fragmented and inconsequential behaviour of contemporary food consumers. This is a difficult task and survey results therefore often are not easy to explain. To my opinion the difficulties of food-researchers to decide to the existence of orderly patterns of food consumption have to do at least with the history of the chain, in several respects. I only touch at 'the reversal of the chain', which is a well-known process in the food-field. It indicates that the production and distribution of foods must start at the demand side and not at the supply side of the chain. Consumption has become dominant to production and distribution. The reversal of the chain is intimately connected to economic and socio-cultural changes, which became manifest since the second half of the twentieth century. What has happened?

The availability of food in (post) modern-industrial and affluent societies has been secured for every inhabitant since then. *Food security* has become a normal basis for all nations of the European Community, be it at a different pace. Problems of food quantity (shortages and one-sidedness) in European Countries for the most part have been resolved. This is a unique

situation in history. A high meat consumption of the population may be seen as an indicator to this relatively recent change (see for instance the figures on Mediterranean meat consumption in *Leonhäuser*). The development of the professional food chain, a governmental food policy, the growth of knowledge, science and technology and the connected institutions, have contributed largely to closing up the period of food scarcity and one-sidedness. The coming into existence of the food chain enables (non-involved) citizens to leave their former productive tasks to the chain and to limit themselves to consumption. This is an example of the fundamental social process of the occupational division of labour and its corollary, the generation of new professions.

During the same period a shift in dominance took place from the first to the later links in the chain. The power relations between the people, groups and their institutions, actively involved at the different locations (at the links) were altered. Primary producers and processors lost, while distributors and consumers gained in power. Consumers and their organisations seem to have achieved a more influential position, ever since the problem of quantity is over. The assortment and its location of distribution, the supermarket, have transformed into a real land of Cockaigne. Consumers can allow themselves to make an exclusive choice for some preferred foods and leave alone others. They now have plenty to eat and therefore may afford to become critical and refuse to buy. The spread of income and education through all of society is a case in point as well. The shaping of affluence and abundance went along with (coincidentally or not) relevant socio-cultural developments. I allude to the changes in the social relationships between important and distinctive groups. Mutual relations of power and dependency between man and women, parents and children, civil authorities and citizens, the old and the young, doctors and patients, the established and the outsiders shifted in balance (Sociaal Cultureel Rapport, 1998). In the context of the food chain a similar shift took place between producers and consumers.

5 The rise of consumers' expectations and food quality

In the (post) modern-industrial conditions of today quantity problems have reduced to the problem of consumers 'choice from a broad variety of processed foods. Problems of quality, however, seem to have multiplied. A final topic, relevant to the theme of the reversal (or: 'the other end') of the chain is the connection between expectations of consumers and problems of food quality. To my opinion the exploration of this connection may result into some insights about quality-dimensions. Quality is collectively indicated by European consumers as a most important influence in food choices, but it's meaning is not unambiguous. Different groups in different periods attach different meanings to the quality concept. In this section some examples are shown in the field of food and health in social and historical context.

Affluent societies create high levels of expectation among their members. I allude to expectations to what life and society should offer them in generally and what food may contribute to it in particular. Expectations have risen in the twentieth century, with an accelerating speed since the sixties. An easy example concerns health and a long life. This was for long a classic pursuit, realized by a few privileged people, but nowadays striven for by everybody. Health is the contemporary top-value to all members of society, when asked to range the most important things in life (Sociaal en Cultureel Rapport, 1996). Food is basic to health and thus it must be of a healthy quality. In the twentieth century the concept of food quality acquired many different dimensions, demanded for by various social groups and interests in various periods. The following four cases, presented in chronological order, may

serve as examples of the long-term twentieth century process of ascription of different dimensions to the concept of quality (Van Otterloo, 2000b).

- The rise of the demand for quality in the twentieth century roughly started in the1890's, at two social fronts at a time at least. The position of the Dutch trade to England of (home-produced) butter then was threatened by low standards of quality. This situation was caused by the usual practice of adulteration, worsened by a lack of hygiene. Groups of producers and the government took a lot of measures to solve this problem, sanctioned by law. In this way the dairy production got rapidly involved in processes of modernization and industrialisation. At the same period groups of hygienists, mainly doctors and social reformers, demanded another type of food quality. They argued for the necessity of nutritious food (having a high protein content) and un-decayed food for the poor working classes. The food quality problems at about 1900 thus had to do with the dimensions of falsification, decay, lack of hygiene and standards of nutrition, relating to health and working power. These dimensions of quality have been under control of law and food policy since 1919. At that point in time the national parliament assented to the proposed food laws in the Netherlands.
- In the fifties and sixties quality meant: a long shelf life, to which were added attractiveness (colour, smell and appearance, tastiness, ease of handling in the kitchen and variety. All these characteristics of quality were offered by producers and distributors in the food-chain. In turn they set prices as profitable as possible to keep the customers. The production of foods with such qualities was made possible by – often piecemeal- technical and scientific innovations. The knowledge of the composition of raw materials and foods and of their functioning in the body was at the basis of these qualities. Groups of food professionals in- and outside the chain in these period increased in number and made every effort to improve these product qualities..
- About the 1970's groups of critical consumers organized a crusade against the industrial use of additives and contaminants in foods. They gained in influence at the waves of the environmental movement. New quality demands by consumers were added to the existing ones, for instance that a food should be 'natural'. Food processing and industrial preparation were in disrepute. Producers feared a loss of turnover and tried to adapt to these specific consumer's demands. The flavouring-industry for instance invented 'substances similar to nature'.
- In the nineties a series of so-called food scandals shocked the Dutch consumers, ranging from salmonella- chicken to the presence of toxic and other contaminating materials in frozen spinach, jars of baby-food and bottles soft drink. Animal diseases, swine fever, BSE and mouth and foot disease (in 2001) added to the quality problems already in existence. Consumer's trust reached rock bottom. The complexity of the food chain probably plays an important negative role here, while it is operating at an European and even a world- encompassing scale. Risks of diffusion of contamination and disease are conceivable and even proven time and again. The chain and its practices of production and distribution got itself talked about today. The application of the technology of genetic modification to food production added to these quality problems. This situation led to new and further- reaching dimensions of food quality from the part of the consumers and their spokesmen. The expectations as to the handling of animals and plants at the locations (links) of production, should reckon with their welfare. Contemporary food quality amounts to the health and preservation of the environment and of nature as a whole.

All of the different quality dimensions mentioned, had their own period of origination in the twentieth century. Once having appeared however they seem to remain present, although their priorities may change. How the inconsistencies in quality dimensions are to be made compatible is the unsolved question to people and parties involved in the chain at the start of the twenty-first century.

6 Some final remarks

Modernization and industrialization in European societies has been along now for at least two centuries, bringing important social changes. The development of the food chain went along with the gradual transformation of a mass of food producers into a mass of food consumers. In a varying pace food productive tasks have been withdrawn from the household. Today a very small amount of work on food and feeding is left at the level of the household. Most of the growing, processing and preparation tasks have become incorporated into the earlier links in the food-chain. It is a question open for research which food phases remain connected to the household-link at the end of the chain and how they are organised socially. Even the phase of consumption seems to loose its former (more or less) exclusive connection to the social unit of the household. Shopping and catering facilities are supplied outside everywhere. People may eat elsewhere and with others than the members of the household and family at a (more or less) regular base. Canteens at locations of work and sport are examples. In this way members of the household turn into individual consumers, who have to decide for themselves. The food chain, in its turn, has evolved from a mainly local to a mainly global phenomenon. This evolution implies processes of lengthening and differentiation between and within the links in the chain (Van Otterloo, 2000b). Problems of quality and the rise of consumer power make up constraints, obliging the people and groups involved in the chain at different links to reckon with each other. People in this way learn to think and handle in terms of mutual dependency. This is the reason why speaking of chains in the food field has become so popular.

7 Endnotes

(1) An example is found in the number of food papers in this jubilee IFHE-Congress. Nearly half (five) of the 12 sessions and fourteen of the twenty-four papers do concern food-related topics. This means a substantial overrepresentation and even a presence of food-papers in sessions concerning the two other congress themes.

(2) This multi-disciplinary and multi-university project (1992-2002) is focusing on the history of technology in social context in many fields, for example agriculture and food. It will result among other things in a seven-volume standard-work on the History of Technology in the Netherlands in the Twentieth Century. Volume III on agriculture and food is edited by JAN BIELEMAN and ANNEKE VAN OTTERLOO (general editors, J. W. SCHOT, H. W. LINTSEN ET AL.) and appeared in 2000 by Walburg Pers Zutphen (see references).

(3) These influences are similar to those mentioned in the outer rings of the Food and Nutrition System by Sobal et al. 1999, see the chapter by Leonhäuser in this book.

(4) The physiological transformation process is not included in figure 2, but it may be added when needed.

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Changes of food quality management systems in the public catering

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Abstract

Production of healthy, safe and qualitative food is one of the main tasks and a challenge for public catering enterprises at the same time. Quality control systems both in food industry and public catering enterprises are evaluated in accordance with standards of ISO 9000 series. Traditional approach to food control and protection based on food inspection, laboratory analysis, food legislation, education, etc. had not been very successful. One of such systems, which is more typical in food industry, is HACCP system. The system is based on food safety and prevention of related problems.
The aim of our research is: to work out HACCP system for the Latvian public catering enterprise and objectives are: to identify potential hazard points for the technological process of chicken-roll with vegetable stuffing, establishing a monitoring system in the CCPs and testing the final product. HACCP study is carried out using seven principles and fourteen stages. Microbiological, Chemical and Physical potential hazards are analysed. Critical control points are determined for identified potential hazards applying the decision tree. Final product microbiological analysis is carried out using the plate method. The following CCPs are determined for the technological process of chicken-roll with vegetables: microbiological hazard - 2; chemical hazard - 1; physical hazard - 1. Monitoring procedures for CCPs are developed. HACCP study is carried out in the hotel and public catering enterprise "Oma" for new product - chicken-roll with vegetable stuffing.
The final product testing proved the effectiveness of HACCP system. The results demonstrated that developed food safety system completely excludes the possibility of food poisoning for consumer in public catering enterprise.

1 Introduction

Production of healthy, safe and qualitative food is one of the main tasks and a challenge for public catering enterprises at the same time.

In order to produce qualitative products, technological processes have to be improved. Quality control systems both in food industry and public catering enterprises are evaluated in accordance with standards of ISO 9000 series. In order to produce competitive products, each country has to harmonise its own production with analogous standards in other countries. Although certificate itself does not guarantee production of safe food contamination hazard still exists.

Traditional approach to food control and protection, which is based on food inspection, laboratory analysis, food legislation, education, etc., had not been very successful. Increased number of monitoring institutions and tested samples did not succeed as well.

1.1. Quality management systems

Different quality systems for arrangement of quality issues are created and have received international recognition to meet requirements of customers. The systems supplement each other and it is possible to work out and introduce into practice them simultaneously (Figure 1).

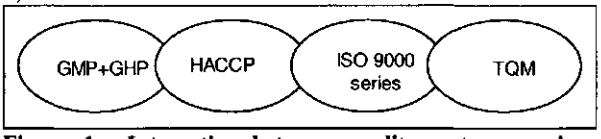

Figure 1 : Interaction between quality system requirements (GMP - Good Manufacturing Practice; GHP - Good Hygiene Practice; HACCP - Hazard Analysis in Critical Control Points; ISO 9000 series - Series of International quality management) and quality securing standards (TQM - Total Quality Management).

Management systems, which ensure food safety during technological process, are GMP + GHP and HACCP. GMP and general principles of food hygiene are preconditions for the HACCP system implementation in the enterprise. GMP and GHP systems are providing quality and general principles of food hygiene at all stages of the food chain from primary production to the end product (Early, 1995).

1.2. Good Manufacturing Practice and Good Hygiene Practice

GMP can be defined as a collection of requirements and procedures for the operation and management of food factories, their environment, facilities, processes, plants, equipment, personnel, etc. in order to ensure production of safe food.

GHP is a combination of all conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain from primary production to the final consumer (Neyts et al., 2000).

1.3. HACCP

HACCP system is one of the most widespread systems in food industry. HACCP has science-based systematic and preventive approach, dealing with biological, chemical and physical hazards identification, critical control points, determination and monitoring, end product inspection and testing. The main task of the system is to ensure food safety and to prevent related problems. The Codex Alimentarius Commision during its 21st session in June 1977 adopted HACCP system and guidelines for its application and general principles of food hygiene (FAO, 1998). World's and Europe's food industry enterprises accepted HACCP system as food safety system. At the turn of the century enterprises must comply with the rapidly changing requirements. The only way to remain competitive and to be ahead of one's rivals is to anticipate changes and react quickly (Mortimer and Wallace, 1994).

For public catering enterprises in Latvia HACCP system is new system because we have just began to identify quality management problems.

The aim of our research was to work out HACCP system for new product of the hotel and public catering enterprise "Oma"- chicken-roll with vegetable stuffing.
The tasks of the research were:

- to work out strategic plan for new product development in the enterprise;
- to construct flow diagram for the technological process of new product production;

- to prepare a list of all potential biological, chemical and physical hazards at each step of technological process;
- to determine critical control points (CCP);
- to establish monitoring system and corrective actions for each CCP;
- to test final product.

2 Materials and methods

Study of HACCP system of the new product is implemented using principles of strategic planning carried out in "Oma" - one of the Latvian hotel and public catering enterprises.

Strategic management involves defining and developing of effective strategy by certain methods and activities in order to adapt environment of enterprise and apply strategic goals. Strategic planning is a component of strategic management. Strategic planning is development of viable combination of enterprise, long-term goals, resources and environmental conditions by specific methods and activities.

The goals and realisation trends of organisation and enterprise are chosen during the planning process. Organisation secures possibility to use all organisational methods in order to reach the goals, motivation is connected with important stimulation methods for reaching the goals, but control provides the managers with objective information on conditions in enterprise comparing planned and actual results.

HACCP study is carried out using seven principles and twelve stages. Biological, Chemical and Physical potential hazards are analysed. Critical control points are determined for identified potential hazards applying the decision tree. Microbiological analysis of the final product is carried out using the plate method (Dillon and Griffith, 1995).

3 Results

Since chicken-roll with vegetable stuffing is a new product, in all its development and management it requires a strategic plan which is not an integral part of HACCP system.

The implementation of this strategic plan was carried out in four steps applying principles of strategic planning.

Parallel with the framing of the strategic product planning, the HACCP system was developed which ensures product safety. Actually the HACCP research was carried out in 12 steps, but as the aim of this research was to work out only the major issues, this publication does not include all the steps.

3.1. Strategic planning steps of the new product - chicken-roll with vegetable stuffing

1) Planning. Compilation of work group, which includes experts from all divisions related to production. Definition of the work task that has to be as short and simple as possible. Preparation of plan and schedule for each task. Election of the work group co-ordinator. Development of product description.

2) Analysis. Analysis of the developed production plan.

3) The third step, that requires a lot of effort and energy, is involvement of each employed person in the system development. Great motivation and confidence of the highest administration is necessary in order to motivate employees in the improvement and development of the enterprise. For the above-mentioned purpose it is necessary to communicate with workers, to look for their opinion and to involve them in the identification of problematic issues and in the drafting of documentation. Leaders have to work with employees every day because only in such case it is possible to achieve trust, to rise workers self-confidence and to create a desire to participate in the process of changes.

4) The last step is allocation of resources for successful project realisation.

3.2. The steps of the HACCP plan

Technological scheme of new product - chicken-roll with vegetable stuffing - is worked out in the hotel and public catering enterprise "Oma".

HACCP introduction in enterprise has several stages. The main stages are as follows:

1) Creation of process flow chart. Compilation of HACCP program. In Latvia HACCP program is called "self-control" program.

The flow diagram of the production of chicken-rolls with vegetable stuffing is shown in Figure 2.

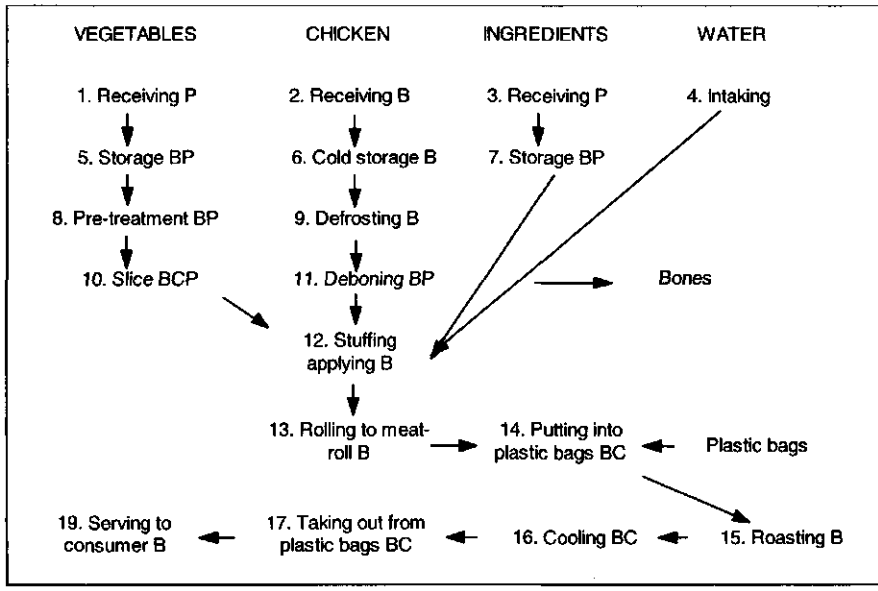

Figure 2 : Flow diagram of the production of chicken-roll with vegetable stuffing, where CCP - critical control point; B - biological hazard; C - chemical hazard; P - physical hazard. Determined critical control points are: CCP 6B, CCP 15B, CCP 10C, CCP 11P.

2) Sanitary - hygienic conditions in the enterprise "Oma" have been estimated in order to evaluate their conformity with the GMP requirements. This estimation is necessary for identification of biological, chemical and physical hazard in every stage of flow diagram. Equipment, devices, tools and inventory have to be manufactured from harmless materials.

All raw and packing materials must have certificate of approval, which guarantees safety for the health and environment.

Before identifying chemical hazard, cleaning-disinfecting system has to be chosen. All cleaning-disinfecting aids have certificate of approval and have cleaning-disinfecting procedures worked out by the companies. Cleaning-disinfecting procedures are practically realised by trained personnel in the enterprise "Oma".

Taking into consideration all factors mentioned above, potential hazards are identified (see Figure 2).

3) The next step of HACCP plan was *to prepare a list of all potential biological, chemical and physical hazards* in each step of flow chart and to consider any measures to control identified hazards.

4) Determination of critical control points. All identified hazards are not significant for food safety, because we determined the steps of technological process, which can be controlled to eliminate the hazards or minimise their likelihood of occurrence. Determination of CCP can be facilitated by the application of a decision tree. Decision tree consists of the four specific questions. The answers to these questions show weather the potential hazard can be considered as a critical control point.

Determined critical control points are presented in Figure 2.

The following CCPs are determined for the technological process of chicken-roll with vegetables: biological hazard (pathogenic micro organism) - 2; chemical hazard (detergent residues) - 1; physical hazard (harmful extraneous materials - bones) - 1.

5) For each CCP we *established monitoring procedures*. It is the scheduled measurement or observation, which shows weather a CCP refers to its critical limits.

Monitoring of CCP 6B is storage temperature and time; monitoring of CCP 15B is baking temperature and time; monitoring of CCP 10C is cleaning-disinfecting system; visual monitoring in CCP 11P.

6) In cases, when the results of CCP monitoring indicated a loss of control, we *undertook corrective actions.*

Thus the products which are harmful for the human health are prevented from entering the market. The essence of the HACCP system includes the management of production and preventive measures thus we can fight with the causes not with the effects.

7) Testing of final product is performed for HACCP system effectiveness assessment analysing total content of micro-organisms, pathogenic bacteria, detergent residues and bone fragments.

The obtaining of testing results demonstrated that chicken-roll with vegetable stuffing did not contain pathogenic micro-organisms, detergent residues and bone fragments.

As a result we can conclude that HACCP system for technological process of production, which was worked out for new product -chicken- roll with vegetable stuffing, was functioning effectively and consumers are provided with a safe product.

4 Conclusions

- Flow diagram has been created for the technological process of production of chicken-roll with vegetable stuffing.
- The critical control points (biological - 2, chemical - 1, physical - 1) have been identified for the technological process of production of chicken-roll with vegetables stuffing.
- Monitoring procedures have been established for each critical control points.
- The final product testing results demonstrated that chicken-roll with vegetable stuffing did not contain pathogenic micro-organisms, detergent residues and bone fragments.
- HACCP study has been carried out in the hotel and public catering enterprise "Oma" for new product - chicken-roll with vegetable stuffing.

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Meal Patterns of women over 65 years – the EVA-Study

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Abstract

Objectives: What are the characteristic meal patterns of independently living elderly women? How are "nutrition related activities" integrated in overall daily activities? How much time is spent on them?

Methods: In a qualitative study on "biographical factors influencing eating behaviour", 43 women out of a sample of 60 women (age 64 to 94) kept 3 days dietary records and activity records. A total of 592 meals were analysed in respect to meal patterns, duration of meals, timing of meals and nutrient content.

Results: On average each woman consumed 4.8 meals daily. Daily main meal is a regular, fresh cooked lunch. Most common is the starch-vegetable-meat pattern. Bread with sweet spreads and coffee is the prominent breakfast pattern, while bread with cheese/sausage spreads and herbal teas, or mineral water are characteristic for supper. Meals are integral for structuring daily activities, they are consumed regularly. Durations of main meals (averages): breakfast 33 min., lunch 36 min., supper 34 min. Timing of main meals (averages): breakfast 8:10am, lunch 12:30pm, supper 18:50pm. Nutrition related activities (producing, shopping, cooking, storing, cleaning, eating) sum up to a total of 4 hours 15 min daily (averages), which is an equivalent of 27% of total daily wake hours.

Conclusions: Nutrition counselling and education of elderly women has to be based on the knowledge of their meals patterns and food related activities.

1 Introduction

Most Western societies will experience major demographic changes in the near future. Among European societies Germany has the largest population, consequently the absolute number of elderly will surpass its neighbouring countries. While at present every fifth German is over 65 years old, demographers predict that in 2030 every third German will belong to this age group (European Commission, 1999).
In Germany studies on eating behaviour have not been focused on elderly until recently but rather on younger and middle aged adults. Quantitative German surveys such as the National Consumption Survey (NVS) or the reports of the nutrition Society of Germany (DGE) (Schneider et al., 1997; Stehle et al., 2000) do neither give details on meal patterns nor reveal thorough information on how eating and drinking are integrated in every day life practices of the elderly. While regular intake of nutrients is part of our physical survival, meals and meal patterns are not biologically but culturally shaped. In all cultures humans eat "structured" within the frame of "meals" (Douglas et al., 1981; Douglas et al., 1974). The body of

literature does not give a standard definition of "meals" or "meal patterns" (Mäkela, 2000). For our study we define meals as an occasion where specific and culturally acknowledged food is consumed at a certain time and location for a certain purpose, often together with other persons (Teuteberg et al., 1986) and with certain meal patterns or common "types", which are based on culturally acknowledged food groups, staple food and dishes.
We are far from understanding the complexity of potential and joint influences that shape and model meal patterns. While quantitative consumption surveys focus on overall representative quantities of food eaten in various socio-economic groups, qualitative studies aim to capture a holistic and in depth picture on every day life practices and motives of eating behaviour. This study followed a qualitative approach.

2 Objectives of the study

What are the meal patterns of elderly women? How much time is spent on daily eating and "eating activities" such as shopping, preserving, storing, cooking, cleaning and eating? Elderly people and especially women have acquired experiences with preparation of meals throughout their lifes. Cooking and food preparation is still in the realm of women today (Brombach, 2001), this holds true for the elderly women as well.
Following objectives for the EVA-study were derived:

- What are the meal patterns of independently living elderly women?
- How are meals integrated into everyday life practices?
- When are meals eaten during the day and what are the durations of meals?

3 Methods

In a non-representative, qualitative study a sample of 60 women age 64 to 94 years living independently in Giessen, a city 60 km north of Frankfurt/Main, Germany were interviewed in their homes. Recruitment followed a snow-ball sampling technique. Duration of qualitative semi-structured interviews was 1,5 hours on average. Open-ended questions focused specifically on the issues of eating and drinking in the life course (methods, data analyses and results of interviews are published elsewhere (Brombach, 2000)). After the qualitative interviews all participating women were asked to keep written descriptive dietary and activity records on three days of their choice, including two working days and one weekend or holiday. Food eaten was recorded in household units and usual amounts such as e.g. 1 slice of bread, 1 tablespoon. Participants were asked to record all food eaten during the day as well as time and place of the "food event". The women were asked to indicate and relate a "name" to the "food event" such as first meal of the day as "first breakfast", second meal as "second breakfast" or "snack". They were also asked to point out their "main meal(s)". Instructions for protocols were given in written form, additional telephone calls and telephone aid insured for accuracy and completeness of the protocols.

Dietary records were analysed on two levels: all food eaten was coded and analysed for nutrient content using the nutritional software DGE-PC version 1.0 which is based on the national German food consumption table. The second level of analysis summed up food eaten during a "food event" and classified it as a "type" or "meal pattern" such as e.g. "bread and jam" for breakfast or "cooked vegetable-starch-meat" for lunch.

Participants were also asked to fill out a time record picturing daily activities throughout 24 hours. Each record was calculated according to total daily activity, summed and grouped up all other activities. Each activity record was double checked with the dietary record to verify the time and duration of meals. Data of the time records was calculated using SPSS/PC version 9.0.

4 Results

All interviewees lived independently in their homes. 60 women age 64 to 94 years (mean age 71,6 years) participated in the study. 43 out of 60 women were keeping three days dietary and activity protocols. Interviewees were a positive sample of well-educated and healthy elderly women. Only 24 participants originated from the research site, all others moved to there from other parts of Germany or former German parts during or shortly after world war two. On average all women had lived at the research site for more than 40 years. Out of 60 women 23 were married, 23 widowed, 3 divorced and 11 singles. A total of 124 days with 612 "food events" were recorded, 592 "food events" were analysed. 29 "food events" such as a glass of water, a little piece of candy or cough drop were not considered as "meals" unless the "food event" was denoted as "meal" by the participants.

4.1 Meal patterns

On average 4,8 meals were consumed daily, with three meals pointed out as "main meals": breakfast, lunch, supper. All participants attributed "lunch", a freshly cooked hot meal, as the most important

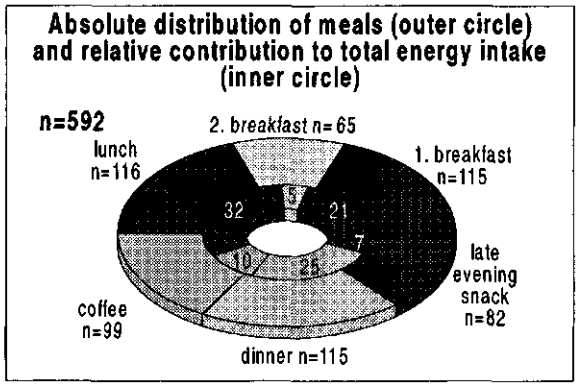

Figure 1: Absolute distribution of meals and percentage of contribution to total energy intake meal of the day. Main meals contributed more energy to total energy intake than "interim meals" (fig. 1).

4.2 Meal duration

Meals were integral for structuring daily routines and were seen as external "time markers" during the day. Durations of main meals tended to be longer on weekends (fig. 2) than on working days.

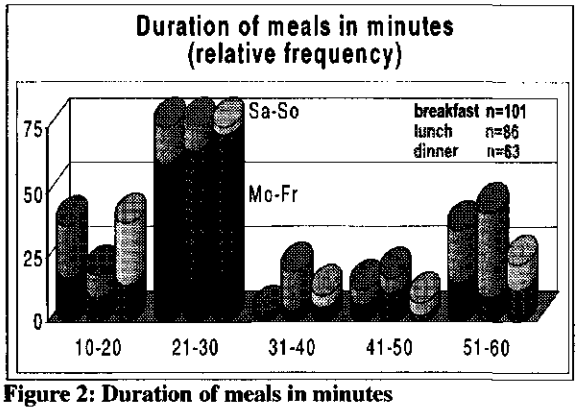

Figure 2: Duration of meals in minutes

Average durations of main meals: 33 minutes for breakfast, 36 minutes for lunch and 34 minutes for supper. The average beginnings of main meals were: breakfast at 8:10am, lunch at 12:30pm, supper at 6:50pm. Breakfast was often attributed to be the "starter" of the day and provided 21% of total daily energy intake (fig.1).

4.3 Breakfast, Lunch, Supper

Bread was the most common pattern for breakfast, either consumed with jam, honey or with cheese and sausage spreads (fig.3). Generally rye bread was favoured over white bread, coffee was the predominant beverage.

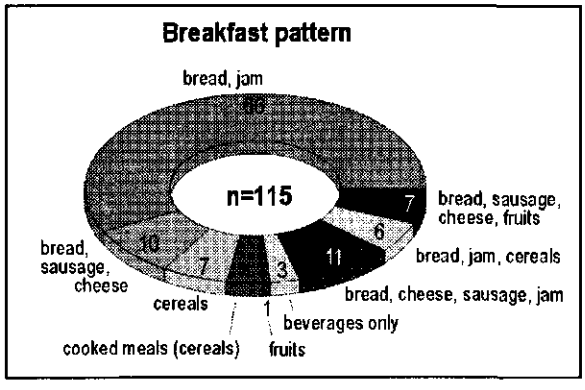

Figure 3: Breakfast pattern

Lunch was always attributed to be the most important meal of the day, while Sunday lunch was considered to be the most important meal of the week. In two thirds of lunches no beverages were consumed while in all other meals beverages were consumed as well. According to the interviews, consuming beverages during lunch was considered to be "*...filling you up..*", or "*...diluting the stomach acid..*". Most interviewees pointed out that during childhood it was not allowed or not common to consume beverages at lunch, it was consequently never "learned", thus never became part of today's eating behaviour. In almost all cases lunch was a freshly cooked meal of seasonal food, use of convenience products was rare.

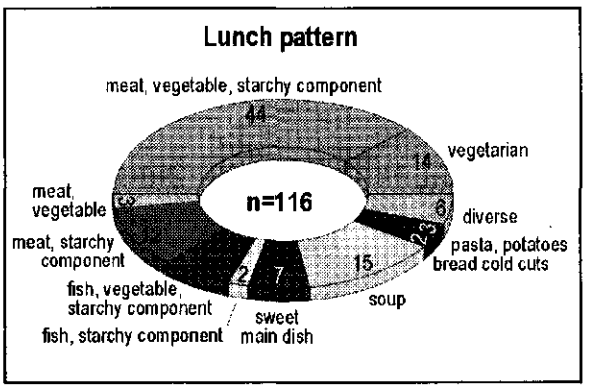

Figure 4: Lunch pattern

The predominant lunch pattern was "meat-potato-vegetable" while soups or stews such as "pot-au-feu" were recorded in 15 meals (fig. 4).
Meals with no meat were denoted to religious values such as fasting traditions on Fridays where fish instead of meat was consumed. Women originating from the Southern or Southwestern part of Germany also recorded sweet main dishes such as sweet dumplings or sweet pancakes which are traditional regional dishes but not common at the research site. In general, lunch pattern of the interviewees pictured the regional and local traditions of one's specific "culinary origin".
Even though interviewees not originating from the research site had lived there for more than 40 years, the traditions and food patterns of one's "culinary origin" were maintained in adulthood. Adopting the local food traditions of the research site was not common. Preferences for pasta over potatoes, sweet main dishes or stews are characteristic examples for local and regional culinary traditions.

Despite local and regional variety of patterns, common characteristic structures in all lunch patterns were found: lunch is always a freshly cooked hot meal, consists of regional and local food, with little or no use of convenience products, is consumed regularly, around noon, is considered to be main meal of the day, and was seen as important time-marker for structuring the day in two halfs: before12am and after noon.

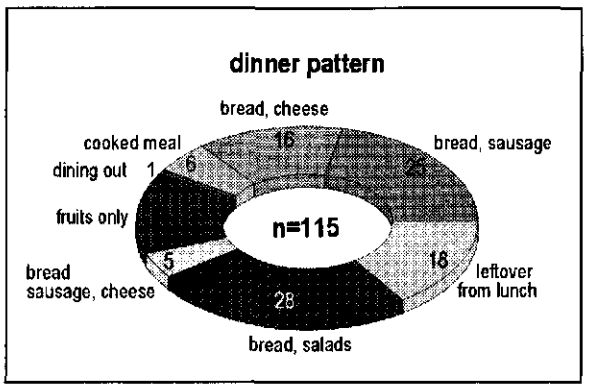

Figure 5: Dinner pattern

Dinner (supper) (Fig. 5) is traditionally a "cold" meal, with bread as main component. Cheese and sausages with it were predominantly favoured. Interviews revealed that it was frequently viewed as "*...unhealthy...*" to eat a cooked meal in the evening: cooked meals eaten after 6pm were seen as "*...heavy...*" or attributed to "*...make you fat...*". A cooked meal for supper was seen as an exception when for example no cooked lunch was eaten or when guests were invited for supper (in such case lunch was a "cold" meal). Eating out in restaurants at the evening was not commonly practised by the interviewees. Except for the coffee meal with the prominent pattern coffee and/or cake/cookies, meal patterns of the interim meals such as second breakfast and late evening snack were "unstructured" and mostly single food items like fruits, beverages or sweets were consumed.

4.4 Eating as part of daily activity

On average 15,5 hours were spent awake while sleeping or resting for 8,5 hours daily. This pattern of time use was similar on working days and weekend or holidays. A total of 4 hours 15 min (average) was used for "nutrition related activities" such as producing, shopping, cooking, storing, cleaning and eating. This is an equivalent of 27% of total daily wake time, thus pointing to the prominence of activities related to "meals" and its preparations. "Eating related activities" thus structure the day in two ways: as part of daily routines and eating as a time to sit down and enjoy the meal.

5 Discussion

Eating is prerequisite for our physical survival, whereas „meals" and "meal patterns" are biologically unnecessary. Yet it is characteristic for humans to eat structured within the frame of "meals" (Goody, 1982). Neither nutritional nor sociological studies allow referring to the term "meal" in a uniform manner. There is no consent in the nutritional body of literature on when a food event becomes or is a meal. One description of "meal" from a nutritional point of view denotes meals as events of food intake with an interval of at least 15 minutes prior to another food intake, or as event where at least 210kJ are consumed (Gibeny et al., 1997). This definition would then not encompass a chicken broth (less than 210kJ) eaten at a certain time at a given place and occasion, which, for the moment preliminary, we could otherwise describe as a "meal". There is multitude of other every day life terms describing "food events" as meals such as "snacking", "interim meals", "TV-meal" and so forth. Definitions on meals are "*...on loose social and /or cultural norms of timing and size, and therefore (...) are clearly subject to many acute and chronic social influences and chronological trends*" (Gatenby 1997:8). Neither nutritional nor sociological studies deploy on "when eating is transformed to a meal" thoroughly. Simmel was one of the few sociologists elaborating on "meals". He did so from a theoretical perspective and concluded that meals, or to be more precise: the need to eat, form the smallest common denominator which all humans share (Simmel, 1957). Conferring to the assumption that meals are part of everyday life of elderly women leaves us to consider meals as culturally bound with culturally set meanings and margins. Following such assumptions led us to follow a qualitative approach to describe meals as part of everyday life practices of elderly women, encouraging participants of our study to attribute their own "meaning, name and interpretation" to a certain "food event". From the data of our study we describe a meal as occasion of food intake dynamically interrelated and affiliated with certain social contexts such as family or culture where certain food is eaten at a certain time at a certain location. Meal patterns, we further assume, are shaped, learned and formed as a "meal pattern" throughout the life course.

For the participating women meals play an important role for structuring their individual everyday life. Their kind of food eaten as well as the timing of meals are influenced by social and cultural factors as described in literature (Almeida et al., 1995; Mäkela, 1995; Douglas, 1984) and reflect their socialisation as well as local culinary traditions of their place of origin. "Eating" and the transformation of eating practices into daily activities mirror social values and norms and can thus be described as "social total phenomena" (Durkheim, 1971).

In our study duration of meals tend to be similar to the general German population with the exception of breakfast and Sunday lunch (GFM-GETAS 1995). This is surprising, since after retirement there could be more time allocated to eating and drinking during the day since meals and nutrition related activities are integrative part of daily activities and routines. Yet the structure of meals (timing, duration) is not adjusted for more "leisure time". Our study did neither reveal a change in timing nor duration of meals in comparison to the general population. Although this is a small qualitative study it supports the idea of the maintenance and rigidity of eating behaviour in life course (Krondl et al., 1982; Furst et al., 1996; Winter Falk et al., 1996).

Lauque et al. describe a higher frequency of eating out in restaurants than was found in our study (Lauque et al., 1998). It may well be the case, that different cultural and social factors are more important for dining out than economic reasons, since participants in the EVA-study are described as middle class and well educated elderly women in good financial conditions (Brombach, 2000). Meal patterns seem to be stable throughout the life course and thus function as part of one's cultural and regional identity (Almeida et al., 1995; Becker, 1995; Winkler et al., 1995). This appears to be true in this study but may be different in younger adults who have experienced a world of fast technological and social changes.

Written dietary and activity protocols in addition to qualitative interviews on eating as applied in this study are helpful for describing meal patterns of elderly women. Exploring the interrelation of everyday life practices and meal patterns was thus possible. Meal patterns described by the women depicted regional variances and similarities of culinary traditions attributed to cultural aspects.

The study holds both strengths and limitations linked to design, sampling and method. First it used a positive selection of healthy, independently living elderly women. It was a non-representative small sample of elderly women of a certain region. Thus findings are limited to women in similar living conditions. The interviews, dietary and activity protocols were pre-tested with a small sample of elderly women but neither validated in other age groups nor with biochemical parameters.

The main strength of this qualitative study is a comprehensive, holistic and deep approach to investigate "meals" as part of every day life activities of elderly women. This approach has been called for by other researchers but not many have taken up the challenge. The combining of a comprehensive, everyday life perspective ensured a broad approach to elaborate on "meal patterns in everyday life situations of elderly women": Engagement in prolonged interviews ensured data quality as well as in depth insight into the everyday life practices of those elderly women. There is in our knowledge no better way to describe meals in everyday life practices of elderly women then to ask themselves. Maintenance of one's dietary practices have been reported in other studies (Almeida et al., 1995; Mäkela, 1995) and suggest that nutrition science should emphasis research on the meal patterns and its trajectory in life course.

6 Conclusions and implications for research and practice

Further research should be urged to include other age groups as well as men to conceptualise meals as culturally influenced. Longitudinal studies should be implied to follow the onset of meal patterns in the life course. Yet to be explored is the topic of fragility and disease in the elderly in relation to meal patterns: are there meal patterns which are promoting health or can changes of meal patterns from one's former practices be seen as an early warning sign for malnutrition and subsequently disease?

Meal patterns seem to be stable throughout life course and thus function as part of one's cultural and regional identity. Meal patterns described by the women depict regional variances and similarities of cultural traditions attributed to cultural aspects.

For nutrition counselling and education of elderly women it is seen as important to acknowledge meals as culturally influenced as well as to understand timing and duration of meals as socially acquired.

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Potatoes Fast Food: Technology, Consumption and Future Trends

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Abstract

This paper analyses the increased diffusion of potato products (frozen, chips, dried) and the relative production chain. The aim is to show the contribution that these products have had on changes in food habits in Europe and in our country, evaluating the technological evolution in processing procedures and the possible exploitation of by-products.

1 Introduction

In recent years, certain changes in lifestyle, such as the increase of women in the workplace, distances between the workplace and the home, and the lack of time to spend in the kitchen, have led to a noticeable change in consumer choices of food products. This is revealed in the increased request for convenience foods and the increase in cafeterias and fast food restaurants. The role of products made from the processing of potatoes (frozen, chips, dried) is interesting.
This paper analyses the increased diffusion of these products and the relative production chain. The aim is to show the contribution that these products have had on changes in food habits in Europe and in our country, evaluating the technological evolution in processing procedures and the possible exploitation of by-products.

2 Characteristics and use of the potato

The potato, an herbaceous annual plant (tuber *Solanum tuberosum L.*), belonging to the Solanacee family originating from South America (Peru, Chile), was introduced into Europe in the second half of the Sixteenth Century by Father Cieza, Pizzarro's orderly, who sent the first potatoes to the Spanish royal family in 1588 (Dizionario delle Scienze Naturali, 1849; Ballarini, 1989). The spread of this product only became evident two centuries later when A. Auguste Parmantier (1737-1813) revealed the nutritional validity of the potato (table 1). In that period, the potato proved to be providential for the French economy, which was seriously affected by war and famine. In 1853 the flavor of this tuber was reappraised thanks to an idea of George Crum, a chef from New York, who sliced potatoes into thin slices and fried them in oil. The result was called *crisp* due to its crunchy texture (Bray, 2000).

Table 1 – Composition of raw potatoes.

	%	Minerals	mg/100 g	Vitamins	mg/100 g
Moisture	75-78	Ca	10-14	A	trace
Proteins	2	P	53-56	B1, Thiamine	0.10
Carbohydrate §	16-22	Fe	0.6-0.9	B2, Riboflavin	0.02-0.04
Fats	0.1-0.15	K	410-570	B5, Pantothecnic Acid	0.3
Cellulose	0.4-0.6	Na	3-7	B6, Pyridoxine	0.2
Ash	0.3-2	Mg	27	C, Ascorbic Acid #	15-24
Fibre	2			PP, Niacin	1.2-1.5
Food energy (100 g)		290-375 kJ (75-90 kcal)			

Notes § of which starch 93-99% and sugars 0.2-1%. # The C vitamin degrades fast in fact in 6 months it is reduced to 6-8 mg.

Source: our processing based on Villavecchia-Eigenmann (1975), Macrae et al. (1993).

Currently, many different varieties of potato are cultivated, an area in continuous evolution, each one recognizable for its particular characteristics, such as the aptitude to grow quickly or slowly (early potatoes, semi-early, semi-late, late), the size and shape of the tuber (round, oblong and flat, cylindrical and tapered), the colour of the skin (white, yellow, pink, red, violet), the colour of the flesh (white, yellow, mottled), and water content (floury and watery) (Villavecchia Eigenmann, 1975).

Potatoes are cultivated largely for human consumption and, if consumed directly, must be clean (with a maximum of 1% soil attached), hard, healthy and sprout-free. They must not show, either before or after cooking, any abnormal smell or taste. They can be harvested as mature plants (common potatoes) or before complete ripening (new potatoes). New potatoes have a thinner peel, a light skin which is easy to remove.

Over the last few decades, a noticeable increase in the production and consumption of food products obtained from the processing of potatoes has occurred. For example, in America, in the 1960s, 5.5 million tons/year (Mt[(1)], Mt = megaton = 1million metric tons) of potatoes were processed, while today about 14 Mt/year are processed (Plissey, 1998). In Europe, on the other hand, the 400,000 tons/year of potatoes processed in the early '60s has increased to 10 Mt/year in recent years (Fabiani and Valvassori, 1982; UEITP, 2001). The most important processing countries include The Netherlands, Germany, Great Britain, France and Belgium.

The most common processed products are frozen products (French fries, also called chips, or pre-fried zig-zag frozen chips, cubed or wedged frozen potatoes), ready to eat products (crisps, fried potato slices and other snacks) and dehydrated products (dried mashed potatoes which need water added before cooking).

Potatoes selected for processing are common potatoes which have to display certain characteristics, depending on the type of processed product desired (table 2).

Table 2 - Characteristics of raw potatoes for the different processed potato products.

Products	Calibre	Reducing sugars	Dry Matter	Specific gravity	Shape
	mm	% on fresh weight			
Frozen French Fries	50-60	0.2-0.4	20-23	1.080 - 1.105	From short oblong to long oblong
Chips	40-60	<0.25	20-25	1.080 - 1.105	No oblong
Dehydrated	>40	<1	20-24	1.080 - 1.105	Regular (for example no falcate or coiled), superficial "eyes"

Sources: Our processing based on Fabiani and Valavassori (1982), Anon. (1990a), Casarini and Ranalli (1996).

In particular, it has been noticed that the potato size and superficial "eyes" determine fewer peeling losses. Processing procedures require, moreover, a reducing sugar limit content because the excessive presence of sugars causes the browning of the chips due to the Maillard reaction: reducing sugars react with the amino compounds (amino acids, peptides and proteins), with creation of melanoidin, causing browning. This represents a defect in the

quality of the product. It is important to maintain the level of dry matter within the range indicated in table 2, as this influences the texture of the product, yield during frying, the level of oil retention, and taste (crunchiness, tenderness and moderate flouriness).

3 Manufacturing plants

The first potato processing can be traced to Neolithic farmers in the high regions of Bolivia, where potatoes were dried using rudimentary methods. The potatoes were immersed in water and then exposed to the freezing night air; the next day they were mashed and the water removed, then exposed to the sun until they were dehydrated. Potatoes dried in this way were called "chuño" (black chuño or white chuño if protected from the sun). In this way the potatoes became light and easy to carry and were used after re-hydration. (Toussaint-Samat, 1991; Biadene, 1999). In more recent times, the manufacturing of processed potatoes developed in the United States during the Second World War, meeting the needs of supplying ready-to-eat products to soldiers, but the widespread popularity of these products really began in the 1960s.

3.1 Production chain of pre-fried frozen products

Most frozen potatoes are manufactured as "French fries" (potatoes sliced into sticks), the cooking process is completed by the consumer. The introduction of frozen pre-fried potatoes into the food market dates back to 1945 when the American firm Maxson Food Systems, from Long Island City (New York), supplied the Air Force with a frozen meal that included pre-fried potatoes. The following year the product was sold in supermarkets, but became common after the global spread of fast food restaurants (those chains, like McDonald's and Burger King, where quick meals are available), contributing to a noticeable change in food habits (Anon, 1985).

In order to obtain 1 ton of pre-fried frozen potatoes, 2 tons of tubers are needed, 5-10 tons of water, less than 0.1 t of vegetable oil and approximately 3-6 GJ of energy, of which 2-3 GJ (200-300 kWh)[2] electric energy and the rest to produce 0.6-1.5 tons of steam. (Menniti, 1978: Talburt and Smith, 1987; Pizzoli spa, 2000). In the '70s to obtain 1 ton of pre-fried frozen potatoes 20 tons of water are nedded (Menniti, 1978). The production chain of pre-fried frozen potatoes is reported in figure 1.

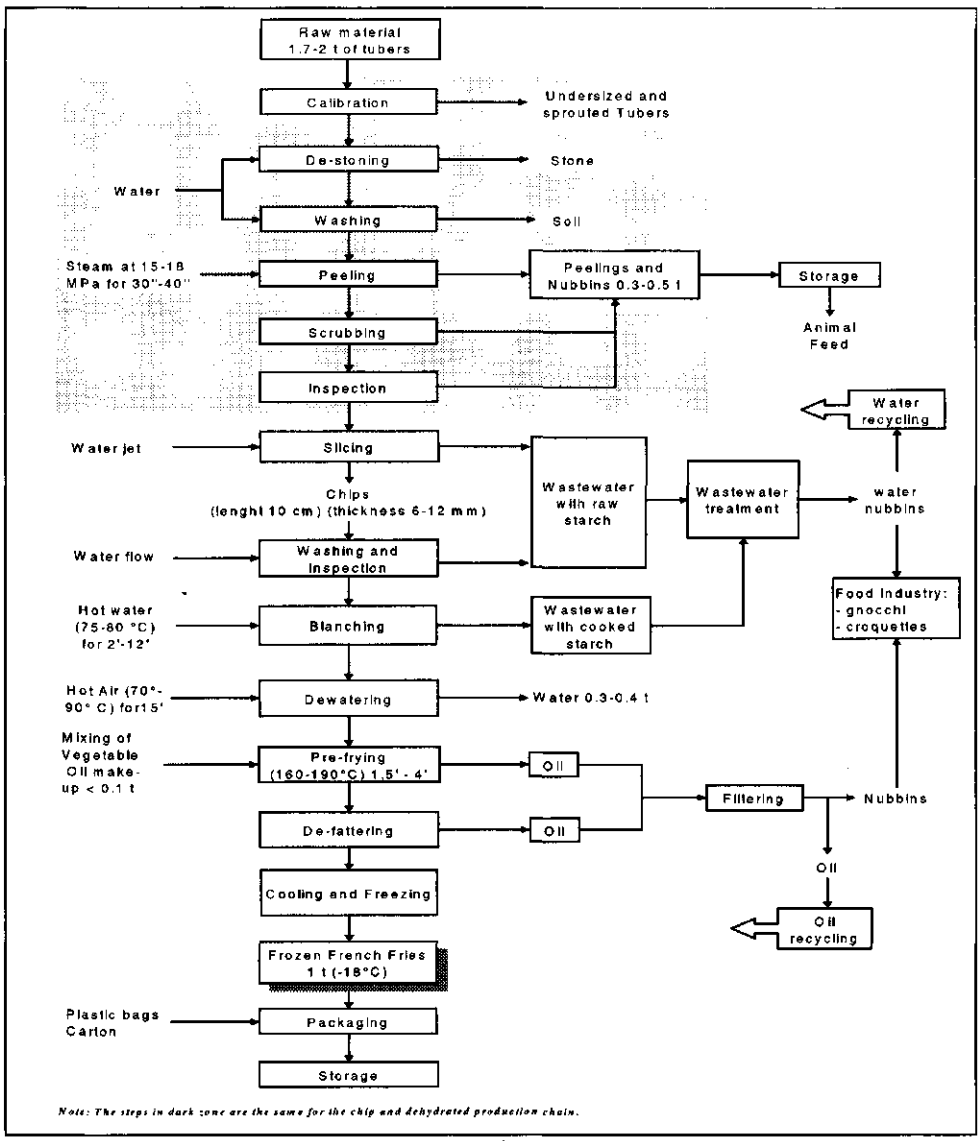

Figure 1 : Production Chain of Frozen French Fries.

The preliminary phase in the preparation of raw materials, consists in the rejection of sprouted or undersized potatoes (calibration) and the elimination of stones (de-stoning) and solid residue (washing and scrubbing). The potatoes are dumped in a hopper which uses water and the potatoes, being light, float, while heavier residue, stones for example, sink and are easily removed. The resultant water is turbid but without fermented material and so, after filtering, can be disposed of through drains or canals. Today it is common to re-use this water for the same washing and de-stoning process.

The skins are then removed from the potatoes (peeling), generally using an abrasive system whereby the potatoes pass through a cylinder equipped with rotating rollers covered with a rough surface of zirconium and aluminium oxide, easily cleaned and replaced when worn-out. The peeled potato is then plunged into water (changed frequently) in order to eliminate excess

starch. Today, increased rotation speed of the rollers has reduced the consumption of water (PPM, 2001a). Moreover, steam peeling (180-200 °C) is able to peel the potato with a jet of high pressure steam (15-18 MPa) in 30-40 seconds. The length of time and steam pressure treatment depend on the type of tuber and the depth of cortex to be removed. The advantages of this system include the low percentage of peeling losses, the elimination of water pollution and pollution derived from the treatment by-products (peelings), which can be used for animal feed. The disadvantages, on the other hand, derive from the increased consumption of energy and from the occasional presence of potato peel left on the tuber. After this process it is useful to scrub the potato in order to eliminate the peel which is partly detached. In the specific case of pre-fried potatoes, peeling losses oscillate from 10 to 20% of the raw tuber (Talburt and Smith, 1987).

By-products from the peeling process, including potato scrapings and peel, are kept in silos for animal feed, particularly for pigs, cattle and sheep. Today, these products are used also in the making of biodegradable plastic products (Potatopak Ltd, 2001).

The peeled and inspected potatoes are then cut into French fry strips (slicing) with a slice thickness of 6-12 mm, length 10 cm, with the help of a jet of water that projects them onto rotary-type slicers at a speed of 100 km/h. The slicers are made of blades mounted on a circular plate which need to be frequently changed (usually every hour) due to the starch deposited on them and to the water jet.

The potatoes travel along vibrating belts (washing and inspection) fitted with screens to eliminate irregular forms (thin slices, short or broken pieces or pieces with a different appearance to the smooth or curved product) and nubbins. At the same time they are washed again for the removal of any starch from the cut surfaces, to avoid slices adhering to each other during frying. The resultant water from this process is full of raw starch and thus, before being re-used, must be purified. Generally, this water reveals a BOD_5 of 2,000-2,500 mg/L and contains prevalently starch and traces of albumin, cellulose, mineral substances and fats (Menniti, 1978).

The potatoes pass under a jet of hot water or steam[3] (75-80°C) for several minutes (2'-12'). This phase (blanching) eliminates oxidizing enzymes (tyrosinase and amylase) and decreases the excess of remaining sugars in order to: a) obtain a uniform colour and an improved texture of the French fries; b) to decrease the absorption of fats during frying; c) to reduce frying time. The disadvantage is a possible loss of aroma. The time and temperature of blanching depend on the characteristics of the potato, specifically, the blanching process lasts longer if the quantity of sugars is high. Common practice is to immers the strips in a antioxidant solution for s everal seconds (40''). In order to improve the quality of the product, for example, to obtain improved crispness and less oil retention and to reduce frying time, it is possible to remove the excess moisture from the French fries in hot air ovens at a temperature of 70-90°C for about 15 minutes (dewatering).

The process continues with the pre-frying phase, the length of time depending on the thickness of the chip and the temperature of the oil. Generally, time is calculated between 1.5 and 4 minutes in hydrogenated oil, with temperatures that oscillate between 160 and 190°C (Talburt and Smith, 1987). Generally, palm oil or peanut oil is preferred: a) giving an increased crunchiness; b) avoiding the chips adhering to each other; c) a reduction in stickiness. During the frying phase it is essential to keep the oil level constant, which is re-used several times after being filtered to eliminate nubbins, the presence of which accelerates oil degradation.

The chips are then "defatted" on a vibrating holed belt; the oil is saved and returned to the fryer. The potatoes are then cooled with a reduction of temperature from 100-120°C to 3-5°C. They are then frozen, using a process that consists in bringing the product temperature down

to –28°C in such a way that, in the end, the "heart" of the chip reaches a temperature of at least –18°C.
Without interrupting the "cool chain", the pre-fried frozen potatoes are then packaged in plastic bags, weighed electronically, packed into boxes and submitted for quality control (Bangratz, 1989). In the end, they are conserved in refrigerators at a temperature of about –19°C (a temperature that must be maintained until the moment of consumption) for as long as 12 months.
Waste products from the frying process, and any potatoes rejected during the selection process, are used in the preparation of flakes, soufflés and potato croquettes or gnocchi. In the latter case, the trimmings are cooked, mixed with flour, moulded using specific machines (gnocchi makers) and then frozen and packaged (Casarini and Ranalli, 1996). The composition of pre-fried frozen potatoes is reported in table 3, and it is possible to notice that the fat content varies depending on the cooking phases.

Table 3 - Composition of frozen French fries.

Before final cooking	%	After final cooking	%
Carbohydrate §	20-25	Carbohydrate §	30-40
Protein	2-3	Protein	3-4
Fats	4-10	Fats *	8-20
Fibre	1-3	Fibre	2
Moisture	60-70	Moisture	40-50
	Food energy (100 g)		
520-750 kJ (120-180 kcal)		1,000-1,400 kJ (220-340 kcal)	

Source: Our processing based on, Talburt and Smith (1987), Burton (1989).
§ of which starch 93-99%. * This range depends on cooking methods (oven heated 8%, skillet heated 20%). Home skillet heated French fries have a fat content of 8-9% (Talburt and Smith 1987).

3.2 Production chain of potato chips

The introduction of the processed product known as chips into the food market, began during the Second World War. Heinz Flessnern, an English manufacturer resident in Germany, was the first person to begin production in Europe, specifically to supply the American troops with this product (Bray, 2000).
To obtain 1 ton of chips, 3 - 3.5 tons of potatoes are needed, 20 tons of water and approximately 4 GJ of energy, of which 0.7 GJ (80 kWh)[2] electricity and the rest to produce 1.4 tons of steam (figure 2). Waste products (peelings and nubbins) are generally used as animal feed (Menniti, 1978; Talburt and Smith, 1987).
The potatoes chosen for this type of processing, present the characteristics shown in table 2.
The preliminary phases of processing, calibration, de-stoning, washing and peeling, are the same as those utilized in the production of pre-fried products, aimed at the production of tubers ready for slicing. In this case, steam peeling is inappropriate, in that it provokes a pre-cooked strata, interfering with the quality of the finished product. It also produces losses during peeling of about 0.3-0.5 tons of peelings and potato solids per ton of chips. This by-product is usually used for animal feed, although today, as above, it is also used as raw material in the production of biodegradable plastic products (Potatopak Ltd, 2001).
The slices have a variable thickness of between 1-1.7 mm and are obtained by projecting the potatoes with water jets onto the lateral blades of the slicers, using centrifugal force. The water jets also remove any small potato particles (raw starch) which cannot be re-used.
In the blanching phase, the potatoes, sliced and washed, are plunged for several minutes into hot water (65-90°C) in order to eliminate starch (cooked starch), still present, which emerges during the slicing process (this increases the adherence of the slices during the frying process), and any excess of reducing sugars. Blanching with opposite current water jets halves or even reduces by 1/3 the consumption of water (Theron, 1982). Moreover, the turbulent environment reduces the possibility of slices adhering to each other (PPM 2001b). The slices

can also be treated with additives at this point (for example sodium bisulphate, citric acid and sodium citrate, sometimes mixed with phosphoric acid or calcium chloride) in order to avoid browning (Talburt and Smith, 1987).
The wastewater is rich in starch (estimated <30 kg/t produced chips) and is continually filtered and re-used in the slicing process. The starch is recycled for use as animal feed.
The dewatering phase follows, in which the potatoes are surrounded by a blast of hot air which reduces the water content from 80% to approximately 70%. This operation reduces frying time.
The frying process can be performed either in batches – today this technique is utilized only in smaller plants - or in continuous fryers. The frying time and temperature varies between 1.5 and 4 minutes and between 160 – 190°C, depending on the method used, batch or continuous fryers, whilst the water content of the chips falls to 2-6% (Bray, 2000; Talburt and Smith, 1987). Originally, the most commonly used type of oil was peanut oil, which has now largely been replaced by cheaper and more specific oils, such as refined palm oil, hydrogenated or not, soya oil (Theron, 1982). Continuous heating, contact with oxygen and oil exposure to light, all determine the formation of substances which modify the taste, aroma and fragrance of the chips, as well as their shelf-life. In order to avoid such inconveniences, rapid oil changes are advised, in order to prevent the oil from having time to degrade. In general, the same amount of oil that is absorbed by the product (equal to 0.3 – 0.4 t oil per t chips) is added to the fryer. The frying process is completed with defatting, in which the oil is drained from the chips, filtered and re-used. In any case, the product retains a high fat content (35-40%), which manufacturers try to reduce in order to offer consumers a low-calorie, highly digestible product, and also in order to reduce oil consumption during the processing phases.
The technique of oven-cooking chips is becoming more widespread, a process whereby, as soon as the cooking process is terminated, the chips are sprayed with a jet of hot oil (Bray, 2000). The potato chips are drained, salted (15-20 kg salt per t chips) and packaged in flexible bags, designed to block the light. No additives are added to this product. The chips should reveal a light, uniform colour, they should be crunchy and reflect the composition reported in table 4.

Table 4 - Composition of potato chips.

	%	Vitamins	mg/100 g	Minerals	mg/100 g
Carbohydrate #	40-50	B1, Thiamine	0.21	K	1,140
Protein	5-7	B6, Pyridoxine	0.3	Na	610
Fats	35-40	B2, Riboflavin	0.07	Ca	36-40
Ash	3.5-4	PP, Niacin	4.8	Fe	1.8-2.4
Moisture	2-6	C, Ascorbic Acid	8.4-16		
Food energy (100 g)		2,150-2,380 kJ (510-570 kcal)			

Source: Our processing based on Talburt and Smith (1987), Burton (1989), Bray (2000).
# of which starch 39-49% and sugars 0.8-1%.

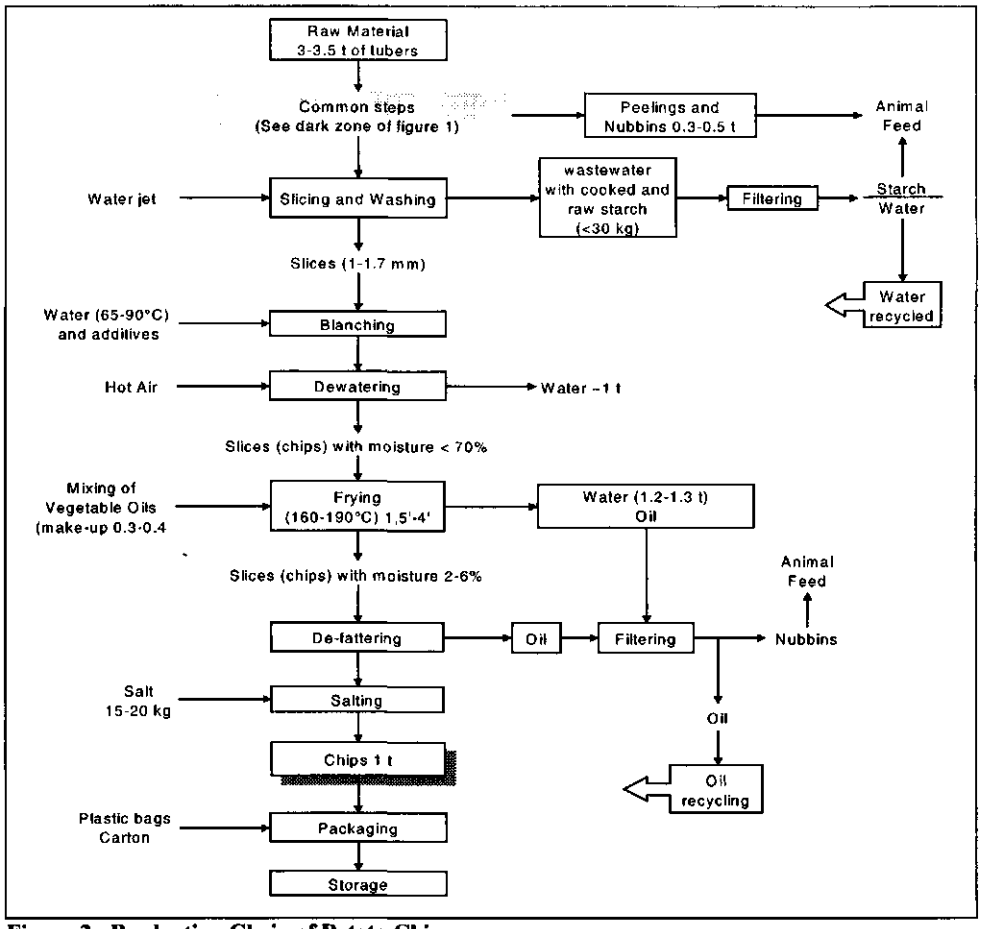

Figure 2 : Production Chain of Potato Chips.

3.3 Production chain of dehydrated potatoes

The production of dehydrated potatoes began in a rudimentary way in far-off times (the chuño in Peru), but only in the 1960s developed on an industrial level. The needs about the quality of raw material are more flexible than the other potato products. In fact often even tubers thrown out in other production chains (for example the potato with a high content of reducing sugars) or the nubbins of the different phases (especially the cutting one) are used. Floury varieties with high solid contents are advisable and, at the same time, they can have a higher percentage of reducing sugars (table 2).

To obtain 1 ton of dehydrated products 6-7 tons of raw potatoes are needed, 30-35 tons of water and about 40 GJ of energy, of which over 3 GJ (over 350 kWh)[2] electricity and the rest to produce about 15-20 tons of steam (figure 3) (Menniti, 1978; Talburt and Smith, 1987).

The phases of raw material inspection and preparation are the same as the other chains examined; they consist in washing and scrubbing potatoes. The peeling can use different techniques and produces a loss of 0.4-0.7 tons (Talburt and Smith, 1987). The potatoes are then sliced as previously described. The slices have a thickness of 13-15 mm, in order to cook them in a uniform way and reduce cooking time.

The pre-cooking phase lasts 15-20 minutes in water at a temperature of 75-80 °C, followed by the cooling of the product in water at 15 °C. These phases are important to obtain starch gelatinization and retrogradation, and to avoid potato texture disintegration that could cause an excessive loss of solids. The wastewater of these phases is poor in cooked starch and it is generally reused in the peeling or in tuber washing.
The cooking process, on the other hand, uses steam for 15-40 minutes. The steam can be injected directly in the cooker or pass externally in a cluster of tubes surrounding it. This method prevents water from being condensed inside the machine. Consequently the moisture content in the final product does not increase.
Potatoes should be mashed immediately after the cooking to mix better additive solutions and avoid cell rupture. The additives are sodium bisulfite, added to retard non-enzymatic browning; antioxidants (such as butylated hydroxyanisole, BHA, and butylated hydroxytoluene, BHT), to delay rancidity and the emulsifiers (monoglyceride emulsifier, E471) to fix the starch and prevent the mash from becoming gummy.
This passes on a drum drier and the obtained product looks like a very thin film – its composition is shown in table 5 – that is ground into flakes or dices. The packaging consists in bags, usually an aluminium film, designed to protect from oxygen (Talburt and Smith, 1987; Toussaint-Samat, 1991).

Table 5 - Composition of dehydrated potato products.

	%	Vitamins	mg/100 g	Minerals	mg/100 g
Carbohydrate	80-82	A	traces	K	1,600
Protein	7-9	B1, Thiamine	0.25-0.4	Na	84
Fats	0.4-0.8	B2, Riboflavin	0.1	P	203
Moisture	5-9	PP, Niacin	3.5-4.8	Ca	33-44
Ash	3-4	C* Ascorbic Acid	20-26	Fe	2.4-17
Food energy (100 g)		1,380-1,460 kJ (320-350 kcal)			

Source: Our processing based on Talburt and Smith (1987), Anon. (1990b), Degli Atti and Sellerio (1991).
** After 6-8 months it goes down to 7-8 mg.*

4 The market of potato products

In the last decades the world production of raw potatoes, about 300 Mt in 1999, remained steady enough. In the 60s about 280 Mt/year was harvested (FaoStat, 2000). However, the tuber has an important role in the human diet and all over the world more than a billion people usually eat it. On the contrary, its use changed deeply and we note a decline in fresh potato utilization accompanied by a continual rise in process utilization.
In fact, in the US (United States) the total annual potato consumption per-capita, from about 50 kg in the 60s to about 65 kg in the 90s, is mainly due to the relevant increase of the annual potato consumption per-capita as potato frozen products (from 3.5 kg of tubers in the 60s to over 25 kg of tubers during the end of 90s), dehydrated (from 2 kg to 8 kg) and chips (from 5 kg to over 7 kg). During the same period the annual fresh potato utilization has, on the contrary, decreased from over 35 kg to 20 kg per-capita (Plissey, 1998). These changes are also underlined by the increase of the quantity of processed potatoes: from about 5.5 Mt/year, that is 50% of annual potato production (11 Mt/year) in the 60s, to about 14 Mt/year, over 60% of annual potato production (23 Mt/year) in the 90s (USDA, 2001).

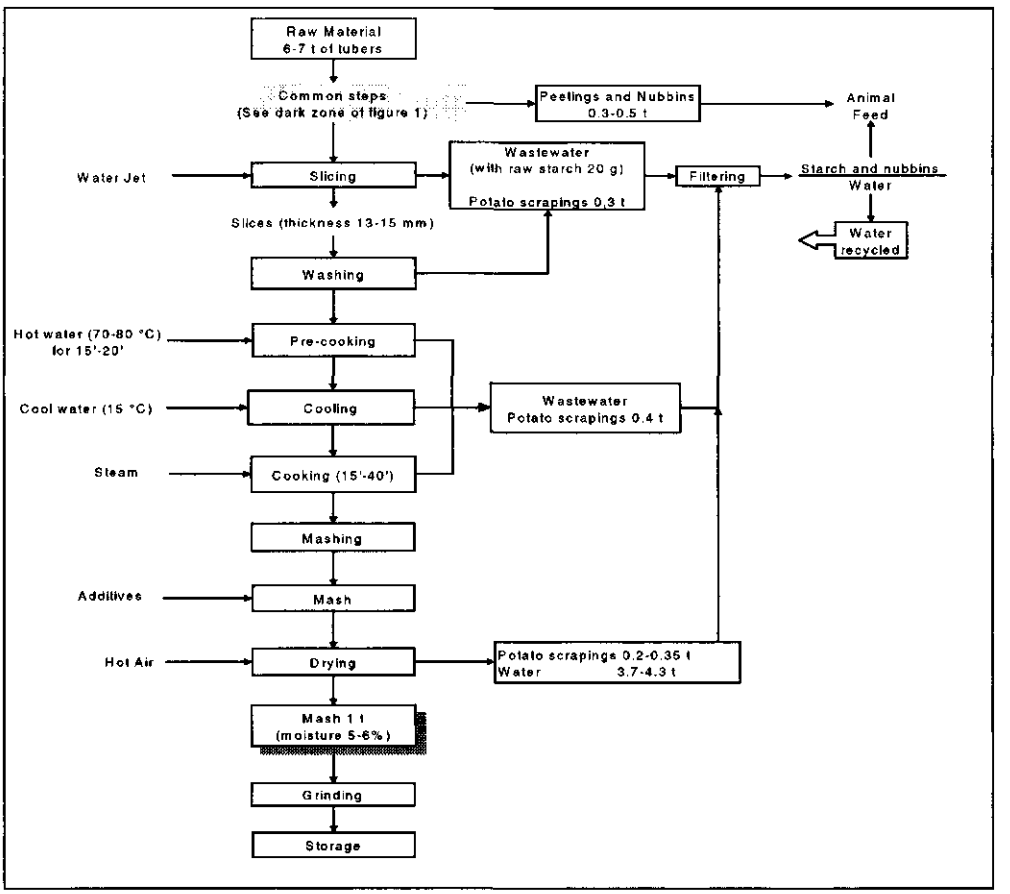

Figure 3 : Production Chain of Dehydrated potatoes.

The potato has an important role in the food habits of Europeans and its industry is a meaningful source of income. Its use, direct or indirect as processed, is relevant. In 1999 EU (European Union 15) produced about 48 Mt of potatoes, about 15% of world production, deriving from about 1.3 million ha. About 10 Mt of tubers (over 20% of production) were processed. On the contrary, in the 60s less than 500,000 t were processed with a potato production over 75 Mt (Fabiani and Valvassori, 1982; Rames, 1982; Commissione Europea, 1999).

The Netherlands are the main European Union producers of processed potatoes for food use. In 1999 they produced more than 1.3 Mt of processed products, about 75% of which (about 1 Mt) was exported. The industry, characterized by the production of dehydrated potatoes and above all of frozen pre-fried, has increased more relevantly among the EU countries. In fact, the Netherlands processed potatoes increased from about 50,000 t/year of tubers in the 60s to nearly 3 Mt of tubers in 1999, i.e. about 50% of Dutch potato production (UEIPT, 2001).

Germany follows: the potato processing industry, developed during the 60s, is the biggest EU producer of dehydrated potatoes, about 130,000 t in 1999, i.e. 25% of processed potato

production (500,000 t). During last decades the process almost doubled: from about 1 Mt/year in last 70s to about 1.8 Mt in 1999 (UEITP, 2001).
On the contrary in Great Britain potato processing, above all in chips, started earlier than in other EU countries. In fact in the 70s it processed 1.3 Mt/year and obtained 130,000 t chips. During last decades the chip production (in 1999 it was 140,000 t), even though it recorded a fall (in 1985 it was 200,000 t), is the most important one in the EU although the increase in processed tubers – 1.6 Mt – is due to the considerable increase in frozen products (260,000 t/year in 70s and 480,000 t in 1999) (Rames, 1982; British Potato Council, 2001).
French figures show an appreciable increase from about 90,000 t/year potatoes destined to the processing in the 60s to over 1 Mt in 1999. Nowadays the production is 400,000 t finished products, 40,000 t of chips of which, 300,000 t frozen French fries and 60,000 t dehydrated (FNTPT, 2001).
In Italy the potato processing industry is poor and in 1995-1999 only 5% (a little more than 120,000 t) of our annual potato production was processed. It follows that the increase in this industry was much slower that in other analysed countries. According the AIIPA (Italian Food Product Industrial Association) statistical figures in 1974 less than 4,000 t of tubers were processed (Menniti, 1978).
Nowadays, this industry has thirty companies, but only half of them can process more than 2,000 t/year. The high cost of raw materials constitutes a problem and limits the growth of this industry. In fact, the wholesale price of 1 ton of potatoes produced in Italy is 200 Euro while the imported ones, coming especially from the Netherlands and France, is about 30 Euro (Andreini et al., 1990; Nico, 2000).
The estimated processed potatoes consumed are 350,000 t/year of tubers in the 90s, of which about 150,000 t/year were imported as processed products, i.e. chips (about 16,000 t) and frozen potatoes (60,000 t). On the other hand, 200,000 t/year of tubers were processed in our country and the 40% (80,000 t) of them come mainly from the Netherlands, France and Germany. In 1999 the Italian potato product production was about 40,000 t of chips and 30,000 t frozen French fries and less than 1,000 t of dehydrated. These data show that in our country the per-capita consumption of processed products, expressed as the amount of processed potatoes, is 6 kg/year versus 20 kg/year in Germany, 25 kg/year in the Netherlands and over 30 kg/year in Great Britain (Andreini et al., 1990; UEIPT, 2001). Although this industry is small, the importance of processed potato products is conspicuous. For example, the frozen products are 30% (about 90,000 t) of all frozen products consumed in 1999 (IIAS, 2001).

5 Future Trends

In recent years particular attention has been paid to the nutritive characteristics of food. Diet problem and diseases coming from unbalanced nutritive supplies have stimulated researchers to improve the features of certain food. French fries (chips, frozen pre-fried) in particular as far as their fat content were carefully studied and analysed. It is necessary to underline the presence of poisonous substance deriving from the oil degradation when this reaches high temperatures. This substance contribute to increase the cholesterol level and destroy the thermolabile vitamins.
At the end of the 80s chips with a reduced content of absorbed oil were launched on the world markets (less than 30%). The innovative technique to have them consists in cooking potatoes into forced air ovens at a temperature of 150-300 °C for ten minutes and, then, spray them with hot oil. The chips deriving a retain fat content from 15 to 25% and, at the same time, they have a crispy crust and tender middle.

Over the years many researchers have tried to use some substitutive tasty fats such as oil but less "fearful" for our health. In 1996 the Procter & Gamble obtained FDA's (Food & Drug Administration) approval for a substitute of fats called Olestra. It presented a caloric value of 0 calorie as it is not metabolised. This "non-fat fat" was used to fry chips but as a result it can cause intestinal problems and it does not allow the absorption of liposoluble vitamins. To prevent these inconveniences the FDA indicated to write down on the packaging of this product that it can cause intestinal problems. Moreover, it established an addition of A, D and E vitamins using Olestra. However, the use of this fat substitute requires further studies in order to guarantee the consumer (Camaggio and Spada, 1996).
Besides, there are several patents allowing reduced oil absorption products. It is possible to reach this aim covering chips with amyloysis and then blanching and drying them before frying. Another patent consists treating the potato, before frying, with a colloidal solution to limit oil absorption (Bray, 2000).
As to frozen pre-fried chips, potatoes can be steamed and then cooked by home frying (Pizzoli s.p.a., 2000).
It results that potatoes processed products have had an important role in changing our food habits as they are "high service products" that reduces meaningfully meal preparation time. In fact, as to the pre-fried, it is only necessary to complete their last phase of frying in order to use them. On the other hand, chips have an immediate use and can constitute a practical snack. Their high caloric value that can lead more easily to unbalanced diet, can cancel the above mentioned advantage. As previously examined, the technological innovation or all the efforts to improve the quality of the product can minimize this inconvenience in the future.
On the contrary these problems do not affect dehydrated potatoes which, however have interesting features: they occupy a very reduced space (they weigh six or seven times less than the raw material), have a high shelf-life and reduced time in preparing complex needs.

6 Endnotes

(1) All references to ton in this article refer to metric tons.
(2) In this paper we consider that in order to obtain 1 kWh of electricity over 9 MJ of primary energy are necessary.
(3) Steam is preferred because it causes a limited loss of hydro-soluble substances.

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Functional foods: regulation and consumer protection

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Abstract

The consumer rising attention to health problems and the awareness of importance of relationship between diet and health have led to a growing consumption of dietary supplements, particular foods and others, as the so-called *functional foods*, that have appeared for the first time in Japan in the late 1980's. Later, these products are spread in the USA market, in Canada and in the Europe, where there was not only enthusiasm but also skepticism about functional foods.
The present framework of regulation in regard to the production and the marketing of functional foods is too weak, showing deep gaps.
In this paper the world regulation is examined, with an overview of the regulatory status in Japan, USA, Canada and Europe. Particular attention is addressed to the use of debatable "health claims" on the food labels and to the safety of functional foods.
Institutional authorities should ensure consumers that: 1) claims in labelling are true and adequately substantiated, in order to avoid lying expectations about their supposed benefits and/or even negative effects; 2) functional ingredients are safe; 3) they are not added in the foods high in cholesterol, fat, sugar or sodium.
Moreover, it's necessary to harmonize food regulation on the international basis.

1 Introduction

Concepts and viewpoints about nutrition science in the industrialized world have, over the years, undergone significant transformation. Changes in life-style, the increase of the average life-span, increases in illnesses connected to food and the consequent rising cost of health care, coupled with the individual's desire to improve his/her own psychophysical well-being, have all played a significant role.
These changes have affected the food manufacturing industry, which has identified a potential niche in the market, and consumers, who have learned to recognize the importance of the relationship diet-health.
The consumer is now able to choose from a large range of food products, including so-called *functional foods*, which apart from offering necessary nutrients have a specific effect due to certain ingredients (Camaggio et al., 2000).
The consumer, however, is not always able to make an informed choice as the information about the product is not always clear and is often cause of confusion. Legislation, for example, apart from being incomplete, inadequately protects consumer interests.
On a worldwide level, apart from Japan, there is no specific legislation regarding functional foods. Notwithstanding their diffusion, they remain without rules guaranteeing safe marketing. Everything is left to the free choice of food manufacturers themselves, who, in an attempt to promote products, often take recourse to methods which, whilst legal, can be misleading.

The communication of supposed benefits of functional foods to the public, through *claims* on labels or packaging or through advertising, is a particularly controversial area. Such claims, particularly *health claims*, can have a significant impact on the consumer, but are often imprecise or lacking any true scientific basis. *Health claims*, proposed through the use of symbols, written statements or images, describe the presumed benefits of the functional food in terms of prevention and even treatment of illnesses (Mariani Costantini et al., 1999).
In order to understand the present situation and the future prospects of the functional food market, a study has been made of how the leading manufacturing and consumer nations of such food products, seek to regulate the sector.

2 Regulation in different countries

2.1 Japan

Japan is the only country to have created specific regulatory legislation, with an official definition of *functional foods*, instituting in 1991 a system for approving health claims, offering food manufacturers the possibility to display a specific nomenclature on labels: FOSHU (Food for Specified Health Use) (ILSI Europe, 1999).
Originally, the system for approving health claims for food manufacturers consisted in applying to Local Authorities and to the Ministry of Health and Welfare. The application included: scientific documentation made by outside experts underlining the nutritive and/or therapeutic basis of the health claim; recommended intake of the functional ingredient, with the relative scientific data; information both on the safety of the ingredients and on the physical/chemical characteristics; information about the analytical methods used (with Certificates from the National Health and Nutrition Laboratory) and the compositional analysis of the product. Information regarding the *health claims* had to be supported by scientific papers published in the fields of nutrition and/or medicine. (CSPI, 1999).
It was essential that the functional food product was produced as a conventional food and not in the form of pill or capsule etc. Having obtained approval, the *health claim* could then be shown on the label, but not in a exaggerated or misleading way. The manufacturers could not encourage excessive consumption of the product or dissuade consumers from medical remedies.
The system of application and renewal of FOSHU approval was, and continues to be, voluntary. Manufacturers wishing to market functional food products without the FOSHU approval, can do so using the description 'Health Food', as long as they do not use claims specifically connected to the treatment or cure of illness.
This system has led to the creation of an anomalous and badly regulated market. In 1998, only 126 products were approved by FOSHU, while some thousand functional food products were marketed 'Health Foods'.
In 1998, the Japanese Government, in an attempt to increase the number of applications, decided to simplify the approval process, affecting several important changes, including the reduction of produced scientific documentation, the elimination of external scientific assessment of the product as long as manufacturers' claims were published. The Government also eliminated the need for the company to test the product at the National Health and Nutrition Laboratory, accepting instead tests performed by the manufacturers themselves.
These alterations to the framework have significantly weakened the approval system, making it far less trustworthy or effective, and above all, emptying it of any serious scientific basis. The absence of any regulatory system for functional food products marketed outside the FOSHU system, also created many problems, including a series of protests from consumers

who, after having consumed products, have not only denounced the lack of the claimed benefits but, in some cases, have been taken ill, even hospitalised. (CSPI, 1999)
It is to be hoped that a more adequate system of approval is established, based on solid scientific principals and that it is made obligatory for all functional foods on the market.

2.2 United States of America

In the U.S.A. there is no official definition of functional food. In recent years various proposals for the identification of a precise and single definition have been made by important organisations, but currently there is still no definition, law or regulation.
Since they do not exist as legal entities, functional food products are marketed either as conventional foods or as 'dietary supplements', or even, in some cases, as 'medicinal foods'.
Two types of claims are permitted by the current legislation: structure/function claims and health claims (ILSI Europe, 1999). The former refer to the effects on the normal functions of an organ or body system. This type of claim can be used both for conventional foods and for dietary supplements, without any approval from the FDA (Food and Drug Administration).
For conventional foods, it is necessary that the substances mentioned in the structure/function claim, beyond the specific function described, contributes to the improved taste or aroma or has an added nutritive value or a technical effect on the food[1]. (CSPI, 1999)
Health claims, on the other hand, are subjected to more severe and precise rules, specific to the category and description used in marketing the functional food product.
For conventional foods and dietary supplements, since 1990, reference must be made to the Nutrition Labelling Education Act (NLEA), and specific pre-market approval from the FDA is required (currently, 11 health claims are approved by the FDA) (Leatherhead Food RA, 2000).
Since 1997, several amendments to the law governing approval have permitted manufacturers to choose to use *health claims* for conventional foods and dietary supplements, based on "authoritative statements" of Federal Scientific Body such as the National Institute of Health and the Centre for Disease Control or the National Academy of Science (ILSI Europe, 1999). These claims do not need approval from the FDA, which still, however, must authorize them.
The FDA itself has replied to numerous complaints denouncing the disappearing role of 'sole judge' and its inability to block misleading or poorly substantiated health claims, by refusing to acknowledge a whole series of claims based on "authoritative statements" of other government bodies.
The FDA has banned also the health claims[2] made by functional products categorized as having a high-fat content, for example, or as having an excessive level of saturated fats, cholesterol, sodium or other substances: this is extremely positive in order to the consumer protection (CSPI, 1999).
Legislation regarding the safety of ingredients falls under the auspices of the Federal Food, Drug and Cosmetic Act (1938 and successive amendments), on the basis of which conventional food ingredients need the pre-market approval of the FDA whenever the manufactures fail to demonstrate that the ingredients are recognized as GRAS (Generally Recognized As Safe), that is recognized as safe from a scientific point of view or in relation to long-term experimentation and analysis of the product.
For dietary supplements, the procedure is more rapid and easier, given that they are considered safe until evidence proves otherwise, and can be marketed 75 days after the manufacturers notifies the FDA of the prospective health claims with evidence.

2.3 European Union

As with other countries, in the EU there is still no legal definition of functional food[3]. Only recently a European Commission initiative, within the framework of the FUFOSE (Functional

Food Science in Europe) project, coordinated by ILSI (International Life Sciences Institute), released a Consensus Document aimed at establishing a scientific definition of functional foods in Europe (ILSI Europe, 1999). The results of this study can be summarised in 4 key points:

1. Food can be regarded as functional if it is satisfactorily demonstrated to affect beneficially one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either an improved state of health and well-being and/or reduction of risk of disease. Functional foods must remain foods, and they must demonstrate their effects in amounts that can normally be consumed in the diet. They cannot be marketed or consumed as pills or capsules.
2. Scientific knowledge of the mechanisms by which functional foods can produce effects on the body is necessary with the aim to identify 'markers'[4] relevant to these effects.
3. Results obtained by 'markers' must constitute the scientific base for formulating advertising claims or messages, which must be correct, valid, and sufficiently clear for consumers. Two types of claims are proposed: 1) enhanced function claim 2) reduction of disease risk. The first type refers to the functional components that, apart from having a traditional role in the growth, development and function of the body, can also have beneficial effects on physiological, psychological and biological activities, without making any specific reference to particular pathological state. This claim resembles the "structure/function claim" currently used in the U.S.A. The second type of claim makes clear reference to the effect that specific nutrients and non-nutrients, contained in the functional food, might have in the decrease of risk of specific pathological state. This type of claim resembles the "health claim" currently used in the U.S.A.
4. Multidisciplinary research programs are advised, finally, with the aim of establishing a scientific-technological framework for addressing problems connected to the concept of functional food.

The document pays particular attention to those aspects regarding safety in the consumption of functional foods.

It is essential to conduct short and long-term studies into the effects that such foods might have on the human body, monitoring the possible interaction between functional ingredients and human functions, and between ingredients (ILSI Europe, 1999).

According to the conclusion of the Consensus Document, the functional food market, with the relative, specific product claims, must develop alongside progress in food regulation which is the only means to guarantee the safety of functional foods.

The EU, through a Directive 2000/13/EC, March 20th, 2000, published May 6th, 2000 in the Official Journal of the European Communities, prohibits the use of *health claims* on labels of food products and in advertising. (Official Journal of the E.C., 2000). Each member state has adopted this Directive into their national legislation, but with different interpretations.

In the E.U., the fact that there is no harmonized legislation on health claims of functional foods, has led countries, sine the early 1990's to introduce self-regulating programs (Table 1). Specifically, *Codes of Practice* have been elaborated, often deriving from collaboration between the food industry and retail organizations, consumer associations and local authorities. The aim of such programs is to identify, given the lack of harmonized legislation, guidelines for use of health claims for food products with respect to labelling-laws and advertising. Such self-regulation also functions in a way to apply pressure to the authorities to adopt adequate regulation. The obvious limit of such codes of practice is the fact that they are based on a voluntary agreement and no manufacturer can be forced to adopt them.

Table 1 Legislation and Health Claims in the Member States of the European Union

Belgium	Health claims made without reference to scientific evidence of efficacy are banned. A Code of Practice designed by FIAA (Federation of Agriculture and Food Industries) contains guidelines towards a freer use of health claims.
Denmark	Both health claims and function claims are absolutely banned.
Finland	Legislation maintains the illegality of health claims. However, given the widespread marketing of functional food products, with their relative health claims, a degree of flexibility of interpretation has evolved. The Association of Industry has proposed the introduction of new health claims.
France	Health claims must be authorized by the Ministry of Health, which decides case by case (indeed, the situation is neither clear nor linear). Generally speaking, the desire to render the interpretation of health claims more elastic prevails.
Germany	Claims made about treatment or prevention of illness are prohibited, even when true, clear and based on scientific foundations. Well-being claims are permitted (for example, the following type of claim is not allowed: "Product X strengthens the immune system", while it is possible to make a claim such as: "Product X increases the natural defence system"). This law is, however, not completely respected on a commercial level, perhaps because of the different types of controls used in the various Federal States.
Italy	No specific legislation on functional foods exists. The Legislative Decree 111/1992 regarding food for particular nutritional use does, however, provide for pre-market notification to the Ministry of Health. Misleading claims advertising the prevention or treatment of illness are prohibited. Currently, various products on the market make doubtful claims.
Netherlands	In the absence of specific legislation, the E.U. Directive regarding food product claims are banned. However, in reality, certain health claims are tolerated, as seen in the "Code of Practice Assessing the Scientific Evidence of Benefits stated in Health claims on Food and Drink Products 1998".
United Kingdom	No specific legislation on functional foods exists. Claims of a specifically medical nature are banned for foods. In 1998, a Code of Practice on health claims on food products was compiled, a voluntary code that identifies two types of claim.
Spain	No specific legislation regarding functional foods exists. Generally speaking, health claims on food products are banned, but since 1996, a Decree has identifies certain claims that can be made, drawing up, at the same time, a list of unacceptable claims.
Sweden	Since 1997, a self-regulating programme allowing the marketing of food products with some health claims exists. Such claims must be true and nor misleading and the effect of the claim must be evinced through a normal consumption of the product within a balanced diet. Currently, 8 health claims are accepted by the Swedish Food Administration.

Source: Leatherhead Food RA, 2000

Due to insistent request for regulation of food products by consumers, the European Commission published a *White Paper on food safety* January 12th, 2000, a document that underlines the necessity of reform and increased legislation in the field. The White Paper proposes an ambitious plan of concerted action, based on strategies, fields of activity and relevant scientific research. With regard norms of regulation, the 3° Action Group includes "foods connected to aspects of health", foods that meet the specific, often induced, needs of the consumer. Functional foods could well fall into this category. In this way European Community has demonstrated a great attention about functional foods and about consumer protection, but this attention was not put into practise.

2.4 Australia and New Zealand

Other developing markets include Australia and New Zealand. In 1998, the Australian and New Zealand Food Authority (established as a agency in 1995 following an inter-Governmental agreement between the two countries) initiated a pilot project, with the aim of evaluating the use and management of specific health claims of products containing folate. This is just one of the projects developed within the framework of the development of functional foods.

Regulation of health claims generally is severe; the use of the word "health", for example, is banned from labels and advertising. Given that the number of functional food products on the market is growing, each with their own relative health claims, the Authority proposes the adoption of stricter controls and regulating procedures. (Leatherhead Food RA, 2000).

3 Consumer Protection

The defence of the consumer must be a primary objective behind the growth and development of the functional food market. However, as seen from an analysis of current specific regulation, this objective is seldom achieved. In order to guarantee a high level of health protection for the consumer, and to restore and consolidate their faith, it is essential to avoid creating false expectations and avoid convincing the consumer that any single product might be a panacea. The consumption of functional foods might not have the beneficial effects promised and, in some cases, might even cause undesirable side effects. The reasons for this are various: an excessive consumption of the added ingredients; a reaction between these and other components; the eventual presence of residual toxic substances used in the extraction and/or formulation of said ingredients (Mazza, 1998); individual biological responses. Such foods can interfere with the efficacy of pharmacological therapeutic agents taken at the same time.

It is absolutely essential that the correlation between the added ingredients and the desired benefit is documented by adequate scientific research. The information given in the claims to the consumer, either on the label or through advertising, must be scientifically based, the truth of which must be scientifically guaranteed by competent institutional authorities. It is important that the label contains advice about recommended intake of ingredient and the possible co-lateral effects that might arise from an excessive intake of its own.

In order to allow the consumer the possibility to make informed food choices, a correct alimentary education must come first, capable of supplying correct nutritional information, and underlining the importance of a balanced diet to achieve and retain a good health.

Currently the consumer of functional foods is often the object of frauds and dangers: such products can be found in ordinary supermarkets, often situated alongside traditional products of the same category. Such a technique, while on one hand allowing the consumer to make a direct comparison between the two products (especially of price, functional foods tend to be more expensive, sometimes 40-50% more expensive than traditional products), it can also lead to confusion in the case of the consumer is not sufficiently well-informed of the characteristics of functional foods and the effects of health.

Another possible fraud is connected to the quantity of the added ingredient. In some cases, in fact, the presence of the ingredient is far inferior to that needed to have the desired effect proclaimed on the label.

It would be useful, too, if the label included standard nomenclature to indicate ingredients: in the case of vegetable ingredients, for example, the use of the internationally recognized botanical name[5].

The current situation is confused and offers the consumer very little assurance. Food manufacturers have attempted, with functional foods, to increase their market by taking recourse to different strategies: insistence on their experience in the field; using the production, advertising and marketing capabilities open to them to convince the consumer to buy 'new' commodities. Food manufacturers are competing with pharmaceutical industries to enter into and have impact in this new field, a field of possibly enormous profits, but fail to take into account the real needs of the consumer.
Consumers, on the other hand, have reacted in different, often contradictory, ways. As positive sales results[6] attest, some consumers have clearly allowed themselves to be tempted into buying the new products, while others are seen to be more cautious, paying more attention to the price-quality relation. Some consumers have clearly shown that they are not interested in the new products, perhaps because of the low organoleptic characteristics of the product.
There is a long way to go before these products can be considered really useful and safe, and that their marketing is regulated on an international level by adequate legislation. This needs to be done in order to prevent functional foods from becoming a simple profit-making instrument for manufacturers.

4 Endnotes

* Author's contribution is: Camaggio G. 40%, De Marco O. 20%, Paiano A. 40%.
(1) This is particularly relevant for health claims. In the U.S.A., the Benecol controversy is exemplary. This well-known Finnish margarine contains plant stanols, which helps lower cholesterol levels. Problems have arisen because this element neither enhances taste nor aroma, it has no added nutritive value and has no particular technological characteristic in the product.
(2) This prohibition covers both health claims approved and those only authorized by the FDA.
(3) Currently, functional foods can be covered by the category Novel Food and thus regulated by the relative legislation (Novel Food Regulation 258/97). The term Novel Food covers new products and new ingredients that have not yet been used significantly in human alimentation (included in this category are OGM foods).
(4) For instance, the increased level of red-blood-cell folate is a marker of folate content in food.
(5) This suggestion can also be evinced from the measure issued by the Italian Ministry of Health (Italian Ministry of Health, 2000).
(6) On a worldwide level, the market value of functional foods is Euro 17 millions (Kwak and Jukes, 2000)

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A quantitative analysis of convenience-related food consumption in the Netherlands

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Abstract

A previously developed classification system for Home Meal Replacements (HMR) based on household convenience criteria was used to analyse the data from the 1997-98 Dutch National Food Consumption Survey (DNFCS). All the different HMR consumed by the 2.774 surveyed households during the survey period were classified in a 4x4 'shelf-life' by 'required preparation' matrix. The number of HMR consumption occurrences reported by the surveyed households that could be allocated to each class combination in the matrix system was tallied, as well as the number of consumption occurrences per product. The different HMR products consumed during the survey by the participating households were then arranged in a descending order by the number of consumption occurrences per product. Finally, six main types of HMR products, which together accounted for more than 70% of the total consumption occurrences during the survey, were sorted by its position within the matrix system. Results of this analysis indicate that the consumption of HMR products by Dutch households in 1997-98 was low and concentrated in a handful of products. The developed classification system proved to be a valuable framework for a convenience-based analysis of household food consumption. Moreover, it can be a useful tool in the analysis of convenience-related food consumption patterns based on household data.

1 Introduction

1.1 The need for speed

Of the many trends assigned to today's "Western" food consumer by marketers and manufacturers, lack of time is certainly the one we can least argue against. For most of the active population there is not much time to eat and even less for shopping and cooking. This trend has been extensively reported in EU countries, along with increasingly shorter shopping cycles (Dade, 1992; Datamonitor, 1998; McHugh et al., 1991; Ritson and Hutchins, 1995). However, and in spite of the generalised "need for speed", consumers do not always seem ready to compromise the pleasure of eating a tasty meal for the sake of earning extra time. According to Sloan (1997), there are indeed situations in which consumers willingly spend time preparing and eating meals, for instance on weekends or if they have guests. Eating remains a key part of leisure or socialising, as well as a valued personal experience (Marshall, 1995; Gofton, 1995; Datamonitor, 1998). It is, thus, not surprising that all food chain partakers - manufacturers, caterers and retailers alike-, are showing a growing interest in being able to supply high-quality meals that can bring more choice to the hurried consumer (Bond, 1992; Larson, 1998).

1.2 What are Home Meal Replacements?

The concept of Home Meal Replacements (HMR) was created in the US to designate meals that have been produced away from home for household consumption (Datamonitor, 1998; Ghazala, 1999). This concept, or food category, has been recently redefined in order to clarify its domain and increase its degree of consumer orientation:

> *HMR are main courses or pre-assembled main course components of a meal - a protein (animal/plant), a carbohydrate (starch) and a vegetable source -, in single or multiple portion containers, designed to fully and speedily replace the main course of a home-made main meal.*

This concept excludes, therefore, main course components packed in non-assembled, separate containers as well as all kinds of desserts, breakfast cereals, yoghurts, candy bars, etc. Some snacks (foods usually eaten in-between main meals), starters, soups or salads can be considered as HMR as long as they respect the readiness and compositional requisites set by the definition and can be regarded by consumers as a meal's main dish (Costa et al., 2001).

1.3 Aim

The aims of this study are:

- To apply a previously developed and validated HMR classification system in the quantitative analysis of the Dutch household food consumption in 1997-98;
- To evaluate the use of the HMR classification system as a framework for the analysis of convenience-related household food consumption data.

2 Applying the HMR classification system in an analysis of convenience-related food consumption in the Netherlands

2.1 A consumer-oriented classification system for HMR: development and validation

There is an increasing diversity of production/distribution solutions offered to consumers with the aim of partially or fully replacing home-made meals. Consequently, HMR terminology is also increasingly intricate, with food chain actors mostly resorting to their own (more or less) obscure designations, like *cook-chill, frozen TV dinner* or *ready-to-eat*. These designations intend to reflect the various degrees of readiness for consumption of the products and the manufacturing processes behind them, but this intention is not always clear to the public authorities or to consumers. Direct results of these misunderstandings are, for instance, the difficulty of harmonising safety criteria for HMR and holding them accountable for food-borne illness incidents. It is clear that public health authorities and food scientists are in need of an unambiguous classification system for HMR. Moreover, food product developers, marketers and home economists could also greatly benefit from a clear product classification in order to be able to better analyse patterns of food consumption.

In view of the HMR definition presented, the characteristics of HMR products and existing food classification systems, several conceptual and methodological requisites should be taken into account when developing an HMR classification system. From a conceptual viewpoint, the classification should be based on criteria that are relevant for producers, distributors, researchers and consumers alike. Moreover, it should provide clear designations and a meaningful structure for HMR assortments. From a methodological viewpoint, the

classification should be founded on pre-defined, precise classificatory criteria, in sufficient number to comprehensively (and yet concisely) classify all HMR currently available without ambiguities. Finally, the classification should be validated and tested for reproducibility and usability (Costa et al., 2001).

Having in mind the above-mentioned conceptual and methodological requisites, a consumer-oriented classification system for HMR has been recently developed and validated. In it, two convenience attributes are chosen as classificatory criteria - shelf-life (Sn) and the level of preparation required before consumption (Cn). For this purpose 'shelf-life' has been defined as the period within which an HMR can be kept by the consumer at home, under the recommended storage conditions, without it being rendered unfit for consumption. Taking into account the shelf-life range displayed by commercialised HMR products, four shelf-life classes have been chosen:

- S1 < 1.5 weeks
- 1.5 weeks ≤ S2 < 1.5 months
- 1.5 months ≤ S3 < 1.5 years
- S4 ≥1.5 years.

Within the criterion related to the level of preparation, and based on the range of preparation activities displayed by commercialised HMR products, four classes (C1 to C4) have been defined (Table 1). This definition explicitly encompasses the HMR regeneration process – the time/temperature couple required for bringing a HMR to a state of readiness for consumption-, which has been 'translated' as the consumer preparation instructions displayed in the products' package. From C1 to C4, classes have an increasing level of time, appliances and energy inputs required before consumption. Culinary skills were kept minimal throughout the classes, except for C4, where higher cooking expertise or the addition of other ingredients may be required (Costa et al., 2001).

Table 1 – Four convenience classes for a HMR classification system (Costa et al. 2001).

CONVENIENCE CLASS	DESCRIPTION	EXAMPLES OF COMMERCIALISED PRODUCTS
Ready to eat (C1)	HMR consumed as purchased, requiring no prior preparation	Chilled sandwiches and salads, chilled pies, canned salads, take-away main courses and snacks
Ready to heat (C2)	HMR requiring only mild heating[a] before consumption (includes products processed up to a stage rendering them fit for immediate consumption after thawing or warm water addition)	Chilled pizzas and other main courses, frozen pizzas, frozen main courses and snacks or soups, dehydrated soups and spaghetti dishes, canned soups and main courses.
Ready to end-cook (C3)	HMR requiring sufficient heating[b] to finalise cooking before consumption.	Chilled and frozen lasagne, some frozen menus, dehydrated pasta dishes.
Ready to cook (C4)	HMR which have been minimally prepared for cooking (trimmed, shelled, peeled, cut, washed, etc.) but still require full cooking of some or all of its components	Frozen seafood paella, raw chilled meat/fish cuts with side dishes, raw frozen fish cut with breadcrumbs and vegetable sauce.

[a] ≤15 minutes in a pan, or ≤ 20 minutes in a conventional oven/"au bain marie", or ≤ 10 minutes in a microwave oven
[b] > 15 minutes in a pan, or > 20 minutes in a conventional oven/"au bain marie", or >10 minutes in a microwave oven

Finally, the two chosen criteria have been arranged in a four by four 'shelf-life by preparation required' matrix structure (S_4 x C_4). This was thought to better enable HMR classification according to these criteria since the matrix structure provided a higher level of detail by extending the number of classes from eight (the 4+4 granted by a separate criteria use) to sixteen. Finally, the HMR classification system has been validated according to methodology presented by Pearson et al. (1985). The validation procedure demonstrated that the convenience criteria chosen and its organisation in a matrix structure provide a sound and effective classification system for the universe of Home Meal Replacements considered (Costa et al., 2001).

2.2 An analysis of convenience-related food consumption in the Netherlands: methodology

In order to analyse the 1997-98 Dutch household HMR consumption using the developed classification system, we have employed the methodology developed by Pearson et al. (1985) in their study of food's degrees of readiness for consumption. In the first stage of this procedure we have resorted to the Dutch National Food Consumption Survey 1997-98's (DNFCS) database to obtain an HMR product list. The DNFCS database records the types of food consumed by a representative sample of the Dutch population during the surveyed period, and contains about 3100 items. More specifically, it records all the foods reported to have been eaten, either at home or outside, at least once by one of the respondents during the survey through the so-called '2-day food consumption diary' method (Voedingscentrum 1999). The database does not contain, however, any information regarding the quantities of each recorded food product that have been consumed during the survey. From the DNFCS database, and with the help of a Dutch dietician, all food products complying with the given HMR definition (174 items) were selected and its description recorded. Next, information about shelf-life and required preparation for the manufactured share of the 174 items was collected directly from the packaging of products displayed in supermarkets. In this way the information level was the same as that available to consumers. HMR products that can only be bought at a foodservice outlet and are intended for immediate consumption were given a shelf-life of one day. It was assumed that they did not require any further preparation before consumption. Finally, each item was classified according to the pre-defined criteria and assigned to its respective S_n x $C_{n,(n=1,\ldots,4)}$ class combination within the matrix system (Costa et al, 2001).

In a second research stage, the diaries recording the in-house food consumption of 2.774 Dutch households were screened for HMR consumption[i]. Only 150 out of the 174 food products initially selected from the DNFCS's database as HMR could be traced back in the households' food consumption diaries. This discrepancy was due to inaccuracies existing in the database and the exclusion of some products from the HMR category after concluding that the surveyed households had not seen them as complete main courses. All the households in which one or more of these 150 HMR products was consumed during the 2 days of the survey were selected, and its HMR consumption (type of product and number of consumption occurrences) recorded. The household identification code and the demographic characteristics of the household member (s) who actually consumed the product(s) were also recorded. The number of HMR consumption occurrences that could be allocated to each of the S_n x $C_{n,(n=1,\ldots,4)}$ class combination within the classification matrix was tallied, as well as the number of consumption occurrences per HMR product. The 150 HMR products consumed were then arranged in a descending order by the number of consumption occurrences per product. Six HMR products, which together accounted for more than 70% of the total consumption occurrences, were sorted by its position within the matrix-shaped classification system.

2.3 An analysis of convenience-related food consumption in the Netherlands: results

The outcome of the first stage of the methodological procedure described above is presented in Table 2, which shows the results of the allocation of the 174 HMR products originated from the DNFCS database within the HMR classification system (Costa et al., 2001).

Table 2 – HMR classification system displaying the allocation of the 174 HMR products selected from the DNNFCS's database and the percentage of products per C_n x $S_{n\ (n=1,...4)}$ class (Costa et al., 2001).

	C1 Ready to eat	C2 Ready to heat	C3 Ready to end-cook	C4 Ready to cook
S1 Shelf-life < 1.5 weeks	32 (18 %)	2 (1 %)	0	0
S2 1.5 weeks ≤ shelf-life <1.5 months	11 (6 %)	11 (6 %)	3 (2 %)	0
S3 1.5 months ≤ shelf-life < 1.5 years	2 (1 %)	55 (32 %)	14 (8 %)	0
S4 Shelf-life ≥ 1.5 years	0	41 (24 %)	3 (2 %)	0

The second stage of the methodological procedure yielded a total of 388 HMR consuming households, with a total of 426 HMR consumption occurrences during the DNFCS. This represents approximately 14% of the households participating in the survey and about 1.1 HMR consumption occurrences per consuming household during the survey, respectively.

Table 3 depicts the number and percentage of HMR consumption occurrences that can be allocated to each of the S_n x $C_{n,\ (n=1,...,4)}$ class combination within the classification matrix. Finally, Table 4 shows the six most frequently consumed types of HMR during the survey, the percentage of consumption occurrences per type of product and the types' respective classification within the matrix system.

Table 3 – HMR classification system displaying the number and percentage of HMR consumption occurrences during the DNFCS which can be allocated to each C_n x $S_{n\ (n=1,...4)}$ class combination (n=426).

	C1 Ready to eat	C2 Ready to heat	C3 Ready to end-cook	C4 Ready to cook
S1 Shelf-life < 1.5 weeks	140 (36 %)	19 (5 %)	0	0
S2 1.5 weeks ≤ shelf-life <1.5 months	15 (4 %)	21 (5 %)	6 (2 %)	0
S3 1.5 months ≤ shelf-life < 1.5 years	0 (0 %)	95 (25 %)	30 (8 %)	0
S4 Shelf-life ≥ 1.5 years	0	91 (24 %)	9 (2 %)	0

Table 4 – The six most frequently consumed types of HMR during the DNFCS, the percentage of consumption occurrences per type of product and the types' respective classification within the matrix system (total number of consumption occurrences = 426). These six types of HMR together accounted for more than 70% of the total consumption occurrences during the survey.

Top 6 HMR products	Percentage of consuming occurrences	Classification
Chinese take-away meals	24 %	$S_1 \times C_1$
Frozen pizzas	17 %	$S_3 \times C_2$
Canned soups	17 %	$S_4 \times C_2$
Take-away pizzas	6 %	$S_1 \times C_1$
Chilled ethnic and Dutch ready meals	5 %	$S_1 \times C_2$
Chilled ethnic and Dutch ready meals	5 %	$S_2 \times C_2$

2.4 An analysis of convenience-related food consumption in the Netherlands: discussion

Assuming that the results of DNFCS provide a representative picture of Dutch nation-wide food consumption in the years of 1997-98, the fact that only 14% of the surveyed households reported to have consumed HMR seems to indicate a relatively low consumption of this type of products in this period. This analysis of the results is supported by the results of DNFCS itself, which show that the group of 'samengestelde gerechten' (a category of foods roughly comparable to the HMR category) was not even among the 10 most used nutritional food groups in The Netherlands in 1997-98 (Voedingscentrum, 1999). However, no definite conclusions regarding this matter can be drawn, since the DNFCS was indeed limited both in time-span and number of participating households.

The results displayed in Tables 2 and 3 show that the Dutch HMR household consumption in 1997-98 was, both from a qualitative and a quantitative point of view, concentrated in two well-defined levels of convenience. These levels were, more concretely, top convenience products with minimum shelf-life (S_1 x C_1), mainly sandwiches and prepared meals supplied by foodservice, and long durability convenient meals (S_3 xC_2/S_4 xC_2), mostly frozen or canned ethnic meals. Differences between the values presented in Tables 2 and 3 were only relevant (above 2%) for class combinations S_1 x C_1, S_1 x C_2 and S_3 x C_2. These differences indicate that the importance of the consumption of top convenience products with minimum shelf-life was reinforced by the quantitative analysis, namely in what respects the consumption of HMR supplied via the foodservice and chilled ready meals. The results depicted in Table 4 show that 74% of HMR consumption occurring during the DNFCS could be accounted for by only four types of products – take-away meals (Chinese meals and pizzas - 30%), frozen pizzas (17%), canned soups (17%) and chilled ready meals (10%). All these HMR types can be allocated to classes that require none to minimal preparation before consumption (C_1 and C_2), but display a wide range of shelf-life when classified according to the shelf-life criteria (S_1 to S_4). Nevertheless, the majority of allocations respect classes S_1, S_3 and S_4, in agreement with the remaining results obtained.

The results of the quantitative analysis performed support previous conclusions drawn on the basis of the qualitative analysis only, already pointing out that the use of a narrow range of HMR was characteristic of the Dutch food consumption in 1997-98 (Costa et al., 2000; Costa et al., 2001). Three possible explanations for these results can be provided. The first explanation is that the results obtained are an artefact caused by the HMR classification system. This hypothesis can only be dismissed once the classification's validity with other product lists (i.e., its reproducibility) has been verified. The reproducibility of the developed HMR classification system is currently being tested and its results will be reported in the near future. The second explanation is that the concentration of Dutch HMR consumption is an artefact caused by the data sample used – the DNFCS qualitative results. This is highly unlikely since the survey was carefully designed to provide a representative picture of Dutch nation-wide food consumption in the years of 1997-98 (Voedingscentrum, 1999). However, we cannot completely dismiss this hypothesis since no comparable surveys were performed at the time with representative samples of the Dutch population. The last, and most likely, explanation is that indeed Dutch HMR consumption in 1997-98 was practically limited to products belonging to the two referred convenience levels, although many other products with different convenience levels were widely available at the time of the survey. This hypothesis is partially supported by ready meals' (the manufacture share of HMR) sales for The Netherlands in 1997-98, in which canned and frozen ready meals together represented over 70% of total sales volume (Datamonitor, 1998). This situation could be either due to the nature of Dutch consumer preferences or the characteristics of the HMR assortment available. How much each of these causes actually contributed to such concentration in HMR consumption and ready meals' sales is a topic worthy of further investigation.

3 Conclusions and future research

The study here described demonstrates that the consumption of HMR products in Dutch households in 1997-98 was low, and concentrated in a handful of products (mostly ethnic meals) displaying a consistently high level of convenience regarding the preparation they require before consumption. The range of shelf-life exhibited by these products is somewhat wider but tends to concentrate either on products with minimum shelf-life - 35 % of the

consumed products belonged to class S_1 -, or on products with long durability (34% of the consumed products in classes S_3 and S_4). However, the situation regarding HMR consumption in The Netherlands today may be different from what these results might lead to conclude. For instance, the 1998 forecasts for 1999-2001 indicated that while frozen meals would still represent half of total ready meals' sales, chilled meals would gradually surpass their canned counterparts as the second most sold ready meals in The Netherlands (Datamonitor, 1998). Nevertheless, the results here presented have, according to us, sufficiently demonstrated that the developed HMR classification system is a valuable framework for a convenience-based analysis of household food consumption data. Moreover, we think it can be a useful tool in the analysis of convenience-related food consumption patterns based on household data.

In future research in this area we will consider the uncovering of potential relationships between Dutch household HMR consumption, as discussed in the study here presented, and consumers' socio-demographic characteristics. This research is expected to highlight areas where the introduction of new, more consumer-oriented food products and marketing strategies could bring great benefit.

4 Acknowledgements

This study has been carried out with the financial support of the Portuguese Foundation for Science and Technology, under the program PRAXIS XXI. The authors thank all the institutions involved in the 1997-98 Dutch National Food Consumption Survey for granting them with free access to the original data. The authors would also like to thank Ed Zwarts, Dr. Karen Hulshof, Saskia Meyboom and Prof. W. van Staveren for their assistance during this study.

5 Endnotes

[1] Each household participating in DNFCS was given two different diaries to record the household members' food consumption during the two days of the survey: an individual diary for individual, out-of-the-house food consumption, and a household diary for in-house consumption of all household members (Voedingscentrum, 1999).

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Perceptions of Dutch seniors regarding Home Meal Replacements: a focus group study

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Abstract

Four focus groups were conducted with self-standing senior (55+) residents of the Dutch Gelderland region with the aim of ascertaining their beliefs, attitudes and opinions regarding Home Meal Replacements (HMR), as well as their perceptions of some of these products. Participants were all in charge of meal acquisition and/or preparation at their households, and included both HMR users and non-users. Results indicate that, besides meal composition, the hedonic aspects of preparing and eating a meal are important. Reasons for using HMR are mainly related with convenience and timesaving aspects or incapacity to cook, while reasons for not using HMR are related with a higher degree of trust and self-esteem achieved by preparing one's meals. This study shows that psychological factors, especially the low moral status of convenience foods, play an important role in seniors' meal choice.

1 Introduction

Home Meal Replacements (HMR) have been recently defined as "manufactured main courses or pre-assembled main course components of a meal – a protein (animal/plant), a carbohydrate (starch) and a vegetable source -, designed to fully and speedily replace the main course of a home-made meal". This definition encompasses not only the so-called *Ready Meals* (manufactured HMR), but also the Meals-on-Wheels service, house delivery and take-away (Costa et al., 2001a). According to an analysis of the 1997-98 Dutch National Food Consumption Survey (DNFCS) data, about 14% of the Dutch population uses HMR (Costa et al., 2001b). This analysis also indicated that about 38% of Dutch HMR consumers were older than 55 years of age, which is rather surprising since HMR consumption in the Netherlands has always been associated with young urban couples with no children and two incomes (Zuurbier and Migchels, 1998). A European study on nutrition and the elderly, reporting a wide consumption of ready-made meals among European subjects between 70 and 75 years of age, seems to confirm these results to a certain extent (Hautvast et al., 1992).

There is not much known about the Dutch seniors, their beliefs, attitudes and wishes, also in what respects meals and meal preparation (Hielkema and Kuyer, 1995). Most studies involving seniors and meals have focused on seniors' nutritional needs, the determinants of appetite in older people, and the quality of meals in resting homes and meals-on-wheels services (Hautvast et al., 1992; Mathey, 2000; LCO, 1995). To our knowledge, there are also no published studies investigating what sort of features seniors expect from their meals in general, or from meals which have been prepared from them in particular, and their relative importance. However, there appears to be the general believe that today's Dutch seniors do

not appear to have a high regard for ready meals, since they consider their own cooking to be healthier (Hielkema and Kuyer, 1995). But as the government and society encourage seniors to be more self-standing and intervenient in daily life, less time and energy remain for food-related household activities. Seniors are increasingly questioning themselves about what they will eat when they do not wish, or are no longer able, to fully prepare their meals. As they become more active in society, it is reasonable to expect that they will increasingly demand for healthier meals, requiring none or little preparation (Hielkema and Kuyer, 1995). It becomes therefore imperative for meal providers (both institutional and private) to know what seniors expect from products that can potentially replace their own cooking. The aims of this paper are therefore:

- To get a first solid impression of the opinions of Dutch seniors about HMR on which to base future quantitative research, through the performance of qualitative research (a focus group study);
- To come up with a few suggestions to manufacturers on how to make HMR more attractive to elderly.

1.1 The senior population in the Netherlands

Senior citizens (55+) currently represent 23% of the Dutch population, a share expected to rise to about 30% in 2015 mostly due to an increase of life expectancy (CBS, 2000a+b). The largest age segment within Dutch seniors (42%) comprises individuals aged between 55 and 64 years old, equally men and women, with a three-quarter majority of (married or non-married) couples. The second largest segment (32%) comprises individuals aged between 65 and 74 years old, 10% more women than men, 65% of which are married or living in marital status. The third and smallest segment (>74 years) encompasses 26% of the Dutch seniors and is composed of overwhelmingly more women than men, mostly widows and widowers (CBS, 2000a). The majority of Dutch seniors is at least in reasonable health and have an income from which they can live comfortably, although there is a considerable minority – some single seniors and widows, the very old and seniors from ethnic minorities- who are in a less favourable situation. In 1992, only 25% of the Dutch population between 55 and 65 years old (and mostly men) remained in the workforce (Hielkema and Kuyer, 1995). Along the nineties, however, the Netherlands' early retirement trend is slowly being reverted, with the government encouraging seniors to remain working even after retirement to help fight the shortage of labour and the need for immigrant workforce. The Dutch government is also highly interested in increasing the amount of self-standing seniors and their quality of life, as this eases the pressure on welfare and health care systems (Klerk and Timmermans, 1999; BBC, 2000). All things considered, it looks like most of the Dutch seniors will probably be able to enjoy the rest of their (long) lives with a reasonable degree of both physical and economical self-sufficiency (Hielkema and Kuyer, 1995). This evidence, and the expectation of a growing 'grey' buying power with an interest for high-quality products and services, has made of Dutch seniors a very attractive market segment for many companies in the Netherlands (Todd, 1995). In view of this, marketers have segmented Dutch seniors from a life-style perspective into three distinct groups:

The Golden Enjoyers – Socially and physically active people, with high spending power and not much will to cook everyday;
The Silvered Singles – Reasonably healthy, well-off widows, very active in associations, eating frequently out of the house;
The Bronzed Home-birds – More conservative seniors, with poorer health and little wish to be socially active, keen on cooking and eating the Dutch hot-pot (Sonneveldt, 1996).

In what respects food-related behaviour, research conducted by Hielkema and Kuyer (1995) showed that Dutch seniors are mostly interested in the aspects of eating which will enable them to have a long, independent life. They are thus interested in healthy eating, which they associate with the consumption of fresh foods, especially vegetables, and pay attention to their salt, sugar and fat intake, and of course to price. They enjoy shopping for food, preferring speciality shops to supermarkets for their daily shopping, as shopping in supermarkets is found to be very tiresome.

1.2 Focus Groups

A cornerstone of the design stage of a new product development or improvement process is to listen to the voice of consumers to understand their needs and demands. This listening process usually begins with qualitative measurements that enable the product design team to understand consumers' basic needs and desires and learn the consumers' viewpoint about a certain product category. One of the most popular forms of qualitative measurement at the design stage is the performance of focus groups. Focus groups are particularly indicated for situations in which not much is known (or has been investigated) about the consumer segment and/or the product category in question (Urban and Hauser, 1993). Focus groups are thoroughly planned, moderated sessions, designed to obtain the perceptions of several individuals (usually between 6 and 9) regarding a specific topic of interest in an informal, non-threatening environment. Careful and systematic analysis of the discussions provides insight into how a product, service or opportunity is perceived. Focus groups are especially useful for exploratory research (Casey and Krueger, 1994). Advantages of focus groups, when compared with individual interviews or quantitative methods like questionnaires are:

- Focus groups permit researchers to gather a lot more information more quickly and at less cost;
- Its format allows the collection of large and rich amounts of data in the respondent's own words;
- Focus groups allow researchers to interact directly with respondents, which in turn allows the observation of non-verbal cues, follow-up questions and probing for further information;
- Participants react and build up on responses from each other, which potentially increases the chance of getting new ideas or uncovering underlying opinions;
- Participants often enjoy focus groups, since they are encouraged to give their opinions and have discussions with other people in a relaxed and open environment.

Nevertheless, focus groups may also present limitations, especially if they are not carefully planned and conducted:

- Participants may tend to agree with each other, give socially accepted answers, be unduly influenced by a dominant participant, or not talk at all if they are too shy;
- The presence of a moderator and the way he/she conducts the discussion can lead to biased results;
- Results of focus groups are hard to summarise and interpret, and are not quantifiable;
- Due to an usually small number of participants, who may or may not be representative of a population, results can hardly be extrapolated;
- Researchers may tend to unduly believe more in focus groups' results than in hard statistical data, since these results are generated 'live' and heard directly from the mouth of the consumers (Stewart and Shamdasani, 1990; Dawson et al., 1993; Casey and Krueger, 1994; Ressureccion, 1998).

However, careful planning of the sessions, sensible recruiting and extensive moderator training (as well as keeping an open mind), can efficaciously solve some of these limitations (Stewart and Shamdasani, 1990; Dawson et al., 1993). Focus groups have also been previously reported as being appropriate to collect believes, attitudes, opinions and perceptions of individuals regarding food products, eating habits and diet (Crockett et al., 1990; Brug, et al., 1995; Costa, 1996).

2 The focus group sessions

2.1 Planning

Having in mind the research aims proposed, the planning of the focus group encompassed the proper definition of the target population - the Dutch seniors-, the establishment of an interview guide for the focus group sessions and the selection and training of the moderators (Casey and Krueger, 1994).

2.1.1 The target population

The target population for this study was defined as 'self-standing Dutch citizens (men and women) aged 55 years or older, in charge of meal acquisition and/or preparation at their households'. This definition excluded individuals living in resting homes, but included seniors who occasionally (but not regularly) eat at day care centres or make use of the meals-on-wheels service. For the convenience of both participants and researchers, it was decided to select only individuals who had their residence in the Gelderland region, preferably near the city of Wageningen. Moreover, and to ensure a reasonable degree of representativity, it was decided that the recruitment procedure should aim at obtaining participants with different educational levels, marital status and living situations. Finally, both users and non-users of ready meals were to be recruited, as we were interested in obtaining as much different views of HMR among seniors as possible.

2.1.2 The interview guide

The research team began to build the interview guide by studying scientific literature and other available information (and expertise) on the theory and practice of focus groups, the Dutch senior population and the HMR assortment in The Netherlands. Based on this study, a semi-structured interview guide, consisting of a list of questions that had to be discussed during the focus group sessions and instructions for the session's procedure, was developed according to the general guidelines described in literature (Stewart and Shamdasani, 1990; Dawson et al., 1993; Casey and Krueger, 1994). The list of questions is summarised in Table 1. The guide divided the focus group sessions into two parts of 40 minutes each, with a 15 minutes break in between for refreshments. The first part focused on the attitudes, beliefs and opinions of the participants about home made meals and ready meals, and started with a general question to be asked in turn to the participants, in order to put them at ease and lead to further discussion (Stewart and Shamdasani, 1990). In the second half, participants were to be shown 5 branded ready meals available at local supermarkets (a frozen meal, a chilled meal, a vacuum-packed meal and a dried meal, all composed of the same type of dish), and asked to give their opinion about them. Participants were to be free to touch and examine the samples and to open the packages, but should not be given the opportunity to taste the product, to focus the discussion on other aspects besides only the product's sensory properties.

Table 1 – Summary of the focus group questions

First part:
Which characteristics do you find important in a warm meal?
What kind of ready meals do you know?
What is your opinion about ready meals in general? And what is your experience with them?
Do you use ready meals regularly? Why/Why not?
Would you use ready meals if you were not able or not willing to cook anymore?
Second part:
Which aspects of the displayed products raise your attention?
Having in mind your answer to question 1 (first part), what is your opinion about these products?
Which of these products would you choose for your warm meal tonight? Why?

A pre-test of the interview guide was carried out among food technology students, to see whether the questions were understood as they were intended. The interview guide was finally presented to different experts in senior's nutrition and consumer research, and improved according to their remarks. According to what is recommended in literature (Stewart and Shamdasani, 1990; Casey and Krueger, 1994), we decided to conduct at least 4 focus groups, the final number of sessions being dependent on the complete attainment of the research aims proposed. All the sessions were to take place in the morning, between 10 and 12 o'clock. The sessions were also to be video-recorded, so a total of 3 people of the research team per session would be present: the moderator, an assistant and a cameraman. The assistant should organise the arrival and departure of the participants, the break for refreshments, observe the session and take notes of the main ideas discussed. A lecture room of the Wageningen University was chosen to host the sessions. The University is a non-commercial place close to the potential participants' home, and its lecture rooms provide the necessary space, comfort and quietness.

2.1.3 The selection and training of the moderators

According to the guidelines presented by Stewart and Shamdasani (1990), the moderators were recruited among food technology graduates with a background in consumer research who appeared to be genuinely interested in the research and curious to hear the seniors' opinions. Preference was given to people who seemed to possess a reasonable degree of social skills during the recruitment interviews. The selected moderators had two months to familiarise themselves with the topic of the research, the target population, the skills of focus group moderation and the interview guide. Moderators trained themselves to moderate the sessions by asking for advice from people who had experience with focus groups and interviewing seniors, and by watching videotapes of focus groups previously performed. During the above-mentioned pre-test of the interview guide, moderators were also given the opportunity to practise their skills and the session's procedure. During the training, it was stressed that the moderator should interfere as little as possible in the discussion and try to remain neutral in her speech and non-verbal conduct, in order to maintain the discussion as natural as possible (Casey and Krueger, 1994).

2.2 The recruitment of the participants

Participants were recruited in person at shopping centres, at the elderly association of Wageningen and at the canteen of a sports centre. The people approached were briefly informed about the general research aim – to know their opinion about meals and meal preparation -, and asked to provide some answers for a short questionnaire, which included socio-demographic aspects, as well as aspects related to meal preparation and HMR use. Selection of participants for the focus group sessions was based on some of these aspects, such as age, knowledge about HMR and responsibility in meal acquisition/preparation, for instance. The eligible respondents were then invited for a (video-recorded) group's discussion about meals and meal preparation at the Wageningen University. Potential participants

received a written invitation displaying the date and time of the discussion, a map of Wageningen and a telephone number to contact in case of questions or cancellation. They were also informed that transportation, if necessary, could be arranged, and that they would receive a gift for their participation. One day prior to their session the participants were contacted by telephone to confirm their participation. Following the advice given by literature to over-recruit (Casey and Krueger, 1994; Resurreccion, 1998), and to ensure that at least 8 people would actually appear for the sessions, a total of 9 participants were recruited for each session.

2.3 Carrying out the focus group sessions

Four focus groups were conducted with a total of 32 participants, 5 men and 27 women. Participants were all in charge of meal acquisition and/or preparation at their households, and included both users and non-users of HMR. Most participants were not familiar with each other. The age of the participants ranged from 54 to 83 years old, with an average of 72 years old. Table 2 shows the socio-demographic composition of the participants, as well as the frequency of their HMR consumption.

Table 2 – Focus Groups' participants

Characteristics	Number	Percentage (%)
Gender		
Male	5	16
Female	27	84
Total	32	100
Age		
50 – 54	1	3
55 – 59	4	13
60 – 64	2	6
65 – 69	6	19
70 – 74	8	25
75 – 79	7	22
80 and older	4	13
Marital Status		
Single	2	6
Married	17	53
Widowed	10	31
Divorced	3	9
Education level		
Low	6	19
Middle	16	50
High	10	31
Housing situation		
Independently	25	78
Senior Flat	7	22
Ready meal usage		
Yes, more than once	20	62
Yes, once	4	13
No, never	8	25

The participants were received upon arrival by the session's assistant and guided to their seats in the sessions' room. There, the moderator, the assistant and the participants were seated at tables placed in a circle. To facilitate the discussion name cards were placed on the table in front of the participants. The cameraman was located in the background behind the participants and was instructed to film from a fixed point and not to disturb the discussion in any circumstance. The discussion started with the moderator welcoming the participants and briefly introducing herself, the assistant moderator and the cameramen, and reminding the participants that the session was to be video-recorded. Next, the general topic of the research

and the aim of the session were explained. The participants were informed of some ground rules for the discussion (Stewart and Shamdasani, 1990) and asked if they had any further questions or remarks. If not, the moderator initiated the discussion by asking the participants in turn what they found important in a warm meal. The sessions took between 1 ½ and 2 hours, with a 15 minutes break in which tea or coffee with cookies were served. After the discussion of the last question, the moderator summarised the main ideas coming out of the discussion, asked for any final comments or questions, thanked the participants for coming and closed the session. The assistant then accompanied the participants out and presented the gifts (a ready meal or a gift coupon). Most of the participants then took the opportunity to tell the assistant that they had greatly enjoyed the session.

2.4 The analysis of the results

After each focus group, the moderator wrote down her first impressions from the session, afterwards comparing her notes with those of the session's assistant. Next, the complete transcript of the session was written down in Dutch and then translated to English. Two researchers separately checked the English transcript on the accurateness of the translation. In a hybrid process from the different methodologies described in literature (Stewart and Shamdasani, 1990; Dawson et al., 1993; Casey and Krueger, 1994), the written transcripts were then read and content-analysed by the moderator and the leader of the research team. With the help of the session notes, a summary of the main ideas was elaborated. Based on this summary, a system of categories was created, extensive enough to ensure that everything expressed during the session would fall under one of the categories. Following a 'copy-and-paste' procedure, the parts of the text relevant to each category were then grouped together, after being coded with the identification of the respective participant and session. Sections of the text that were incomplete or not making much sense were eliminated at this stage, together with sections of doubtful veracity. After all sessions had been conducted and analysed, all the categories generated, together with the respective sections, were put together and analysed. Sections under similar categories were put together; categories not relevant for the research were discarded. Based on the categories addressing the main research questions, an overall summary of the four focus groups – consisting of key findings and examples of related participants' quotations - was finally made.

3 Results and discussion

3.1 Important characteristics of a warm meal

A summary of the four focus groups conducted is displayed in Tables 3 to 5b. According to the focus group participants, the main characteristics of a warm meal are variation, appearance, taste, healthiness and freshness (Table 3). Regarding variation, participants stressed that the warm meal should be varied on itself, that is, that warm meals should not contain only potatoes, and/or only meat, but rather a combination of a starchy component, a protein source and vegetables. Moreover, variation between meals – "It is important not to eat the same everyday" – was highly appreciated, as it was seen as ensuring a healthy diet. Participants stated that, although they believe to remain fairly good eaters, they did not have as much appetite as they did before, and that the perceived appearance and taste of the meal highly influenced their appetite. Therefore, meals should look and taste good in order to increase their appetite. According to the participants, meal components should be well cooked but not overcooked. Potatoes that remained intact and crunchy vegetables were appreciated features, as they were associated with a more pleasurable taste and mouthfeel. Participants stated that it is important for them to eat healthy meals, meaning meals that are freshly

prepared everyday from non-processed ingredients, low on salt and fat, and containing a high amount of raw or cooked vegetables.

Other aspects of the warm meal, such as its composition and how the meal should be served and eaten, were also mentioned at this stage of the session (Table 3). According to participants, daily meals should be simple and preferably follow the tradition of the Dutch cuisine: boiled potatoes, fried meat with gravy and boiled vegetables. Soup, dessert and salads are appreciated but not essential. However, some meals may be different. For instance, participants stated that on weekends they rather eat soup with sandwiches or order meals from the Chinese restaurant than prepare a warm meal, since they are usually not in the mood to cook. Participants also found that meals should generally not take too long to prepare, although they were mostly not willing to sacrifice quality for quickness in preparation. Meals should always be served warm and eaten at a set table. The eating environment should be cosy and people should take time to enjoy their meals.

Some of the underlying values attached to meals and meal preparation were also put forward at this stage by the participants (Table 3). Meal preparation is generally seen as a (woman's) duty. Independently of whether a person has time for cooking or actually enjoys it, meals should be cooked from scratch everyday. Moreover, people who are not willing to cook everyday or search for alternatives to their own cooking are seen as lazy, with participants attaching a high value to being active and doing things for yourself. To prepare meals was also seen as a means of being appreciated by your family and as giving a sense of achievement. Mealtime was regarded as one of the highlights of the day, a time to socialise with family or friends.

Table 3. Important characteristics of a home made warm meal

Variation	"Meals must be varied" "It is important not to repeat meals in the same week"
Taste & Appearance	"I think that above all the meal should be tasty" "Taste and smell are very important" "It is important how the meal looks like, that it looks appetising" "I find the colour of a meal important, it should not be too homogeneous" "The meal should be well cooked" "The potatoes should not be overcooked. The vegetables should be crunchy, to let their taste come forward"
Healthiness/ Freshness	"It is not only about eating tasty food, I want to eat healthy food everyday" "You must get your vitamins" "It is important to pay attention to the amount of fat in the meal" "I preferably eat freshly prepared meals" "The freshness and quality of a meal are important things to me"
Preparation	"It has to be prepared quickly, I don't like standing in the kitchen for hours" "The meal's quality is more important than how long it takes to prepare it"
Composition	"What I mostly like to eat is the Dutch pot, as mother cooks it at home" "I am from the generation of potatoes, vegetables, meat and gravy." "Meals should be simple, but good and varied"
Serving and eating	"I always eat at a set table" "It is important to serve the food warm" "It is important that you take the time to have your diner" "It is the atmosphere around it that makes a nice meal"
It is one's duty to cook	"I do not like to be in the kitchen for long, but I make sure one way or the other the meals appear on the table" "I was never an enthusiastic cooker. I cook because one has to"
One should make one's own meal	"I hear about women who don't want to cook and I think: girls, you have the whole day for it!" "I find ready meals totally unnecessary. I can shop for myself. The most important thing is to be active" "Ready meals are for lazy people"
Appreciation/ achievement	"I enjoy when my children come to eat at my place. I love it when they say: 'Mom, it was delicious' " "I make a big effort to please my guests with my meals" "A good meal is the meal I cook, with fresh vegetables and tasty meat"
Socialising	"Making time for diner, the entire atmosphere. Everybody sitting together at the table, the best part of the day" "Dinner is a social event. It is not only the quality of the food, it is also the quality of the conversation" "We try to prepare something in advance, so that we spend less time in the kitchen when the guests are there"

3.2 Knowledge and opinions about ready meals

The general knowledge of participants about the current ready meals' offer in Dutch supermarkets was very good. Even non-users knew a wide variety of products and could correctly describe a considerable number of them. The large majority of the participants declared that they viewed ready meals as being more appropriate for other groups of consumers (Table 4). Ready meals were seen as products suitable for people who cannot cook anymore – "for the really old or sick" -, people who do not know how to cook – young people and male adults in general – and working people – "they don't have time to cook, we do". Generally speaking, ready meals were seen as products for people who can not or will not make the effort to cook or do not enjoy eating anymore. Some participants also stated that the fact that they did not have a microwave or did not know how to use such a modern appliance prevented them from using ready meals. Nevertheless, participants could name situations where the use of ready meals might be handy, like on 'special' days (when one is "allowed" not to be in the mood for cooking, like on weekends or very busy days) – when eating alone, when having unexpected guests, during holidays, etc. Other situations in which these meals can be convenient are, according to the participants, when you forgot to shop for food or you just came back from holidays, or when a particular dish is too complicated to prepare. Some participants also said that ready meals are handy when, due to other engagements, you simply

do not have enough time to cook and eat your dinner. The use of ready meals by people who are too ill or too old to cook, or by widowers, was also seen as something not reproachful.

Participants saw ready meals in general as being standardised, mass-produced and unwholesome foods (Table 4). They stated to think that ready meals contain mostly bad quality ingredients, excessive amounts of food additives and are prone to quick spoilage. They also affirmed that they believe that people who frequently eat ready meals do not get a well-balanced, healthy diet. Moreover, ready meals were viewed as being expensive and energy-intensive. Participants stated that they could cook a cheaper and tastier meal in the time that takes to prepare a ready meal. Ready meals were also seen as being rather incomplete from a nutritional viewpoint. Participants declared that when they were using ready meals they felt the need to prepare something to add to them, like a salad or a fried egg. Participants could also name some positive aspects of ready meals. They said they thought that ready meals usually tasted much better than they looked, are really quickly and convenient to prepare and also convenient to stock. The experiences related to ready meal use described by the participants were mostly not very positive (Table 4). Ready meals portions were found to be generally too big, but often containing relatively few vegetables. They were also considered to look mostly unappetising. Some participants found them often overcooked and salty, and others found them just not tasty enough. Packages were seen as difficult to handle and open, especially the ones going into the microwave, and creating an excessive amount of waste. The information on the label was found to be mostly not quantitative enough and written in too small letters to be readable. Finally, participants found ready meals not that much easier or quicker to prepare than their own meals. Some of them also stated that they rather order from take-away services, since they supply meals that are already fully prepared.

3.3 HMR as an alternative for self-cooking

When confronted with the idea that in the near future they might not be able to cook anymore, most of the participants reacted in an unconcerned manner. Some of them simply declared never to have considered such possibility. Others declared that they would ask neighbours or a relative to prepare their meals. Others yet stated that people who can not cook anymore should not be living independently anyway. However, participants also discussed alternative solutions to the problem, such as the regular use of ready meals or meals-on-wheels services. Some of the participants were more in favour of using ready meals since they thought these would allow them a higher degree of independence than the meals-on-wheels service. One participant said: "With ready meals you still decide when you eat and what you eat. It is reassuring to know that they exist". Participants also found it inconvenient that one has to be at home at specific hours to receive the meals from the meals-on-wheels service. Regarding the positive aspects of meals-on-wheels, participants named the fact that they were brought home (eliminating the need to shop everyday) and that they offered plenty of choice, including tailored meals for people following a diet. Participants clearly preferred meals-on-wheels services providing frozen or chilled meals to the ones providing warm meals. They thought that it was likely that the meals were already lukewarm when people received them. Moreover, they found the fact that they would have fixed times to eat, depending on the schedules of the meals' distribution, highly inconvenient. On the other hand, services delivering chilled or ready meals were seen as giving them more freedom to decide the timing of meals and other daily activities, since distributions were not so frequent and meals could be stored for a longer period. The only downside to this service was the fact that participants would then have to own a microwave and be able to handle it.

3.4 Reactions to ready meals and suggestions for product improvement

Tables 5A and 5B display the results obtained from the discussion during the second half of the sessions. When shown the different products, participants began mostly by mentioning features that had to do with packaging or labelling (Table 5A). Comments related to the packaging generally stressed their wish for easy-to-open packages that keep meal components separated and allow buyers to see the product inside. Attractive packaging was also stated as being highly appreciated. Regarding labelling, participants generally expressed their need for a more precise and clear information. They also expressed their trust in products sold by well-known brands. The following discussion focused on the preparation required by the different products, portion size (Table 5A) and composition (Table 5B). Taking into account what was said, there seemed to be a demand for an increased product choice and more tailored-made meals. Different portion sizes, suiting the needs of different households, more variety of dishes and the possibility to assemble one's own meal from separate meal components were improvements suggested by a great deal of the participants. This demand for tailored-made meals reappeared when participants were discussing the healthiness of the products displayed. Participants declared they would like to see available special meals for people following a diet, in particular meals low on fat. Above all, ready meals should be really "ready", that is, they should demand only minimum time and effort to prepare.

Table 4. Opinions about ready meals

Ready Meals are not for me	"They are for people who cannot cook anymore" "They are for men who cannot cook themselves" "Young people do not cook anymore, they don't enjoy the pleasure of preparing their own food" "People who work would use ready meals before we do" "If you want to use ready meals than you have to have a microwave. I don't have one" "We are just not used to them"
Ready Meals are mass-produced and standardised	"They contain a lot of added stuff, E-numbers" "Ready meals are mass-produced, I don't believe that any first class product can come out of that. They must put the cheapest vegetables and potatoes in it" "If you buy the ingredients yourself, you choose the amounts, the quality and the price. With ready meals you don't have that control anymore" "The quantities are standard: for one person it is too much, for another too little, for another too little vegetables or too many potatoes..." "There are too little vegetables in them"
Ready Meals are not wholesome	"If you eat ready meals everyday you will quickly get a deficiency in some vitamins. We miss a salad as side-dish" "Ready meals are fatty and salty" "Meals that lay for a week in the supermarket before they are sold cannot be fresh anymore" "In spite of the package I have the feeling that bacteria can grow in it really quickly"
Ready Meals are expensive	"I think you can cook yourself for less money" "How much energy you have to spend to get the oven warm in the first place!" "A ready-to-eat meal on its own doesn't look that yummy, If you want to eat a tasty meal, you have to organise yourself and add something extra. You might as well cook yourself"
Ready meals do not look or taste that good	"I think that they often don't look that tasty, with all that cooked stuff in it" "I have tried it once, I thought it was not tasty" "It's too salty" "The potatoes fell apart when warmed, I had to eat them with a spoon"
Package is excessive and not handy	"Everything looks nicely packed, but if you look at your dustbin at the end it is full with plastic" "Even with this one person's package you get a pile of waste" "The package gets too hot in the microwave. I always burn my fingers on it" "You only get this little piece loose to pull the lid off. You have to get a pair of scissors and cut the package open. I think that is terrible"
Labelling	"The ingredients are there but not how much of each ingredient" "The information regarding whether the package can or cannot go into the oven or microwave is not clearly written on the packages" "Sometimes the letters are too small"
Ready meals are not that much more convenient	"Frozen foods do not warm up well in the microwave. The outside is cooked but the centre is still frozen" "You can also be ready in 15 minutes when cooking yourself. It takes only 10 minutes to prepare noodles" "Take-away meals are already cooked. I just have to take them home and eat them, and that is it"

Participants were allowed to open the packages and look at their contents, if they required doing so. When that happened, the discussion focused on the appearance of the meal (Table 5B). Meals were found to be generally not too colourful or attractive. Participants highly disliked the appearance of meals in which the components were already mixed together, and they had difficulties imagine how the dried ready meals would finally look like. A discussion of the freshness and the storage of meals followed. Some participants found no meal to be fresh, since they were all already prepared. Others thought the chilled meal to be fresher, because it had been packed fresh and had a short shelf-life. Others yet found the frozen meal fresher, because the ingredients were "fresh frozen". The dried or canned meals were generally found to be not fresh, but were on the other hand highly appreciated because of their storage properties. Different participants appeared to have different concepts of freshness, and no consensus on this topic could be reached.

4 Conclusions and future research

Taking into account the quality and quantity of the information obtained regarding the opinions and perceptions of Dutch seniors about Home Meal Replacements, the focus group technique has resulted in valuable information. The idea of starting the sessions by asking first for the important characteristics of warm meals did much for the quality of the results obtained, since home made meals appeared to be a strong reference point for HMR evaluation. The results obtained show that the participants attach a high moral and emotional value to prepare their own meals, which reflects negatively on their judgement of ready meals and other HMR.

Table 5A. Reactions to ready meals and suggestions for improvement

Packaging	**See-through package** "I rather have a package that allows me to see the contents, then I know what I'm buying" "You should be able to see what is in it. Maybe they can put a little window on it" **Components kept apart** "They should keep the components apart so that you can decide for yourself how much of each you want to eat. That works more on your taste buds" "I should be able to distinguish what I'm eating, otherwise I don't buy it" **Attractive** "I find the package of the dried meal very pretty. It gets your attention" "The package should make the product look tasty" **Easy to handle** "You heat it in warm water, and then what? How do you open it? There is only that little metal gadget" **Environmental-friendly** "The packages should be recyclable or returnable. They should work less with plastic and more with carton"
Labelling	**Composition Information** "They should have labels with bigger letter types and a light background, otherwise it is almost unreadable" "Sometimes there is no information about the composition. You should at least know what it contains" "I would not choose for a product that does not mention the quantities of the ingredients" "I have problems understanding the labelling. What is maltodextrine?!" "They should always use the same units of measure" **Shelf-life** "I always look first at the due-by-date" ***Brand name*** "I first look at the name of the producer, to see whether it is a known brand " "I would not usually buy such a product, but if it is from that brand..." **Preparation instructions** "I always read carefully the preparation instructions before I start cooking" "It should be clearly stated in the label how you should prepare the meal"
Preparation	"All these products can be very quickly prepared, 5 minutes in the microwave" "This one must stay 13 minutes in the microwave, or 45 min in the oven. If you are in a hurry... You use a lot of electricity and time just to get the oven warm! It should not take that long to prepare" "Ready meals for people who cannot cook should be as simple as possible. You should only have to warm them up, eat it and throw the plastic package away afterwards. No washing!"
Portion size	"It is too much. I don't dare to put the rest back in the freezer because I am afraid it will spoil" "There should be different portion sizes for the different people and for one-person households"

Ready Meals only became appreciated when participants were confronted with the possibility of not being able to cook anymore, since they allow them to remain somewhat independent from others. Independently of the psychosocial considerations, seniors think that there is much room for concrete improvement of the quality of ready meals. Handier packages, clearer labels, simple and short preparation, better taste and appearance and tailored-made meals are the sort of practical improvements that would be greatly appreciated by the participants. Whether that would do much to make the whole concept of replacing home-made meals more

attractive to seniors and to turn them in sales hits within this segment is something that companies need to carefully contemplate. Perhaps an improvement of the image of ready meals, aiming at changing the low moral status associated with not cooking one's meal (or removing the consequent feeling of guilt for using ready meals), could be more effective. In any case, as participants stated, at a certain stage HMR become unavoidable for everybody, and companies selling HMR products seen as "less worse" or "almost as good as my own cooking" will probably have a better chance of success.

From a more fundamental viewpoint, it would be worthwhile to repeat these sessions with other groups of Dutch seniors and with groups representing other Dutch (or non-Dutch) market segments, to see if similar results could be obtained. It would also be interesting to learn more about the cognitive structure (product attributes-benefits-values hierarchy) behind the meal choice of senior citizens, in order to be able to fully understand the motivations behind the low moral status of convenience foods (Reynolds and Gutman, 1985). Finally, the results of the focus group study here presented can also be used to design and perform a quantitative study assessing the actual importance of the low moral status of convenience foods to consumers in general (Gofton, 1995).

Table 5B. Reactions to ready meals and suggestions for improvement (cont.)

Composition	**Additives** "I would preferably choose a meal which is free from preservatives and colour or taste enhancers" **Protein source** "I look at how much meat is in it, and what type of meat" "There should be ready meals made of fish too" "A meal does not necessarily have to contain meat" **Starch source and vegetables** "The overwhelming component of the meal is pasta or rice There are too little vegetables" "Good quality potatoes that do not fall apart when heated" "I would add a salad, you need some more vegetables in a meal" "Product only has carbohydrates, a little bit of vegetables. I would rather have a fried egg with bread" "They should offer more choice. They should allow you to choose the ingredients' combinations you want" **Not complete** "I would choose the frozen meals because they contain already all the necessary ingredients" "I would choose the frozen or the dried, with the idea of adding something to it"
Healthiness/ Nutrition	"The label already informs you that they added vitamins, because they could not keep its original value. I think that is very honest of them" "I wonder what is the amount of vitamins in this product, if it is so harshly processed" "They should not be too fatty" "They should create special meals for sick people, low on fat and/or salt"
Appearance	"This meal does not look that good, I exclude it immediately because of that" "It is a bit weird, you cannot imagine that the dried meal is going to become food" " I find the noodles too white. I don't have any high expectations about it" "I don't see myself eating this, it is all mixed up, a real mess" "We want them to look nice"
Freshness	"The dried product does not attract me. Dried vegetables are not the same as fresh, even after adding water" "I should choose the frozen one, its vegetables are freshly frozen. I expect that to taste better" "You can read on the label: fresh, quick, easy. But that is really not fresh anymore, it is already cooked" "The chilled meal appears to be the most fresh, it was prepared and immediately set under cool storage. As long as you pay attention to the due-by date it should be ok to eat it. I would choose this one"
Storage	"The dried meals fit better in my closet" "Frozen meals are handy because you can use half of it and keep the rest in the freezer" "We want meals that we can keep for long in the freezer, or better yet, in the closet"

5 Acknowledgements

This study has been carried out with the financial support of the Portuguese Foundation for Science and Technology, under the program PRAXIS XXI. The authors thank Marisa Navarro for her assistance during the focus group sessions and their analysis. The authors also wish to thank the Dutch seniors who have kindly agreed to participate in this study.

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Food consumption, food safety and risk perception

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Abstract

Food safety is one of the major consumer concerns in present-day discussions on food and nutrition issues in the Western world. In this context, our paper pays much attention to means of empirical research that is concentrated on food consumption and food safety from a consumer perspective. What risks are there in consumers' perception and how can we understand these? Some of the results of empirical research that has been conducted are discussed. The results are based on data of 427 households in two regions in the Netherlands. Risk perception is treated as a multilevel phenomenon. The multilevel analysis approach results from the fact that a large majority of the Dutch respondents do trust the safety of food products *in general*. However, at lower levels of abstraction, i.e. at the level of product categories and products, the risks of e.g. convenience food, novel foods, poultry, meat and eggs are perceived by a large proportion of the respondents. Next to the multilevel approach, the theoretical framework of the research consists, on the one hand, of traditional *socio-economic* factors such as income, education, age and presence of children in the household, and on the other hand of *attitudinal* statements. It is stated that risk perception of consumers both depends upon (tangible) socio-economic variables and (intangible) attitudes. Variations in the dimensions of risk perception have been established by using categorical regression. Both socio-economic factors and attitudes appear to be of importance in explaining differences in the various levels of risk perception.

1 Introduction

The food market is shifting from being product driven to being consumer driven. Food producers increasingly become aware that they have to make a consumerist turn. Unfortunately enough, this move towards a consumer-oriented food market is accompanied by various food scandals and animal diseases which scare food consumers. One of the most important concerns of today's food consumers is food safety. Against this backdrop, we focus on this particular consumer concern.
We aim to show that food consumer behaviour generally and food safety particularly are matters of sense and sensibility, and that research should approach both topics accordingly. Starting from this idea, the objective of this paper is to make sense of the sensitiveness of food choices. Next to reasonable scientific arguments that human behaviour is more than mere reason, the current food market also gives ample reason to search for food consumers' susceptibility to food products and food processing. Now, in these times of BSE-scare and foot-and-mouth disease, a vivid societal sense of urgency backs up the scholarly idea to approach food consumption in a way that is both more comprehensive and more sensitive, i.e.

searches for visions of food consumers about themselves or the world they live in as well as for their (underlying) feelings with respect to food consumption and production.
It is self-evident that is beyond our scope here to dwell into the sensitiveness of food choices in general. We will focus on risk perception of food consumers. This means that, as a matter of fact, overt behaviour of food consumers is strictly speaking no topic in the empirical research we refer to in this paper. This is not to say, of course, that perception (covert behaviour) and choices have nothing to do with one another. On the contrary, perceptions may be regarded as indicators of actual behaviour. Reading perceptions as predictors of overt behaviour should, however, try and avoid linking them in a linear manner. Empirical and theoretical research bear abundant evidence that human behaviour is not that simple. We are whimsical creatures to whom it is not always given to act in line with our perceptions. Our attitudinal information is unquestionably the foundation on which our behaviour is founded, but this does in no way imply that clear-cut (causal) connections between perceptions and actions could be taken for granted.
To complicate things even further, in order to improve our understanding of risk perception, it is helpful to treat it as a multilevel phenomenon. The outcomes of our empirical research indicate that consumers have different levels of trust at different levels of analysis. For instance, when people trust the safety of food products *in general*, they can simultaneously be much less confident with respect to lower levels of abstraction, i.e. at the level of product categories and particular comestibles. This means that consumer confidence and consumer concerns might differentiate at different levels of analysis.
Next to multilevel analysis of the explanandum, with respect to the explanatory variables our research framework consists of traditional *socio-economic* factors such as income, education, age or size of the household, as well as of underlying *attitudinal* dimensions. We suppose that risk perception of consumers both depends on (tangible) socio-economic variables and (intangible) attitudes. The results of our empirical research proof that this idea is not without merits. Besides, this line of argument is in tune with the idea to search for an approach that is able to cope with food consumption in terms of both sense and sensibility.
This paper concentrates on the issues of multilevel risk perception and understanding risk perceptions on the basis of an approach in which attitudinal variables are taken as seriously as socio-economic ones in order to improve our understanding of food consumer behaviour. Sections 2 and 3 introduce these two issues conceptually. Section 4 introduces the data and method of the empirical research that has been conducted. Section 5 is addressed to some of the results collected by applying our approach. This paper is brought to a close in section 6 that is briefly devoted to the main conclusions.

2 Complexities of consumption

Today's world is better characterized by consumption than by production. We are living in a consumer society. The importance of consumerism and consumer goods are as important for modern people's reason for living as consumers are for keeping the wheel of the affluent societies' economies going. Devoted consumers searching for their identity through purchasing consumer goods and services embody the rising tide of consumerism. While skyrocketing consumption has become the hallmark of our era, and the importance of consumers and consumerism to modern economic and cultural life is recognised, we increasingly become aware of the fact that we are facing severe difficulties to understand consumers' foibles, fads and fancies. In many aspects modern consumers defy traditional segmentation by age, gender or income. Classical criteria to divide consumers into different homogeneous groups with corresponding behavioural intentions and patterns have lost much

of their explanatory power. Hence, the behaviour of the inhabitants of modern consumer society cannot be understood by straight and measurable segmentation criteria only. Not in an effort to "overthrow" former conceptions and criteria, but merely to supplement them, we suggest to use variables of a socio-cultural or socio-psychological origin in *addition* to socio-demographic and socio-economic ones to meet the complexities of consumptive preferences and choices.

Analysing consumption in a more encompassing way than strictly in terms of age, educational level or salary, is in line with modern consumer studies. Although consumer societies are commonly labelled materialistic, a main line of thought in recent research is that consumption is only partly a matter of price and product features, and, to a large extent, orchestrated by pleasures and principles. In other words, next to use and exchange value that influence consumers' food choices, identity and symbolic values are involved. We are referring here to a field of research in which the dematerialisation of consumer goods and consumerism is given centre stage (see e.g. Barlow and Maul, 2000; Barnes, 2001; Bocock, 1993; Dagevos and Hansman, 1999; Featherstone, 1991; Holbrook, 1999; Jensen, 1999; Lewis and Bridger, 2000; McCracken, 1988; Pine and Gilmore, 1999; Schultze, 1997, Slater, 1997; Wolf, 1999). Brought into prominence is the idea that in the affluent world of consumption, product qualities or prices are neither necessarily nor automatically decisive in explaining consumer behaviour. That is to say, food consumption is not simply and solely a matter of nutritional value, price, taste and the like. Evocative or ethical aspects of *both* products *and* production processes should be taken into consideration too.

There is all the more reason to do so because food consumption is as influenced by its societal context as today's food market is interconnected with consumer society at large. Moreover, the supply side of the food market is increasingly aware that the food market needs to shift from being product driven to being consumer driven (see e.g. Grunert et al., 1996; Kinsey and Senauer, 1996). Nowadays, consumer mindedness and customer relationship management slowly by surely enter into the lexicon of agribusiness, food supply and agricultural policy. The complexity here is that the sincere feelings of urge that exist in the food market to proceed with the so-called consumerist turn towards a genuine consumer-focused market, seem to go hand in hand with serious problems concerning food production processes and food products. Problems, that is, which exercises many consumers' minds. The late food scandals and current BSE-scares and foot-and-mouth disease have serious repercussions on the supply side as well as the demand side of the food market. Consumer acceptance and confidence of food products and food production practices is at stake. One of the major "consumer concerns," as they are coined, is food safety (see e.g. Blandford and Fulponi, 1999; Brom and Gremmen, 2000; Dagevos and Frouws, 2000).

After the foregoing, there are obvious reasons to concentrate on food safety. Firstly, in a demand-led food market the issue of food safety is crucial. Secondly, food safety is of the essence in the time of continuous turmoil in the food system. Thirdly, while food safety is mostly connected with the product per se, this product-oriented focus may be supplemented with a process-oriented perspective. In the end, food safety is the result of production processes and practices in the food chain as a whole. Making a division between food safety in commonly used terms of product-oriented qualities (freshness, shelf life, additives) and in terms of process-oriented qualities (growth hormones, genetically modified organisms, animal welfare, organic farming) is largely an artificial one. Therefore, our analysis of risk perceptions on food safety will incorporate process-oriented consumer concerns too.

3 Attitudes and levels

To incorporate attitudinal variables in our approach is, amongst others, based on the underlying idea that food consumer behaviour is not a phenomenon to be situated in a vacuous space. Food consumption is part of a wider social context. As a consequence, consumer behaviour is influenced by this context through traditions, values, mores or codes of conduct, media coverage, government policies, etcetera. People's worldviews and lifestyle mindsets, for their turn, may be presupposed to have an effect on their preferences, choices and consumption patterns. In order to nose our way carefully in this "whimsical wonderland" full of "mysterious ways" and "psycho-logic," our explorations start with investigating if and if so, to what extent, attitudinal statements trickle down and represent explanatory power with respect to risk perception of food consumers.

The questionnaire includes over twenty statements, representing different perspectives or attitudes. Some examples are such statement as 'Technological development contributes to food safety,' 'Animals from bio industry are a serious threat for food safety,' 'With respect to food, taste is key,' or 'Genetical modification of animals should be forbidden.' With respect to social developments, our questionnaire also searches for opinions about how worried people are about such various topics as obesitas, public security, gmo's, world food shortage, violence on television.

Taking different contextual issues into account in order to find out to what extent risk perceptions of food consumers are (emotionally) attached to opinions and feelings about social issues, does not imply that the statements aim to categorise consumers in fixed taxonomies. We rather believe that consumers think and act in ways which range from a focus on *materialistic* or *individualistic* and *short-term* benefits to *responsible* modes of consumerism in which engagement and commitment prevail, and consumers are concerned about (long-term) consequences of their consumption patterns as well as food production practices. Food consumers can put on different faces depending on the situation, the moment, or what kind of food product or production process they are dealing with. One is not always and automatically interested in, for instance, convenience or variety with respect to all kinds of comestibles. Price or availability are also able to do the trick and make food consumers tick.

Variation is a feature of food risk perception too, as our explanandum happens to be a multilevel phenomenon. Risk perception refers to a general feeling of discomfort connected with possible negative consequences of, in this case, the purchase or consumption of food (products). With respect to food consumption risk perception ranges from a perceived risk of getting ill after the consumption of a specific product, from feelings of possible harmful effects the consumption might have on ones long-term personal health, or even to concerns on the world ecosystem. Especially, in researching the explanatory power of the behavioural component with respect to food safety it is crucial to define clearly the nature of risk perception.

In our multilevel approach we distinguish *components*, *levels* and *types*. Components refer to differences between consumer trust, consumer concerns and the perceived chance of getting ill after eating a certain product. Levels relate to the different aggregation levels the risk perception is connected with: food in general, food categories or a specific food product. As for types of risk, we have limited ourselves to health risks, societal risks and technological risks (see Figure 1).

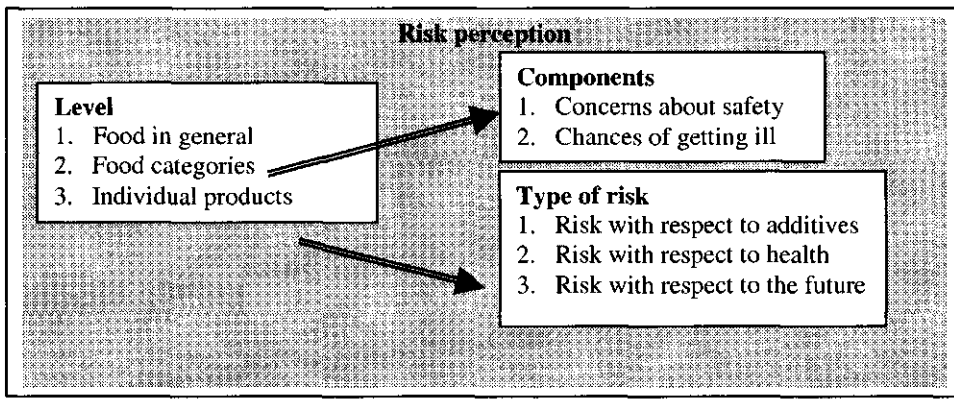


Figure 1 – Three levels of risk perception

4 Data and method

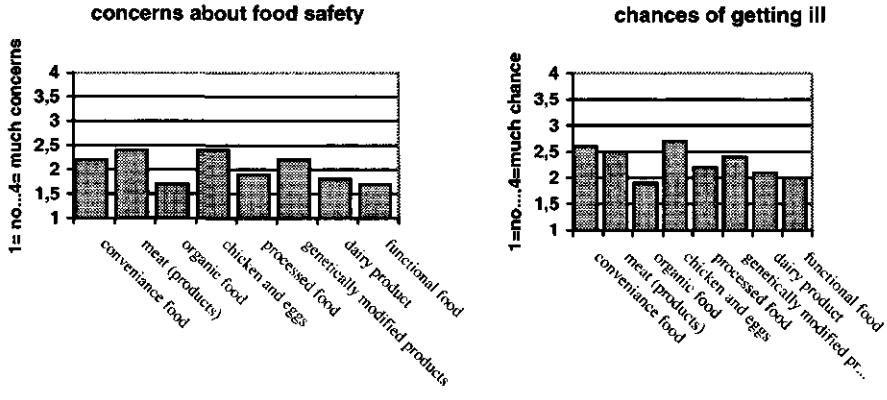
Both in The Hague as in Wageningen 500 questionnaires have been distributed among visitors of supermarkets in May 2000. They were asked to complete the questionnaire at home and then to send it back by mail. In distributing the questionnaire attention has been paid to having some dispersion in terms of sex, age and ethnicity.
The final sample consists of 420 respondents. As can be seen from Table 1, row 1 to 8, the sample is not representative in terms of socio-economic variables. Youngsters and higher educated are dominant in the sample, just as households with no children and households with a low household income. More people in Wageningen – a moderate urbanised area where more people are supposed to be concerned of and involved in food and nutritional issues - have returned the questionnaire than in the Hague. The Hague is in terms of population the third city in the Netherlands.
However, it has never been our intention to achieve a nation wide representative sample, but to come to a sample which allows us to test the hypotheses by means of sufficient dispersion in the variables. This has been achieved as can be seen in the Tables 1 and 2
In analysing the data, SPSS 10.0 for Windows has been used. In establishing the relationships between dependent and independent variables categorical regression, an optimal scaling technique, has been applied. Compared to the classical regression techniques, this technique is more sophisticated with respect to the scaling nominal, ordinal and numeric variables.
The various scales have been assessed by Cronbach's Alpha. This holds particularly for the risk scales in Table 2. Factor analysis has been used in the construction of the independent variables that relate to attitudinal dimensions in Table 1, see row 9 and further. In the factor analysis the following standard criteria have been applied: explained variance> 60%, Eigenvalues >1, Bartlett's test of sphericity and the Kaiser-Meijer-Olkin measure. Cronbach's alpha should exceed .65.
With respect to the dependent variables, see Table 2, the following can be said. Trust in food relates to the general level of risk perception. They are measured directly. Anxiety at purchase and chance of getting ill by food are intermediate variables in risk perception. They relate to categories of food as functional foods, dairy products, organic food, and the like. They are measured indirectly and constructed through the reliability analysis. The variables risk of food additives, risk for health and risk for the future relate to perceived risk at the level of food

products as beef, pork, chicken, vegetables, chips and take-away meals. Again, these three variables are measured indirectly, this time by means of a summation procedure.

5 Results

As Table 2 shows, the overwhelming majority of the respondents consider food in the Netherlands to be (very) safe, 83 per cent. Only two per cent is of the opinion that food is unsafe. There is also little anxiety at purchase of food. When the risks are more specifically related to food products, the majority still has little concern. About 60 percent is little concerned on the risks of food additives, the risk of food for own health and the future, just as on the chance of getting ill by food. However, about 40 percent are concerned. An indication that risks of the consumption of food are perceived more frequently, as the level of risk perception becomes less abstract.
It is obvious from Figure 2 that both concerns about food safety as chances of getting ill differs across product categories. In general there is a high correlation between concerns and chances of getting ill across the food categories but the absolute levels do differ. Apparently the relative high chances of getting ill does not worry people too much.

Figure 2 – Risk perceptions related to product categories



With respect to the types of risks there are differences between products within the same category.

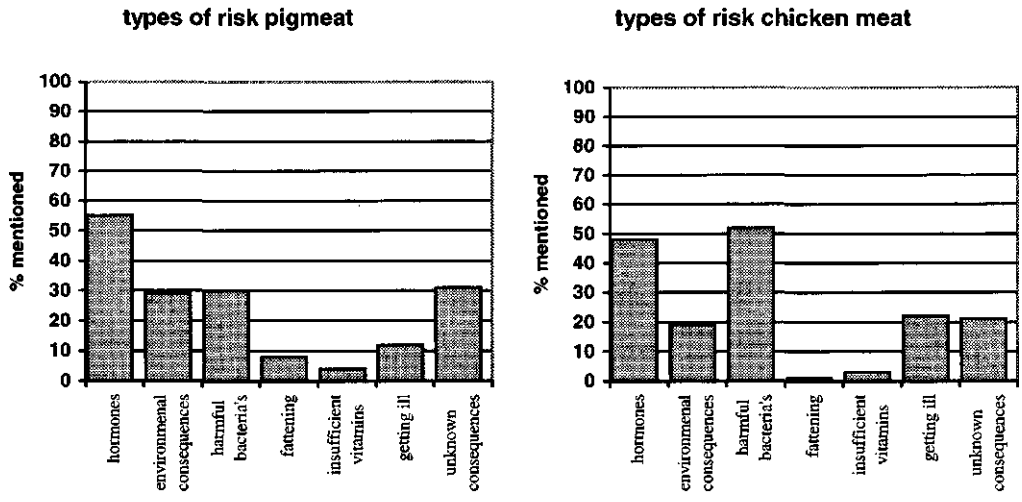


Figure 3 – Risk perception related to products

As can be seen in Figure 3 the technological risks (hormones) are perceived higher for pigmeat than for poultry. On the other hand perceived risks with respect to health (harmful bacteria's, insufficient vitamins, chances of getting ill) for poultry are much higher than for pork. The *unknown consequences for the future* and the *environmental consequences* for pigmeat show higher perceived risks for the future with respect to pigmeat than to poultry.

Levels and components of risk perception can also be analysed by means of a model. Tables 1 and 2 already give an overview of the dependent and independent variables used in this analysis. In Tables 3 and 4 we present the results of this model.

Table 3 indicates that 25 per cent of the variance in trust in food equation is explained by the independent variables. About 20 per cent of the variance in the regression on anxiety at purchase is explained by the equation. For the dependent variable chance of getting ill by food, the explained variance is much lower, 11 per cent. As people become older, trust in food diminishes. A higher household income is positively related with trust in food. People with higher purchasing power have probably more opportunities to buy for instance biological products. People with a rational attitude – according to the standardised b's the most important independent variable - consider food more frequently to be safe, the reverse holds true for people with a traditional attitude. Finally, people who are aware of health risks while shopping trust food more frequently.

Attitudinal dimensions only explain anxiety at purchase. People who are aware of health risks while shopping by paying attention to ingredients, additives and production process are anxious more frequently, just as people with a more strict attitude to hygiene in the kitchen and people who are individually concerned on food issues. However, people with a rational attitude are less anxious.

In the explanation of the chance of getting ill by food, socio-economic variables are more prominent. Higher educated estimate the chance of getting ill by food higher than lower educated, just as males and younger people do. People with an attitude of much individual concern on societal issues like food allergies, obesity and the like, more frequently respond

higher chances of getting ill by food. The same holds for people who are aware of health risks while shopping by paying attention to ingredients, additives and the like.
In Table 4, the explained variance is 17 per cent for the equations on risks of food additives and risk for health, and 15 per cent for the regression on risks for the future cent for the equations on risks of food additives and risk for health, and 15 per cent for the regression on risks for the future. The overall picture is characterised by diversity.
Risk of food additives is perceived to be greater in household where children are present. Next to household composition, education is of interest. Higher educated are more concerned on the risks of additives. Three attitudes are of importance in explaining variations in the perception of risks of additives. The more one has collective concerns on nature and environment, the more risks are perceived. This holds also for people with much individual concern on food issues. On the contrary, people who adhere to rationality of government and science (rational attitude) perceive less frequently the risks of additives.
Risks for health is explained both by socio-economic factors as attitudinal dimensions. Attitudes as individual concern on societal issues as well as individual concern on food issues lead more frequently to much concern on the perceived risk of food consumption for one's health. The opposite holds for a nonconformist attitude. As people grow older, they have less frequently concerns on the risk of food consumption for health. This is also the case when households are lârger, while households with young children are more frequently concerned on the risks of food consumption for the health of people. This conflicting result can probably be attributed to the fact that 15 per cent of the respondents are students, living in student homes not well known for their high standards of hygiene.
Only attitudes explain variance in risk for the future. The most important variable is traditional attitude. People with a traditional attitude are concerned more frequently on the risks of food consumption for the future, just as people with more collective concerns on nature and environment and high individual responsibility. The contrary holds true for people with a nonconformist attitude.

6 Conclusions

Food safety is key in our consumer-driven food market that is currently confronted with food scares and scandals. The perceptions of consumers on food safety are crucial to (re)gain trust in the food system. Therefore, our research has concentrated on risk perceptions of food consumers. We have treated risk perception as a multilevel phenomenon. It appears to be that a large majority of the Dutch respondents do trust the safety of food products in general. At lower levels of abstraction, that is, at the level of product categories and products respectively, consumers perceive risks more frequently. This outcome implies that consumer trust in food safety at one level is not always or automatically inversely related to consumer concerns. Consumers can have trust in food safety in general and *simultaneously* have concerns about particular food products. So, outcomes at a general level do not tell us the whole story.
The theoretical framework of our research incorporates both traditional socio-economic factors (income, education, age) and socio-cultural attitudinal statements. It is believed that risk perception of modern food consumers depends upon socio-economic factors on the one hand as well as attitudes on the other. Both sets of variables turn out to be of worth. Attitudinal statements prove to have explanatory power and add to our understanding of the underlying sense and sensibility of contemporary food consumer behaviour. The main conclusion is that both socio-economic factors and attitudes matter in explaining differences of risk perception.

This conclusion indicates that changing the production-consumption food chain implies that it is all the more important for suppliers – from farmers to retailers, that is – to try to *understand* consumers. This is more demanding than knowing only how old they are or what kind of work they do. It is also necessary to become acquainted with what goes on in their heads, hearts and households in order to understand better what fits in with the consumers' environment.

Table 1 - Descriptive statistics of independent variables

Sex(respondent)	Male: 32 % Female: 68%
Age (in years of the respondent)	17-25: 18%; 26-40:33% 41-55: 26%; >56: 23%
Education (respondent)	Low: 9% ; middle:31% ; high: 60%
Duration work week (hours per week of respondent)	< 15: 5%: 15-32 : 18%; > 32: 28%
Income (per month per household)	<2500:29%; 2500-5000: 42%; 5000-8000: 23%: > 8000:6%
The Hague or Wageningen (household)	The Hague: 39% Wageningen: 61%
Partner yes/no	Yes: 61%
Household size (# persons per household)	One: 28%:; two:33%; three:12%; > three: 27%
Household composition (presence and age of children)	Children 0-5: 14%; children:8%; children >13: 9%; children have left home:21%; no children: 48%
Individual concern (societal issues)	Little: 62%; much: 38%
Individual concern (food issues)	Little: 39%; much: 61%
Collective concern (nature & environmental issues)	Little: 25%; much: 75%
Collective concern (political issues)	Little: 21%; much: 79%
Rational attitude (to government and science)	Low:17%: neutral:40% high: 57%
Traditional attitude (to production)	Low: 3%; neutral: 40%; high: 57%
Individual responsibility	Low: 11%; neutral:49%; high:40%
Non-conformist attitude (to present organisation of food supply)	Low: 69%; neutral: 29%; high: 2%
Attitude towards hygiene in the kitchen	Cleaning everything once a week: 1%; once a month: 20%; once a year:58%; less than once a year: 21%
Attitude to perishables	Pays always attention in using food to risks of perishables: 58%: nor always: 42%
Attitude to risk of bacteria contamination	Aware of risk: 81%; unaware: 19%
Attitude to health risk while shopping	Being aware of health risks while shopping: 21%: not: 79%

Table 2 - Descriptive statistics of the dependent variables

Trust in food	(very) safe 83%; unsafe nor safe 12%; unsafe 3%; does not know 2%
Anxiety at purchase	Little: 77%; much: 23 % Cronbach's alpha = .80
Chance of getting ill by food	Small: 58%; big: 42% Cronbach's alpha = .86
Risks of food additives	Little concern (mentioned <3 times): 56%; much concern (mentioned 4-7 times): 44%
Risks for health	Little concern(mentioned < 4 times): 59%; much concern (mentioned 5-15 times): 41%
Risk for the future	Little concern (mentioned < 2 times): 63%; much concern(mentioned 3-11 times): 37 %

Table 3 - The impact of socioeconomic factors and attitudinal dimensions on trust in food on anxiety at food purchase and on perceived chance of getting ill by food

Independent variables	Trust in safety of food				Anxiety at purchase				Chance of getting ill			
	ß	s.e.	F.	Imp.	ß	s.e.	F.	Imp.	ß	s.e.	F.	Imp.
Sex	.001	.049	.00	-.002	.006	.051	1.42	.000	-.138	.054	6.53	.064
Age	**-.187**	**.053**	**12.40**	**.085**	.004	.051	.65	.011	**-.122**	**.058**	**4.50**	**.043**
Education	-.002	.047	.22	-.001	**.101**	**.056**	**3.28**	**.026**	**.178**	**.058**	**9.37**	**.130**
Duration work week	-.003	.050	.37	-.002	.002	.051	.18	.004	.005	.053	1.06	.031
Income	**.193**	**.058**	**11.13**	**.051**	.004	.052	.53	.006	-.007	.056	1.34	.009
The Hague or Wageningen	.009	.048	3.44	.012	.002	.050	.12	.002	-.004	.053	.45	.002
Partner yes/no	.005	.079	.53	-.008	.000	.074	.00	-.001	-.003	.060	.29	.003
Household size	-.010	.067	2.15	.021	**-.103**	**.071**	**2.08**	**.015**	.004	.058	.40	.001
Household composition	**.103**	**.052**	**3.13**	**.029**	-.010	.053	3.31	.033	.003	.062	.27	-.005
Individual concern (societal issues)	-.005	.049	.92	.012	.003	.051	.25	.009	**.168**	**.054**	**9.84**	**.168**
Individual concern (food issues)	-.000	.051	.00	.001	**.160**	**.054**	**8.76**	**.139**	.009	.057	2.68	.074
Collective concern (nature & environmental issues)	-.000	.053	.00	.002	.004	.054	.57	.032	.007	.057	1.42	.077
Collective concern (polical issues)	.006	.047	1.73	.003								
Rational attitude	**.341**	**.048**	**49.79**	**.470**	-.001	.049	.00	-.002	-.004	.052	.55	-.007
Traditional attitude	**-.121**	**.051**	**5.61**	**.116**	**-.199**	**.051**	**15.32**	**.203**	.000	.052	.00	-.001
Individual responsibility	.008	.046	3.18	.051	-.002	.049	.006	.003	.006	.052	1.21	.042
Non-conformist attitude	.007	.047	2.30	.050	.003	.048	.48	-.009	-.008	.050	2.88	.055
Attitude towards hygiene in the kitchen	-.007	.047	2.40	.011	-.003	.047	.54	.000	-.004	.051	.57	.023
Attitude towards perishables	-.006	.050	1.52	.019	**-.172**	**.046**	**13.79**	**.135**	.005	.054	.97	-.003
Attitude to risk of bacteria contamination	.000	.051	.00	-.001	.005	.053	.78	.022	.008	.056	2.25.	053
Attitude towards health risks while shopping	-.010	.051	4.02	.083	.007	.053	1.84	.038	**.102**	**.056**	**3.33**	**.076**
					.248	**.049**	**25.65**	**.339**	**.132**	**.053**	**6.19**	**.164**
	Ss = 115.0; df = 21; F = 7.32; p = .000; Adjusted R^2 = .25				Ss = 94.60; df = 21; F = 5.60; p = .000; adjusted R^2 = .20				Ss = 60.42; df = 21; F = 3.21; p = .000; adjusted R^2 = .11			

Table 4 - Impact of socioeconomic factors and attitudinal dimensions on perceived risk of food additives, of food consumption on health and of food consumption on the future.

	Risks of food additives				Risks for health				Risks for the future			
	∃	S.e.	F.	Imp.	∃	S.e.	F.	Imp.	∃	S.e.	F.	Imp.
Sex	.001	.052	.00	.005	.002	.052	.22	.015	.003	.053	.33	.010
Age	.001	.062	.00	.010	**-.162**	**.056**	**8.53**	**.014**	.008	.054	2.17	.032
Education	**.137**	**.053**	**6.73**	**.048**	-.009	.051	3.21	.067	.005	.056	.66	.010
Duration work week	.004	.052	.50	.010	-.006	.053	1.12	.001	-.005	.052	.82	.019
Income	.004	.052	.62	.018	.003	.051	.38	.004	.003	.054	.28	.004
The Hague or Wageningen	.005	.050	.97	.023	.007	.050	2.06	.043	.007	.052	1.66	.035
Partner yes/no	.003	.058	.29	.023	.125	.073	2.96	.053	.006	.057	1.16	-.012
Household size	-.007	.080	.81	-.030	**-.160**	**.076**	**4.43**	**-.016**	**.107**	**.058**	**3.36**	**.082**
Household composition	**-.217**	**.085**	**6.48**	**.204**	**-.136**	**.061**	**5.00**	**.096**	-.008	.061	1.75	.043
Individual concern (societal issues)	.003	.052	.43	.015	**.197**	**.052**	**14.50**	**.203**	.005	.052	.82	.025
Individual concern (food issues	**.131**	**.054**	**5.86**	**.147**	**.204**	**.054**	**14.23**	**.278**	-.002	.056	.16	-.010
Collective concern(nature & environmental issues)	**.148**	**.055**	**7.16**	**.187**	-.000	.054	.00	-.004	**.122**	**.056**	**4.70**	**.162**
Collective concern (political issues)	.007	.050	1.82	.037	-.005	.050	1.22	-.002	.004	.050	.50	.017
Rational attitude	**-.125**	**.051**	**6.07**	**.115**	-.002	.050	.24	.001	-.010	.053	3.37	.087
Traditional attitude	.006	.053	1.43	.062	-.004	.053	.50	-.006	**.184**	**.054**	**11.65**	**.274**
Individual responsibility	.005	0.48	1.18	-.011	.007	.048	2.61	.005	**.107**	**.050**	**4.58**	**.023**
Non-conformist attitude	-.004	.050	.64	.029	**-.174**	**.050**	**12.01**	**.142**	**-.162**	**.051**	**10.02**	**.218**
Attitude towards hygiene in the kitchen	.008	.049	2.96	.012	.007	.049	2.02	-.002	.002	.048	.21	.003
Attitude towards perishables	.002	.053	.20	.010	.010	.053	3.36	.091	-.002	.054	.10	.002
Attitude to risk of bacteria contamination	.005	0.55	.92	.034	.001	.055	.00	.007	.003	.054	.33	.004
Attitude to health risks while shopping	.007	.051	1.73	.052	-.007	.051	2.07	.008	-.005	.052	.92	-.027
	Ss = 85.8; df = 21; F = 4.94; p = .000; adjusted R^2 = .17				Ss = 82.3; df = 21; F = 4.68; p = .000; R^2 = .17				Ss = 74.7; df = 21; F = 4.15; p = .000; R^2 = .15			

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Beer consumption patterns in Latvia

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Abstract

In Latvia, popularity of beer, compared to other alcoholic drinks, increases with each year.

In 2000, the total beer market in Latvia has reached 95.7 million litters and consumption of beer 41.2 litters per capita. Consumers make choice about beer they buy basing on a number of factors. Additionally to its price such factors as appearance, convenience, smell, taste and perceived quality strongly influence consumers' choice.

The overall objective of this study is to determine consumer attitudes towards beer drinking: preferred brands, volumes, and packing and labelling information.

A survey of 200 randomly selected respondents was conducted in the fall of 2000. Respondents had to answer 17 questions related to the quantity, brand, price, etc. of beer they consume and to their attitude towards beer drinking in general. Both female and male respondents of ages between 18 and 70 participated in the questionnaire.

The obtained data showed that approximately 84 % of respondents had a positive attitude towards beer drinking while to 16 % it was negative. Consumers drink beer because they like it or they consider beer a refreshing beverage. Most of respondents prefer domestic beer. Beer drinkers choose different local brands *(Aldaris, Tervete, Bauska, and Lacplesis)*. Male respondents mainly prefer 0.5 l glass bottles, female – 0.33 l glass bottles. PET bottles of 1 – 2 l volume are popular because of their price. Only 26.2 % respondents confirmed they always carefully read the labelling information.

1 Introduction

Beer is a very old drink, the history of which can be traced almost 5,000 years back. In most of the traditional brewing countries, beer is seen as a part of national identity. All the classic beer styles have their origin in the northern and central part of Western Europe: Pilsner comes from Bohemia, a wide variety of beer from Germany and Belgium; different brands of ale from Britain. Lithuania, Latvia and Estonia have their own local traditions in beer drinking.

In Latvia, beer drinking is becoming more and more popular compared to other alcoholic drinks. First and foremost, beer contains only a moderate amount of alcohol (usually 4 – 5%). Beer is a refreshing long drink containing a number of ingredients, which can be beneficial to health - major nutrients (carbohydrates and peptides), a number of vitamins and minerals, antioxidants and other important micronutrients (Baxter, 2000:1).

In 2000, the total beer market in Latvia has reached 95.7 million litters and consumption of beer per capita - 41.2 litters (Grislis, 2000). Consumers choose beer they buy basing on a

number of factors. Additionally to its price such factors as appearance, convenience, smell, taste and perceived quality strongly influence consumers' choice. Consumers would like to decide on the purchase of beer basing on full information regarding beer attributes.
According to official statistics, beer drinking is often one-sided giving only data regarding consumption per capita/year and the total amount of beer production per year.

The overall objective of this study is to determine consumer attitudes towards beer drinking. Specific objectives are:
1. determine consumer perceptions regarding beer consumption,
2. determine consumer perceptions regarding price, brands, packing, labelling,
3. formulate some recommendations to producers and retailers basing on analysis.

2 Materials and Method

A survey of 200 randomly selected respondents was conducted in the fall of 2000. Respondents were asked 17 questions related to beer drinking: how often they drink beer, how they chose the brands, whether the price and packing material are important, do they know anything about new brands of beer. Types of response were: a) yes or no; b) free choice among 3 – 4 given answers and c) written comments. For summarising the survey data, frequencies of each answer were calculated, except responses of 16% (n=32) of respondents who were excluded from the analysis because of their negative attitude to beer drinking. Respondents were interviewed individually by the future specialists of household science.

Also demographic information was obtained from the survey. Respondents had to provide information on their sex and age. Participants were demographically diverse with ages ranging from 18 to 70. The average respondents' age was 33 years. Therefore, depending on age, the respondents entered into two categories: young people under 30 (n=117; 59%) and people above (hereinafter seniors) 31 (n=83; 41%). 48% (n=96) of respondents were female and 52% (n=104) were male.

Data from the questionnaire were analysed using the statistical analyses system (SPSS 8.0).

3 Results

Table 1 shows demographic characteristics of the sample.

Table 1 Characteristics of the study sample

Characteristics	*Men*	*Women*
Age group		
18 -30	62.5	54.2
31 – 49	27.9	25.0
50 and above	9.6	20.8
	(104)	(96)
Attitude to beer drinking		
Positive (n=168)	90.4	77.1
Up to 30	62.8 (59)	54.1 (40)
30 and above	37.2 (35)	45.9 (34)
	(94)	(74)
Negative (n=32)	9.6	22.9
Up to 30	60.0 (6)	54.5 (12)
30 and above	40.0 (4)	45.5 (10)
	(10)	(22)

The data from the questionnaire proved that approximately 84 % of respondents had a positive attitude towards beer drinking while to 16 % it was negative. The negative attitude varied over the respondents' groups. The percentage of people not drinking beer was as follows: 9.6 % male, 22.9 % female, 15.4 % young people and 16.9 % seniors. The picture seems to be optimistic as women and young people are most endangered by alcoholism.

Consumers drink beer either because they like it (n=128; 76,2 %) or they consider beer a refreshing beverage (n=36; 21.4 %) (Table 2). The women mentioned also other reasons, for instance, beer is a good appetizer, beer is a good source of vitamin B, etc. The amount of beer consumed several times per week tended to be higher among men (30.9 %) and respondents older than 31 (29.0 %). A higher percentage of beer drinking several times per year among women might be explained by the traditions of Latvian holidaymaking when beer is the main drink (e.g., at Midsummer day). Mostly, respondents like to drink beer from special glasses (38 %) and from glass bottles (43 %).

Table 2 Frequency (%) of beer drinking

	Total	*Men*	*Women*	*Under 30*	*Above 31*
			Aim of beer drinking		
Like the beer	76.2	79.5	71.6	79.8	71.0
Beer is a refreshing drink	21.4	20.2	23.0	20.2	23.2
Other reason	2.4	0	5.4	0	5.8
			Times of drinking		
Several times per week	25.0	30.9	17.6	22.2	29.0
Several times per month	23.2	26.6	18.9	17.2	31.9
Several times per year	51.8	42.5	63.5	60.6	39.1

The market survey showed that in total over 30 brands of beer produced by 10 local companies and some imported beer brands are available in the market. The majority of respondents prefer domestic beer (95 %) (Table 3). Only some of respondents acknowledged they do not have a definite preference. Though there are many brands available in the Latvian market, consumers appear to prefer only a few among them. Beer drinkers mostly choose beers produced by local breweries such as *Aldaris* (37 %), *Tervete* (13 %), *Bauska* (12 %) and *Lacplesis* (8 %). On the whole, if people like *Aldaris* beer they dislike beer from other smaller breweries, and the other way round. Some people gave a general answer: *"I prefer dark beer"*, *"I do not like strengthened beers"*, etc. but, generally, they mentioned specific brands.

The price for domestic beer ranged between Ls[1] 0.25 - 0.45 (0.39–0.71 USD) per 0.5 *l* bottle. Imported beer generally has a higher price, for instance, *Budweiser Budwar* (the Czech beer) is sold for Ls 0.59 per 0.5 *l*, *Saku Ice* (Estonian beer) – Ls 0.49. The respondents were asked to give their opinion whether the price for beer is acceptable (Table 3).

[1] Ls – Lats. Latvian currency, the exchange rate for 1 USD = 0.63 Ls on 30.03.2001.

Table 3 Reported frequency (%) of beer purchase according to sex and age.

	Total	*Men*	*Women*	*Under 30*	*Above31*
		The price of beer			
Beer is cheap	23.2	23.4	23.0	30.3	13.1
Beer is expensive, might be cheaper	63.1	70.2	54.1	65.7	59.4
The price of beer is acceptable	13.7	6.4	23.0	4.0	27.5
		Brand of beer			
Local brands	94.0	98.9	87.6	95.0	92.8
Foreign brands	2.4	1.1	4.1	3.0	1.4
Does not matter	3.6	0	8.1	2.0	5.8
		Volume of beer			
0.33 l glass bottles	12.5	3.2	24.3	8.1	18.8
0.5 l glass bottles	65.5	68.1	62.2	68.7	60.9
PET bottles (1l and more)	22.0	28.7	13.5	23.2	20.3
		Information on label			
Yes, I read	26.2	26.6	25.7	30.3	20.3
No, I do not read	73.8	73.4	74.3	69.7	79.7
		New brands of beer			
Yes, I am interested	63.1	66.0	59.5	71.7	50.7
No, I am not interested	36.9	34.0	40.5	28.3	49.3

In the survey respondents acknowledged that the price for beer might be lower, but generally they consider the price acceptable. Most respondents consider the best acceptable price for beer might be Ls 0.40 per 0.5 l bottle.
The market survey showed that the total beer consumption according to packing is as follows: beer in bottles - 46 %, beer in cans - 1 %, beer in kegs - 9 %, draft beer in tanks - 16 %, beer in plastic PET bottles – 28 %.

The choice of beer by the packing type depends on various factors: local traditions, purposes of use, sex and age. In Latvia, beer drinkers generally prefer 0.5 *l* glass bottles as they are considered more convenient for use. Besides, there is an opinion that beer in glass bottles is of higher quality and is safer for drinking. Some people prefer drinking draft beer in pubs. Male respondents mainly prefer 0.5 *l* glass bottles or bigger volume PET bottles, female – 0.5 *l* glass bottles or 0.33 *l* glass bottles (Table 3). PET bottles of 1–2 *l* volume are becoming quite popular because of their price. Some respondents explained: *"If you have a bigger bottle there is no need to go to the shop twice"; "They are most convenient for a picnic".*

Two questions in the questionnaire were closely related:

- *"Do you read carefully the labelling information?"*
- *"Are you curious about new beer types in Latvia?"*

The respondents, reporting on their interest in the labelling information, usually were also interested in new beer types. Only 44 respondents (26.2 %) confirmed they are carefully reading the labelling information. The percentage of people reading the label was as follows: 26.6 % male, 25.7 % female, 30.3 % young people, and 20.3 % seniors (Table 3). People explained that they were reading the label either to be aware of the alcohol content, to know the ingredients of the specific beer or to learn something new. People reading the information on the label consider they have already found their brand of beer and know the necessary information without reading the label. Most participants indicated that their primary sources of information about new brands of beer are advertisements on television, in newspapers and magazines. Most of respondents did not know what faro, stout, ale, etc. are. On the whole, 62 male (66 %) and 44 female (59.5 %) respondents acknowledged they have interest in new beer types.

4 Conclusion

From the results obtained several conclusions can be made.

Approximately 86 % of adults have a positive attitude towards beer drinking. Most men, especially under 30, stated they approve beer drinking and they drink beer several times per week. This might be assumed a positive tendency, what will in future allow to decrease consumption of strong alcoholic drinks. However, most men regularly consume more than one type of beverage, often combining beer and spirits. 16 % of respondents reported they are not drinking beer, among them 9.6 % were male, 22.9 % - female. Similarly it is among young people (15.4 %) and seniors (16.9 %).

The potential of market for good quality local beer is high. Approximately 94.5 % of respondents preferred various brands of beer produced in Latvia. Mostly, beer drinkers choose the beers produced by local breweries such as *Aldaris* (37 %). *Aldaris* is a consumer-oriented company: appearance of the new beer brand Riga 800 in the market, the lottery of Gold beer and other events have got wide publicity in the mass media and are aimed at satisfaction of consumers' demands and at reaching high recognition for the company. It might be recommended to other local companies to pay more attention to marketing strategy in order to increase their share in the market.

The price per 0.5 *l* bottle of domestic beer, what ranges between Ls 0.25 - 0.45 (0.39–0.71 USD), is very important in purchasing decisions. Many respondents would like to buy cheaper beer. In the questionnaire, respondents suggested that the price for beer might be approximately Ls 0.40. Producers and retailers should consider how to keep the price of beer in economically most acceptable level to satisfy the demands of consumers.

In Latvia, beer drinkers generally prefer 0.5 *l* glass bottles because they consider them most convenient for use. There is also an opinion that beer in glass bottles is of higher quality and is safer. From the responses conclusions can be drawn that PET bottles of 1–2 *l* volume are becoming more popular because of their comparatively lower price.

Most respondents, especially men, indicated that it would be interesting to try new brands of beer. They suggested that the new brands of beer might be advertised more actively by producers and retailers.

Continued research is needed to clarify the reasons why people prefer beer to other alcoholic drinks, what do they know about beer, its positive and negative properties, to what extent do education, level of income, nationality and area of residence effect people's attitudes and knowledge about beer.

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Nutritional intake and socio-economic indices of pregnant and lactating women in the Vaal Triangle, South Africa

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Abstract

Objectives: This study formed part of a larger project and the objective of this study was to determine the nutritional intake and socio-economic indices of pregnant and lactating women.
Methodology: A validated demographic questionnaire and quantitative food frequency questionnaire (QFFQ) was used and statistically analysed. A total of 431 questionnaires were completed. Trained fieldworkers conducted interviews and took the anthropometric measurements.
Results: The results of this study showed that 26.9% of the sample population was lactating and 73.1% was pregnant. Most of the women (98%) reside in townships and 79.3% is unemployed. According to the BMI cut-off point of 25, the majority of the sample population is overweight or obese. The top ten items most often consumed by pregnant women were, in descending order: fresh milk, tea, coffee, cold drink, maize meal, fruit juice, bread rolls, magou (non-alcoholic fermented maize drink), rice and sugar. Lactating women: fresh milk, tea, coffee, maize meal, cold drinks, magou (non-alcoholic fermented maize drink), bread rolls, yoghurt, rice and sugar.
Conclusion: The diets of the subjects consisted of very low iron contained foods. Most of the subjects have been overweight before, during and after pregnancy.
Recommendations: Iron deficiency is widespread among females of reproductive age. It is partly induced by plant-based diets containing low levels of poorly bio-available iron. The most effective technological approaches to combat iron deficiency include food fortification and dietary strategies.

1 Introduction

Iron deficiency, malnutrition and genetic factors can also contribute to anaemia, and it is thus difficult to estimate the percentage of anaemia in a particular population that can be attributed to malaria. Anaemia is undoubtedly a major health problem in children and pregnant women in areas of tropical Africa where malaria is a problem (Gillespie and Johnston, 1998:6).

Anaemia is a major cause of postpartum maternal mortality and the anaemic pregnant woman is at greater risk of death during the perinatal period. A recent review of 21 studies in Africa and Asia concluded that a reasonable estimate of the risk of maternal mortality attributable to anaemia is 20,0% in Africa and 22,6% in Asia (Gillespie and Allen, 1994: 15).

Dietary assessment is an aid in the interpretation of anthropometric, clinical, and laboratory findings that provide a foundation for dietary counselling. Dietary assessment is also an important aspect of surveys of nutritional status of population groups. Different methods are used to obtain food consumption patterns at individual level, for example, weighed record,

estimated record, 24-Hour recall, food diary (FD), quantitative food frequency questionnaire (QFFQ), and diet history (Katzenellenbogen et al., 1999:251).

The aim of the study was to determine the nutritional intake and socio-economic indices by means of biochemical, anthropometric (weight/height status) and to describe the related demographic background of pregnant and lactating women in the Vaal Triangle. The research site "Vaal Triangle" was chosen because of it's structural conditions: The Vaal Triangle, around 80 km south of Johannesburg and is a semi-industrial, low income area consisting of formal and informal settlements. Therefore this region was chosen for research.

2 Subjects and methods

The sample population consisted of 431 females, living in the Vaal Triangle, of these 431 women 116 were lactating and 315 were pregnant, aged between 16 and 35 years. Random sampling was done where a full list clinics in different towns was drawn up. A sample of the various clinics in the different towns was drawn at random and all pregnant and lactating women visiting these clinics were included on a list. Stratified random sampling was then used because it was necessary to have a full list of individuals in each stratum and also to determine the demographic profile such as age groups, geographical areas and social class categories.

The inclusion criteria for participation in the project were the following: females, age between 16 and 35 years old, pregnant and/or lactating with monthly income less than R3000 per household (1$ = R8.01). All the subjects were eligible to participate in the study if these criteria were met.
A total of 19 different antenatal and post-natal clinics were used in this project. The survey was conducted between November 1999 and April 2000. The sample consisted of 30 randomly selected pregnant and lactating females between 16 and 35 years old from the sample (n=431) used for the determination of food consumption patterns.
Power calculations are necessary to determine the likeness to detect an effect for a given sample size, effect size and level of significance (Florey, 1993:1882). For this study the power calculation was calculated for Hb:

$$Hb = 10.49 \times \frac{3.18^2}{2^2}$$
$$= 10.49 \times \frac{10.11}{4}$$
$$= 26.52$$

Based on the power calculation it was decided to use 30 subjects for the study.

It was advised by the various clinic sisters that a sample size of 30 should be used. This is due to the fact that most pregnant and lactating women are anaemic or iron deficient and if too much blood is drawn this could in fact affect the mother and the baby. The sample size of blood specimens was therefore chosen according to the availability of pregnant and lactating women who were willing to have their blood drawn.

A consent form was drawn up for the drawing of blood and was approved by the ethics committee from the Vaal Triangle Technikon. The consent form drawn up included

information explaining the purpose of the study as well as the procedures to be followed during the study.
All the clinics were given copies of the form because the clinic sisters performed the actual drawing of the blood. Thirty blood samples were drawn for the determination of heamoglobin (Hb), hematocrit (HCT), Red blood cells (RBC), Mean cell volume (MCV), iron, ferritin (FER) and transferrin (TRF).

All the fieldworkers chosen for this study were Sotho speaking and were given extensive training and detailed instructions on the administering of the QFFQ's and demographic questionnaires, the use of food models, anthropometric measurements and the food diaries.

The demographic questionnaire included questions on age, race group, present employment, breadwinner in the family, geographical area and if lactating the age of the baby. A validated QFFQ was used as a test measure in this study to obtain qualitative, descriptive information about usual food consumption patterns, specifically those containing iron and dietary intake. The QFFQ's were distributed, completed and collected by field workers. Food models were used simultaneously to determine portion sizes and to explain and describe the food items to the subjects.

Validity of the QFFQ was tested by the food diaries for this study. The reliability of the questionnaires was tested twice by 10% of the sample population in this study and the answers were compared to each other. The food diaries were used as reference measure for the QFFQ and completed simultaneously with the QFFQ.

Laboratory assessment is important as it provides information on the nutritional status of the hematologist. The subjects were required to fast overnight (12 hours). Venous blood samples were collected by the nursing sisters using a 21-gauge scalp vein infusion set. All the blood samples were drawn with minimal stasis between 07h00 and 10h00 to avoid affects of diurnal variation.

All the samples were collected and analysed by a hematologist under controlled, standardised conditions. The assessment of the iron status of the sample population was important in order to determine whether the sample population was iron deficient or anaemic. The assessment was also important to determine the association between the nutrient intake and iron status of the pregnant and lactating women in the Vaal Triangle. The Hb levels were determined using venous blood, anticoagulated with EDTA.

At the clinics the fieldworkers recorded the subjects' anthropometric measurements namely weight, height and weight-for-height and compared it against the weight-for-height tables to determine over-and underweight. All the subjects were weighed in light clothes without shoes on a portable electronic scale. Height was measured with an upright stadiometer placed against a perpendicular wall. Two measurements were made and might not by more than 0.5kg (weight) or 0.5cm (height).

The dietary intake of the pregnant and lactating women was determined by using the QFFQ's and the food diaries. The QFFQ's were sent out to determine the food consumption patterns of foods commonly consumed by pregnant and lactating women in the Vaal Triangle. The food diaries included a list of foods with a very high iron content in order to determine if the pregnant and lactating women were consuming foods containing iron.

The iron status was also determined by taking blood samples of the target population.
The results from the QFFQ was compared to the food diaries and the results from the blood samples were then compared to the two questionnaires. This then determined the iron status of the pregnant and lactating women.

Differences between the pregnant and lactating group for all variables were compared using the Levene's two-tailed test for equality of variances. Differences were considered to be significant if $p < =0.05$. Chi-Square and Fisher's exact test (two-tail) correlation coefficients were used to test for associations between iron, BMI and macronutrients. Correlation was considered to be present if $r \geq 0$ with significance level $p \leq 0.05$. Table 1 summarises the different statistical methods used.

Table 1 Statistical methods

Variable	Statistical Methods
QFFQ	**Dietary Manager ® software programme with the SA food composition tables**
Demographic questionnaires	SPSS for windows version 8.0 programme. MS Excel 97
Anthropometry	SPSS for windows version 8.0 programme. Hypothesis test (1tail T test)
Food Diary	MS Excel 97 SPSS for windows version 8.0 programme.
Iron status	SPSS for windows version 8.0 programme. MS Excel 97 Fisher exact (two-tail) test

3 Results

The results were presented for three trimesters of pregnancy. The results of this study showed that 26.9% lactating- and 73.1 % pregnant women participated in the study.

According to tables 2 and 3 most of the women were Black and between the ages of 21 and 30 years old. 98% of the women reside in townships and 79.3% are unemployed. The majority of the lactating women (61%) and pregnant women (52%) have a monthly income between R0-R500 (1$ = R8.01) per month. 57.5%of the lactating women have babies aged between 0-3 months.

Table 2 Demographic data of pregnant women

Demographic Variable	N	%
Structure of age	**315**	**100**
16-20 years	54	17.2
21-25 years	114	36.0
26-30 years	89	28.3
31-35 years	53	16.9
36+ years	5	1.6
Race Group	**315**	**100**
Black	302	95.8
Coloured	5	1.6
Indian	8	2.6
Present Employment	**315**	**100**
Yes	76	24.2
No	239	75.8
Sole Provider	**315**	**100**
Yes	46	14.7
No	269	85.3
Geographical Area	**315**	**100**
Vereeniging	147	46.8
Meyerton	5	1.3
Vanderbijlpark	163	51.9
Salary Bracket	**315**	**100**
R0 -R500	165	52.4
R501 -R1000	71	22.4
R1001-R3000	61	19.4
R3001-R5000	17	5.3
R5001 +	1	.6
Pregnant Months	**315**	**100**
1	3	1.0
2	10	3.2
3	30	9.4
4	32	10.0
5	47	14.8
6	52	16.5
7	49	15.5
8	61	19.7
9	31	10.0

Table 3 Demographic data of lactating women

Demographic Variable	N	%
Structure of age	**116**	**100**
16-20 years	14	12.4
21-25 years	33	28.3
26-30 years	38	32.7
31-35 years	29	24.8
36+ years	2	1.8
Race Group	**116**	**100**
Black	114	98.3
Indian	2	1.7
Present Employment	**116**	**100**
Yes	20	17.2
No	96	82.8
Sole Provider	**116**	**100**
Yes	15	13.0
No	101	87.0
Geographical Area	**116**	**100**
Vereeniging	36	31.3
Meyerton	3	2.6
Vanderbijlpark	77	66.1
Salary Bracket	**116**	**100**
R0 -R500	71	61.4
R501 -R1000	10	8.8
R1001-R3000	27	22.8
R3001-R5000	6	5.3
R5001 +	2	1.8
Age of baby in months	**116**	**100**
0-3	67	57.5
4-6	31	26.5
7-12	15	13.3
13+	3	2.7

The mean intake of all QFFQ's, per subject was to represent the consumption patterns and nutritional intake. Dietary Manager ® programme with the South African food composition tables (1991) as part of the calculations was used to determine the food consumed by the sample population. The frequency of consumption of food was examined and the standard deviations were also determined as shown in tables 4 and 5.

The diets of the subjects consisted of very few plant foods and animal foods were scarce except for milk. Most of the items consumed were low in iron.

Table 4 Top 20 foods and beverages consumed by pregnant women

Number	Food Item	Quantity per women per Day
1	Milk, whole fresh	695ml
2	Tea, brewed	238ml
3	Coffee, brewed instant	139ml
4	Cold drink, squash	169ml
5	Maize meal	478g
6	Cold drink, low-calories	208ml
7	Fruit juice, baby	133ml
8	Bread rolls, brown	209g
9	Mahewu/magou (non-alcoholic fermented maize drink)	87ml
10	Bread rolls, white	269g
11	Rice, white cooked	281g
12	Sugar, white granular	499g
13	Yoghurt, low fat fruit	128g
14	Fruit juice-dairy mix	94ml
15	Apple, raw with skin	252g
16	Chicken, roasted	289g
17	Custard, whole milk	243ml
18	Maltabella (wheat porridge), uncooked	181g
19	Beef, rump steak	227g
20	Banana, raw	236g

Table 5 Top 20 foods consumed by lactating women

Number	Food Item	Quantity per women per Day
1	Milk, whole fresh	237ml
2	Tea, brewed	83ml
3	Coffee, brewed instant	43ml
4	Maize meal	161g
5	Cold drink, low calories	68ml
6	Cold drink, squash	55ml
7	Mahewu/magou (non-alcoholic fermented maize drink)	48ml
8	Bread rolls, brown	80g
9	Bread rolls, white	103g
10	Yoghurt, low fat fruit	55g
11	Rice, white cooked	102g
12	Sugar,white granular	184g
13	Chicken, roasted	111g
14	Fruit juice, baby	25ml
15	Fruit juice-dairy mix	33ml
16	Apple, raw with skin	96g
17	Custard, whole milk	89ml
18	Maltabella (wheat porridge), uncooked	60g
19	Banana, raw	88g
20	Beef, rump steak	79g

Table 6 was conducted using the original values of iron, Fer, Trf, Hb, Hct, MCV and Rbc. According to the table 50% of the pregnant women and 83.33% of lactating women suffer from Iron deficiency anaemia (IDA).

Table 6 Interpretation of iron status from blood samples

Summary table of cut-off points.

	% Pregnant	% Lactating
Normal	4.17	16.6
Iron	0.00	0.00
Iron deficient	41.6	0.00
Iron deficient anaemia	50.0	83.3
Missing	4.17	0.00
Total	**100.0**	**100.0**

The Fisher exact test correlation coefficient was used to test for the association between iron, BMI and macronutrients.

According to table 7 there is a very big association between iron and the macronutrients especially for lactating women. The correlations for pregnant women were not as statistically significant as that of lactating women. The p value in a test is the smallest value for α for which the sample results become statistically significant.

Regarding the correlations between the BMI/weight there is no associations, for both pregnant and lactating women.

Table 7 Summary of the associations using the Fisher Exact Test. P = 0.05

Variable	Pregnant (Correlation R^2)	Lactating (Correlation R^2)
Energy vs Iron	0.4715	0.9862
Protein vs Iron	0.3291	0.9235
Carbohydrates vs Iron	0.4221	0.9064
Fat vs Iron	0.2884	0.9027
BMI vs Iron	0.0007	0.0199
BMI vs Energy	0.008	0.0226
BMI vs Protein	0.0014	0.0611
BMI vs Carbohydrates	0.0211	0.0025
BMI vs Fat	0.0028	0.0408

4 Discussion

In African societies, both rural and urban, the number of single mother households is increasing all the time. Rural women, deserted by their husbands are forced to go out and work. Although this is very much part of the African lifestyle, it often puts a greater strain on the poverty wrecked rural families and communities. According to the demographic data of this study most of the subjects were Black, residing in townships and their monthly earnings is between R0-R500 (1$ = R8.01).

Their way of living affects their food consumption patterns. According to the results shown in tables 3 and 4 it can be clearly seen that the food and beverage items most often consumed by the subjects contained very little iron. According to Barasi (1997:183), there are many factors influencing iron absorption and they include: other nutrient-certain nutrients enhance iron absorption. These include sugars, citric acid (vitamin C). The addition of a serving of a vitamin C rich food at every meal will significantly enhance the absorption of dietary iron. Factors enhancing absorption is: animal protein, human milk, acid medium, calcium, intrinsic factors and physiological state Daily intakes (mean ± SD) for pregnant women were 8425.71 ± 2279 kJ, 73.18 ± 23 g protein, 62.29 ± 23.7 g fat, 292.45 ± 72.2 g carbohydrate, 9.74 ± 3.8

mg iron and for lactating women 8511.94 ± 2047 kJ, 76.24 ± 25 g protein, 61.95 ± 22.3 g fat, 294.37 ± 64.2 g carbohydrate, 10.50 ± 4.0 mg iron.

The mean total iron intake (9.74 mg/day) for pregnant and (10.50 mg/day) lactating women fell below the RDA (18 mg/day) for pregnant women and (13 mg/day) for lactating women. The reason for the low intake maybe from the types of foods consumed since most of the subjects are from low income households and cannot afford the more expensive iron containing foods like meat, poultry, seafood and therefore cereal-based as these food items are cheaper and more filling.
The three most important factors that determine the amount of iron absorbed from the diet are the amount of iron ingested, its bio-availability and the iron status of the individual. Low dietary intake and the lack of iron supplements was the main reason for iron deficiency in the present study. Low bio-availability of the dietary iron was also a factor due the high intake of plant sources for example, maize meal porridge and bread, together with a low intake of heme iron sources such as meat, fish and chicken. The availability of iron from non-heme foods could also be decreased by the high intake of tea and coffee with meals. Ascorbic acid is considered the most potent enhancer of non-heme absorption. The effect of ascorbic acid on iron absorption is so pronounced that it has been recommended that each meal should contain at least 25 mg and even up to 50 mg of ascorbic acid. The more inhibitors present in a meal, the more ascorbic acid is necessary to achieve the same absorption increase (Kruger *et al.*,1994:135). In the present study the iron status for pregnant women were as follows: 4.17% normal, 41.67% iron deficient erytropoiesis and 50% IDA and for lactating women: 16.67% normal and 83.33% IDA.

According to the BMI cut-off point of 25, 79.12% of pregnant women and 80.39% of lactating women were found to be overweight or obese. In a study done in Kenya, Mexico and Egypt it was found that women who were heavier and fatter at conception had retained substantially less weight and fat at 2-4 weeks post partum, reflecting the lower weight gain of fatter women during pregnancy (Allen, 1994:72).

The prevalence of anaemia in the present study is 50% for pregnant women and 83.33% for lactating women. This compares unfavourably with studies done in other parts of SA. In a study done on Black pregnant women at Baragwanath Hospital (Johannesburg) the prevalence of anaemia (Hb<11g/dl) was found to be 20.5% and a study done on pregnant women at the antenatal clinic at Pelonomi hospital in Bloemfontein, the prevalence of anaemia was found to be 26.2%. Higher prevalences have been reported for pregnant women in sub-Saharan Africa (50%) and South Asia (64%) (Dannhauser *et al.*, 2000:39).

The reason for high prevalence in the present study is due to the fact that most of the subjects were from townships, unemployed and came from low-income households and therefore were not consuming items with high iron content.

5 Conclusion and recommendations

Dietary improvement by means of food fortification, food diversity and iron supplementation is essential. Fortification of suitable food vehicles with absorbable forms of iron is a highly desirable approach to controlling iron deficiency. If a fortifiable food exists and is consumed by many people at risk of iron deficiency, fortification is likely to be the most cost-effective

strategy. There are many possible strategies for iron fortification. One approach is to fortify staple food that is consumed in significant quantities by most of the population. Fortification of wheat flour with iron is technically relatively simple and this has been successfully implemented in several countries in South America, North America and Great Britain. Another approach is to fortify a widely consumed condiment, which could be afforded by women from low-income households.

Iron supplementation refers to the distribution of iron in medicinal form (tablets, liquid form or parenteral injection) and is often the only way to improve iron status. WHO considers pregnant women as a priority group for iron supplementation. The subjects in the present study did not take any iron supplements since they did not understand the need for it. Blanket supplementation need not be expensive, because preventative rather than therapeutic doses of supplementation can be used. Side effects of iron supplementation which is usually minor (constipation, diarrhea and nausea) will be less with lower iron doses and can be improved by counseling about the diet and supplement use. Motivation of the patient, explaining why and how the tablets should be taken, as well as reduction of side effects is some of the essential recommendations for iron supplementation programmes (Kruger *et al* 1994: 136).

No nutrition education was given at these clinics; therefore an intervention programme is recommended that combined iron supplementation with a nutrition education programme. The nutrition education programme should include proper dietary guidelines within a limited budget and ways to increase iron intake during pregnancy and lactation. Further research on iron supplementation and nutrition education programmes in this population of pregnant and lactating women is recommended.

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From food producing to food consuming household units: implications on household food security in rural Kwazulu-Natal

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1 Introduction

In many parts of Africa, farmers depend mainly on their own production for their food supply. It is expected that crops grown in one rainy season will yield the yearly supply of food (Liere et al., 1995). However, the ability of households to produce food assumes certain necessary pre-conditions such as availability of land, ownership of the means of production such as capital or credit, technology, extension services and inputs.

Today the diets of many African ethnic groups are primarily composed of modern refined foods that are readily available in urban area supermarkets and in food stores and trading posts in many peri-urban areas. Rural area inhabitants may not necessarily be well served by these food outlets but inevitably strive to consume these 'shop' foods. The mass production of high-technology foods has tended to overshadow the indigenous foods, which in many ways were more nutritious and locally available. There is even evidence to suggest that there has been a drastic narrowing of the food base in many traditional communities (Ogle and Grivetti, 1985). However when households move from purely food producing units to food consuming units, the assumption is that they have the necessary capacity to ensure food security.

1.1 Food Security

The World Bank (1986) has defined food security as "access by all people at all times to enough food for a healthy active lifestyle". This definition encompasses the notion of (i) quantity and quality (ii) accessibility to all and (iii) sustainability of the food supply. Particularly important is the ability of each individual to access food in order to achieve a healthy and active life.

South Africa can be described as a country that enjoys relatively high food self-sufficiency at the national level and does not fall in the category of countries classified by FAO as low income food deficit countries (LIFDC). However this national food security does not translate to household food security. A household is defined as food secure when it is capable of acquiring through product or purchase, food of quality that meets nutrient requirements of its members at all times (Gobotswang et al., 1996).

Most South African households still experience poverty, which manifests itself in food insecurity and ill health. Approximately 14 million South Africans are vulnerable to food insecurity. Nutritional status is used as an indicator for measuring household food security. Studies done so far have found that one in four children under the age of six years are stunted due to chronic malnutrition. In addition, one in three children have marginal vitamin A status, while one in five children is anemic (Steyn et al., 1998). Food insecurity and malnutrition are highest in provinces with large rural populations. It is also highest among the African population (Food Security Working Group, 1997).

The concern for household food security is due to the fact that the level of unit yields in subsistence agriculture has been declining. This has been attributed to the increased costs of inputs such as seeds, fertilizer and mechanical methods of working the land, a lack of motivation due to the small returns from the input of family labour, and an over dependence on non-agricultural earnings as a source of income (KOVVSA Report, 1989). A similar situation has been observed in India where shrinkage in the area under major food crops has become one cause of malnutrition. In addition, a decline in production and consumption of indigenous foods may also be to blame for the food insecurity especially in rural areas.

Rural development has been accepted as the key to the survival of sub-Saharan African countries dependent on rural production to provide food and exportable cash crops with which to earn foreign exchange, among other things. It was also generally viewed as a means to redress the economic imbalances, dependency and underdevelopment inherited from colonial governments (Musoke, 1990). In South Africa, 72% of poor people live in rural areas and 70% of rural people are poor (The Food Security Working Group, 1997). Rural development is therefore seen as an important step toward redressing the economic imbalances of the past apartheid era.

In the mid 1960s, rural development plans in developing countries focused on 'modernising' traditional agriculture and encouraged the use of high-yield seed varieties. These were expected to increase agricultural productivity and rural incomes (Musoke, 1990). In spite of these efforts, the increases in food production were short lived and in many cases, only those individuals with capital and access to labour could cope with the high cost of inputs. However, it is still believed that increasing food production, storage and trade can ensure food availability. There is therefore need to explore the opportunities and constraints in small holder farming with a view to identifying strategies that can be used to expand the rural food production base.

The purpose of this study was to examine existing patterns of food production and food consumption, with special emphasis on determining sources of food consumed and the extent to which households are food secure.
The main research questions were:

1) What food crops do people in the study area grow?
2) What methods are used to produce such foods and what are the constraints?
3) What foods are household members consuming and what is the source of such food?
4) To what extent do households depend on the food that they grow?
5) Are households food secure?
6) What is the socio-economic status of households in the study region?

2 Study site

The study was undertaken in two sites of KwaMzimela ward administered by Mthunzini District, in rural Kwazulu-Natal Province, situated in the North East Coastal Region of South Africa. KwaMzimela ward is divided into North and South regions. Each of the regions is further divided into sub wards and the study was carried out in two sub wards in the North region and 3 sub wards in the South region.. The criteria used to select the sub wards included accessibility for the research team, a representative sub ward where there was a transitional stage of development between agricultural and industrial activities and number of community activities. Community co-operation and willingness to participate in the study

were additional criteria considered. The preliminary data on which this paper is based was derived from the 2 sub wards (Oyemeni and Esiklebheni) in the North region of Kwamzimela ward.

3 Materials and Methods

The data for this study was collected in two stages. The first contact with the district was exploratory and utilized a participatory research approach, mainly facilitated through focus group discussions (FGDs). Two focus group meetings were held in two separate sub wards within the north region in Mtunzini District. Key informant interviews were also conducted to provide further understanding of the community and their problems. This methodology helped to identify the foods grown and consumed, resources of production and the constraints experienced.

The second part of the study involved administering an interview based on a structured questionnaire, to a purposive sample of 60 households in the North region. The same clusters used for the focus groups were used for the household survey. The questionnaire was used to identify household characteristics, to determine the range of foods consumed and the extent to which households were food secure. The following diagram illustrates the data collection process.

Phase 1: Qualitative

Ethical clearance (Involved presentations to tribal courts on purpose and benefits of study

↓

Key informant interviews (Agricultural extension officers)

↓ Analysis

Group discussion with field assistants who work closely with community (Purposive sampling)

↓ Analysis

2 Focus Group discussions in North Region- qualitative

↓ Analysis

Phase 2: Quantitative

Survey -using structured questionnaire

4 Results

4.1 Socio-economic characteristics of households

Fifty eight percent (58%) of households are headed by a male while 42 % are female headed. Close to fifty two percent (51.8%) of heads households never went to school, while another 27% did not complete primary school education. The average number of people per household is 9.8

Table 1 shows the work status of household heads. About 46% were said to be unemployed. Only 20 % are employed and of this proportion, 9% are in casual employment. Another 21% percent of household heads are pensioners. The community considers pension as an occupation because pensioners receive a government grant of R520 per month.

Table 1 Work status of the household head

STATUS	PERCENT (%) N=84
1. School/studying	4.3
2. Employed (includes casual employment)	20
3. Self employed	8.6
4. Unemployed	45.7
5. Pensioner	21.4

Household Income

The main sources of income for the households surveyed are pension and remittances or contributions from household members who are working. The average total household income in the area is R967. Food crops or animals did not feature prominently as sources of income.

4.2 Food Production Factors

4.2.1 Food Crops Grown and animals kept

According to the focus group discussions the main food crops are maize, beans, pumpkin, yams and sweet potatoes. These crops are grown in large fields, usually located away from the homestead but maize and sweet potatoes are also grown in fields around the homestead. A variety of vegetables are grown in community gardens especially in winter. The vegetables include cabbage, beetroot, carrots, spinach, onion, tomatoes and green pepper.

Animals are kept in both communities surveyed and the most common are cattle, goats and poultry. From the FGDs it was apparent that households grow only enough for home

consumption, while animals such as cattle and goats are kept for bride price and cultural rituals.
However goats were more easily converted to cash in times of need than were cattle. Cattle are sold when there is a major financial stress. Chicken is more easily converted to food or cash.

4.2.2 Land size and utilization
From the household survey, it was determined that the land on which most people grow food is too small. Thirty nine percent (39%) of households have less than 1 hectare and another 26% have an hectare of land. This is communal land under the tribal leadership and the chief allocates the land. 64% of respondents said that the land used is a community allocation.

However land already allocated to a given family in the past is considered as family land and it is passed on to family members through inheritance. Each family farms the fields and land on which the homestead is situated independently. The land allocated for community gardens is also under the tribal chief, and is considered as communal property. However, members of a community garden are each allocated individual plots. The crops grown in the individual plots are usually the same. A household can have fields situated away from home, a garden next to the homestead, and/or a small plot in a community garden. It should be noted that although the size of land is small, survey data revealed that 47% of households as represented by the respondents were only partially using the land, while 20% of respondents indicated that the land is not used at all.

4.2.3 Methods used in farming
Traditional methods of farming are still used in the fields. The hoe is a common cultivating tool although the ox and plough are used to prepare the land. The focus group participants in one sub ward (Esklebheni) indicated that they use cow dung manure and compost to improve the soil but compost was preferred because it is cheap and always available. In contrast, in the second sub ward (Oyemeni), the FGD participants said that they use fertilizers and manure is not common. The extensive method is used for keeping animals (cattle and goats) and they feed by grazing locally. The free-range method is used for rearing poultry.

4.2.4 Constraints to food production
FGDs in both sub wards identified the following constraints:

- Unavailability of an irrigation scheme for the community gardens. The water source currently used is shared for domestic consumption and for animals.
- Lack of clean water was expressed as a concern. The subsequent infections can compromise food intake.
- The lack of fencing around the fields used for such crops as maize and beans fields means that livestock destroys the crops since there is uncontrolled grazing.
- Vegetables are spoilt by pests such as worms and beetles and this ultimately affects the crop yield as well de motivates the community garden members from continuing. The members, (majority of whom are women) are not able to afford pesticides.
- Surplus produce could not be sold due to lack of local markets. Lack of transport also limited the sale of produce to distant markets
- Soil erosion was a problem caused by floods and drought conditions. The participants said they did not know methods of preventing soil erosion.
- For animal production, disease such as foot and mouth and Newcastle disease in chicken were expressed as limiting factors.

4.3 Food Consumption

In the focus group discussions the participants reported that the most commonly eaten foods are maize (prepared in different forms), beans and wild greens. Maize and beans were considered as security foods because they are not expensive and can be produced with ease. In addition, everyone in the family eats maize and it is also served to chickens and dogs. One participant commented:

> "You see, mealie meal...er... you cannot do without it because we eat it in many ways with different kinds of isishebo" (female, Esiklebheni).

'Isishebo' is a stew or curry prepared with meat or beans. Common vegetables include spinach and a variety of traditional wild greens (imifino) that include amaranthus, blackjack and pumpkin leaves. Groundnuts are fairly common and are often ground and mixed with the wild green vegetables.

The survey data on food consumed were grouped into 3 categories, namely, high use foods, medium use foods and low use foods. Table 2 gives a list of the foods in the various categories. Mealie meal (a product of maize) was rated as a high use food while beans, wild greens, and other vegetables were rated as medium use foods. This finding concurs with FGD information in terms of common foods. However the survey also revealed that tea, sugar, oil and milk are consumed daily while the vegetables are consumed less frequently but on a weekly basis. In addition, rice, and English potatoes were rated medium use foods. These food items provide an alternative to mealie meal in households that can afford.

Table 2 Food consumption patterns

FOOD ITEM	Bought or produced
A. High Use Foods (Eaten daily)	
Onions Mielie Meal Sugar Tea Milk Oil	All these food items are bought from the shops
B. Medium use foods (Eaten weekly)	
Tomatoes Cabbage Pumpkin Wild greens	} Some produced, but } mainly bought
Potatoes Rice Samp Dry beans Potatoes Chicken	} All Bought
C. Low use foods (Eaten monthly)	
Guavas (only in season)	Picked from the wild
*Mealie bread"	Bought
Spinach *Arrow root *(Amadumbe) *Sweet potatoes *Jugo beans	} Both bought and } produced
Mutton Beef	Bought Bought

*Note the low use of traditional foods, indicating a shift to 'modern' refined foods

4.4 Extent to which households depend on food produced and food security situation

The majority of households (77.9%) said that the maize harvest lasts for 1-3 months only. Most households (about 75%) expect to buy maize every year. When respondents were asked whether the household depends/relies more on the garden or the shops for staple food such as maize, the majority (71%) said that they rely on the shops for their food (see table 3). This finding is corroborated with findings from the food frequency table that revealed that of the foods that are highly consumed or medium use foods, the majority were bought from the shops.

Table 3 Main source of food

Source of Food	Percent
From shops	70.6
From both garden and shops	23.0
Mainly from garden	6.4

It was observed that even when maize is grown, the people do not grind it to maize meal themselves (although mealie meal is the most common staple food item), but prefer to buy the mealie meal from the shops. The FGD participants attributed the shift to the shops for food purchase to the lack of food processing equipment such as milling machines, the poor food preservation methods and the long cooking time of traditional foods. The FGD at Oyemeni indicated a greater shift to modern foods all bought from the shops while the group at Esiklebheni said that they still use traditional foods, which are locally produced. In this sub ward, the wider consumption of locally produced food was attributed to establishment of community gardens, which allowed households to have food throughout the year. In addition, they indicated that they have such grain processing equipment such as the stone and also the hand milling machine.

The home produced maize is eaten on the cob while still green, or cooked as whole grain when dry together with beans. It is evident from the table that traditional food items such as taro, sweet potatoes and jugo beans are only consumed on a monthly basis if at all, and this indicates a shift away from traditional foods to modern 'refined' foods such as potatoes and rice.

4.4.1 Are households food secure?

The fact that households depend on the market for food does not mean that the households do necessarily have adequate money to purchase it. Eighty three percent (83%) of respondents indicated that there are problems in obtaining food and fifty percent (50%) of respondents said that the main problem is not having enough money to buy food. Another 15% said that there is not enough food in the homestead. It should be noted that the mean income is 967 South African Rands and the households are fairly large with over 9 members. It is difficult to feed such a large number of people on less than R1000.

The study also found that there is a shopping facility within walking distance for 98% of households. However these shops do not meet all food needs. Most people have to travel to the next town (Empangeni) which is about 25 km away to buy major food items. Travelling 25 km under the existing road conditions could 2 take hours including waiting time. Households may therefore be food insecure due to

a) limited amounts of food produced
b) limited or no money to purchase food
c) Available shops too small to stock main food items or too expensive.
d) Distance and transportation costs to the next town

5 Conclusion

The preliminary findings from the study show that households have a low resource base. Although the gender dimension to resource allocation and control is still to be investigated, available data showed that 42% of households were female headed. Such households have been found to be at a higher risk for poverty and consequent food insecurity. The level of education was very low, with an estimated 52% of heads of households who have never gone to school. This means that such key household members are not functionally literate and can not access the same level of services as those with higher levels of education. More importantly, job opportunities are limited for such persons. Forty six percent (46%) of the same household heads were unemployed. It has also been shown that the mean household income per month was R967, against an average household size of 9.8 persons per household. This means that the food burden for households is heavy and especially given the limited amount of food produced at the household level.

Overall, fewer and fewer households grow the food they eat. The study revealed a growing trend towards consuming food available in the shops. However this may not necessary be coupled with the necessary capacity to buy adequate food. Therefore there is a high likelihood of households being food insecure in general and are at risk of nutrition security. There was also evidence of a definite shift away from traditional foods such as sweet potatoes and amadumbe (taro), the traditional pulses and the dark green leafy vegetables to more refined foods such as the finely ground maize meal and rice, and cabbage as vegetable. This shift seems to discourage production of food at the household level.

The focus groups provided an insight into the food production problems experienced. Among them are the lack of water or appropriate technology for irrigation, drought conditions, poor soils, lack of fencing around the field crops, and poor pest management. In addition the lack of markets is a problem that discourages large-scale production of food. Most households only grow for home consumption.

The small land size, the land tenure system, as well as the poor utilisation of available land are limiting factors to food production and food security. There is also evidence of poor agricultural practices. However the limited amount of income also means that there is no money for agricultural inputs. On the whole the shift from food producing to food consuming households among resource poor communities is likely to contribute to more food insecure households and there is need for intervention programmes that will help to address the constraining factors. An improved extension service may the first necessary step to a successful intervention programme.

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Demographic profile, nutritional status and food consumption patterns of children two to five years old in the Vaal Triangle, Gauteng, South Africa

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Abstract

The main objective of this study was to determine nutritional status and food consumption patterns of children aged two to five years to gather information to plan intervention to address the malnutrition problem in the area. Trained fieldworkers visited 11 randomly selected day care centres and seven municipal clinics in the Vaal Triangle. The questionnaires were completed in an interview situation. Anthropometric measurements (n=183) included weight-for-age, weight-for-height and height-for-age.

The results showed that the majority of children stayed in urban townships (88,4%) with an average monthly household income of less than R1500 (55,9%). The majority of households had an average of two children (32%). Food most commonly consumed was tea, sugar and maize meal with animal protein 8th on the top 20 foods consumed list. With regard to anthropometric indices, 5 % were underweight (weight-for-age below –2SD from the reference NCHS median), 14 % were wasted (weight-for-height -2SD) and 39 % stunted (height-for-age -2SD).

Comparing income and the number of employed persons to the number of people in the household, little money is available for food. This can possibly be reflected by the prevalence of stunted children in the sample population, indicating a chronic rather than acute malnutrition problem. Comparing the top 20 foods consumed by children to the nutritional status it is clear that the food most consumed is of less nutritional value possibly causing the malnutrition.

1 Introduction

The first five years of a child's life are crucial to his/her psychological well being. In addition, correct nutrition in a sound socio-economic environment is the foundation of health and well being for the rest of a child's life (Rothwell, 1994: 22). In South Africa (SA) between 20 and 25% of pre-schoolers are stunted and, therefore, suffer from chronic under nutrition. The most vulnerable age is two years and there is substantial evidence that weaning practices are a major determination of under nutrition in this age group (Vorster et al., 1996:31).

The purpose of this study was determining the nutrient intake and nutritional status of children age two to five year old in the Vaal Triangle. The Vaal Triangle forms part of the Gauteng province as a strong manufacturing sector, and is situated approximately 70km south from Johannesburg.

South Africa occupies the southernmost part of the African continent. The surface area is 1 219 090km². Gauteng takes up 17 010km² of the surface area of the country. The rate of urbanisation is 97%. The population for Gauteng is estimated at 7,35 million. This area relies heavily on the Vaal Dam on the Vaal River, from whence water is piped across the province (Government Communication and Information system (GCIS, 1999:1).

According to the department of health countrywide 22,9% of children are stunted. Another 5,5% of children show other symptoms of malnutrition, such as abnormally low weight. The integrated Nutrition Programme (INP) aims to facilitate a co-ordinated intersectional approach to solving nutrition problems in South Africa. The community-based nutrition projects of the INP focus on household food security and food-based income generation for the country in general (GCIS, 1999:399). The Vaal Triangle as a unity has never been measured for its own nutritional problems focusing on the area as an industrial area with a lot of poverty and unemployment.

2 Methods

The study population consisted of 350 male and female children (n=350), aged two to five years old in the Vaal Triangle. The multistage sample was made up of four privately funded, seven Gauteng Provincial Administration (GPA) day care centres and seven municipal clinics.

The fieldworkers obtained dietary data from each child's mother or caregiver by means of a quantity food frequency questionnaire (QFFQ). Demographic information was obtained through a demographic questionnaire (n=183). Both the questionnaires were completed in an interview situation combined with weighing and measuring of the children (n=183). Due to time constraints and the length of the QFFQ's, only 41 QFFQ's could be completed in full.

3 Analysis

3.1 Questionnaires

The demographic questionnaire was sent to a statistician and analysed. Only validated questionnaires and standardised methods were used. Data was presented in terms of frequencies and percentages for the following categories:

- age;
- gender;
- number of children per household;
- household income;
- regional dimensions; and
- occupation of the breadwinner.

After completing the fieldwork, questionnaires were checked for completeness, accuracy and usability by the researcher. The QFFQ's were analysed by using a dietary software package called Dietary Manager® the data from the QFFQ's were captured and related in tables and graphs for interpretation. The statistical analysis was done by an independent statistical analyst to determine the adequacy of the nutrient intake and prevalence of deficiencies that could be concluded from the QFFQ's. The minimum, median and maximum intake of the children was analysed and compared to 100% of the RDA. From the data a top 20 list of foods

most often consumed was also drawn up. The association of nutrient intake and nutritional status was compared at <67% of the RDA.

3.2 Anthropometric measurements

The "road to health" chart (RtHC) of the Department of Health SA were used to make a statistical comparison of the anthropometric indicators. As recommended by the WHO, the nutritional status of the children in the survey was compared with an international reference population defined by the NCHS. Height and weight measurements were classified according to these percentiles, which are generally used as an intentional reference population. For this study age was calculated in months from the date of birth to the actual date that each child participated in the survey.

The anthropometric measurements was sent to a statistician and analysed and scatter plots was drawn on the RtHC. The measurements included the following; weight-for-height, weight-for-age and height-for-age indicated on the 5^{th}, 50^{th} and 95^{th} percentile of the NCHS median.

The association between the anthropometric indices and the nutrient intake of the children was analysed by a statistician.

The types of statistical analyses included the following tests:

- Two by two tables: This was used to compare the children with –2SD anthropometric status to children with >-2SD anthropometric status with each other with regards to the nutritional intake <67% of the RDA and >67% RDA.

- Analysis of variance (ANOVA): This was used to establish the correlation between the children <-2SD, -2SD≤-1SD and >-1SD and the nutrient intake. Probability was indicated as a figure smaller than 0,05 (p=0,05).

3.3 Demographic characteristics

Table 1: General information on the household

Parameter	N=183	%
Age distribution of the sample population		
24 – 35 months	50	27,1
36 – 47 months	45	24,5
48 – 60 months	88	48,4
Gender of the respondents		
Female	97	52,9
Male	86	47,1
Age distribution broken down into age groups		
Female: 24 – 35 months	20	21
36 – 47 months	23	23,5
48 – 60 months	54	55,6
Male: 24 – 35 months	30	34,7
36 – 47 months	21	25
48 – 60 months	35	40,3
Number of children per household		
One	51	28
Two	59	32
Three	37	20
Four	20	11
Five	5	3
Six	11	6
Geographical area of children in the study area		
Vanderbijlpark	91	49.6
Meyerton	25	13.7
Vereeniging	67	36.7
Geographic area of the households		
Township		88.4
Rural village		6.6
Farm		2.5
Informal settlement		2.5
Number of employed people per household		
Nil	39	21
One	88	48
Two	46	25
Three	5	3
Four	5	3
Income into the household N=140		
R0-R500	28	19.5
R500-R1000	30	21.2
R1000-R1500	21	15.3
R1500+	61	44.1

Table 1 is a summary of the demographic characteristics of the sample. Income, educational attainment of parents, and family size are significantly associated with the nutritional status of the pre-school child (Aguillon, 1978:10). The basic causes of malnutrition include number in the household, ethnicity, education levels of parents, occupation of parents, family income, housing characteristics, family food expenditure per month, eating away from home, and health services, safe water and sanitation (Caliendo et al., 1978:71).

Most of the children that partook in this study were resident in a town, township or city, which showed to be close to a lot of shopping complexes and shops. Therefore the availability of the food was not the problem but rather the availability of resources to acquire the food. Unemployment and large families could be the cause of in-availability of food. The low income of the families indicates that very little money is available for food. As poverty improves and income increases the families will probably have more money available for food and thus improve their eating habits and improve the nutritional status of the children if the correct foods are brought into the households, by buying the correct foods for optimal nutritional growth.

4 Nutritional status

According to a countrywide study in SA amongst children of one to nine years of age (Labadarios et al., 1999), at national level, stunting remains by far the most common nutritional disorder affecting nearly one out of five children. It was found that in Gauteng the prevalence of stunting was 20%.

4.1 Underweight (Low weight-for-age)

Table 2: Weight-for-age

Parameter	N=183	%
Standard deviation (SD)		
< -2	25	14
≥-2 ≤ 1	86	47
> 1 ≤ 3	53	29
> 2	15	8
No parameter	4	2

Acute underweight occurs when an acute shortage of food has been experienced and is indicated where the weight-for-age is lower than –2SD of NCHS median. In the Vaal Triangle 14% of the children was severely underweight. It was also indicated that 47% of the children fall in the risk area of malnutrition (≥ -2 ≤ 1). Only 29% of the children had a normal weight-for-age. These results indicate that a severe underweight problem exists in the Vaal Triangle.

The results in this study are similar when compared to the National food consumption survey results where it was found that in Gauteng 8% of children one to nine years of age sorted under the < -2SD group resulting in underweight (Labadarios, 1999:14).

4.2 Stunted (Low height-for-age)

Table 3: Height-for-age

Parameter	N=183	%
Standard deviation (SD)		
< -2	71	39
≥-2 ≤ 1	50	27
> 1 ≤ 2	42	23
> 2	16	9
No parameter	4	2

Thirty nine percent (39%) of the children was seriously stunted as shown in the height-for-age less than –2SD of the NCHS median. This indicates a chronic shortage of food experienced possibly because of the low-income level and unemployment. The percentage risk cases for stunting is 27% and only 23% of the children had a normal height. The WHO (1993:711) estimated that 43% of children under five years old in developing countries have a low-height-age.

Labadarios (1999:14) indicated that 20% of children one to nine years of age in Gauteng were stunted. Stunting is a serious problem in this population as the prevalence amongst the sample population is almost double that of the rest of Gauteng. The value of stunting as an indicator of nutritional status was questioned by Schaaf et al. 1992:3 in saying that children adapt to their nutrition environment by restriction their growth for optimal weight in relationship to height. A comparison done showed that undernutrition is still very common amongst pre-school-age children, resulting in small (stunted) rather than thin (wasted) children (de Onis, 1993:710).

4.3 Wasted (Low weight-for-height)

Table 4: Weight-for-height

Parameter	N=183	%
SD		
< -2	9	5
≥-2 ≤ 1	57	31
> 1 ≤ 2	51	28
> 2	46	25
No parameters	20	11

In this study 5% of the sample population had low weight-for-height that indicated wasting indicated at <-2SD from the NCHS median. Thirty one percent (31%) of the children are however at risk of being wasted. These results are similar to other studies completed in South Africa. Labadarios (1999:14) indicated that 2% of children one to nine years of age were wasted.

In terms of the NCHS standards a large portion of the children were stunted (39%), which is consistent with other studies done in South Africa, indicating chronic malnutrition. Fourteen percent of the children were underweight indicating acutely undernourished children. The availability of foods is as much a problem as the availability of nutrient dense foods, this is obvious when comparing the nutrient intake to the nutritional status of the children. Table 4 indicates that 85.3% of the children took in <67% for protein. 100% total fat, 85,5% total carbohydrates, 100% calcium and iron and 82% vitamin C.

5 Dietary intake

5.1 Energy and macro-nutrients

The mean reported energy intake of the children was lower than the RDA's for energy. The intake on average is less than half of the RDA for the specific age of the children. The great majority of the children consumed a diet deficient in energy and of poor nutrient density to meet their nutrient requirements. Sixty three percent (63%) of children two to five years old in the Vaal Triangle consumed less than two-thirds of the RDA in energy. Findings of the

National food consumption survey indicated that 49% of children one to three years of age and 54% of children four to six years of age in Gauteng consumed less than two-thirds of the RDA (Labadarios, 1999:15). In a meta-analysis of literature Vorster et al., (1996:10) reported that rural black children aged two to 5,9 years had relatively low energy intakes.

Table 5: The mean nutrient intake (N=41)

Nutrient	Minimum	Median (% RDA)	Maximum	RDA	< 67% of RDA (% children)
Energy (kJ)	2188.46	3619.8 (66.3 – 47.8)	11992.29	5460 – 7560 kJ	85.3
Total protein (g)	17.64	31.2 (195 – 130)	114.81	16 – 24	0
Plant protein (g)	4.95	9.9	37.8	-	
Animal protein (g)	12.12	21.2	77.01	-	
Total fat (g)	14.69	27.4 (46.4–38.6)	102.30	59 – 71	100
Cholesterol (mg)	45.35	103.17	388.74	-	
Total carbohydrate (g)	62.83	124.1 (68.2 – 51.7)	388.97	182 – 240	85.4
Fibre	2.54	5.1	19.23	-	
Calcium (mg)	63.79	350.2 (43.8)	943.63	800	100
Iron (mg)	1.76	4.2 (42)	16.67	10	100
Magnesium (mg)	55	116.6 (145.8 – 97.2)	433.53	80-120	7.3
Vit C (mg)	5.51	30.3	149.3	45	82.9
Vit A (µg RE)	74.02	712.8 (178.5 – 142.6)	1823.71	400-500	21.9

g = gram
mg = milligram
µg = microgram
µg RE = Retinol equivalents
RDA = Recommended daily Allowance
KJ = kilojoules
SD = Standard deviation

Reported intake of total protein by the children reached and even exceeded the RDA, other studies completed compared to this had the same outcome where not one of the groups had a problem in meeting their protein requirements (Vorster et al., 1996:10). When the intake of energy is low and intake of protein is high, the amino acids from dietary protein will be used as an energy source and not for protein synthesis and growth. Marasmus could then be seen as a bigger threat than Kwashiorkor in the Vaal Triangle as Marasmus could be associated with a high prevalence of stunting as retardation of growth and malnutrition is one of the clinical symptoms of Marasmus.

5.2 Vitamin A and Iron

Over a third of the world's population suffer from deficiencies of iron, vitamin A and iodine. The elimination of micronutrient deficiency has therefore been declared a global priority. In South Africa the deficiency of iron, vitamin A and iodine constitute a problem of major public health concern. There are certain areas in the country where cases of iodine deficiency disorders (IDD) are found. Anaemia and marginal vitamin A deficiency are widespread. In South Africa approximately 21,4% of pre-school children are anaemic and 33,3% of young children have a marginal vitamin A status. (Department of health, 1999:13).

In this study it was found that in 27% of the children the vitamin A intake is below the RDA. Vitamin A deficiency (VAD) is a major problem in over 75 countries. World-wide, VAD is though to contribute to over 1 million childhood deaths a year and to cause blindness in about half a million children. South Africa has a serious public health problem of VAD, the extend of the problem was defined in 1994 in a survey which found that 33 out of 100 children under the age of six years in South Africa had poor vitamin A status. Gauteng as a province has a 23,5% prevalence of VAD (Department of health, 1999:5).

The mean intake of iron observed in the present study was 4,2 mg per day that is less than 50% of the RDA. According to Vorster et al. (1996:19) the mean reported iron intake of children two to 5,9 years of age amongst the white population was 8 mg per day, the urban black population was 5.3mg, Coloured 8.8mg and rural black 13mg compared to the RDA of 10mg. Iron deficiency anaemia (IDA) is the most common nutritional disorder in the world; it lowers resistance to disease and weakens a child's learning ability and physical stamina.

Micronutrient deficiencies substantially affect the nutritional status, health and development of a significant percentage of the population and contribute to growth retardation, morbidity, mortality, brain damage and reduced cognitive and working capacities (Department of health 1999:5). No biochemical measurements were taken to determine the prevalence of vitamin A and iron in the sample population, but when the intake of these nutrients are considered, it may well be that anaemia and VAD may be prevalent.

The results in this study should cause concern about the diets of children one to two years of age attending day-care centres and municipal clinics in the Vaal Triangle. The two foods consumed in the largest amount are tea and milk, this could probably be ascribed to caregiver influences on the child and what they think is suitable. Maize meal is the third largest quantity of food consumed by the children. This reveals a diet low in nutrient density with items such as tea, bread and rice and only some dairy products is evident amongst these. The lack of vegetables and fruit is cause for concern as these appears low down on the top 20 foods consumed list as can be seen in table 2. The average intake per month was established and worked back to average per day. Apart from milk, protein rich foods appear low on the list for foods consumed. Red meat, except for beef sausage is not even on the top 20 list. It can be seen that most of the protein is supplied by dairy products.

Table 6: Most frequently consumed foods by mass. (n = 41)

Rank	Food	Average intake per day (g)
1	**Tea, brewed**	210 ml
2	Milk, fresh whole	68 ml
3	Yoghurt, low fat fruit	44
4	Maize meal	16
5	Bread, brown	15
6	Sugar, white	14
7	Maltabella	13
8	Chicken, cooked	12
9	Rice, white cooked	10
10	Potato, mashed	10
11	Bread, white	8
12	Apple	8
13	Macaroni / spaghetti	8
14	Banana, raw	7
15	Orange	7
16	Beef sausage	7
17	Spinach, cooked	7
18	Ice cream	6
19	Polony	6
20	Cheese, cheddar	5

6 Association between dietary intake and nutritional status

6.1 Carbohydrates

It can be concluded from the results of this study that a relative probability exists that children consuming < 67% of the RDA for carbohydrates, could be underweight, stunted or wasted. The results of this study confirm the results from other studies (Vorster et al., 1996:23) that carbohydrates are an essential nutrient in the diet of the pre-school child. The pre-schooler is energetic, active, and restless and has a high kilojoule need during this phase, children may seem to be perpetually hungry. The consumption of complex carbohydrates, bread and cereals, should be encouraged (Stanfield, 1997:148 and Greyvenstein, 1996:344).

Carbohydrates are the single most important source of food energy, comprising of 40%-80% of total food energy intake (SASA, 2000:4).

Comparing this study to a study by Bourne et al., 1994:696 amongst three to six year old children in the Cape Peninsula where they found that high percentages of children fell below the RDA for most nutrients with the exception of protein and folic acid, this study portrays similar results, their anthropometric indices showed that 27.6% were stunted, 7.7% were underweight and 7.9% were wasted, which could have been contributed to by the low intake of carbohydrates. With the RDA for total carbohydrates being 182-240g it is also reported by Steyn 2000:S10 that a study by the South African National Nutrition Survey Study (SANNSS) group children two to six year old took in less than the RDA for carbohydrates, their anthropometric indices indicated that 23% of the children were stunted and 9% underweight which could be contributed to by the low carbohydrate intake.

6.2 Kilojoule intake

The results in this study showed that children with an intake of <67% of the RDA for kilojoules had a higher probability of being stunted. Comparing the results of this study, it is consistent with the National Food Consumption Survey (NFCS) (Labadarios et al., 1999) where it was found that in Gauteng 49% of children one to three years of age and 54% of children aged four to six years of age took in < 67% of the RDA in energy. In this sample

population 85,3% of children two to five years of age took in <67% of the RDA in kilojoules. It was reported by Brown (1995:336) that in recent studies it was shown that the quality of the diet might be an important determinant of energy intake and growth. This creates a problem in certain countries as high-quality foods may not be accessible to those children with the greatest need, either because the foods are simply not available locally or the cost of these foods are to high.

6.3 Vitamin A intake

Comparing the results of this study to the NFCS it was found that in Gauteng 71% of children one to three years of age and 65% of children aged four to six years of age took in < 67% of the RDA in energy. In this sample population 21,9% of children <-2SD took in <67% of the RDA in vitamin A.

Results of the associations between the anthropometric indices and the dietary intake of the children showed that the intake of <67% of the RDA of kilojoule, carbohydrates and vitamin A can result in a low weight-for-age (underweight), height-for-age (stunted) and weight-for-height (wasted).

6.4 Other nutrients

It was also found that all the children in this study took in <67% of the RDA for fat, but it can be seen that as the children's nutritional status increases the fat intake also increased, indicating that the fat intake contributes towards the nutritional status of the children.

Although the protein intake of the children is > RDA for protein, it can still be seen that as the nutritional status of the children increased the protein intake also increased, indicating that protein plays a role in the nutritional status of the children.

It can be concluded that for the children in day care centres and municipal clinics in the Vaal Triangle calcium, iron and vitamin c intake did not meet the lowest range of the RDA's in their diets.

7 Conclusion

The pattern of the nutrient intake of children as obtained through this study indicates that at least one out of three children had a nutrient intake of approximately less than half of the recommended level for a number of important nutrients like calcium, iron, zinc, vitamin D, vitamin E, vitamin B6, vitamin B12 and vitamin C. Most of the children consumed a diet deficient in energy and of poor nutrient density to meet their micronutrient requirements. Comparing the top 20 foods consumed by children to the nutritional status it is clear that the food most consumed is of less nutritional value possibly causing the malnutrition.

Food is a commodity that has to be purchased and until the purchasing power of the poor increases, endemic malnutrition will remain a problem. There is therefore some urgency in arriving at a national consensus on strategies to combat high unemployment and low wages.

A lot of the children that took part in this study attended a day-care centre or crèche during the day where breakfast and/or lunch are served. Considering the results of this study it can be speculated that the children either does not get enough food to sustain them or that the food is of poor nutritional value. It is important that day-care centres should adhere to a diet planned

by a professional person to ensure that the children receive enough and the correct food to ensure optimal nutrition for the time spent at this facility and for their activity level.

Nutrition intervention in day-care centers as well as nutrition education at these facilities as well as municipal clinics will have to be planned and implemented.

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Pitfalls and possibilities of consumer-oriented product development of food

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Abstract

Successful product development requires a consumer-oriented approach. Therefore it is necessary to study consumers, their preferences and perception, and to translate the obtained information into product characteristics. This paper presents a model of food perception from a multi-disciplinary perspective, which is to be used for consumer-oriented product development. The model is elaborated for the consumers' wish for health-promoting food. In-dept interviews were conducted to gain insight in health perception related to product characteristics of consumers. Preliminary results show that variation and compensation are important attitudes when consumers try to attain a health-promoting diet. "Natural" and "fresh" were mentioned as health-promoting product characteristics. The proposed model seems a valuable instrument for consumer-oriented product development. Further research on its methodology and application is recommended.

Keywords
food choice behaviour, perception, health, multi-disciplinary

1 Introduction

During the last century important developments in the position of food in daily life of consumers[1] and producers took place. In former times consumers were self-sufficient, during the last century this changed into an industrialisation of the food production process. In the beginning of the 20th century there still was scarcity of food in the industrialised countries, while at the end of this century the amount of food was abundant. In times of scarcity the main focus of consumers is on getting enough nutrition, whereas farmers and producers try to maximise the amount of production. In such times new product development was mainly technology-driven. But nowadays fundamental changes in demographics, labour force participation, and income distribution, continue to dictate changes in the food system (Kinsey

[1] A consumer is the person who buys, prepares or eats the product. Consumption is defined as the use of a product (Peter and Olson, 1996). Food consumption refers to a behavioural act involving the acquisition of food.

and Senauer, 1996). Producers realise that the food supply chain has become a food demand chain driven by consumers' priorities. Thus, market orientation in the food industry will help to build a better competitive position for future (Grunert et al., 1996). Development of new food products is an essential part of it. Still many introductions fail, because they do not completely meet consumers' wishes. The solution seems to be consumer-oriented product development. The implementation of such a strategy requires the identification of consumers' wishes and the translation of these wishes in an effective and consistent way into product characteristics. Because of the general interest of society in a long and healthy life and the increasing sales of functional foods, in this study consumer-oriented product development is elaborated in a case in which health-promoting food properties are chosen as a decisive element. The aim is to structure the variables influencing consumer food perception and establish measuring techniques to support consumer-oriented product development.
The process of consumer-oriented product development is divided in different steps, of which the first three will be described and discussed in this paper.

1. Modelling the determinants of food choice behaviour and perception from a social psychological perspective.
2. Selecting the most relevant variables to operationalise.
3. Measuring consumers' perception of health in relation with food and product characteristics.
4. Testing a conceptual product.

1.1 Food choice behaviour and perception

The variables influencing food perception and food choice have to be determined before a translation from consumers' preferences into product characteristics can be made. Therefore, these variables are assessed and structured first. Food-related behaviour of consumers is studied by various social sciences, such as anthropology, economics, marketing, psychology and sociology. Food production, in its turn, is researched by technological disciplines, for instance, agriculture, plant breeding and food technology. Successful consumer-oriented product development requires the integration of knowledge and expertise of all these different research fields.

Axelson and Brinberg (1989) define food-related behaviour as what people do; that is, people's actions towards food. They distinguish four elements: choice, purchase, consumption, and nutrient intake. These four behaviours may be seen as a set of sequential steps that people perform to maintain or enhance their well-being (Axelson and Brinberg, 1989). People start by making a choice among food products, then making a purchase, and then consuming the food. Consumption of food results in nutrient intake, which is an outcome of behaviour. Each step is connected to, but not determined solely by, the previous step.

Shepherd and Sparks (1994) gave an overview of models about the factors influencing food choice. They conclude that in general the large number of variables can be divided into those related to the food, to the person making the choice and to the external environment. In ethnology dinner is used as a representation of the complex term food. In his structural vision of dinner, Tolksdorf (1975) distinguishes two parts, the meal and the situation. Since the situation is very important to product development, this variable is added to the model of Shepherd and Sparks (1994), and denominated by the term 'context' (see Figure 1).

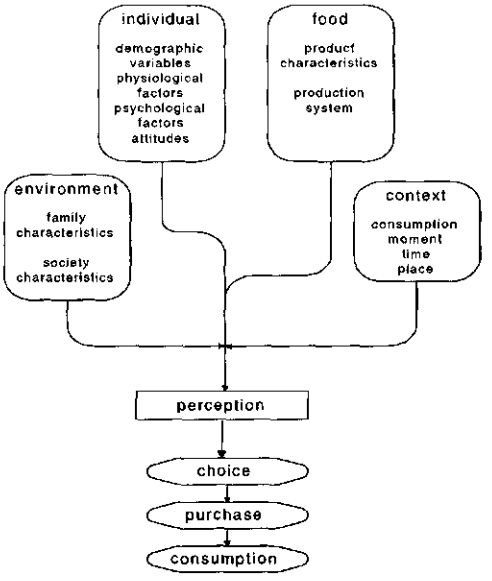

Figure 1. Food perception model; (based on Shepherd and Sparks, (1994), Axelson & Brinberg (1989) and Tolksdorf (1975).

1.1.1. Four types of perception

Step one, the choice of food, is influenced by perception, the ideas that people have about food products. The process of food perception always consists of an actor, the consumer or purchaser, and an object, the food product, which are inextricably related to each other. So the first step in understanding why consumers choose certain products, is the analysis of their perception of the characteristics of these products.

In the food perception model as presented in Figure 1, the link between the determinants of food and consumer-related variables on one side and the consumer behaviour on the other side is made by perception. Perception is an important element in this study. Because of its importance in the process of food choice and therefore as a starting point for product development. Insight is needed in what people think and belief about food-related items. The actual behaviour of consumers towards a product starts to be important when a conceptual product has become available. Since perception is such an essential element in the model, four types of perception will be described based on Antonides and Van Raaij (1996).

Completing perception; people are inclined to complete their observations. If a product is good on three product attributes, consumers tend to assume that the product will be good on a fourth attribute as well. A consequence of this attitude could be that if a product has one characteristic related to health, consumers assume that it is a healthy product. An important question for product development is on which level consumers complete their observation? Is it only based on ingredient level or on price, taste and health or, for example, more generally related to biologically grown and produced under animal friendly conditions?

Selective perception implies that people observe certain aspects of reality and do not note other aspects. For example, if consumers get an overload of information about healthy food, they might continue to drink coffee for it's good taste although they are aware that this is unhealthy. Especially for health-related topics this is an interesting aspect of perception, because in a next phase of this study is tried to establish what people observe if they look for healthy food.

3 Results

Variation is seen as the basis of a health-promoting diet, and the respondents to the interviews mentioned compensation as a way to reach this. This means that when consumers talk about food related to health, they consider their diet in general. So the consumption of a specific product or meal is always put into the context of the diet, and this observation is in accordance with Armistad (1998). The way in which the respondents compensate for the intake of, for instance, fatty or calorie-rich food is different from person to person. One ate more vegetables the next time, another less fat. One related it to the next consumption moment and another one to the dinner of the next day. Although people do not always eat health-promoting products, they still consider their diet in general as health-promoting.
When questioning into more detail and getting closer to specific product characteristics, respondents mention fresh, natural as health-promoting product attributes and absence of fat and presence of vitamins as health-promoting product ingredients. But still these attributes are very general. Therefore the next questions were related to specific product groups; vegetables, meat and dessert, to come closer to product characteristics. For vegetables respondents mention fresh, appearance, crispy and land of origin as health-promoting product attributes. When describing meat respondents mention fresh, hygienic preparation, colour, and type of fat. Health-promoting product attributes of the dessert are presence of colourings, amount of sugar, amount of fat and calcium.
In the in-dept interviews the respondents discussed also aspects of the production system, like e.g. environmental friendly grown or the package of the product.
Asking respondents to compose a fictive dinner proved a good approach to help them to structure their thoughts about food and health-promoting products. But the respondents also mention that just because a Dutch dinner consists of the different components it is in general considered as health-promoting.
The ranking of products on the aspect of their healthiness give additional information about the motivations of respondents of health-promoting product characteristics. For example, ranking different types of meat gives additional information about the aspects respondents consider when talking about health-promoting attributes.
During the in-depth interviews the respondents mention those aspects which are based on their knowledge about food and its health-promoting characteristics. So in this exploratory research the cognitive aspects are worked out, whereas the affective aspects which are also of interest are not discussed yet.

4 Conclusions and recommendations

The application of the food perception model for consumer-oriented product development seems promising, but still some additional and essential steps have to be made to develop this approach into a fully-fledged tool for the food industry. Food perception is a complex activity integrated in people's daily life. Eating habits are part of culture, which means that there are many aspects related to food perception of which consumers are unaware. Tools are needed to make a well-balanced selection for operationalisation of the most relevant variables. Moreover, more accurate research methods are required to get insight in the unconscious and more emotional aspects influencing food choice. After these steps the food perception model for a consumer-oriented approach needs to be validated by the testing of a conceptual product. In this study we tried to gather product characteristics related to consumers' wishes for health-promoting food. The results are still on a general level. For product development more detailed attributes are needed. The intention is to achieve this goal in further research by

demarcating the research field with more concrete products. Besides that also different methods like group discussions and questionnaires will used to come closer to the product characteristics describing the product and the production system.
Finally, it is very important to start with the quantification of the food perception model. Structuring of food perception, experience with methodology development concerning perception measurement and concept testing will give important input to reach successful consumer-oriented product development.

5 Acknowledgements

This research project is financed by Foundation for Agri Chain Competence

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Future trends of food production and consumption

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Abstract

During the past few decades, the increased information about the relationships between nutrition and health has made people pay more attention to healthy eating. Another major change is the increased consumption of ready or partly ready meals, which can be explained by people's tendency to prefer easy cooking to save time. Not less important is progress in food processing technologies and logistics, which favours it. This article discusses the future developments of food habits in Finland. The views of different food chain actors about future food habits of were collected and analysed in a qualitative study setting. The results indicate that convenience, healthy foods, as well as ethically and ecologically produced foods were seen as increasingly important in the future. All actors agreed on the continuance of the convenience aspect in meal management. Manufacturers and wholesalers expressed stronger trust in the increase in the consumption of healthy foods than consumers did. On the other hand, consumers believed in the increase of ethically and ecologically produced food products more than manufacturers, wholesalers and retailers. In addition, retailers stated that the attitudes consumers express in the interviews, do not always come true in real choice situations.

1 Introduction

Consumers' food habits and food choices have been studied by various disciplines. Nutritional science's focus has been on the products people eat and the nutrients they get. In Finland, this research has long and strong traditions. Many studies indicate that during the 1980s-1990s Finnish people have reduced the intake of saturated fats and salt in their diets (e.g. Nutrition in Finland 2000, Helakorpi et al., 2000). This is, at least partly, due to the fact that Finnish manufacturers have put serious effort on developing low fat milk products and reducing salt contents of cheeses, sausages and breads. According to social scientists, the individualization and the relaxation of societal norms between 1970s and 1990s can be seen as major influential factors to changes in meal patterns, structure and composition of the meals as well as their contextual situations (e.g. Warde, 1997; Marshall 1995). Changes in meal patterns and food habits have had an influence on the meal management of households. Economic and marketing researches have paid attention to the increase in the use of highly processed foods and ready meals, so-called convenience foods. The concept "convenience" here is to be understood in a broad sense. Convenience food may be understood as snacks, chips or any fast food products. However, if convenience is related to meal management, when any product is processed so that its use in meal preparation requires less time and less effort than the use of non-processed product does, it may be regarded to have some element of convenience in it. A ready-prepared meal is highly convenient when compared to having to prepare the meal from fresh ingredients at home. (Gofton, 1995.) The increase in the consumption and the supply of convenience foods as well as of other highly processed foods shows a major change also in Finland (Varjonen, 2000; Ahlqvist and Pajunen, 2000).

It is predicted that the ready meal market will maintain growth in all Western countries. While the frozen food market is relatively mature in countries such as UK, France and Germany, significant growth rates are still being achieved in Italy and Spain. The chilled meals show the highest growth. E.g. in France of volume sales of chilled meals rose 70% between 1993 and 1997. (Hilliam, 1999.) In Finland, the tradition of using chilled foods is longer since it dates back to the 1970s. The assortment of the chilled and frozen meals remained fairly limited until the mid 1990s after which it rapidly expanded. The development is precipitated by hurried life-styles and by modern working patterns which demand more time and effort of women and men, thereby leaving them less time for family meals and meal preparation. The development also benefits the food industry and trade. Production of highly processed foods gives greater value added and yields more profits. (Varjonen, 2000.)

The aim of the study was to predict future eating habits and meal management in households in Finland. A broad perspective of a food system was used as starting point (Fine et al. 1996). A food system is a larger concept than a food chain. A food chain usually includes primary production, food manufacturing, wholesaling and retailing, and finally consuming and recycling. A food system includes also other factors, e.g. policy makers, economic and technical developments, and information related to food. In this study, the focus was on food chain actors, households and the mediators of food related information. The framework of the study is visualized in figure 1.

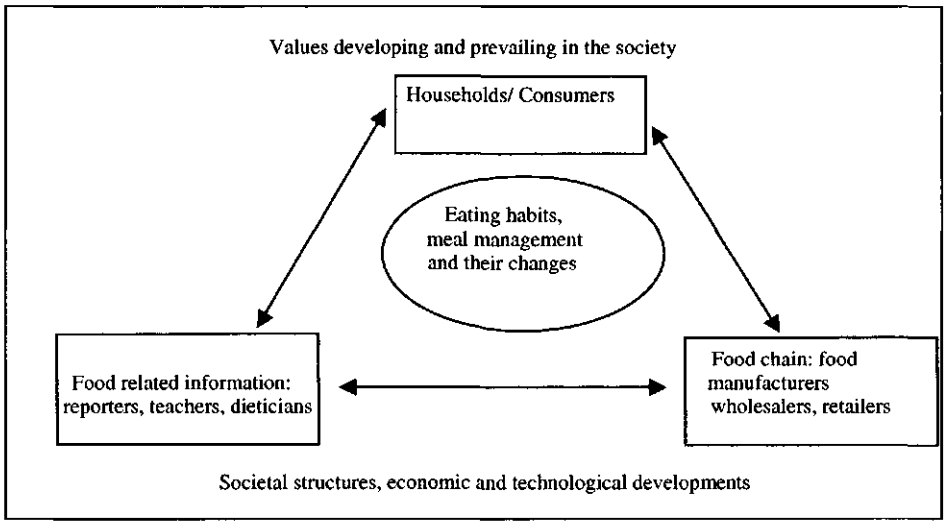

Figure 1. Actors that influence eating habits and meal management.

2 Method and data

In order to achieve rich data about the future trends, a qualitative research method was selected where the different parties to the food system could freely express up their ideas and visions of the future food trends. Data were gathered by individual interviews and focus group discussions. According to the framework people from various professional fields as well as laymen were interviewed. Food journalists, home economics teachers and dieticians representing the media and food education took part in focus group discussions. Other focus

group discussions were arranged for consumers of different age groups and life cycles. People responsible for product development of the biggest Finnish food manufacturers, as well as sales managers of wholesale and retailing companies were interviewed individually.[1] Altogether 39 persons participated in the study: twenty of them were consumers; ten came from the field of food related information, five persons from the food manufacturing and four from the trade. Number of interviews was considered sufficient as new issues did not come out in the last focus groups and interviews. Themes of the interviews were derived from the results of earlier studies (e.g. Varjonen, 2000; Land, 1998; Taylor, 1996). Themes dealt with future trends such as convenience in meal preparation, ethics and ecology of production, and healthy diets. Technological and economic development in society, food related information in the mass media, changes in lifestyle and values were discussed as influencing factors. All interviews took place during the winter and spring 2000, before the European food crises broke out in the autumn 2000.

3 Results

The opinions of interviewees were very similar on some trends independently of the part of food system participants represented, but on some other trends they had differing views.

3.1 Meal management

Convenience was a trend that all interviewees agreed with. It was believed to continue because the rhythm of everyday life is getting faster and faster. On weekdays there is no time for a family to cook a dinner, to sit down and eat together. At weekends it is more common to cook and eat meals together but even then convenience is regarded important. Ingredients that families buy for the meals are pre-prepared so that they only need to be combined and cooked. However, according to consumers, ready meals have an image as "just filling the stomach". They are expected to become tastier and more attractive in the future.

Preparing meals at home from the fresh ingredients or using partly or fully ready meals, ordering hot meals to home or eating out are becoming equally common in the future.[2] This is to say there will be more alternative ways of meal management available and used by households. Especially people living in cities agreed with this. Eating out will be more common than now. This is due to the habits young people have developed. As children they started to go to hamburger restaurants and later, as young, to pizzerias. As adults they are believed to go to more expensive restaurants. Elderly people will eat out more and more in day centres. Several kinds of "take away" –meals will prevail. But as the meal preparation at home becomes more rare, the emotional aspect of it will get more impetus. This will keep home cooking, and even growing vegetables for one's own use, "alive".

3.2 Food as a hobby

In Finland, the public discussion about food habits in the past has often had a negative tone in it, full of decisive restrictions and rules mixed with respect and guilt. Doctors and dieticians have told what should be eaten to keep fit and healthy. Mothers working full time outside home have often felt meal preparation a burdensome task. Today this is changing. School children are able to prepare their meals by themselves after the school by just heating them in the microwave oven. Meal preparation as a duty is being replaced by meal preparation as a hobby. One may cook when one has time and feels like it, together with friends, trying new flavours and recipes, etc. Those who can afford it, may go to nice restaurants, and travel to exotic countries to taste exotic cuisine. Food as a hobby provides new and interesting

experiences. The trend has emerged lately in the Finnish media and it was discussed in the study in focus group discussions among food reporters, home economics teachers and dieticians. Food as an expensive hobby involves only a very minor part of the population at the moment but it is expected to gain ground. Consumers of the focus groups talked about entertaining food programmes and competitions that have become very frequent and popular on the television. Television provides a less expensive way to get new experiences of food.

3.3 Healthy eating

Interviewed food manufacturers and wholesale managers had a strong confidence in healthy foods in general, and in functional foods especially. These are believed to possess value added for consumers, and therefore they are more favourable than conventional foods. For consumers healthy food was an ambiguous concept. When talking about healthy diet they brought up product qualities such as 'no allergenic substances', 'no additives or preservatives', 'no traces of pesticides or genetic manipulation'. Healthiness meant not only the nutritional contents but also safety for them. Consumers also felt that it is difficult to follow the guidelines for a wholesome diet because there are so many unwholesome products around just waiting to be bought and eaten. Dieticians considered that the use of ready meals and other kinds of convenience foods makes it more difficult for people to follow balanced and wholesome diets. People are used to choose the ingredients for their meals in a balanced way but when they choose ready meals or parts of the meals, it is not always easy to know what ingredients the dish contains. The situation is complicated by the fact that the product range of ready meals changes very fast. New products are brought to the market all the time and old products are drawn out. Consumers have to learn to find out the contents of new foodstuffs and try to relate this information to one's intended diet. Teaching consumers how to do this gives new challenges to the health educators.

According to dieticians and home economics teachers, the trend towards convenience food is contributing to the polarisation of food related knowledge and skills of the population. As some people pay keen attention to their diet and know a great deal about the nutritional contents of products and their origins, at the same time, more and more people, especially young ones, know less and care less about these things. They eat what is available at home and what they can accept as the variety of dishes they are used to eat is very limited. Easy snacking leads away from the regular meal times that are important for small children.

3.4 Ethical and ecological production

Consumers believed that ethics and sustainability will grow in importance in the future and more foodstuffs will be produced according to high and clearly stated ethical principles. This is because treating animals and nature in a sustainable way is worthwhile in itself. The development will get impetus from possible food crises. Nevertheless, consumers were hesitant to say how it is possible to distinguish the ethically produced foodstuffs from the less ethically produced ones in shops. Consumers believed that "organic food" is produced ethically and ecologically because the principles of production are jointly defined and controlled. Therefore the "organic" label is one kind of guarantee of high quality production. On the other hand consumers also trusted Finnish farmers who follow the conventional way of cultivation. They were trusted to follow the traditional, i.e. sustainable ways of cultivating land, to treat animals well and to follow official regulations of production. Therefore the products are seen as pure and safe for consumers. This opinion was shared by manufacturers and consumers as well as interviewees working with food related information. The fact that Finland had not experienced food crises such as mad cow disease or dioxin in meat products was said to be a proof for this.

Interviewees representing the food manufacturers and trade were more dubious about the development of organic foods production and consumption. They had doubts that people, after all, were not willing to pay higher prices for the products that have not been proved to be better than the products produced in the conventional way. In organic farming, the quality and quantity of the harvests are always more unstable than in conventional farming. Wholesale companies want to buy in large quantities and a producer must have a guarantee that there is enough harvest to sell. For the manufacturers making deals on organic products include bigger risks than making deals on conventional products.

Retailers' opinion was that, in general, organic foods do not sell as well as is believed and is portrayed in the media. People are not willing to pay higher prices because the conventionally produced food products are as good as the organic foodstuffs, with one exception, there is a continuous shortage of organic meat and meat products.

3.5 Role of information

Throughout the interviews the important role of information came out. As a small country Finland adopts international trends rather than creating its own. Manufacturers, wholesale traders and food journalists visit international food exhibitions and food fairs, read studies of consumer behaviour, and try to judge "what is in the air". At the moment convenience is seen to be a uniform trend all over the Western countries. But at the same time trends are splitting more and more. There are trends for vegetarians, those who prefer ethnic foods, organic foods, etc.

Consumers did not speak of international trends. They wanted more information about the foods they buy. The origin of the product was important for consumers. They wanted to know, above all, where and how the meats that they bought in the supermarkets or ate in the restaurants, were produced. The problem was that this information was not always available. Interviewed retailers' and wholesalers' opinion was that people want to buy groceries fast and they are not interested in reading a great deal of information in product packages or near the shop shelves. They claimed that those buying ready meals were not very much interested of the origin of the ingredients. However, the lack of knowledge may result in other expressions. For instance, consumers had suspicions towards the chilled meals or pre-baked rolls that kept well longer than they had before due to the technological processing developments. Consumers thought products keep well because of preservatives which they think contain "poisons".

4 Conclusions and discussion

The purpose of the study was to predict future food habits and meal management practices. The problem was studied by using a broad perspective of a food system as a starting point, and exploring opinions of different actors in the food chain.

The results show that it is possible to trace strong trends that are supported by several factors of the food system. All interviewees agreed on the importance of the convenience trend. One reason for this was seen to be the hurried urban lifestyle and individualism. The trend is also supported by technological developments in food manufacturing, in food keeping qualities and in logistics. Another interesting development related to meal management is a possibility to use of several alternative ways of managing meals. People eat out more often than before, and "take away" -food is a growing habit, especially sandwiches and pizzas, which is

relatively new phenomenon in Finland. One consequence of the ease of cooking is that meal preparation, when using fresh ingredients, is experienced more as a hobby than as a duty.

Healthy food was a trend supported by all interviewees. This was because people were seen to care more and more about their health. However, the opinions differed as to what in what kind of healthy food consumers like. Manufacturers and traders saw functional foods as a good and easy solution for consumers, who in their turn were more worried about the safety or purity of food. Another problem for them was how to avoid over-weight in affluent and tempting food markets.

Differing opinions were presented on the future of ethically and ecologically produced foods. Manufacturers' and traders' opinion was that it will not be as prominent a trend as consumers think. Ecologically or ethically produced foods have not, at least not yet, been proved to be healthier to the people. Therefore consumers were not believed to pay the required higher price for them.

Whether these trends are leading to sustainable economic developments and to the sustainability of nature is not evident. Convenience foods are often individually packed and therefore they require a great deal of packaging materials. Ready meals are energy consuming because they are first cooked, then chilled, perhaps frozen, and then transferred long distances and continuously kept in cold. On the other hand mass production is more effective in energy use than an individual household in its meal preparation. More research on the life cycle of foodstuffs would be needed to determine which way consumes more energy.

Commitment to sustainable growth and its importance has been a theme in the media for a long time. However, for Finnish consumers this has not resulted in many alternatives to choose between ethically-ecologically produced products and conventionally produced products. Economic effectiveness and technological productivity have been more important in determining production. Interviewees of the wholesale companies say that it is the responsibility of the wholesaler to check the ethics of the manufacturer. Consumers should not have to worry about it. Several food crises that have emerged in public have undermined the trust that wholesalers and manufacturers would like to maintain.

Meal management has traditionally made up a major part of households productive activities. Strong investments on ready meals by manufacturers and traders and households' high willingness to consume these products are going to change deeply the routines of everyday life of households in the future.

5 Endnotes

(1) Three of the interviewed persons represented the manufactures/stockholders selling the total share value of 76% from the fresh ready-prepared meals in Finland in the year 2000, 90% from frozen vegetables and 70% from processed fish products. One of the interviewed persons represented the biggest manufacturer of the frozen ready meals in Finland and one represented the third biggest manufacturer. The stockholders represented in the study made about 85% of the total retail value share of the fresh and frozen foods in Finland in the year 2000. (Source: A.C. Nielsen: Market trends 2001)

(2) Alternative ways of meal management with respect to convenience were discerned for the analysis in study: Varjonen 2000. The least convenient way was self-sufficient meal management, and the most convenient was eating out. Other five stages were distinguished between them:
1. Meals prepared from fresh ingredients cultivated at least partly by the household itself.

2 Meals prepared from fresh ingredients bought from the market.
3. Part of the meal bought ready prepared, e.g. French fries, cooked meat, ham, etc.
4. The whole meal bought ready prepared, e.g. pizza, frozen meals to be heated at home.
5. The whole meal brought home heated, e.g. home pizza delivery, home meal replacement foods.
6. Eating out at restaurants, cafeterias, schools, nurseries, etc.

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Part 3

Provision and use of care

The household production of care

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Abstract

As a consequence of social change, the household in European societies has become increasingly synonymous with family. The importance of traditional economically productive functions of the household in the spheres of agrarian production, cottage industry and home working declined. The household became the context for family life and its significance as a unit of consumption, rather than as a unit of production, became prominent. In this process, the role of the household in the production of care tended to be glossed over. Only recently, now that European societies are approaching the limits of the welfare state and care needs to increase because of population ageing, this role is getting more attention.

This presentation in the framework of the IFHE conference will focus on the household production of care. For the definition of care we will base ourselves on Joan Tronto's work, in which care is both attitude and practice. Because care is also practice, resources are needed to perform it. In actual care arrangements, not only households and families but also local communities, the state, and the market play a role. The composition of care arrangements according to the actors involved and their roles regarding the different aspects or phases of the care process, will differ according to the societal and cultural context. Hence, the analysis of care arrangements will benefit from a comparative perspective. A model picturing the actors and resource flows involved in care will be discussed. In the discussion the factor of gender will receive ample attention, because of the *gendered* nature of both care and the division of labour in the household. In view of the pace at which European societies are experiencing population ageing, elderly care will be taken as a case.

1 Introduction

In post-industrial Europe households are now primarily seen as units of consumption. The time that households engaged in economic production for own consumption or for the market or a combination of these, seems to lie far behind us. With the exception of family farms and occasional self-employment in the domestic sphere, economically speaking households consume rather than produce. This gradual shift in the economic functions of the family household has been documented by many scholars (e.g. Laslett, 1972). At the same time, the character of the family that formed the household changed as well. The family's mission became almost exclusively focused on reproduction - birth and upbringing of children - and nurturing. The family as we know it now in Western societies is described by Giddens (1997: 142) as follows. "This family is a group tied by close emotional bonds, enjoying a high degree of domestic privacy and preoccupied with the rearing of children. It is marked by the rise of *affective individualism*, the formation of marriage ties on the basis of personal selection, guided by sexual attraction or romantic love" (author's italics).

The processes just described yielded the image of the nuclear family household, of which the internal relationships are guided by emotional bonds and which is a unit of consumption

rather than one of production. This 'flat' image does not do justice to the productive functions of the modern nuclear family household and the work that is accomplished in it. It also glosses over the fact that household members are not only tied by affection and emotion, but also by moral obligations, material support mechanisms, and interdependency based on the division of labour in the household. Although at this conference the emphasis is on the consumer end of the chain, I will argue that for a proper discussion of the issue of care, we have to look into the productive functions of the household. Furthermore, the 'sentimental family' will have to make place for the family-based domestic group that exchanges more than sentiments.

Although the focus in this paper is a micro-focus, we will pay attention micro-macro linkages regarding the problem of care. Since we will define care not just as a disposition but also as practice, labour is involved in the provision of care. As Van Dongen has convincingly shown in his book (1993) the internal division of labour in the household is linked in various ways to the external division of labour in society. Hence, micro-level patterns are linked to and influenced by macro-level developments and structures. Households do not operate in isolation of the political, economic, and demographic context.

In this paper, we will first briefly discuss the issue of care and the welfare state. In this discussion we will pay specific attention to the problem of population ageing in European societies and its implications for care and the welfare state. Then I will return to the micro level of the household, discussing the provision of care at household level in relation to the concept of household. At the end of my paper the whole discussion will be summarised in a model that I would like to present to you.

2 Care and the welfare state

In Abram de Swaan's by now classical book "In Care of the State" (1988) the emergence of the welfare state in the United States and in a number of Western European countries is described. The central question of the study is: "How and why did people come to develop collective, nation-wide and compulsory arrangements to cope with deficiencies and adversities that appeared to affect them separately and to call for individual remedies?" (De Swaan, 1988: 2). The answer to this question lays in social processes, called 'unfolding' by De Swaan (1983), in which people gradually came to live in large, open, differentiated and single-stranded social networks instead of the closed, small, and multi-purpose networks of pre-industrial times. People came to be dependent for specific things on an increasing number of (unknown) others, instead of on a small number of (familiar) people for everything. De Swaan calls this process of collectivisation 'a generalisation of interdependency'. These processes gave birth to the welfare state as we know it now.

While the welfare state provides a framework for collective care, it can only function properly if it is held together by care among individuals and small groups. Care in the public sphere through collective arrangements by the state has to be supplemented by care in the private sphere, or the other way around - as some people will argue. Anyway, the one does not work without the other. In this relationship between what one might call the external and internal division of care labour - to paraphrase Van Dongen - gender is a key structuring factor. Women have always played an immensely important role in care labour in the private sphere. I will come back to this issue when I discuss the definition of care.

However, there are limitations to even the most perfect of welfare states. Two developments in particular gave rise to concerns about the sustainability of the welfare state and the appeal for a 'caring society'. The first one is the emancipation of women with the concomitant increasing labour force participation. Given the important role of women in care provision in the informal sphere, this implied a decreasing care potential in households and families. The second one is the demographic development of population ageing. Declining fertility in European countries, in the Netherlands occurring somewhat later than in neighbouring countries, combined with increasing life expectancy, led to increasing proportions of elderly in society and decreasing proportions of young people. In the Netherlands, for example, in 1920 the proportions of persons aged 0-14 years old and 65+ years old were 32.66 and 5.92 percent respectively. In 1990 these percentages were 18.21 and 12.80 (WRR, 1993: 19). It is estimated that by 2040 almost a quarter of the Dutch population (23 percent) will be 65 or older (CBS, 1999: 132). This shift in the dependency ratio has been summarised by Finch (1989) as follows. "Changes in the dependency ratio have expanded the need for younger generations to provide care to older people, but have also affected their capacity to do so." In an OECD publication it is noted that the needs of older people will have to be increasingly met by a greater reliance on the family, while the capacity of the family to do so is under threat from changing demographics (Twigg, 1996). And, we may add, the first development I identified, namely women's increasing participation in the labour market, decreased this capacity of the family even further.

3 Defining care

In this discussion our point of departure is Tronto's definition of care. It reads as follows. "[Care is] *a species activity that includes everything that we do to maintain, continue, and repair our 'world' so that we can live in it as well as possible. The world includes our bodies, our selves, and our environments, all of which we seek to interweave in a complex, life-sustaining web*" (Tronto, 1993: 103). In spite of the fact that this definition is very broad, in Tronto's view not all human activity is care. For an activity to be called care, both the activity and disposition of care have to be present. To state it simple: care is not only talking but also doing, and care is not only doing but also intending. I think this explicit description of care as both attitude and practice is crucial. Another important part of Tronto's theoretical framework is her view on care as a process consisting of four analytically interconnected phases:

1. *Caring about*: The recognition that care is necessary, the identification of the need for care, which can take place at any level. Caring about calls for attentiveness.
2. *Taking care of*: Assuming responsibility for the identified need and determining how to respond to it, which requires agency and responsibility.
3. *Care-giving*: Directly meeting the needs for care by physical work and face-to-face contact. The quality of care-giving is determined by the competence of the care-giver.
4. *Care-receiving*: Including this phase implies assessing the adequacy of care and calls for responsiveness on the part of the care receiver.

Four criteria for good care can be derived from this framework. Good care requires attentiveness in caring about, responsibility in taking care of, competence in care-giving and responsiveness in care-receiving. Tronto adds a fifth criterion, namely linking together the four phases into a well-integrated care process (Tronto, 1993: 107 ff).

The whole process is *gendered*. By this we mean that men and women play different roles in the care process and that society expects them to play different roles because of societal values and norms about behaviour of men and women. As we know from the literature and

from our own observations women are dominant in the third phase, that of care-giving. Why this is so and how this situation came about, is a discussion that I will not go into now. Men tend to be dominant in the second phase. They are the ones who usually 'take care of'. They will see to it that something is done. In a society where resources and assets are unequally distributed between the sexes, this is a pattern that can be expected. The first and the fourth phase of the process are least dependent upon gender. The gendered nature of the care process is not unchangeable and varies in time and place. However, the gendered division of labour in care is related to the gendered division of labour in society at large. Though this is changing, for example as a consequence of women's increasing participation in the labour market, it is a gradual change of which the eventual outcome is hard to predict. Hence, the roles men and women play in the care process will not change dramatically in the near future. One of my students is now doing a study for his master's degree about male care givers. He interviews men whose wives have a chronic disease and who have taken on the female care-giving role, while maintaining their job as well. He asks them about the problems they are experiencing and about how their friends, colleagues and employer respond to the situation. Regrettably I cannot yet present the outcomes of his study.

4 Care and the household

Now that I have sketched care in the context of the welfare state and have discussed the way I see the care process and the important role of gender in it, it is time to zoom in on the micro level of the household. An economic study speaks of households as 'care providers' (Gardiner, 1997). Indeed, they are. Within households people attend to the needs of the household members (phase 1), they take care of these needs in one way or another (phase 2), they give care to those who need it, like children, sick people, old people (phase 3), and they receive care (phase 4). Care-giving within the household is part of domestic labour. The latter can be defined as: "Those unpaid household activities which could be done by someone other than the person who actually carries them out or could be purchased if a market for those activities existed" (Gardiner, 1997: 11). Care-giving in the household is unpaid labour by household members carried out for the benefit of another household member.

We take it more or less for granted that households are care providers. However, the question might be asked why this is so. Why do people in a household carry out unpaid care labour for the benefit of somebody else in the household? The answer to this question lies in the fact that the household can be seen as a context of *condensed morality*, as I called it elsewhere (Pennartz and Niehof 1999: 206). This condensed morality derives basically from two features of the household[1]. The first one is its family base. Private households are based on marital and family ties. These are relationships with a normative content, which entail obligations (Finch, 1989). In family relations within the nuclear family contained in the household the normative content is built up over time through day-to-day social interaction. Therefore, these relationships remain strong even after the persons concerned (children) have left the household to form one of their own (Harris, 1990). The second feature of the household is what Cheal calls its 'moral economy'. According to Cheal, in a moral economy the actions of individuals are motivated by a desire to produce socially preferred (i.e. moral) relationships between them rather than by the rational pursuit of their self interests. The felt need to maintain enduring relationships of co-operation results in explicit ideologies of

[1] When I speak about household I mean the private family household and exclude the institutional household.

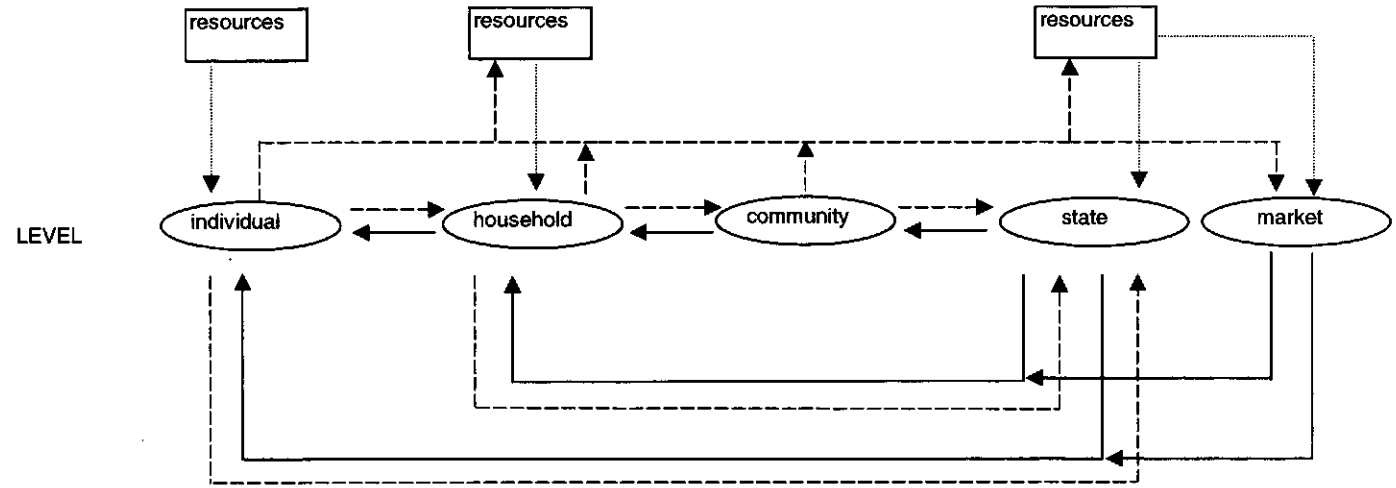
mutual support. Within a moral economy the rational individual will use all available means to maintain these relationships because they are a source of long-term economic security (Cheal, 1989: 14 ff). The moral economy is an economy of give-and-take that is extended over time. There are norms about reciprocity, but reciprocity rarely takes the form of direct exchange. Care is not immediately reciprocated, sometimes not all. Care-giving is motivated by norms and emotions rather than by expectations of immediate returns.

5 A model of care arrangements

For the reasons I discussed above, the household plays an important role in the provision of care. However, in European or Western countries the household is part and parcel of the welfare state. The state provides a social safety net, particularly with regard to the first two phases of care. It specifies categories of people whose care needs have to be attended to, and it 'takes care of' those needs through its laws, regulations, and social welfare departments. So, in actual care arrangements the state plays a part too, in addition to the care provided by households. In between the micro level of the household and the macro level of the state, care is provided at intermediate levels, such as the local community. Apart from being attentive to care needs (phase 1) and taking care of such needs (phase 2), community volunteers can also engage in actual care-giving. Care-giving and 'taking care of' can also be purchased at the market in the form of professional care-givers and insurance packages respectively.

On the following page a model of care arrangements is presented, in which the above-mentioned actors are included. The vision of care as practice underlies the scheme, because care as practice requires that resources are needed to carry out the care process. Actual care arrangements can then be described in terms of the actors involved, the resources mobilised, and the care practice that is delivered. In the model the different levels involved, from micro to macro level, are linked through resource flows and contributions. The model can be used for comparative purposes. When we compare countries or 'welfare regimes' (cf. Esping-Andersen, 1996), for example with regard to elderly care, we can focus on elderly care provided by the state, resources the state has at its disposal, and contributions from households and individuals that add to the resources of the state. Starting at macro level, we can then - as far as the data permit - look at the role of the other actors and compare care arrangements. Within countries, the household is the obvious unit of analysis. I will conclude this paper by looking at a study of elderly care, carried out in rural areas in The Netherlands.

MODEL OF CARE ARRANGEMENTS



6 A case study of elderly care in rural areas in The Netherlands

During the past few years, a study was carried out by a Wageningen researcher (cf. Luijkx, 2001). The study was part of a research project about *Household and Family Care for the Elderly in Ageing Societies*. The other study done within the framework of this project was carried out in rural Yogyakarta, Indonesia. The researcher who carried out the Dutch study, Katrien Luijkx, will defend her thesis on June 5th next. I will highlight some of her findings as an exercise in applying the model.

The research was carried out among 465 persons, men and women, aged 75 and older, still living at home, in 8 rural municipalities in The Netherlands. Tronto's theoretical framework was used for the analysis of the concept of care. Hence, the four phases of care were distinguished. As regards type of care a distinction was made between instrumental care and socio-emotional care. In this discussion, we will limit ourselves to the first. Regarding instrumental care, indicators were formulated for support for: heavy household labour, light household labour, personal care. The following actors were distinguished: the elderly respondent, members of his or her household, informal care givers not belonging to the household, professional care givers (either state-subsidised or state-provided or available at the market).

Depending on the degree of care or support provided and on the type of care giver four types of instrumental care arrangements could be distinguished:

- The independent instrumental care arrangement, in which all instrumental care needs are provided for within the own household (27.5 percent).
- The managing instrumental care arrangement with a social safety net, in which the care-giving work of the own household is supplemented by persons from the social network beyond the own household, notably the kinship network (18.0 percent).
- The managing instrumental care arrangement with a professional safety net, in which the care-giving work of the own household is supplemented by professionals (32.1 percent).
- The dependent cared-for instrumental care arrangement, in which almost all necessary care has to be provided for by persons outside the own household (22.4 percent).

(Luijkx, 2001: 105).

The four types of instrumental care arrangements can be plotted in the model. In the first type there is an exchange of resources, contributions and care provision within the household. The resources used for this arrangement, notably household labour, are confined to the household. In the second type, the managing care arrangement with a social safety, resources beyond the household, notably kinship relations, are used. For a sociologist this is the most interesting category. The research shows that elderly with a large (self-defined) social network of which more than half are children, tend to have this kind of arrangement as opposed to a managing care arrangement with a professional safety net (Luijkx, 2001: 217). The elderly with a social safety net have a larger network of potential care givers, and they use it too. In terms of the model, it means that external household resources are involved, particularly social resources (kinship network), and that the community or neighbourhood becomes an actor in the care process. The reliance on kin shows how important kinship relations beyond the own nuclear family, also in so-called modern, individualised societies, still are (cf. Niehof, 1997). It is also noteworthy that irrespective of the number of daughters these elderly had, in 55% of the cases the primary care giver was a daughter (Luijkx, 2001: 218). Also in this research the gendered nature of care-giving is visible. In the third category of managing elderly with a

professional safety net, there is exchange with the state and the market for professional support. As regards the state, the elderly derive their entitlements to these forms of support or care from earlier contributions to the state in the form of taxes and premiums. In the fourth category the elderly are to a large extent dependent on external care, in which all actors in the model play a part. The human and social resources to provide instrumental care that are confined within the household, are inadequate. When plotting the categories of instrumental care arrangements 1 to 4 in the model, there is a shift of location from the left to the right.

7 Conclusions

Although the study cited above yielded many more interesting findings, for which I refer to the thesis itself, the results presented here illustrated the following.

- When care is defined as practice, the resources used to provide it have to be made visible.
- For understanding care arrangements, the actors involved, their relative contribution in the care process, and resource flows and contributions, have to be assessed.

To conclude I would like to make the following three comments. In the first place, I would like to point to the fact that, defining care as we did, also in welfare states actual care arrangements involve several types of actors who play different roles in the care process. The state is important for identifying care needs of categories of people (phase 1) and taking care of these needs (phase 2). Within the household all four phases of the care process, e.g. not only phase 1 and 2 but also care giving (phase 3) and care receiving (phase 4), take place.

This brings me to my second comment. The household is the most important locus for care as practice. Households mobilise and use their resources for care. Countless women, and to a lesser extent men, provide care on a day-to-day basis and engage in unpaid care labour. These activities are the foundation of the welfare state and of society, without which these would fall apart. Because these activities are carried out in the private sphere and are not part of the political economy, they are less visible and undervalued (Tronto, 1993). For researchers in the fields of home economics, household sciences, family sociology, and the like, the challenge is to change this.

A last comment concerns the role of gender. Care-giving activities in the household are not only undervalued because they take place in the private sphere, but also because they are mostly carried out by women and are associated with what Tronto calls "women's morality" (Tronto, 1993). We have noted that, as a consequence of women's increasing participation in the labour market, the care potential in the household, much needed in an ageing society, may diminish. How the division of labour between the sexes with regard to paid labour, domestic labour and care labour will develop, is difficult to predict. The actual combinations will also differ according to societal traditions and structures (cf. Van Dongen et al., 2001). However, gender roles do not change easily. They are entrenched in the fabric of society. The resilience of gender roles is apparent from recent research results in the Netherlands. It appears that although there was a significant increase of women entering the labour market during the past two decades, the number of hours worked per women hardly increased. Dutch women are the champion part-time workers of Europe. According to recent surveys most of them are satisfied with this arrangement and would not like to work full time. They opt to spend time at home on family- and childcare (Esveldt and Henkens, 2001). The extent to which this is a free

choice or a consequence of the lesser returns they get from their paid labour compared to men (Van Dongen 1993), is an unresolved question.

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The division of "care" in an active welfare state

Comments on the paper of Anke Niehof (Department of Social Sciences, Wageningen University) "The household production of care"

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In this contribution we formulate some critical but constructive comments on the paper of Anke Niehof: The household production of care. Our comments concern the conceptual, empirical and normative approach in the paper of Anke Niehof to the general problem of the production of care within the western welfare states. To the extent that we do not agree with her ideas and approach, we formulate an alternative.
The comments are based on our conceptual, empirical and normative research during the past decade (Van Dongen, 1993; Van Dongen et al. (1995, 1998, 2001). More specifically, we refer to the recently published book: Professional life and family life. The combination model as a motor for an active welfare state? (Leuven, Garant).
The realisation of a better combination of professional, family and social life is one of the main challenges within the new project of the active welfare state, largely launched by the Belgian minister of Social Affairs Frank Vandenbroucke. The book presents the *complete combination model* as the most suitable normative model for the combination of professional life and family life of men and women, within families, companies, clubs and within society as a whole. The model is based on a general conceptual, empirical and normative approach with respect to the daily life of men and women. The Flemish/Belgian situation is used as a concrete illustration. The complete combination model is the basis for a coherent set of policy perspectives on a number of fields: fiscal and social security system, working time schedules and leaving arrangement, child care facilities and education, care facilities for elderly people, household services, mobility infrastructure and counselling instruments for companies and families.

The search for the "active welfare state" can be seen as a phase of the overall development from the traditional basic model of the twentieth century to a new basic model of society (figure 1). The basic models have a very long life span of about two centuries. During a long period two basic models co-exist, the old model going downward and loosing influence, the new one going upward and gaining influence. Each new basic model is partly a reaction against and a rejection of the previous model, but at the same time it is partly a continuation of the previous model, conserving a number of (positive) elements. With respect to the division of labour of men and women, the development from the traditional breadwinner's model in the period 1950-1990 to the modern combination model stands at the forefront.

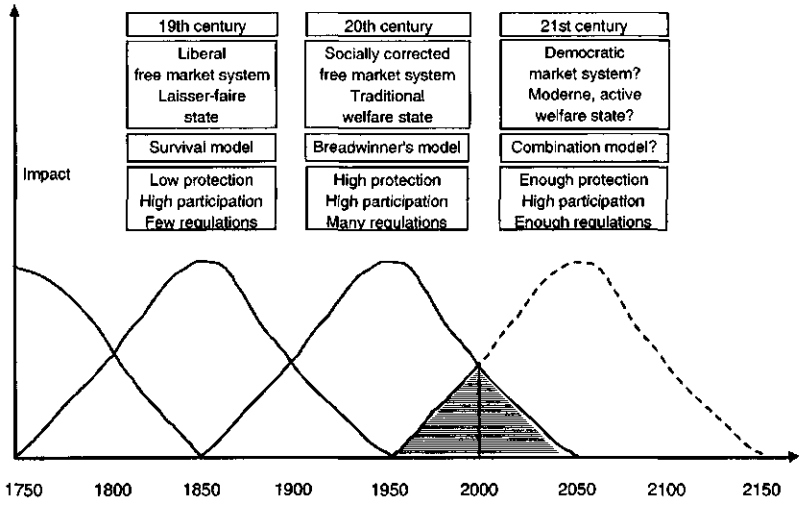

Figure 1: Three basic models of society and the division of labour

1 The division of time and means of men and women in the welfare state

The first element concerns the view on society and the place of families and households. Niehof rightly criticizes the traditional view, with households or families as the units of consumption and companies or firms as the units of production. Private companies were seen as (the core of) the market sector and, consequently, as the real productive system that creates the welfare. Family or households were regarded as units of consumptions, that functions according to other mechanisms, rules, principles. In that way one speaks of the family or household sector.

Although this traditional dual view has been criticized during the past decades, the basic idea still is embedded in all parts of society to a certain extent. In our scientific work, we consequently have argued that this dual view no longer offers a useful conceptual basis for the future.

Niehof says that the productive functions of the household should not be neglected. This is correct. But she is not so clear about the consequences for the conceptual view. Is the family an in-between entity combining consumptive and productive functions, whereas the company is a fully productive entity? In that case, the dualism remains, be it in a somewhat weaker version.

Although she refers to the integrated approach in Van Dongen (1993), it is not clear to what extent she also agrees with the conceptual view of it. In that approach, families are considered to be like all other kinds of organizations, based on one single general theoretical model covering all components of the complex societal system. They function according to the same mechanisms and with the same purpose as all other subjects, regardless of their concrete classification. In this system, the economic, social, cultural sectors are no longer identifiable (figure 2).

All activities of *all* subjects (individuals, families, companies, clubs, public organizations etc.) are seen as *productive* labour processes that are regulated by the general mechanism of demand and supply. Every activity is an input-output process, where the input elements are

transformed into a qualitatively different output, with a certain societal value, partly expressed in monetary and non-monetary terms. The elements of the input and output can be classified into four main categories: personal, social, material and financial means or capital. The basic idea is that each activity provides a certain output which in itself is an input for other activities. They are functionally integrated in a complex and dynamic feedback system.

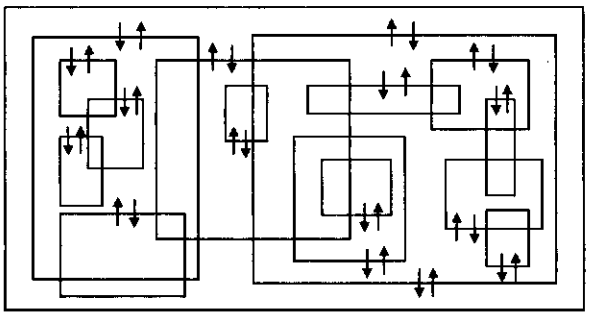

Figure 2: A new basic model for society

In the short run, all subjects try to obtain a certain surplus value, partly in money and partly not in money. Everyone can fail in the short term and hence suffer losses. The finality in the long term then is the capacity of subjects to adapt themselves to the circumstances and to re-orient themselves in the case of a loss.

Following that basic gradual distinction, all women and men are continuously searching for the adequate combination of the different activities or labour processes, in terms of the number of hours and other characteristics. During their live course, all men and women want to create a balanced and adaptive "portfolio" of activities which provides the desired combination of human, social, material and financial means. Practically, we distinguish a number of main categories: professional labour, social labour, family labour, external care or education, personal care and leisure time (figure 3). These categories are further subdivided into smaller activities.

All subjects, including individuals and families, have an *internal and an external division of labour*. The internal division of a subject is called the *labour organization*, the external division among subjects the *market system* or market functioning. This means that *all* subjects take part in the market system to a certain extent, as a complement to their labour organization. The family (member) for instance acquires the input for the labour and exchange process outside the family through the external market transactions. In the same way, the output of the internal division of labour provides the input of the labour and exchange processes with subjects outside the family.

A main component of the division of time is the combination of professional and family work. Each activity provides a certain output which in itself is input for other activities. Professional or paid labour mainly provides the monetary means, but also a number of largely non-monetary means, often personal and social means, that are necessary for the full development of each subject. The basic message therefore is that (almost) all adult men and women have to combine a professional task with the family task, in order to obtain and maintain the required level of wealth within their societal context.

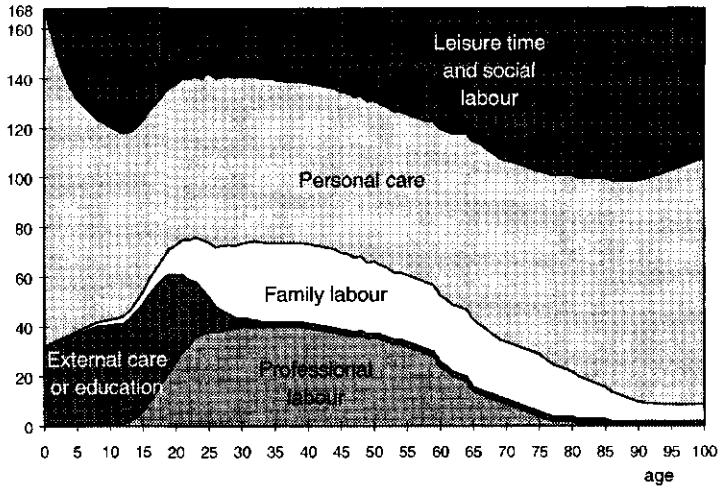

Figure 3: The individual division of time during the life course

The division of time within families is largely dependent on the family form at different stages of life: one person family, lone parent family, two partner family, married of not, with or without children, etc. Figure 4 illustrates the division of professional labour of a fictive woman with a rather complex family life.

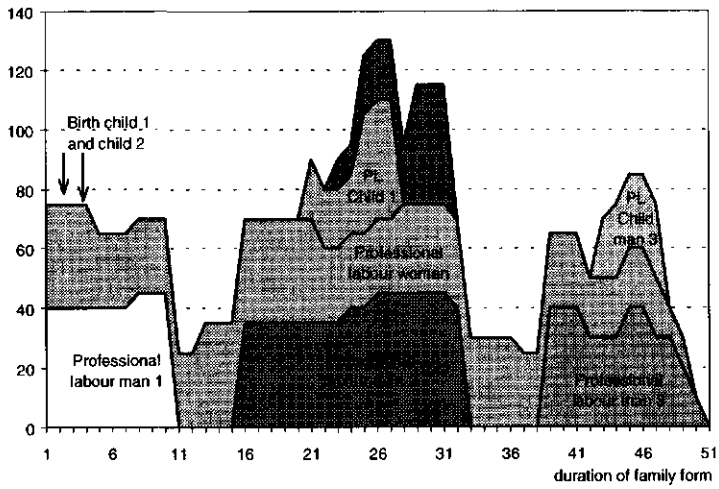

Figure 4: Division of paid labour of a fictive woman with a complex family life

2 Concept of "care" in society/the welfare state

A clear definition of care is only possible within a general approach to the daily life of division of time and means of men and women within families, clubs, companies etc. In that way, the division of care is always a part of the division of the main activities as shown in figure 3.

The main problem within an integrated approach is the concept of "care" itself. The broad definition of Tronto as given by Niehof and others (see f.i. Van Dongen et al., 2001, 39-43) implies that every activity can be seen as "care activity" to a certain extent. The criteria proposed by Tronto to distinguish between "care" and "no care" are not valid, because they count for all activities to a certain extent.
In the first place, we can make the analytical distinction between human and non-human or material care. *Human* care refers to all activities that aim at maintaining and developing the different aspects of the personal and social capital of individuals and organisations: cognitive and physical competences, emotions, affections, needs, values etc. *Material* care refers to all activities that aim at maintaining and developing the different aspects of their material capital: the house, durables, meals, clothing, garden, machines, environment etc. In practice, this distinction is gradual, because the input and output of every activity is a combination of human and material elements.
All these care activities actually (can) occur in the form of paid professional labour, unpaid or lowly paid social labour or unpaid family labour.
In this way, the broad concept "care" is synonymous with the broad concept "activity" or "labour process". The central question then is whether the concept "care" remains useful in a scientific approach.

Tronto (and I guess also Niehof) wants to keep "care" as a scientific concept by conceiving care "as a process consisting of four analytically interconnected phases": caring about, taking care of, care-giving and care-receiving. But again, as the definitions of these phases or aspects show, they can be distinguished in all activities. Every activity, after all, implies an identification of the need for a certain product or service (attentiveness). Every activity also assumes a certain responsibility and the determination of how to respond the need (agency and responsibility). Every activity implies a contact with another subject that needs a service and a certain level of competence to offer enough quality. Finally, every activity implies a receiver of the product or service offered and calls for the responsiveness of that receiver.

Above all, one cannot solve this theoretical problem or anomaly by using this aspects as criteria for "good care". By doing so, one confuses the basic conceptual and normative question. Even more, one tries to solve the conceptual question with the answer to the normative question.

Our conclusion is that the whole conceptual discussion about "care" is abundant because it offers no solutions to the conceptual question: what is care and how can we distinguish it from no care? Moreover, it offers no basis for the solution of the main societal question about the division and the quality of these activities. Seen from an integrated approach to daily life, there is no need for the conceptual distinction between "care and no care". Since all activities are important, i.e. they render a certain valuable output that is useful/necessary for the next activities, all men and women search for an adequate division of these activities. This forms the basis for the main normative societal questions:

- How can we realise a "better" combination of professional, social and family labour for all men and women, on the macro level and within families, companies, clubs etc.?
- How can we realise a "better" combination of personal, social, material and financial means for all men and women?
- How can we realise a "better" division of human and material activities among the paid professional, the unpaid or lowly paid social and the unpaid family labour?

These questions refer to the changing roles of the different actors with respect tot the division of activities and means within the three basic models of society (figure 1): conceptually, actually and normatively.

Therefore, it is necessary to start from a useful classification of activities, based on relevant characteristics, which offers the basis for a productive discussion and for adequate conceptual solutions. In this approach, "care" is no longer used as a scientific concept, but –as it was in the past- as an every day word for a number of activities, such as child care, medical care, care for the house, care for the environment etc.

3 Gender and the societal division of activities

The division of activities and means within society always shows a certain level of differentiation, segregation or inequality related to a number of basic characteristics such as age, gender, geographical, social and ethnical origin, abilities. The challenge is to correctly integrate these dimensions in the overall approach. In that way, one can easily say that the division of activities is gendered to a certain extent, in a gradual and dynamic way, as Niehof also says: "the gendered nature of the care process is not unchangeable and varies in time and place".
Given the problematic definition of care, however, it is impossible to say that women are more dominant in "care" in general or in a certain phase of the care process. In an integrated approach, it is necessary to look at the gender related differentiation or inequality in the division all activities, paying attention to the gradual proportion of the personal, social, material and financial component of the output. Important in this context, is the question to what extent women are dominant in "human services", within families, professional and non-professional organisations. The central task here is to correctly study the time budget of men and women in terms of the number of hours, the location, the payment, the functional level, the quality of the activities etc.
Starting from these questions, society has to determine which differences or inequalities between men and women are unacceptable. Therefore, these gender inequalities need to be quantified by means of scientific models combining a number of distributive functions for the selected aspects. For the future, one has to elaborate a normative model of the division of activities and means, more specifically expressing "the kind of equality" that is preferred. Gender equality policy then aims at eliminating the societal inequalities and at realising the normative model on all levels of society.

4 Attention for "human services to dependent people" in the welfare state

In line with the previous aspect, there is the question whether society (the welfare state) pays enough attention to activities that we would broadly call "human services to dependent people in society", i.e. people that cannot be financially self-sufficient by means of professional labour, due to age (too young or too old), handicap, inadequate education etc. Also for this basic question, one must leave the dual concept of care versus no care and start from an integrated analysis of the division of time and means within and among all actors. Otherwise, society cannot correctly assess the weight or impact of the diverse developments for the different actors and for society as a whole. Niehof shows this by stressing the problematic impact of two developments, the increasing labour force participation of women and the relative increase of the older population. We would like to stress the idea that, by looking at these development in another way, less attention goes to their so called restrictions and more attention can go to the opportunities they offer.

With respect to the first "development", it is necessary to place it in a broader historical perspective, f.i. 1850-2000. During the previous centuries, most women were professionally active and most families had to pool two or more jobs and incomes to make ends meet. The actual quality and composition of the professional labour obviously is time related. Between 1850 and 1930, many women were forced out of the labour market, be it consciously or not, on purpose or not (figure 5, Van Dongen 1993; Van Dongen et al. 2001).

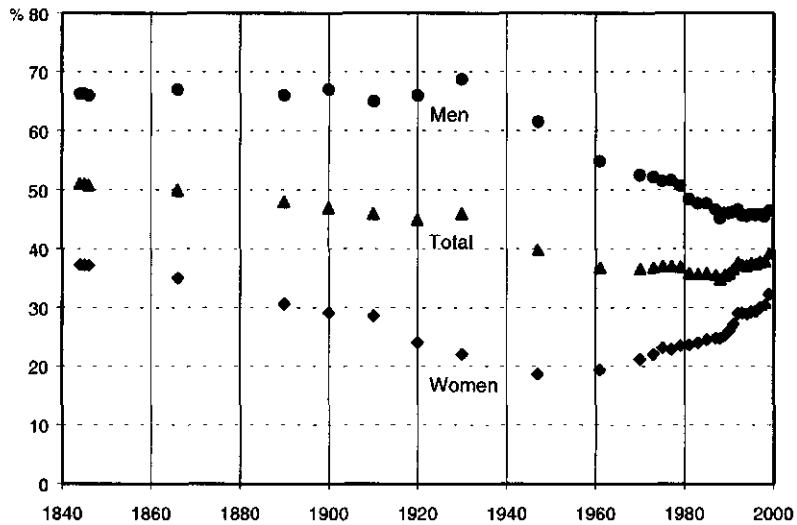

Figure 5: The activity rate of Belgian men and women in the period 1850-2050

The increasing labour force participation of women cannot only be seen as a "decreasing care potential in households or families" but as an important instrument to reorganise and improve the division of activities and means for all actors. The basic idea is that every actor takes a part of the responsibility with respect to the different activities, in order to create a broad and solid basis. Of course, one has to learn to deal with the different problems that occur during the transition period. At the same time, there are (should be) limits to the relative share of

professional labour in the total time budget of every individual and family. But the same count for the other main activities.

The demographic development is mostly seen as a negative constraint for the future division of activities. Of course, every one knows that the share of older people increases and will further increase during the next decades. At first sight, this implies an (ever) increasing burden to society in terms of "human services" (care) that has to be offered. But at the same time, the group of older people are and remain much longer active. This means that they are a large potential of "service givers" to all other actors, be it in their own (larger) family, in the social or professional sector. The so-called negative evolution of the dependency ratio is frequently used, sometimes misused, because it is based on a restricted analysis of "dependency". Figure 6 shows the labour situation of the male, female and total Belgian population during the period 1947-1999, expressed in five basic categories.

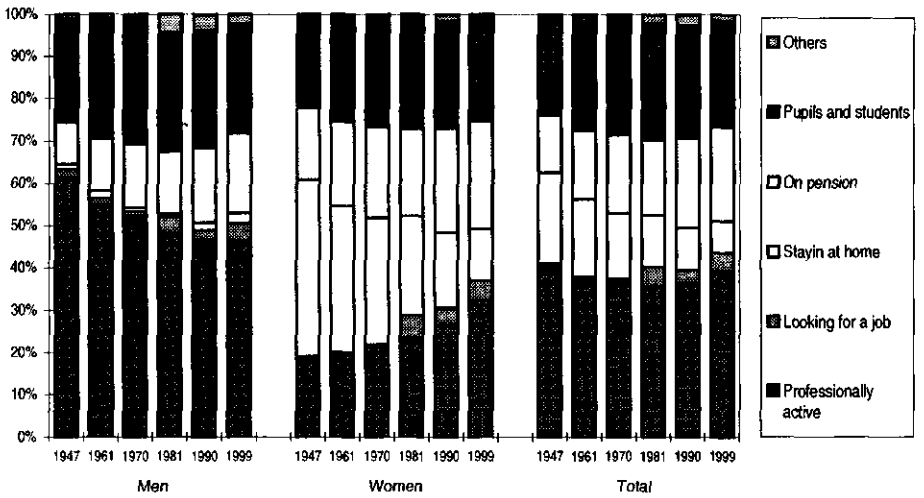

Figure 6: The labour situation of Belgian men and women in the period 1947-1999

The total activity rate, being the proportion of professionally active people in the whole population, has been rather stable during this period. The past two decades this ratio has increased again. Consequently, the total dependency rate, the inverse of the total activity rate, has decreased during the past decades. One can easy generalise these data to many other countries of the European Union.

This analysis shows that society has to search for a new division of the different activities and means among men and women, according to age, education, abilities. At the same time society needs a more balanced allocation of these activities within families, non professional (social) organisations and professional organisations. To do so, one must build empirical models to illustrate the actual developments, starting from a general conceptual approach. These can be the foundation for some normative models for the future which show the direction to be followed and which can be translated into policy perspectives and plans.

5 Model of care arrangements

Starting from the general theoretical and historical analysis, Niehof elaborates a model of care arrangements. At first sight, the model seems all right. It expresses the idea of interaction among the actors in terms of care giving, contributions and resource flows. Seen from an integrated approach (figure 2), however, the model is largely traditional and problematic.

Although Niehof rightly recognises that the household is a unit of production and is both a care giver and receiver, the household is again given a special place or "statute" in society. Firstly, she takes the household as "the obvious" unit of analysis, without any argument. This contradicts with the basic idea of mutual interaction. Furthermore, she expressed that special statute in –for me unclear- terms of "condensed morality". The basic idea here is that households or families –assumingly different from companies, clubs, etc.- have a normative content built up during the daily interaction and imply a "moral economy" largely based on the mutual interests of the members.
In an integrated approach, such differentiation is totally senseless. Every sort of organisation is based on internal relationships with a normative content and imply a "moral economy" based on the mutual interests of the members. "Moral Economy" is in fact is a pleonasm since all "economies" have a moral or normative content.

The next problem is that Niehof does not explicitly tell which activities are seen as care. After all, she implicitly starts from Tronto's basic distinction between care and no care. Above all, she makes no distinction between human and material care.

Furthermore, the levels from micro to macro and the complex interaction process between these levels are not shown. In this context, the "market" is again identified with the private companies, as if the interactions among the other actors are outside the market. In line with this, no distinction is made between the internal and external transactions of the actors.

Finally, Niehof differentially associates the societal actors with certain phases or aspects of the care process, more or less expressed by the different arrows. In this context, the difference between contribution and resource flow is not clear. Moreover, the origin, the character nor the function of the "resources" is explained.

In general, the Niehof's model of care arrangements largely fits in the traditional basic model of society. Due to the different problems, the actual application of the model is therefore largely arbitrary: one is free to choose and interpret the activities, actors and interactions, according to the subjective needs or interests.

The case study of elderly care in rural areas in The Netherlands shows this to a large extent. In fact, the model is not necessary at all to set up the study. This does not mean that the empirical study is useless. It means that the link between the model and the empirical study is rather weak.
The study starts from the distinction between instrumental and socio-emotional care, yet without any clear explanation, as if this distinction can ever be made in real situations. The study is limited to the former one and distinguishes heavy and light household labour and personal (physical?) care. Again here, the difference between socio-emotional and personal care is not clarified.

6 The complete combination model as basis for the division of activities within a democratic society

Society has to search for a (new) normative model for the division of activities, which can serve as a guide for the future development and for the policy to be followed. The answer to this question is based on the normative basis of the new basic model. We use the concept "democracy" as the overall normative concept on all levels of society: from the individual to the global system as a whole (Van Dongen et al., 2001), combining four basic values: freedom, equality, solidarity and efficiency. Other important values are seen as a combination of these basic values.
The main normative ambition of the new basic model is to realise a new synthesis or balance between the basic values, emphasising the positive interaction: each basic value is both a positive lever and a restriction for the other basic values. Because perfect democracy cannot be established, the main goal is to initiate a permanent process of democratisation. In order to realise these values, society needs to develop a coherent set of adequate goals and instruments.

In Van Dongen et al. (2001) four *symmetrical models* for the future are presented, placed within a long-term perspective (figure 7). The models are symmetric to express the principle of gender equality on the macro level. The central question here is whether the symmetry has to be perfect. If not, somewhat less symmetric variants can be designed for every model that still sufficiently satisfies the macro gender equality.
The micro equality condition determines the differences between the five models, expressed by the width of the curves. It refers to the relative share of the combination families where both partners have a more or less equal division of family and professional labour. In order to select the most suitable model, gender equality must be combined with the two other criteria mentioned above.

The *complete combination model* implies that all family types are possible, but that the combination families are dominant. The upper part of the figure shows that in most families both partners divide the professional and family tasks almost equally. The daily time of children is also more or less equally divided between activities inside and outside the family, without departing too much from one specific division. The model offers a real balance between the basic values (freedom, equality, solidarity and efficiency). Gender equality has an equal weight but does not dominate the other values and is at the same time restricted by the other values.

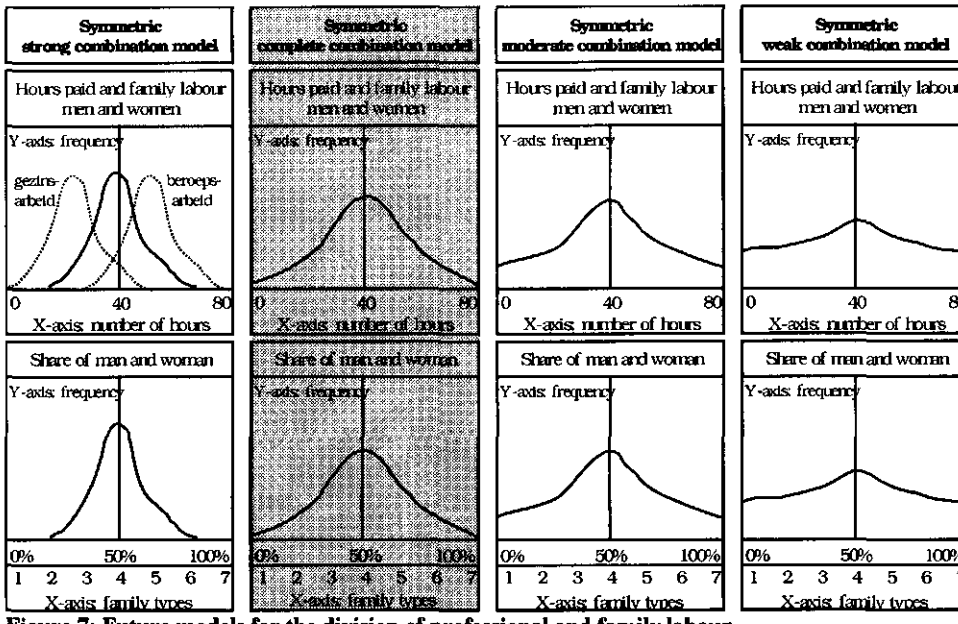

Figure 7: Future models for the division of professional and family labour

A first essential point is that all family types on the left and right side of the complete combination family occur to a certain extent. On the micro level, every individual family can choose its own division of labour, within the boundaries of the clock curve. This curve says that the relative share of the family types decreases when the division of labour between the two partners becomes larger. Under the macro boundaries of the curve, all families can gradually choose another combination when necessary or preferred within a certain phase of their individual or family life cycle.

The lower part of the figure gives the division of the number of hours spent at professional and family labour by men and women, i.e. two identical curves. The model essentially implies that an average or "normal" full-time job will be officially approximately 35 hours a week or about 40 hours a week including travelling and overtime. At the same time, the model offers enough differentiation, from very small jobs to very large jobs, according to the needs of families (or family members) and firms. Again, differentiation according to the life cycle is an essential part of the model. For instance, small and temporary jobs for older students, larger and more flexible jobs for men and women without children, moderate jobs of 30 tot 35 hours for families with children, smaller jobs for older people etc. The model therefore also largely satisfies the solidarity principle since the share of professionally active men and women is large enough to finance a strong collective basis. At the same time, the human capital of all men and women is efficiently used, both for professional and family tasks.

The *strong combination model* more strongly emphasises the gender equality and the higher professional participation as the basis for welfare and solidarity. In that way, the free choice of families and the need within society for differentiation must give way to a certain degree. After all, the strong male and female breadwinner's families are excluded or made impossible. Given the importance of the individual freedom of choice and the need for differentiation, this model does not satisfy the condition of the balance of values. Furthermore, also the feasibility condition is satisfied to a smaller extent, because the "distance" from the past development and the actual situation is much larger. By strongly stressing professional labour, family life

(family tasks, educational tasks and leisure time) stands under too high a pressure. Consequently, also the efficiency condition is not sufficiently satisfied.

The *moderate combination model* offers more space for the free choice and for differentiation within society, sacrificing the conditions of gender equality and solidarity to a certain extent. Inversely to the strong combination model, the share of the breadwinner's families is becoming larger, also that of the male breadwinner's families. This latter aspect will weaken the feasibility because it is far removed from the past and actual division of labour of men. Professional labour gives in to a certain extent, making more room for family life. Consequently, the relative weight of the solidarity and efficiency condition decreases.

In the *weak combination model,* the share of the family types increasingly equalises. Free choice and indifference becomes the dominant value, strongly denying the three other basic values. The share of the (strong) breadwinner's families, after all, becomes very large. Although the model seems attractive at first sight, due to the character of free choice and neutrality, it largely tackles the principles of equality, solidarity and efficiency. Too large a share of the female and male professional population is not or hardly professionally active, which undermines the solidarity condition. At the same time, the feasibility of the model is much smaller then that of the combination models, since it is far more removed from the actual development within families.

The *central hypothesis* is that (a variant of) the complete combination model is the most suitable basis or guiding instrument for a democratisation policy in general and for a integrated gender equality policy in particular (see also Brouwer, 1998; Van Dongen, 1998; Wierda, 1998). Of all models, it can offer the best balance between the basic values: freedom, equality, solidarity and efficiency. Within that balance, it can maximally realise gender equality on the micro and macro level.

Starting from that model, a number of policy perspectives are formulated. We mention the different perspectives without further comment.

1. need for an integrated, durable policy
2. new working hours, leave arrangements according to course of life
3. adjustment of tax system, social security
4. an active employment policy
5. day care for children younger than three years as a basic provision
6. sufficient care facilities outside school time
7. sufficient direct child allowance to support families with children
8. sufficient care facilities for elderly people, disabled and sick persons
9. suitable and affordable transport facilities
10. a family-friendly and emancipatory labour organisation within companies, with professional guidance of companies and families: Family & Business Audit

Residential use of biocide sprays

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1 Synopsis

Use of consumer biocide sprays is influenced by several factors. These are described in this paper based on research, done in private households in the Netherlands.

2 Abstract

Residential use of biocides in spray cans might expose the users to chemical substances; this can imply health risks. Whether this is the case is assessed using computer models, which need information about the product, human behaviour characteristics and environmental aspects. However, hardly any data are available describing these behavioural and environmental aspects in appropriate terms.
The aim of this study was to gain more insight into these aspects in order to make the assessments of the models more accurate.
The methods used in this study are 1. inventory of pesticides present in or around homes 2. observation of consumers (n=24) during actual use of the biocide spray and 3. an oral interview about the reasons for this behaviour.
The results show that the way of using biocide sprays depends on the task to be performed: a targeted spot (indoor plant, outdoor plant and pets), an air space, a general surface, or crack and crevices. Within tasks, a large variability of behaviour is observed. The between-task-differences are large only in some of the aspects, while in other aspects they are very small. Users hardly apply any protection measures, except for taking indoor plants outside for treatment.
The results of this study give more insight into the way of use of spray cans in the residential setting and the exposure to biocides. These data are to be used to provide the computer models with more accurate data, in order to make more realistic risk assessments. Besides, the data are used to verify the assumptions regarding the behaviour of humans, which are used in the absence of real life data.

3 Introduction

Residential use of biocide sprays, i.e. pesticides which are registered as being non-agricultural and applicated by means of a spray can or plant spray (Straetmans, 2000), might expose users and bystanders to chemical substances. This exposure can occur via an oral, dermal or inhalatory route. The uptake of chemicals and other substances, due to exposure, can imply health risks. Generally, computer models are used to assess exposure to biocide sprays and

related health risks. For these assessments, information is needed on 1. the biocide spray used, 2. the characteristics of human behaviour concerned with using the spray and 3. the characteristics of the environmental circumstances in which the spray is used. However, hardly any data are available describing the behavioural and environmental aspects in appropriate terms. This lack of data implies that worst case scenarios are used in the exposure assessments, which might overestimate the risks.
The aim of this study was to gain more insight into the behaviour of humans when using biocide sprays, the environment in which they are used and use characteristics as for instance the duration of use, in order to generate input data for the computer models.
The goal was to contribute to a more realistic assessment of risks of biocide spray use in the household setting.
In order to reach this goal, the following questions were asked:

1. How do people use biocide sprays in and around the house?
2. What are the values of the determinants of exposure as used in computer models?
3. Why do people use biocide sprays as they do?

4 Principles of exposure assessment

When exposure to biocides is to be assessed, several variables are taken into account in computer models. These variables are presented in Figure 1.

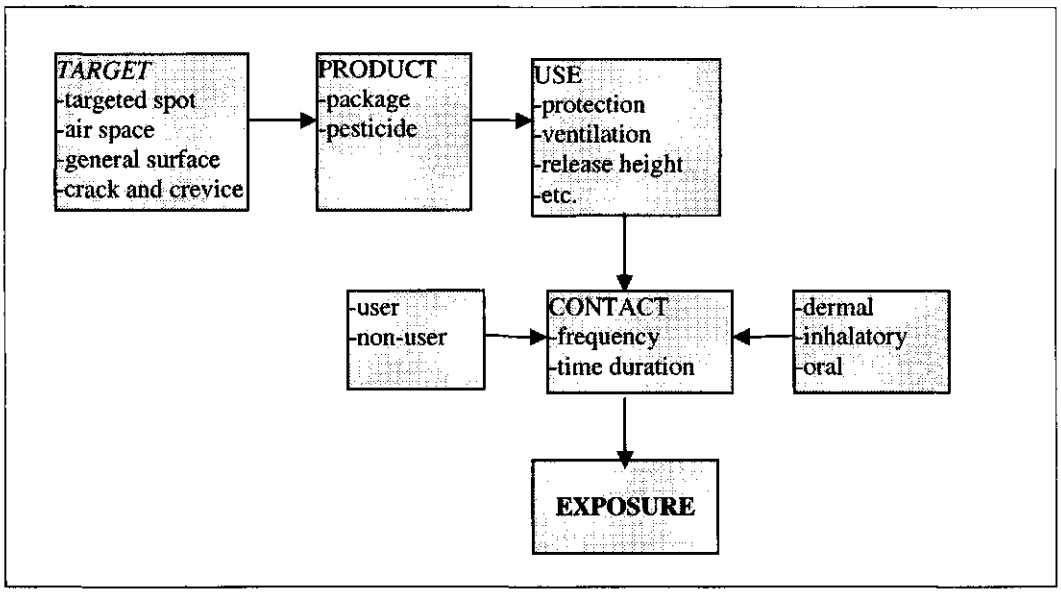

Figure 1: Variables influencing contact and exposure to biocide sprays.

The scheme starts with the assumption that a task has to be fulfilled in the area of controlling pests. For instance, controlling aphids on plants or moths in a wardrobe. There are many products available on the market that are especially meant to spray a certain target, like mosquito sprays or plant sprays. Also non-spray biocides are available, but these products are not taken into account in this study. Different kinds of sprays for various purposes are assumed to be used differently, as the instructions for use differ for the various kinds of

products (Straetmans, 2000). Additionally, the way in which products are used is expected to be user dependent (Weegels, 1997; Weegels and van Veen, 2001). Using the product may cause contact between the user or the non-user and the product via a dermal, inhalatory or oral route. If the product contains a certain chemical, persons might get in contact with a certain concentration of that chemical, which determines exposure.

5 Design of the study

5.1 The research methods

In order to be able to answer the research questions, several types of methods can and have to be used, ranging from quantitative to qualitative methods. Quantitative methods are suitable to be used related to questions starting with 'how much' or 'how often'; when the questions are related to the behaviour or opinions of persons, qualitative methods have to be used (Steenbekkers, 2001).

In this study, the following methods were applied:

- counting the number of biocides present in the participants' homes,
- measuring the characteristics of the treated object and of aspects of treatment,
- observing participants during actual use of the biocide
- an oral interview about the reasons and background for the behaviour during treatment.

5.2 The home visits

The home visits consisted of three parts. First, the researcher explained the relevance of the research and the relevance of the home visit for the research as an introduction. Then the researcher asked to be shown all pesticides that were stored in or around the house, or to be shown all places where pesticides might be stored. Secondly, the persons were asked to show how they actually use a biocide spray (this is recorded on a videotape). Some measurements were made before and after the use (for instance, the amount of biocide spray used) while other measurements were made after the home visit from the screen (for instance, the release height). The last part consisted of an interview, which was tape-recorded.

5.3 The sample

Twenty-four persons participated in this study. They were recruited in various ways: an announcement in a regional newspaper, colleagues from the RIVM or their family members, and acquaintances of the first researcher.

The sample consisted of twenty-one women and three men. Their age varied from 16 to 64, with a medium of 44.5 and an average of 42.1. Six participants were lower educated, eight participants were averagely educated and ten persons were higher educated.

5.4 Analysis of the data

The quantitative data are analysed by means of the statistical program PRISM. Although the number of subjects is not equally divided among the different categories, some statistical tests are performed. The relatively small number of subjects requires caution when interpreting the results.

The observations as recorded on videotape are described in words and used as qualitative input in this study, together with the answers given in the interviews.

6 Results

6.1 Results of the inventory

The first part of the study included an inventory of all pesticides stored in and around the home, be it registered pesticides or biological products (products which are intended to control pests but are not registered as pesticides). The results of this inventory are as follows. Except for one household, each household stores one or more pesticides. As far as registered pesticides are concerned, households stock an average of 3.4 products, ranging from 0 to 18. Biological products are less penetrated into the households: fifteen households (62%) do not store any biological product and nine households (38%) store one or two biological products.

6.2 Results of the observations

The objects sprayed by the respondents are outdoor plants (n=12), indoor plants (n=8), crack and crevices (n=2), mosquitoes (n=2), pets (n=1) and a carpet (n=1) (some persons sprayed two objects). These objects can be classified in the following four application categories: targeted spot applications, air space applications, crack and crevice applications, and general surface applications (see Table 1). This division is made assuming that the way in which exposure occurs and the magnitude of this exposure during and after the use of biocide sprays for the user and/or for bystanders, are different in the different categories (Straetmans, 2000). In this study only one person is observed spraying a general surface with a biocide spray.

Table 1: Objects sprayed during the observations, divided in the categories according to Straetmans (2000) and the number of persons spraying an application type.

Application	*Objects*	*Number*
Targeted spot	Indoor and outdoor plants, pets	21
Air space	Mosquitoes	2
Crack and crevice	Crack and crevices	2
General surface	Carpet	1

Statistically significant differences are found between some use characteristics of spraying indoor- and spraying outdoor plants. These use characteristics are frequency of use, amount used, release height and use duration. In this paper, only the results of these characteristics are given. For the other characteristics, see Baas (2000).

6.2.1 Frequency of use

Table 2 shows the annual frequency of use of biocide sprays, with which persons sprayed during the home visits, as far as they were their own biocide sprays. For different reasons, some persons sprayed with a biocide spray supplied by the researcher; their frequency of use is therefore equal to 0.

Table 2: Annual frequency of use of biocides

	Number of persons	Average (sd) ± Frequency (#/year)
Targeted spot	14	3.7 ± 2.89
Air space	2	84 ± 8.49
Crack and crevice	1	12
General surface	1	2

Considering the use frequency, it is obvious that there are large differences between the categories. The difference in use frequency between targeted spot and air space applications is statistically significant (t-test, t=29.55: p<0.0001). Differences with crack and crevice and general surface applications cannot be computed because only one person sprayed this application with her own biocide and one observation is not sufficient to do statistical tests.

6.2.2 Amount used

Figure 2 compares the amount of biocide used for spraying different applications, as measured during the observations. In three cases of targeted spot applications (plants), the amount used was not measured during the home visit.

The variation in the data is very small for the air space- and crack and crevice applications. Both are small amounts in comparison with the amounts used by the targeted spot applications. A statistically significant difference in mean values is nevertheless not confirmed (ANOVA, F=1.04, p=0.373).

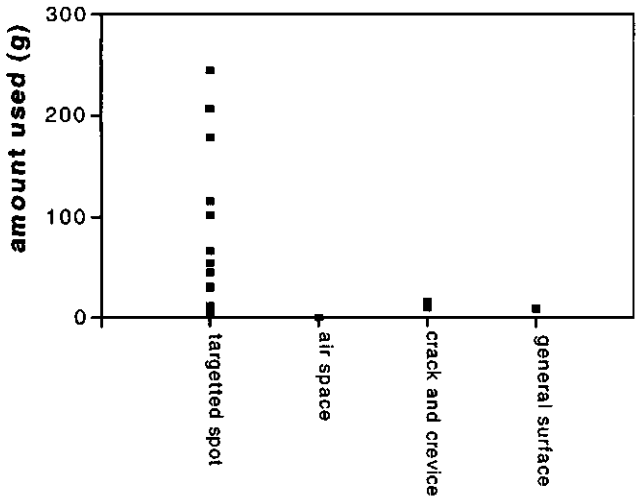

Figure 2: The amount of biocide spray used for all applications, by application categories.

6.2.3 Release height

Figure 3 shows that the two highest release heights were measured during an airspace- and a crack and crevice application. The airspace application refers to a person spraying a mosquito in the living room while the crack and crevice application was done by a person spraying the crack and crevices near the ceiling. The lowest release height is that of a person spraying crack and crevices near the ground. The figure also shows a large variation in the release height between the observations of crack and crevice- and air space applications as compared with applications on targeted spots.

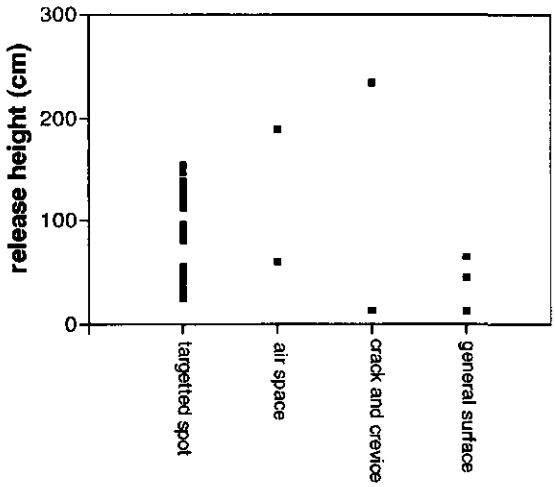

Figure 3: The release height for all applications, by application categories.

Statistically significant differences are found between some use characteristics of persons spraying indoor- and persons spraying outdoor plants. These use characteristics are release height, pause duration, use and total duration and the amount used. In this paper only the results of release height and total duration are given. For the other characteristics see Baas (2000).

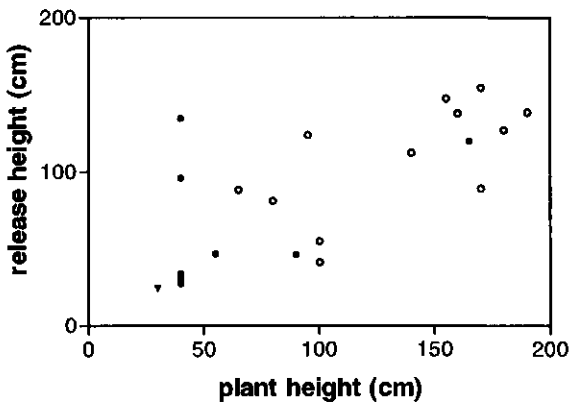

Figure 4: Relationship between the plant height and the release height for spraying plants. Note: A triangle refers to pets, black bullets to indoor plants and open bullets to outdoor plants.

The mean values of release heights for spraying indoor plants are significantly lower than that for spraying outdoor plants (t-test, t=2.283, p=0.035). The lowest release height for a targeted spot application is observed for spraying the pets.

6.2.4 Use duration

In this study, the use duration is defined as the total duration of spraying and pauses in spraying longer than 2 seconds.

The mean use duration for spraying indoor plants is significantly shorter than that for spraying outdoor plants (t-test, t=4.209, p=0.001). This is also the case for the pause duration (t-test, t=2.664, p=0.016). See figure 5.

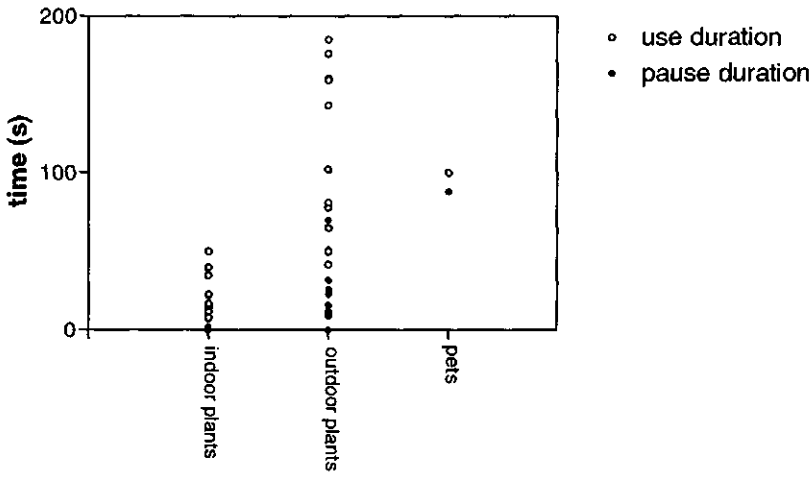

Figure 5: Use duration and pause duration for targeted spot applications.

6.2.5 Way of spraying

Many postures of persons spraying were observed. This results in a large variation in the way persons sprayed. Most persons (n=21) were observed spraying a plant or a pet. Most of them (n=16) were standing, completely upright (n=10) or upright bending a bit (n=6) with their arms either straight (n=8) or bended (n=8). The others (n=5) held other positions during spraying, varying from being completely bended (n=2), to squatting (n=3). Two persons held the plant in their hands while spraying it, and turned the plant with their hands in order to reach all sites of the plant. The other persons either turned the plant with their hands or walked round the plant in order to reach all its sides.

Two persons were observed spraying the air space. One person sprayed a mosquito in the living room when she saw one. She was observed spraying while standing upright and having her arms straight above and in front of her face. The other person sprayed preventively on the eiderdowns of her children to keep possible mosquitoes away. The children laid in bed during spraying, and she sprayed on the top of the eiderdowns, near their faces (± 40 cm). She sprayed standing upright next to the beds, bending a bit and having straight arms.

Two persons were observed spraying crack and crevices. One person sprayed crack and crevices near the ceiling in the kitchen. She climbed on the kitchen worktop to come closer to the crack and crevices where she had seen small flies coming out. She stood upright during spraying, bending a bit backwards and having straight arms above and in front of her head. The other person sprayed crack and crevices near the ground in the hall when she saw ants. She squatted during spraying and had her straight arms downwards.

One person was observed spraying a general surface, namely a carpet. The person squatted on the landing and sprayed. During the pauses she moved to another place on the carpet in order to be able to spray the whole carpet.

6.2.6 Protection measures

Different protection measures were observed. Out of twenty-four, fifteen persons washed their hands after using the biocide spray. Seven persons did not wash their hands, and it is not certain whether the remaining two persons washed their hands or not. One person wore hand gloves during spraying (and washed her hands afterwards).

All persons spraying indoor plants and pets brought these outside and sprayed there.

Food was not present near the site of spraying, except in two cases. One person was eating a carrot during spraying and one person who sprayed in the kitchen where food was present on the kitchen worktop, but it was thrown away after spraying.

One person had shown the mixing and loading of the biocide in a plant spray. She did that in the kitchen and cleared the working top before starting. Two other persons, who did not show the mixing and loading because they had still enough biocide in their plant spray, indicated that they had also cleared the working top before starting the mixing and loading.

6.2.7 Contact

Contact can be of a different kind, namely dermal, inhalatory and oral contact.

Table 3 shows the number of persons having dermal contact via different routes (via the spray cloud, the object and the packaging) during different applications.

Table 3: Dermal contact via spray cloud, object and package, by applications.

Dermal contact via:	Targeted spot (n=21)	Air space (n=2)	Crack and crevices (n=2)	General surface (n=1)	Total (n=25)
Spray cloud	10	1	2	1	13
Object	9	0	0	0	9
Package	13	1	1	0	15

Three persons spraying a targeted spot did not have any dermal contact with the biocide spray. All other persons did have dermal contact. Contact with the spray via the package was observed in fifteen cases. Fourteen persons had dermal contact with the spray via the spray cloud and nine persons via the object itself.

Table 4 shows the degree of inhalatory contact for different applications.

Table 4: Degree of inhalatory contact of persons spraying different applications.

Degree of inhalatory contact	Targeted spot (n=21)	Air space (n=2)	Crack and crevice (n=2)	General surface (n=1)	Total (n=25)
High	0	0	2	0	2
Low	9	2	0	0	11
None	12	0	0	1	12

More than a half of the persons did not have any inhalatory contact with the spray. Most of those who did have any inhalatory contact had not exposed themselves too much.. Only two persons had a considerable inhalatory contact with the spray.

As far as could be observed during the home visits, two persons had an oral contact with the spray. One person was eating a carrot during spraying, while having spray on her hands due to contact with the packing. The second person said that she had spray on her hands, but despite this she did not wash her hands, and she even handed out biscuits to her children and ate the biscuits herself too.

6.3 Results of the interviews

Twenty-two persons have been interviewed during the home visits. The purpose of these interviews was to identify underlying motives of people for using the biocide spray the way they did. For this paper, only findings on two topics are presented: risk perception and site of spraying.

6.3.1 Risk perception

Risk perception refers to persons' perceived risks for their own or other person's health as a consequence of the usage of biocide spray in or around their home. The responses concerning risk awareness can be classified in three groups.

1. They were aware of risk(s) for their health and thus used the biocide very carefully or not at all (n=7).
2. They were aware of risk(s) but could not imagine to be harmed, so they did not take precautions (n=11).
3. They were not aware of risk(s) for their health (n=4).

Seven persons, who were aware of risks for their health in general, named two reasons for having this opinion. The first reason was that they considered poison bad for health per definition (n=5), and the second reason was that the usage of biocide sprays cannot be good for health considering the warnings on the packaging (n=2). All these persons indicated that they used the biocide very carefully or not at all (they normally did not use it, but were willing to use it for the research).

Eleven persons, who were aware of risks for their health but could not imagine to be harmed themselves, were not so uniform in their reasons for having this opinion and for not taking precautions. Three persons did not know what kind of risks they would be running. Three other persons thought that not taking precautions was easier. Two persons did not use poison often. Two persons sprayed outside, and one person washed his/her hands

Four persons had the opinion that using the biocide spray implied no health risks. They gave two reasons: two persons said that they used an ecological product and two persons indicated that they used a safe product.

6.3.2 Site of spraying

Nine persons opted for taking the object outside and spraying there. What were their reasons for doing so (two persons gave two answers to this question)? Four persons said that they did not want the smell of biocide in their homes. Three persons indicated that they did not want to poison their homes. Two persons said that it was the most practical to spray outside, and one person said that she had used the biocide spray outside because the instructions for use said so.

7 Conclusions and discussion

This study shows large inter-individual variability as well as striking similarities in the use of biocides in and around the homes.
Differences were found in the posture in which persons spray. Both differences and similarities were found for the protection measures taken. Differences occurred in hand washing after the use of a biocide spray: some persons did so, while the others did not.
Similarities were found in the site of spraying indoor objects: when possible, they were taken outside to be sprayed. If it was impossible for them to be taken outside, the persons sprayed inside and took good care of ventilation. Additional protection measures were not taken.

In this study, no personal characteristics were found to influence the way of use of the biocide. However, some indication was found of the influence of some object characteristics. Differences in use were found for indoor and outdoor plants. The height of the plant influenced the way of spraying.
Many persons stored one or more biocides in or around their homes, but the frequency of use depended on the application. Air space sprays were used most frequently.

Many persons had a contact with the spray cloud during application, or had contact with the spray via the outside of the packaging. One-third of the persons had contact with the spray on the sprayed object. Half of the persons had inhalatory contact, while 7% had oral contact with the spray.

One would expect that persons who think that the use of the biocides implies health risks behaved differently from persons that do not perceive any risks, or at least that they would take more precautions.
However, in this study there seems to be hardly any relationship between the perceived risk and the observed way of using the product. Persons, who said in the interview that using this kind of products could have implications for their health, do hardly or not at all behave differently from persons who did not perceive any risks.

Until now most variables in computer models, related to the behaviour of persons, were estimated. In this study real life data were generated that can be used in these computer models. Given the variation in use it is recommended that extra attention is paid to the behavioural component in the assessment of risks due to use of biocides.

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ICT and the Inverted Product Chain

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Abstract

Information and communication technology (ICT) influences every-day life in different ways. ICT-products move into private homes, where they can be considered as every other product, being a result of mass production and consumption, expressing cultural value. But the impact of ICT is far reaching, both directly and indirectly. Directly because the technological products can change communication patterns between people and effect daily routine: a different way of gathering information, of banking and in the future of shopping. Indirectly, because ICT has an impact on society as a whole, affecting culture and structure of the labour market. One aspect of the latter is the increased flexibility, for instance expressed in telecommuting practices, which have an effect on daily life to a large extent. In this paper, these developments are discussed. Not only changes in every-day life influence the production-consumption chain; also changes in the chain influence every-day life. For home economics, these changes might justify the establishing of a combined subject area with business administration to "business and consumer studies". However, they should guard the achievements of the subject area, consisting of the knowledge and skills regarding domestic labour and an integrated approach.

1 The impact of ICT on everyday life

Information and communication technology, in short ICT, can be described as a fusion of computer technology, telecommunication, electronics and media (Van Dijk et al., 2000). ICT-products are an integral part of modern culture and penetrate daily life, influencing time budgets and life patterns. These products are not just technological artefacts. They are also a social construction and may be studied using sociological concepts (Cockburn and Ormrod 1993; Lie and Sørensen 1996). The impact of ICT – and, more in general, technological products – on household labour is a disputed one. These products are either regarded as promises of better living or as a dangerous force, dominating and controlling mankind, standardising the quality of human life, threatening the privacy of individuals and increasing social inequalities. Though often propagated as time- and labour-saving, there are no indications in recent history that the introduction of household technology led to a decrease of time spent on domestic labour. Washing machines rather encouraged an increased frequency of washing than a diminished time span for laundry. Vacuum cleaners and central heating – together with the abolishment of coal stoves – saved labour, but coincided with a decrease of domestic servants and increasing standards of hygiene (Cowan 1983; Terreehorst 1994). However, the introduction of household technology contributes to a decrease of muscular strength required for domestic labour. It also can cause a greater variation in the way people execute domestic tasks. For instance, the microwave oven enables the preparation of individual meals at all times (De Hart, 1995).

The role of information and communication technologies deserves special attention. Van Dijk et al. (2000) discern five product groups within the context of the household: television and video; means of personal communication; electronic payment; computers; internet and electronic mail. Television and video, including teletext, have their impact on the way leisure time is spent, but will hardly influence domestic labour. The same applies to modern means of communication, such as portable and mobile telephones. The possession of those products is increasing rapidly, in particular among higher income groups and young people. Payment methods have been digitised in the past decade. In the Netherlands, cash/debit cards ('pin passes') became particularly popular, with 94% of the population having such a card in the autumn of 1998 (Van Dijk et al., 2000). The impact of the possession of cash/debit cards and/or credit cards on shopping behaviour is not researched. The continuous availability of means of payment might invoke irresponsible purchases for some people, while others use it as an easy aid for financial management, since their expenditures appear automatically in print on their bank statements.

In 1998 58% of Dutch households owned a computer, of whom 37% had access to the Internet (Van Dijk et al., 2001). The impression exists that this latter figure grew exponential the last three years. Private use of computers consists mainly of entertainment and education, and supports volunteer work – such as announcements and minutes of meetings, newsletters and members' administration (Casimir, 2001). Though the computer can be used for budgeting and electronic book-keeping, there are no data available to prove how many households actually make use of computers for those purposes. Households do use their computer – combined with a modem and an internet connection – to gather information and to perform transactions. In 1995, the Sociaal en Cultureel Planbureau found that almost one quarter of Dutch households made use of delivery services, mainly of groceries (Keuzenkamp et al., 2000). By that time, only few Dutch households mentioned tele-shopping as an option. This kind of shopping was then still in its infancy. More recent figures make clear that 36 percent of Dutch Internet users ordered something on line and 30 percent of all consumers are interested in doing one's shopping that way (Keuzenkamp et al., 2000). Many of the telecommuting respondents of the author's survey (43%) mentioned tele-shopping and tele-banking as private activities (Casimir, 2001). Also the computer is used for the completion and submission of tax return forms.

The availability of a computer favours the possibility of telecommuting, or, vice versa, telecommuting brings a computer into the home. This could cause profound changes in the performance of household chores and the division of labour within the family. The author found that both men and women are taking up more household tasks, when working at home, men showing a larger increase than women (Casimir, 2001). Since telecommuting is related to changes in work structure and culture in general, this will be elaborated in the next section.

2 ICT and changes in the market sphere

The indirect impact of ICT on the household exceeds the direct influence. The introduction of ICT on the structure of business organisation and on culture is far-reaching. As the development of former technologies, ICT caused an increase in productivity rates and supported the rationalisation of production processes. By enabling flexible production patterns, global distribution and local diversification, and by supporting the acquirement of consumer information, it contributed to a globalisation and massification on one hand, and to individualisation and flexibilisation on the other. ICT entails flexible consumer patterns,

resulting in a modularisation of daily life. Bridging time and distance, ICT enables the coincidence of central control with local access and distributed responsibilities. Flexible work patterns, independent on time and space, are the result (Galbraith, 1967; Nowotny, 1982; P. Frissen 1992; V. Frissen 1999).

The role of ICT in these developments is significant and paradoxical. Technology freed people from their natural limitations and made them dependent at the same time. ICT intensified these developments. As is the case with technology in general, ICT is simultaneously credited with the potential of its positive applications and decried for its equally plausible negative and obstructive effects. Simultaneously, ICT is capable of helping us surpass the paradoxes, because it enables us to gain control over our life. Industrial technology separated the spheres of work and private life; information and communication technology helps us to bridge those spheres again. At the same time, an analogy with Ford's conveyer belt can be seen here: the assembly line moved the pieces around and kept the people in their place; likewise ICT keeps the people in their places and moves the data around. ICT helps to expand the scope of unpaid consumer work – like driving, shopping, gathering consumer information, self-service in the household – into the sphere of paid work, while the underlying organising principles of the paid labour gradually merge into the domestic sphere (Nowotny, 1982).

3 Changes in the product chain

Technology in general, and ICT in particular, causes changes in the product chain. As described above, the manifestation of the products at the end of the chain is changing. Second, new products are developed in a reversed product cycle. Innovations in consumer products used to be developed as a goal in itself, production processes necessary to realise these innovations would follow. Nowadays, innovations in production processes often come first, evoking new consumer products as a spin-off of these innovations. Examples are services offered by banks – such as the electronic concluding of travel insurance – that have been made possible by the automation of processes in the back office. Third, some steps in the product chain might be skipped. For instance, travel agents might become superfluous when consumer book their journeys directly with the supplier. Also, consumers increase their power, by gathering more information and being able to compare prices and services of different suppliers, using the Internet.

The ultimate consequence of the development of the information society is the reversal of the chain of supply and demand. The increased power of consumers, combined with new production methods, realises a situation in which consumer demand steers production instead of the other way around. An example is the manufacturing of furniture and cars, which starts after the order is made. This development applies in particular to the media and other information-intensive sectors. As a result of the Internet, the control over society seems to shift from the established institutions to the individual (Giesen, 2001). Newspapers are threatened in there existence or will at least have to change their focus when almost everybody can combine thousands of sources on the web. The same fate will strike the music industry when consumers no longer buy CD's but download their favourite songs from the Internet. Citing Shapirio's *The control revolution*, Giesen argues that the judgement of politicians, journalists, medical staff and captains of industry will be disputed. The advocates of this development see the old ideal of direct democracy realised through the Internet. The critics warn for a world in which personal inconvenience is more important than war. Cheap

mass media played an important role in the establishing of social cohesion. On the Internet this cohesion dissipates again. Information from the web can be richer and more satisfying as long as personal hobbies are concerned, but news that is of importance for a whole community could get lost (Giesen, 2001).

The concept of demand pull is also criticised for other reasons. The power of consumers to steer production is limited, because choices can only be made within the limits of culture, structure and individual possibilities. Modern western people are not only *free* to choose, but are also *forced* to choose, and not everybody is capable in handling the richness of choices well (Van der Poel, 1993; Casimir, 1987). Kohnstamm (2000) argues that total personal freedom does not lead to more, but even to fewer choices, because people can only choose from the things they already know. This reduces the risks, but also the chance of discoveries and surprises. Next to that, the power of suppliers to influence consumers by advertising, direct mail and image building should not be underestimated either. The methods in this respect have been refined with the aid of ICT, using consumer information – for instance, collected through customer cards – for data mining. Thus, consumers can be addressed in an efficient, individualised way, which might have a manipulative effect.

4 Consequences for the subject area

The consequences of the above-described developments for the subject area of home economics are manifold. First, more insight in consumer behaviour related to the development of ICT products is needed. Second, the mutual influence of paid labour and unpaid, domestic labour – increased by the introduction of ICT – is still under-researched. The study of the private domain seems to be of increasing significance, since in domestic labour norms and values, equality and disparity, gender issues and quality of life are implied. Finally, the subject area itself is changing. At Wageningen University, as well as elsewhere in the world, home economics is undergoing a name change to consumer studies or is combined with business administration or marketing studies. The blurring boundaries between market sphere and private sphere provide in fact the rationale for this development. The boundaries between work and domestic life, between consumer and producer, between public sphere and private sphere, and between humans and technology, are not as clear as they have been under industrialisation. The inversion of the product chain – from market push to demand pull – gives a new impulse to a new direction. However, ignoring the specific contribution of home economics or household studies amounts to throwing away the baby with the bath water. To prevent that, home economists should preserve the achievements of home economics, i.e. the knowledge and skills relating to the study of domestic activities and an interdisciplinary, integrative approach (Casimir, 2001).

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The Demand for Housekeeping Services
An Empirical Analysis with Data from the German Socio-Economic Panel

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Abstract

In the past decade in Germany it was hoped that new jobs providing services for the household would help lower unemployment rates, especially for less skilled people. These expectations were disappointed. It was stated in a recent survey that the household sciences obviously have not yet analysed the demand for housekeeping services precisely enough. This paper aims to help fill this gap. The author has used data from the German Socio-Economic Panel. A very large set of socio-economic and demographic variables were examined in this way to see whether they might explain household demand for housekeeping services. The following variables turned to be significant: household income, size, and location; health, age, and attitudes of the household members.

1 Introduction

The high unemployment rates in Germany, especially in the past decade, have led to a widespread discussion about how new jobs might be created. The European Commission (1993,1995) recommended in a White Book and a report developing the area of the provision of housekeeping services. It was argued that this should be an area of future growth for the following reasons:
- Aging population
- Increasing female labour force participation
- Increasing number of single parents.

A further argument was that these jobs would not be threatened by globalisation, because production and consumption are closely related.(1)

The German government provided the following economic incentives to increase the employment of people who would help in the household.

a) In 1989, an income tax deduction was introduced for households with at least two children[(2)], or with another person who needs care. The rule was that up to DM 12 000 p.a. of a household help's remuneration could be deduced from the taxable income (of the employer).

b) In 1997 this rule was altered as follows. All households are now able to profit from the above mentioned income tax deduction and the upper limit was set at DM 18 000.[(3)]

The empirical effects of incentive a) have been investigated (see Munz, 1996; Hank, 1998). The results of this incentive have been disappointing, however. The effect might only have been to stabilise the number of employment contracts required to pay social insurance contributions.

The empirical effect of incentive b) will be investigated later in this paper. Initially however, the factors influencing the demand for housekeeping services will be discussed theoretically and econometric estimates made.
There are primarily four possible factors for the demand for housekeeping services of households mentioned in literature:
1. Income and prices
2. Division of labour
3. Physical factors
4. Attitudes

With regard to 1., it is clear that we can expect that the demand of the employing households will increase as their incomes rise and that the demand will be the lower, the higher the wages of the possible employees.

2. Hank (1998) and others have pointed out that the more educated the wife, the more efficient it will be for her (and her family) to accept a gainful employment and give a job to a less skilled person in her private household.

3. The older, and probably infirm, the members of the household, the more they will be inclined to employ help.

4. For example, Munz (1996, p.38), Thiessen (1997) and Kraft (2000, p.89) argue that Germans could have particular attitudes, which hinder the employment of a household help. These attitudes can be described as follows: the employment of household help is seen as the luxury of very rich people or perhaps a privilege of the old and weak. Other people should keep their households in order themselves and not waste money on cleaners.

Using 1994 data from the German Socio-economic Panel (GSOEP)(4) Hank (1998) has shown that the factors 1-3 have a significant influence on the demand for housekeeping services. In this paper, we will carry out a similar analysis with GSOEP data from 1994 and 1999. Tools which measure the 4th factor (attitudes) will also be used. Attitudes will also turn out to be significant. Next the relative importance of the factors 1-4 will be evaluated. Finally, we compare the 1994 and 1999 data.

In detail, this paper proceeds as follows. In the next section the theoretical assumptions and the econometric method are presented. Descriptive statistics and the estimation results are shown in section 3. The 4th section concludes.

2 Model

The theoretical foundation of the "Probit"-analysis[7] is presented in this section. We proceed as usual:

Let be $u(x_1,x_2)$ a household utility function with arguments:

x_1: all other goods

x_2: housekeeping services.

For $u(x_1,x_2)$ assume a Stone[5]-Geary specification:

$$(1) \qquad u(x_1, x_2) = \alpha \cdot \ln(x_1 - \gamma_1) + \beta \cdot \ln(x_2 + \gamma_2)$$

with $\alpha \geq 0$, $\beta \geq 0$, $\gamma_1 \geq 0$, $\gamma_2 \geq 0$ and $\alpha+\beta=1$. The parameter γ_1 depends on household size and composition. The para-meter γ_2 depends on:

- size of the dwelling
- age and health state of the adult household members
- the wife's labour force participation
- attitudes of the adult household members.

Let be y household net income, p_1 a price index for the goods bundle x_1, and p_2 the wage rate paid for a household help. Maximising (1) given the restriction

$$(2) \qquad p_1 \cdot x_1 + p_2 \cdot x_2 = y$$

gives the following linear expenditure system[5]:

$$(3) \qquad x_1 = \frac{\alpha}{p_1} \cdot y + \beta \cdot \gamma_1 + \frac{p_2}{p_1} \cdot \gamma_2$$

$$x_2 = \frac{\beta}{p_2} \cdot (y - p_1 \cdot \gamma_1) - \gamma_2$$

For further purposes, we are interested in the second equation of (3), which shows the demand for housekeeping services. The expression $(y-p_1 \cdot \gamma_1)$ says that the demand for housekeeping services depends on that part of the income the household has left when its basic needs, i.e. $p_1 \cdot \gamma_1$, have been subtracted. In the following, we will call the expression $(y-p_1 \cdot \gamma_1)$ "discretionary income". Discretionary income will be the larger, the higher net income, and the smaller, the larger the household size. The parameter γ_2 incorporates the effects that age and health, female labour force participation and attitudes have on the demand for housekeeping services. We therefore choose the following stochastic specification for the demand for housekeeping services:

$$(4) \qquad x_2 = a_0 + a_1 \cdot z_1 + \ldots + a_n \cdot z_n + \varepsilon$$

with

- coefficients a_i (i=0,...n), which have to be estimated
- variables z_i (I=1,..,n) , which measure household income and size, and the age, health, and attitudes of the household members
- a normally distributed random variable ε (expected value $\mu=0$, variance σ^2).

At present most households do not employ any household help. The GSOEP data we use do not indicate how many hours the household help works per time period. But we do know whether a given household employs a help or not. We therefore have to modify equation (4) as follows:

$$(5) \qquad x_2 > 0 \qquad \text{for} \qquad a_0 + a_1 \cdot z_1 + \ldots + a_n \cdot z_n + \varepsilon > 0$$

$x_2 = 0$ for $a_0 + a_1 \cdot z_1 + \ldots + a_n \cdot z_n + \varepsilon \leq 0$.

Now we define a variable HELP by:

(6) HELP=1 if a household help is employed
HELP=0 if no household help is employed.

From (6) follows:

(7) $\text{Prob}(\text{HELP}=1) = \text{Prob}(\varepsilon > -a_0 - a_1 z_1 - \ldots - a_n z_n) = 1 - \Phi(-b_0 - b_1 z_1 - \ldots - b_n z_n)$

(8) $\text{Prob}(\text{HELP}=0) = \text{Prob}(\varepsilon \leq -a_0 - a_1 z_1 - \ldots - a_n z_n) = \Phi(-b_0 - b_1 z_1 - \ldots - b_n z_n)$

with Prob(.) = "Probability of...", Φ=standard normal distribution function and $b_i = a_i/\sigma$ (i=0,...,n).

If the values of the regressors z_i are known to be $z_i^{(j)}$ for m households (j=1,..,m) then we can estimate the coefficients b_i by using the maximum-likelihood approach:

(10)
$$LH(b_0,\ldots b_n) = \prod_{\substack{\text{j,employing}\\ \text{help}}} (1 - \Phi(-b_0 - b_1 \cdot z_1^{(j)} - \ldots - b_n \cdot z_n^{(j)})) \cdot \prod_{\substack{\text{j,not employing}\\ \text{help}}} \Phi(-b_0 - b_1 \cdot z_1^{(j)} - \ldots - b_n \cdot z_n^{(j)}) \rightarrow \max$$

or equivalently by maximising the Log-likelihood function

(11) $LLH(b_0,\ldots,b_n) = \ln(LH(b_0,\ldots,b_n))$.

This approach is known as the "Probit" procedure.[7] For the interpretation of the coefficients b_i, we have to look at equation (12), which follows from (7):

(12) $$\frac{\partial \text{Prob}(\text{Help}=1)}{\partial z_i} = \varphi(-b_0 - b_1 \cdot z_1 - \ldots - b_n \cdot z_n) \cdot b_i \quad .$$

(φ(.) is the density function of the standard normal distribution). Equation (12) tells us that the sign of b_i matters. If $b_i>0$, then an increment of the regressing variable z_i increases the probability that a help is employed. If $b_i<0$, then an increment of the regressing variable z_i decreases the probability that a help is employed.

Within a Probit procedure the goodness of fit is indicated by a coefficient called "Pseudo-R^2". It is defined as

(13) $$\text{Pseudo} - R^2 = 1 - \frac{LLH(b_0, b_1, \ldots, b_n)}{LLH(b_0, 0, \ldots, 0)} \quad .$$

Like the coefficient of determination R^2 used with linear regressions, Pseudo-R^2 has the following properties:
- Pseudo-R^2 = 0 if nothing of the variance in HELP can be explained by the regression variables z_i.
- Pseudo-R^2 = 1 if all of the variance in HELP can be explained by the regression variables z_i.

We can thus estimate the relative importance of an explanatory variable z_i by evaluating the extent to which Pseudo-R^2 increases when z_i is inserted into equation (5).

3 Estimation Results

The GSOEP questionnaires include more than 200 items. Some questions are asked every year, some only occasionally. For the present investigation, the following question is of central interest:
"Do you regularly or occasionally employ household help?" Possible answers were: *"yes, regularly"*, *"yes, occasionally"*, *"no"*. This question was asked in 1994 and 1999. Three data sets were therefore prepared for this paper:

SET94	includes 6020 households which answered the above question in 1994
SET99	includes 6764 households which answered the above question in 1999
SET94-99	includes 1726 non-pensioner households which answered the above question in 1994 and 1999

Descriptive statistics for SET94 and SET99 are given in Table 1 and 2. Table 1 also describes the variables that have been used in our Probit-procedures. Given what has been said above, the list of regression variables should first include the net income of the household, here called YHH.

The discretionary income plays a decisive part following section 2 of this investigation. So we include 0/1-dummy-variables (SINGLEM, SINGLEF, SINGLEPAR, COUPLE0, COUPLE1) that indicate the household type at hand. Hence the expression

(14) $b_1 \cdot YHH - b_2 \cdot SINGLEM - b_3 \cdot SINGLEF - b_4 \cdot SINGLEPAR - b_5 \cdot COUPLE0 - b_6 \cdot COUPLEKID$

mimics discretionary income.

Second, attention had to be directed towards the division of labour. Therefore, we include SATHHWF and SATHHWM, which measure the woman's and the man's satisfaction with household work. Wife's net income (NETTOF) is included for three reasons. It indicates her wage rate and working hours and has an influence on her position in intra-household bargaining.[8]

Tab. 1 Descriptive Statistics of SET 94.			Sample size n=6020 households		
Variable	**Description**		**Mean**	**Min**	**Max**
HELP	=1 if a household help is employed regularly or occasionally, else=0.		0.06246	0	1
YHH	Household net income DM p.m.		3571	200	30000
SINGLEM	Unmarried man	0/1-dummy variables, indicating household composition	0.0784	0	1
SINGLEF	Unmarried woman		0.135	0	1
SINGLPAR	Single parent		0.0537	0	1
COUPLE0	Couple without children		0.2749	0	1
COUPLEKID	Couple with children		0.4372	0	1
AREA	Area of the dwelling in m^2		84	9	350
CARE	0/1-dummy whether someone in the household needs care		0.0357	0	1
AGEF	Woman's age		41.74		94
SANEF	Woman's state of health		2.55	1	6
AGEM	Man's age		37.09		95
SANEM	Man's state of health		2.92	1	6
WORKF	Work	Women's answers to the following question: "Different individuals find different things in life important. How important are the following things to you today?" 1=not important, 2=somewhat important 3=fairly important 4=*very important*	2.61	1	4
FAMILYF	Family		3.39	1	4
FRIENDSF	Friends		2.84	1	4
MONEYF	Income		3.09	1	4
DWELLF	Dwelling		3.14	1	4
POLITF	Political influence		1.79	1	4
SUCCF	Success in occupation		2.2	1	4
LEISF	Free time		2.78	1	4
HEALTHF	Health		3.46	1	4
OEKOF	Environmental protection		3.02	1	4
RELF	Religion, belief		2.14	1	4
WORKM	Work	Men's answers to the following question: "Different individuals find different things in life important. How important are the following things to you today?" 1=not important, 2=somewhat important 3=fairly important 4=very important	1.51	1	4
FAMILYM	Family		1.56	1	4
FRIENDSM	Friends		1.36	1	4
MONEYM	Income		1.47	1	4
DWELLM	Dwelling		1.45	1	4
POLITM	Political influence		1.21	1	4
SUCCM	Success in occupation		1.45	1	4
LEISM	Free time		1.38	1	4
HEALTHM	Health		1.55	1	4
OEKOM	Environmental protection		1.43	1	4
RELM	Religion, belief		1.22	1	4
SPDF	Social democrats	Woman's preference for a *political party*	0.16	0	1
CDUF	*Christian democrats*		0.12	0	1
FDPF	Liberals		0.008	0	1
GRUENEF	Ecologists		0.03	0	1
PDSF	Socialist		0.02	0	1
REPF	Nationalist		0.002	0	1
SPDM	Social democrats	Man's preference for a political party	0.18	0	1
CDUM	Christian democrats		0.13	0	1
FDPM	Liberals		0.01	0	1
GRUENEM	Ecologists		0.025	0	1
PDSM	Socialists		0.013	0	1
REPM	Nationalists		0.009	0	1
SATHHWF	Woman's satisfaction with household work		5.38	0	10
NETTOF	Woman's net income [DM] monthly		750	0	19 000
SATHHWM	Man's satisfaction with household work		2.5	0	10
RURAL	Distance of the household from an urban centre (classed)		3	1	6
CONTACT	Frequency of contacts in the neighbourhood (classed)		2	0	4

Tab. 2 Descriptive Statistics of SET99. Sample Size n=6764 households. For variable descriptions see Tab.1.

Variable	Mean	Min	Max	Variable	Mean	Min	Max
HELP	0.066	0	1	RURAL	3.13	1	6
YHH	3962	200	25 000	CONTACT	2.01	0	4
SINLGLEM	0.035	0	1				
SINGLEF	0.038	0	1	SATHHWF	5.26	0	10
SINGLPAR	0.062	0	1	NETTOF	786	0	13336
COUPLE0	0.3	0	1	SATHHWM	2.87	0	10
COUPLEKID	0.39	0	1				
CARE	0.034	0	1	AREA	90	6	450
AGEF	41.63		97	AGEM	37.26		98
SANEF	2.63	1	6	SANEM	2.94	1	6
WORKF	2.55	1	4	WORKM	2.47	0	4
FAMILIYF	3.34	1	4	FAMILIYM	2.95	0	4
FRIENDSF	2.86	1	4	FRIENDSM	2.49	0	4
MONEYF	3	1	4	MONEYM	2.72	0	4
DWELLF	3.04	1	4	DWELLM	2.67	0	4
POLITF	1.84	1	4	POLITM	1.73	0	4
SUCCF	2.16	1	4	SUCCM	2.22	0	4
LEISF	2.77	1	4	LEISM	2.52	0	4
HEALTHF	3.39	1	4	HEALTHM	3	0	4
OEKOF	2.8	1	4	OEKOM	2.46	0	4
RELF	2.04	1	4	RELM	1.68	0	4
SPDF	0.17	0	1	SPDM	0.19	0	1
CDUF	0.14	0	1	CDUM	0.16	0	1
FDPF	0.006	0	1	FDPM	0.093	0	1
GRUENEF	0.028	0	1	GRUENEM	0.023	0	1
PDSF	0.02	0	1	PDSM	0.019	0	1
REPF	0.0023	0	1	REPM	0.007	0	1

Third, physical factors for the demand for housekeeping services had to be covered. So the woman's and man's ages (AGEF, AGEM) and their health states (SANEF, SANEM) were taken into account. Further, whether someone in the household needs care was taken into account (0/1-dummy-variable CARE). Finally, the size of the dwelling was considered (AREA in m^2).

Fourth, this investigation should find out whether attitudes have an impact on the demand for household helps. At this point, the question was: which items of the GSOEP-questionnaire might serve at all as instruments for attitudes related to employing a household help? It was decided to find out which of the responses to the following question would turn out to be significant: *"Different individuals find different things in life important. How important are the following things to you today?"- work – family – friends – income – dwelling – political influence – success in occupation – free time – health – environmental protection – belief, religion.* As additional tools, indicated preferences for political parties were considered. It is certainly not supposed that these were causal factors for employing a household help, but it was hoped that there were tools which could show a certain complex of opinions, e.g. conservative or feminist ones.

So the list of variables, which can be seen in Table 1, was used for a Probit procedure. The results are shown in Table 3. Note that only those regression variables which turned out to be significant[9] in SET94 or SET99 are listed.

We can see that higher household net incomes favour the employment of a household help. On the other hand, the probability that help is employed is in most cases lower, the larger the

number of household members. This means that household's discretionary income is a decisive variable for explaining the employment of a household help, see again equation (14). Looking at the group of variables that describes physical factors, we find no surprising results. The probability that help is employed increases, especially beyond the age of 65 (for this see Fig. 1) and if a person who needs care lives in the household. The probability is lower, the less healthy the wife.

Tab. 3 Results of the Probit-procedure

	SET94			SET 99		
Variable	Coefficient b	Significance level α	Increment of Pseudo-R^2	Coefficient b	Significance level α	Increment of Pseudo-R^2
INTERCEPT	-2.744	0.0001	0	-1.24	0.0001	0
YHH	0.000172	0.0001	0.0426	0.00016	0.0001	0.0587
SINGLEM	1.24	0.0001		-0.746	0.0015	
SINGLEF	1.32	0.0001		-0.0244	0.1778	
SINGLEPAR	0.94	0.0008		-0.395	0.0071	
COUPLE0	0.78	0.0011		-0.20	0.0579	
COUPLEKID	0.6	0.0133	0.1003	-0.33	0.0060	0.0875
AREA	0.0087	0.0001	0.0166	0.0062	0.0001	0.0078
CARE	0.823	0.0001	0.0438	0.8	0.0001	0.035
AGEF	-0.0066	0.74		-0.032	0.0005	
$AGEF^2/100$	-0.05167	0.26		0.0446	0.0001	
$AGEF^3/1000$	0.007854	0.0122	0.0365			0.03
SANEF	-0.0121	0.0015	0.0021	-0.068	0.0507	0.001
AGEM	0.028	0.1986		-0.0396	0.0001	
$AGEM^2/100$	-0.052	0.2925		0.041	0.0001	
$AGEM^3/1000$	0.0052	0.1267	0.0132			0.01
NETTOF	0.0001	0.0003		0.00083	0.0015	
SATHHWF	-0.016	0.1888	0.0068	-0.0136	0.2372	0.003
WORKF	-0.08	0.0267				
FAMILIYF				-0.116	0.0289	
FRIENDSF				0.085	0.0823	
MONEYF				-0.2	0.0005	
DWELLF				0.093	0.1343	
POLITF	0.12	0.0066				
LEISF	-0.11	0.202				
CDUF	0.26	0.0016		0.2	0.0057	
FDPF				0.36	0.1687	
GRUENEF	0.51	0.0005	0.0131	0.32	0.0286	0.015
FRIENDSM	0.115	0.0373				
MONEYM	-0.237	0.0002				
POLITM				0.091	0.0264	
SUCCM	0.11	0.0126				
HEALTHM	-0.22	0.0014				
RELM				0.092	0.0091	
FDPM	0.457	0.0272		0.52	0.0157	
GRUENEM			0.0145	0.453	0.0036	0.0083
RURAL	-0.0654	0.0029	0.0032	-0.0836	0.0001	0.0057
Pseudo-R^2			0.2927			0.262

Concerning the division of labour, we see that the probability of employing a household help is higher, the higher woman's net income, and is lower, the more she dislikes household work.

Many of the attitude variables turned out to be significant. However, it is difficult to tell a convincing story about why just these should be significant. Nevertheless, it can be seen that

one political preference, for the social democrats, does not favour the employment of a household help, while liberal opinions do.[10]

We now look at columns 4 and 7 of Table 3. The numbers there show the part of Pseudo-R^2 that is explained by the significant regression variables. We can therefore get information about the relative importance of the regression variables. This is shown in Fig. 2. We see that most of the Pseudo-R^2 is explained by discretionary income and physical factors like age, health, care and size of the dwelling. Attitude tools, at least those that we have taken into account, only explain one ninth of Pseudo-R^2.

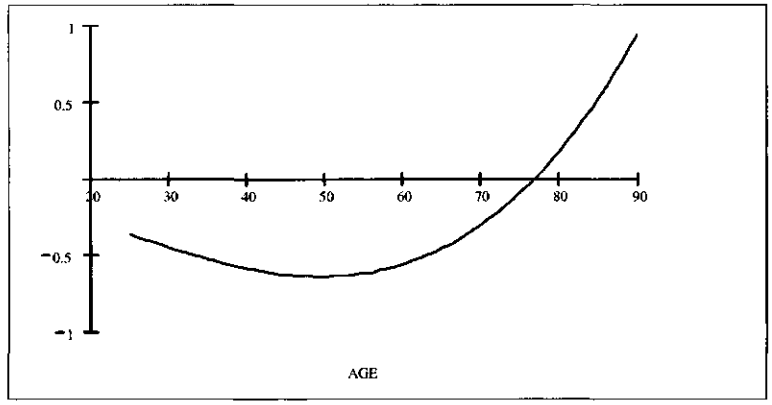

Figure 1: The influence of AGE-terms on the probability to employ a household help for women in SET94 (according to Tab. 3)

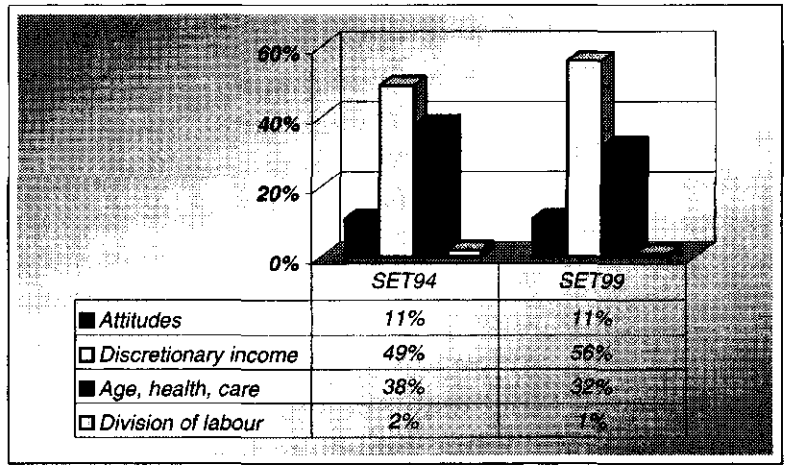

Figure 2: The relative importance of significant regression variables in SET94 and SET99

Tab. 4 Number of households and state of HELP in 94 and 99									
Household real net income increased					Household real net income decreased				
1186 households		HELP in 1999			540 households		HELP in 1999		
		not	occas.	reg.			not	occas.	reg.
HELP in 1994	not	1097	24	20	HELP in 1994	not	500	3	8
	occas.	12	0	5		occas.	6	2	0
	reg.	7	1	20		reg.	6	4	11

Finally, we investigate the effect of the German income tax reform mentioned in the introduction. Old age pensioners could profit little from this reform, however, younger people could benefit. So a data set (SET94-99) was generated, which includes only those with gainful employment and only those who were respondents in 94 and 99. Next, we excluded those households whose composition had changed and those where the state of the variable CARE had changed. After all these exclusions 1726 households were left.
Concerning the variable HELP, we now take three states into account: household help is *not / occasionally / regularly* employed. Because the number of households that changed in the state of employing a help was relatively small, a Probit-analysis led to results with poor significance. So the author decided to present a simple comparison of frequencies. Hence the SET94-99 was split up in two subsets:
- household net income increased from 1994 to 1999
- household net income decreased from 1994 to 1999.

Table 4 shows the number of households in the two subsets according to the state of HELP in 1994 and in 1999.

We suppose that the main effect of the 1997 income tax reform was that households which did not employ household help, or did so only occasionally, would now employ household help regularly, because if they do so, their net income increases. So we looked at the left half of Table 4 and found that 20 households did not employ a household help in 1994 but did so regularly in 1999. However, 7 households employed a household help regularly in 1994 and no longer did so in 1999. Thus the net gain of changes from "not" to "regularly" was 13 households. In the same way, we can compare changes from "occasionally" to "regularly" and get a net gain of 4 households. The number of households with increasing income which regularly employ household help has grown from 28 (7 + 1 + 20) to 45 (20 + 5 + 20). In relation to the number of households which regularly employed household help, this is a percentage growth rate of 17/28=60 %. But, related to the number of all households – even those with increasing income[11] – the percentage growth is only 1.5 %.

4 Conclusions

Our analysis has shown that attitudes indeed have an influence on the demand for housekeeping services. In particular, we could perceive that rather egalitarian political opinions do not favour the employment of household help. However we have also seen that these factors should not be overstated. The main factors of the demand for housekeeping services are, on the one hand, the need for care, and, on the other hand, the disposable income of the household. In other words: households employ household help if they really need them or if they can afford them.

So we can suppose that there will be no growth in housekeeping services above the average in Germany within a short time - even if attempts are made to influence the attitudes concerning them. The main demand factors are physical and economic. With regard to the first factor, it

must be recognised that the aging of society is a slow process and people who are aging today have better health than in the past. With regard to the second factor, we can expect neither a rapid growth in real incomes nor a rapid fall in household help's wages[12].

In the long term, however, we can expect that the number of housekeeping jobs will grow for the reasons we have just mentioned: we can expect that real net incomes will also grow in future, and we cannot neglect the fact that an aging society will need more housekeeping services.

5 Endnotes

(1) Cp. Dorn (2000).
(2) One child for single parents.
(3) Cf. Bundesministerium für Arbeit und Sozialordnung (1996,1997).
(4) The GSOEP is a broad representative longitudinal study of private households. It provides information about all household members, who are Germans living in the old and new German States, foreigners, and recent immigrants to Germany. The Panel was started in 1984. In 2000, more than 12000 households, and more than 20000 persons were sampled. Some of the many topics include household composition, occupational biographies, employment, earnings, health and satisfaction indicators.
(5) Stone (1954).
(6) For a more general approach see Ott (2000).
(7) See for example Judge et al. (1988, p. 791 f.)
(8) Cp. Kooreman, Kapteyn (1990), Ott (1992).
(9) The bound for α was set at (admittedly generous) 25%. Concerning the Age-terms the authors intuition was decisive, cp. Fig. 1.
(10) Note to this that the fraction of respondents admitting to be supporters of the PDS or REP is very low. Compare to this Tables 1 and 2.
(11) Compare to this the right half of Table 4. Among households with decreasing income, the number of households, which regularly employ household help, has fallen from 1994 to 1999.
(12) See to this the part of p_2 in equation (3).

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Informal care for psychiatric patients

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Abstract

This article deals with the outcomes of a research carried out among relatives of chronic psychiatric patients. Aim of the study - which was carried out by written survey - was to gather insight in the material and immaterial burden the informal care for psychiatric patients impose on care-givers and into the latter's need for emotional support. Respondents were also asked about their opinions on current mental health policy in the Netherlands.
The results show that the material burden is heaviest for those, who take care of family members with severe psychiatric problems, who are living in the same household as themselves. The residential situation of the patient was irrelevant to the load of the immaterial burden for his caregiver; whether the patient lived in an institution, independently of with the caregiver, the immaterial burden was the same and heavy. The same goes for the need for emotional support, which was related to the connection between caregiver and patient but not to living arrangements or the load of the material burden.
Informal care-givers of psychiatric patients showed themselves moderately in favour of the Dutch mental health policy, although they did not support all its objectives. The support was unrelated to either the material burden or immaterial burden or the relationship between caregiver and patient.

1 Introduction

Dutch government policy towards people with a long-term care dependency - and thus also towards chronic psychiatric patients - is increasingly emphasising a desire to reduce institutional care provision to a minimum. Instead, there is a growing focus on enabling patients to continue living independently, supported by peripatetic care which wherever possible is provided to the patient at home. Moving the provision of care into the community in this way is intended to help psychiatric patients to continue participating in society and, despite their problems, to live as normal a life as possible (Lower House of the Dutch Parliament (TK) 1998/1999 session).
One effect of these trends is that those in the immediate setting of a psychiatric patient (family members, friends) will become increasingly involved in the more practical aspects of the provision of care and services. Whereas in the past the staff of care institutions was responsible for providing day-to-day support, this will now become a task for the members of the patients' social network where the patient is unable to manage alone.

Relatively little research has been carried out into the burden imposed by providing informal care to people with psychological problems. Moreover, the interest that has been shown was initially confined to examining the influence of the behaviour and attitudes of the social network on the severity of psychological problems and their manifestation. Most of these studies have been carried out in countries where the policy of de-institutionalisation of mental health care took place earlier and has been more far-reaching than in the Netherlands, such as

the United States and the United Kingdom (for a summary of such research see Schene, 1986).
More recent research also devotes attention to the consequences that providing care has for members of the social network. In particular, these studies examine the health and well-being of informal care-providers and their need for information and support (Gallagher and Mechanic, 1996; Farran et al., 1998; Sobieraj et al., 1998; Angermeyer et al., 2000; Lowyck et al., 2000). Dutch research carried out among the family members and friends of psychiatric patients also focuses on this issue. Most of these studies are exploratory in nature, and in many cases involve a limited set of questions and a small research population (Borgesius et al., 1986; Oosterbaan, 1990; Van Meer, 1991; Poelijoe, 1992; Schene and Van Wijngaarden, 1993; Schene and Van Wijngaarden, 1994; Van Wijngaarden et al., 1996; Kerseboom, 1997; Kras, 1997; Dik, 1999; Stam and Cuijpers, 1999). A key aim of the various studies was to obtain an impression of the burden imposed by providing care and to identify possible differences in that burden depending on the type of disorder involved (schizophrenia, manic depression, borderline personality disorder, etc.), with a view to preventing the onset and exacerbation of psychological problems among the informal carers and ' their' patients.

Given the relatively limited value of these studies for providing advice on government policy, the Social and Cultural Planning Office (SCP) decided to carry out its own, supplementary study of family members and friends of people with long-term psychological problems. This study was focused to a greater extent than those referred to above on securing an insight into the material burden (in terms of time and money) imposed by informal care provision. The study also sought to measure the opinions of informal care-providers regarding the present policy on mental health care in the Netherlands.
This paper will give an overview of the most important results and their consequences for future policy in Dutch mental health care.

2 Research design and response

2.1 Topics in questionnaire

The study targeted members of the 'Ypsilon' and 'Labyrint/In Perspectief' family associations, who were asked to take part in a written survey.[1] The (mainly closed) questionnaire included the following sections:

- background characteristics (age, sex, civil status, education, labour market position, etc) of the family member or close friend about whom the respondent filled in the questionnaire;
- information on the type of disorder and current housing situation of the patient;
- the care provided by the respondent (both material and immaterial) to the patient;[2]
- the mutual relations between the psychiatric patient and the respondent, and the need on the part of the latter for emotional support;[3]

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1 The decision to conduct the survey among organised groups of family members (and other involved parties) was based purely on pragmatic considerations. Apart from the probably very high level of non-response, the target population is too small to enable the population to be surveyed on a random sample basis. Other possible ways of acquiring data (invitations via the media, approaching psychiatric patients themselves and/or their carers) are very laborious and it is doubtful whether the representativeness of data gathered in any of these ways would have been greater.

2 Items from these question blocks are analogous with questions in the studies carried out by Van Wijngaarden et al. and Kerseboom, which are also designed among other things to provide an insight into the objective and subjective burden imposed by caring for a psychiatric patient in one's family or circle of friends.

3 See note 2

- the respondents' opinions on current and proposed policy in the field of mental health care;
- background characteristics (age, sex, education, civil status, labour market position, income, etc.) of the respondent;[4]

2.2 Care-providers and patients

The questionnaires were distributed via the national offices of the participating family organisations to 2 x1000 addresses from the lists of members and donors. A total of 938 completed questionnaires were returned on time, a response rate of 47%. Although almost half the respondents stated when asked that they had more than one person with psychological problems in their circle of family or friends, the questionnaire gathered information only on (the care for) one patient. The number of patients to which the study relates is thus the same as the number of respondents.

Women are overrepresented among these respondents, with a share of 73.4%. The men who took part in the study were relatively more frequently the partners of a psychiatric patient; in the categories 'parent', 'child' or 'brother' they were even more underrepresented than average. It was thus chiefly the mothers, daughters and sisters of psychiatric patients who took part in the study.[5] In terms of both education and income level, the respondents belong to the higher socio-economic classes.

Men formed the majority (59%) of the psychiatric patients about whom information was gathered in this study. 37% of the total were aged between 25 and 34 years; the average age was 37. In 43% of these cases, the diagnosis of their disorder at the time of the study was 'schizophrenia'; a further 7% had a different psychotic disorder. 18% suffered from borderline personality disorder and 15% were suffering from a severe mood disorder (depression or bipolar disorder).[6]
Almost half the psychiatric patients in this study (43%) were living independently in the four weeks prior to the completion of the questionnaire; just under a quarter (23%) were living with the respondents; 13% had been admitted to an institutional mental health care facility; and 10% were living in sheltered accommodation. In 4% of cases the respondent did not know where the patient had been living during the period in question.

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[4] For a more detailed description of the study see Kwekkeboom, 1999

[5] The overrepresentations found here by sex and relationship with the psychiatric patient correspond with those found in other research (in the Netherlands and abroad) into the burden placed on caring family members and others involved with psychiatric patients (see e.g. Schene and Van Wijngaarden, 1995). It is also the case in the provision of informal care to people with long-term somatic disorders that it is primarily the female family members and friends who take on the lion's share of the care provision (for a summary see Duijnstee et al., 1994)

[6] The 'overrepresentation' of people with schizophrenia is caused by the fact that Ypsilon is a 'specialist' family association and is in principle only open to family members and others involved with people suffering from schizophrenia or another psychotic disorder. The overrepresentation in fact produces no distortion of the study results.

3 Material and immaterial burden

As indicated above, various ways have been used to chart the burden imposed by caring for a psychiatric patient in one's family or circle of friends. Both a more 'material' burden, in the sense of the investment in time and money, and a more 'immaterial' or emotional burden, expressed in terms of worry and (disruptions in) the mutual relationship have been investigated. In practice this distinction is less easy to identify than it may appear: it seems unlikely that the need to invest extra time and money in caring for a close friend or relative with psychiatric problems will not also have emotional implications.

3.1 Help with everyday tasks

As a first indication for the material burden, respondents were asked to indicate how often it had been necessary in the four weeks prior to the survey to encourage the psychiatric patient to perform everyday tasks such as personal care, eating adequately and healthily, doing domestic chores, going out for things such as shopping and maintaining social contacts. The responses show that almost half the patients never needed to be encouraged. Around 10-15% (depending on the type of task) needed encouragement frequently or almost all the time. Encouragement was needed relatively most frequently for doing domestic chores and maintaining social contacts, and least for personal care tasks.

Sometimes encouragement is not enough and actual help must be provided. For this reason the next block of questions asked whether and to what extent the psychiatric patient had to be helped in carrying out these everyday tasks during the four-week period preceding the survey. The responses showed that more than half the patients had never required help during this period. At most 16% (depending on the task) had required help frequently to (almost) always during this period. This help was needed relatively most frequently in relation to ensuring a sufficient/healthy diet and in doing domestic chores. It is striking that 85% of the patients had never needed help in personal care tasks and that only 2% of them had required help with these tasks frequently or always.

Both the items relating to the need for encouragement and those relating to the actual provision of help scaled fairly well (alphas for reliability > 0.8), enabling scales to be set up for 'need for encouragement' and 'need for actual help' with everyday tasks. Not surprisingly, calculations showed a strong correlation between the living situation and the degree to which encouragement or help (by the respondent) were needed. Those patients who had lived with the respondents during the four weeks preceding the survey had also frequently needed encouragement or help. Those who had lived independently had clearly demonstrated their ability to do so, requiring significantly less encouragement or help. It was striking however that those who had been admitted to an institutional facility during the period not only had to be encouraged more frequently than average, but also more often required actual help (table 1).

Table 1 Need for encouragement or actual help in performing everyday tasks, by living situation of psychiatric patient (in %)[8)]

	encouragement needed				actual help needed			
	never	sometimes	regularly	Often to (almost) always	never	sometimes	regularly	often to always
independent	24	48	19	10	45	42	9	3
with respondent	8	42	34	16	21	39	29	11
With friends/family	23	41	23	-**)	60	28	-**)	-**)
Community Residence (RIBW)	18	50	28	-**)	50	38	9	-**)
In institution	16	42	23	15	40	38	12	10
Other (incl. detention centre)	47	31	19	-**)	82	15	-**)	-**)
total	19	45	24	12	41	39	14	5

*) the differences are significant, $p < 0.05$
**) figure < 5
Source: SCP (FPP=99)

3.2 Extra time and money

For 20% of the respondents who had to provide actual help, this required an investment of more than nine hours per week on average. The amount of time invested was (logically) greater for those with a psychiatric patient living in their home: more than a fifth of this group devoted more than 17 hours to providing help with daily activities. More than 10% of patients who were or had been in an institutional mental health care facility during the period had received help from the respondents for more than nine hours per week. Providing help to a psychiatric patient in one's family or circle of friends thus imposes a considerable time burden. It is therefore not surprising that more than half the respondents stated that they felt partially to severely restricted in carrying out their own everyday activities.

Apart from extra time, for many family members and friends caring for a psychiatric patient also costs extra money. The most frequently mentioned cost items (cited by more than a third of respondents) were travel costs for visiting and living expenses. Only 8% of respondents mentioned costs for dealing with damage caused by the patient. For 47% of those who had incurred such additional costs during the four weeks prior to the survey, those costs exceeded NLG 200, and for 18% the figure rose above NLG 500. This latter group mainly concerned patients who had lived independently during the pre-survey period or who were living with the respondents or with friends/other family members.

The magnitude of the additional expenses for patients was directly proportional to the income level of the respondents themselves: the lower their income, the less they were able to spare for the additional expenses. Nevertheless, it was the respondents in the lower income groups who most frequently indicated that they themselves were placed in financial difficulties because of these additional expenses.

3.3 Cause for concern

The more immaterial burden was charted among other things by asking about the extent to which the respondents had been worried during the four weeks prior to the survey. They were also asked about any negative or positive consequences of the psychiatric disorder on the

relations between the respondent and the patient, and also about the need by the respondent for emotional support.
In the questions on the degree to which respondents had felt worried, six possible reasons were offered: the safety of the patient him/herself, the patient's health, financial position and future, the adequacy of the care provision to the patient and the safety of (other) family members. The fact that almost three-quarters of the respondents never or at most occasionally worried about this latter aspect suggests that the patients concerned in this study do not pose a great threat.

The most important source of worry proved to be the future of the patient; a quarter of respondents frequently worry about this, while more than a third worry about it (almost) constantly.

There is virtually no correlation between the degree to which respondents worry about a family member with a psychiatric illness and the type of disorder suffered by the patient. The living situation of the patient also appears to have no influence. It is the relationship with the patient which is the key to determining whether and to what degree respondents worry: it is parents who worry the most; children or brothers and sisters of psychiatric patients appear better able to distance themselves (table 2).

3.4 Impact on relationships
The psychological disorders appear to have only limited negative consequences for the relationship between patient and carer. Although three-quarters of the respondents stated that they had been disturbed by the patient's behaviour in the four weeks prior to the survey, more than half stated that this had occurred only 'sometimes'. A large majority of the respondents (78%) stated that they had never considered breaking the contact. More than three-quarters of the respondents did however feel that contact with the psychiatric patient disrupted their own lives at least 'occasionally'. This was also the most negative consequence cited by respondents of the psychological disorder suffered by their relative.

With respect to the experiencing of negative relational consequences, too, it turns out to be not so much the type of disorder or the patient's housing situation which exert most influence, but above all the relationship between patient and respondent. Partners and children most frequently report negative consequences. Parents and in particular brothers and sisters have the fewest problems with this (table 2).

Table 2 Aspects of immaterial burden as a result of psychiatric disorders in a family member, by nature of the relationship (in %) [*]

		partner	parent	child	brother or sister	other relationship	total
Level of worry	never	-**	2	-**	9	-**)	3
	sometimes	25	19	36	38	28	24
	regularly	34	37	38	33	37	36
	frequently	29	28	13	14	15	24
	(almost) always	9	15	8	7	17	13
Occurrence of negative consequences for relationship	never	9	16	8	20	18	15
	sometimes	33	45	32	58	55	44
	regularly	31	30	26	16	25	28
	frequently	20	8	24	-**)	-**)	10
	(almost) always	7	2	10	-**)	-	4
Occurrence of positive consequences for relationship	more or less	64	53	88	78	54	60
	(very) good	35	47	8	20	47	39
Availability of emotional support	none (at all)	12	9	8	15	35	11
	reasonable	73	71	87	83	63	73
	a (very) great deal	15	21	5	2	2	16

* differences are significant, $p < 0.05$
**) figure < 5
Source: SCP (FPP'99)..

Research into informal care-provision to people with somatic limitations shows that it can have positive consequences not only for the recipients but also for the providers of the care (Duijnstee, 1992; de Boer et al., 1994). With this in mind, respondents in this survey were also asked to name any positive consequences that might ensue from providing care to a psychiatric patient in their family or circle of friends. The responses to these questions indicated that positive consequences actually occurred slightly more frequently than negative consequences. Thus 41% of the respondents stated that they felt (greatly) appreciated by the psychiatric patient him/herself. Almost one third felt the bond between themselves and the patient to be so strong that even the psychological problems could not damage it. Caring for a family member with a psychiatric illness also taught 84% of respondents to be more accepting of the idiosyncrasies of other people to some degree. Once again, it is the parents who see the most positive aspects of the situation. The brothers and sisters of a psychiatric patient, and in particular their children, have much more difficulty with this.

3.5 Need for and availability of emotional support

The almost continual care, and the negative and positive consequences of providing that care, mean that 94% of the respondents sometimes to almost always need emotional support. This support is sought and found in their own setting: they derive most support from their own partner, where they have one, and from any (other) children. 40% of the respondents also indicated when asked that they did not feel able to approach their GP, social workers or those providing 'formal' care to the psychiatric patient for this emotional support.

Although those without a partner and/or children can frequently turn to friends or neighbours, all in all 10% of the respondents have no-one to turn to for the support they need. The brothers and sisters of psychiatric patients are overrepresented in this group. Parents and partners of psychiatric patients are able to mobilise the most support (table 2).

4 Views on policy

As already indicated, the government drive to move mental health care out into the community has resulted among other things in an increase in the importance of the role played by the family and other members of the social network surrounding the psychiatric patient. In order to ascertain whether the members of that network themselves willingly accept the role accorded to them, the SCP survey also asked about their degree of agreement with a number of principles underpinning current or proposed policy. Although there was considerable variation in the level of agreement per topic, the responses nevertheless show that the participants in the study, though they do not enthusiastically embrace the policy, also do not rigorously reject it.

With an average score of 3.8 on a scale ranging from 1 (strongly disagree) to 5 (strongly agree), the statement that someone with psychiatric problems can best be helped by enabling him/her to live as normal a life as possible attracted most support. The fact that this does not automatically imply that people with psychiatric problems should live independently is evident from the lower average score (1.9) for this item. The response pattern also shows that the introduction of the 'direct payments' system (personal budgets for individual patients) is still an insufficiently familiar phenomenon for a large proportion of respondents (a fifth) for them to be able to express a view on it. Of those who did have an opinion, a majority were (moderately) positive (table 3).

Table 3 Level of agreement with statements on desired policy trends (in %)

	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree	average	Don't know
long-term institutionalisation not good	9	13	27	32	9	3.2	9
care best given at home	16	29	28	18	4	26	5
everyone with psychological problems can live independently	34	39	14	6	1	1.9	6
a person with psychological problems should first be able to turn to their family	13	23	21	35	7	3	3
a person with psychological problems can best be helped by allowing them to live normally	3	5	16	59	13	3.8	4
avoid forced admission as far as possible	10	21	19	35	12	3.2	4
direct payments (personal budgets) in mental health care are a good thing	12	12	11	31	14	3.3	20

Source: SCP(FPP99)

The items from the block of questions on agreement with these principles also scaled well (alpha for reliability > 0.7), enabling a scale to be constructed for 'support for the policy'. The results suggest that the level of support for this policy can be described as moderate to strong among family members and others involved with psychiatric patients. 37% of the respondents indicated that they agreed with this policy, while 3% strongly agreed. The percentages for those who disagreed or disagreed strongly with the policy were considerably lower, at 14% and 2%, respectively.

It is striking that views on current and proposed policy show no correlation with the material or immaterial burden experienced by the respondents. Similarly, no relationship could be established with characteristics of the respondents (e.g. sex, relationship with the patient, level of education or age), nor with characteristics of the patient (e.g. type of disorder or living situation).

5 Conclusions and consequences for policy

The moderately positive outcome on the 'support for the policy'-scale allows to conclude that family members of psychiatric patients are willing to some degree to accept their allocated role in the provision of care. On the one hand this is not very surprising: the information on the immaterial burden showed that this burden is not influenced by things such as the housing situation of the psychiatric patient; whatever policy is pursued, the emotional consequences of a psychiatric illness suffered by a family member or friend remain the same. On the other hand, this outcome is striking: the material burden (in terms of both time and money) was highest for patients living outside a mental health care facility.
The fact that in spite of these consequences for themselves, family members and friends of psychiatric patients still agree with the policy of moving mental health care out into the

community says something about their commitment. Given the cautious nature of this agreement, however, it would seem unwise to place overly heavy demands on that commitment. Even then attention should be given to establishing support arrangements for those delivering informal care to psychiatric patients to enlighten both the material and immaterial burden. The ongoing support projects for children to parents with severe mental health problems should be intensified.

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Every Day Life and Consumption: The Beginning of the Chain. Historical and Post-modern Reflections in Household-Economics

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Abstract

Complementary to the view that consumption is the end of the "production chain", the position in this statement is that consumption in everyday life takes place at the beginning of this chain.

Historical research and post-modern reflections in our post-industrial times can help to better understand and classify the field of production and consumption in every-day life in the household. As Max Weber distinguished household and the acquisition are the two basic types of all economies.

Looking at the far-reaching history of the science of Oikos, House, Huishoud or Household, one sees its importance for society. In addition, one can also see its relation to the start of political economy since the start of industrialisation. Not lastly, the arrangement of the basic types of economy and the changing evaluations of achievements are in the focus of the reflections.

One interesting aspect is the emphasis of production and consumption. Adam Smith, the founder of political economy, remarked that consumption is the end and purpose of production and criticised, that the welfare of the consumer is continuously sacrificed to the interests of the producer; a problem which not only existed in the past.

In postmodernity, social sciences look at the household in a new way. In addition, a critical reflection of constructions of reality, dominant paradigms and hegemonious assumptions are evident. This is a chance for new perspectives of the theoretical approach pertaining to the household, which can help surpass the confined understanding of household and its achievements in every-day life and their meaning for the natural and social framework in our world.

1 Introduction

Complementary to the view, that consumption is the end of the "production chain", the position in this statement is, that everyday life in the household and consumption takes place at the beginning of this chain. To put the consumption at the end of the "production chain" is adopted from Business Economics and is a central component of their paradigm. The position of Household-Science is different, however. Household Scientists start from households and families as the basic units of a community. They consider consumption in the context of mastering every day life. Some aspects of this interpretation will be pointed out in this paper.

The background to this statement is a definition by Max Weber[i], a comprehensive historical research concerning Household Science and Education from Greek antiquity through the Middle Ages till modern Europe[ii]which was completed through the expertise of many scientists from various disciplines and countries[iii]. And finally, a study of countries which have experienced vital changes in recent decades.

It is often not very obvious that Haushalt und Erwerb, in English household and acquisition, are the two basic types of all economies as Max Weber distinguished them. The household intends to provide for its supply ones needs; acquisition instead intends to make profit in the market. The different subject matters and objectives are reflected on the one hand in Household-Science and Business Economics on the other.

2 Historical Reflections on Postmodernity

The hardly perceived history of the two sciences can help to a better understanding of their specific aspects and theories, their dignities and missions, as well as neither one science can be replaced or substituted by the other.

The roots of the both sciences for the different types of economies are found in Greek antiquity. The fore-runner of Household Science is *Oikonomia*, which got its name from *Oikos*, the Greek term for house, and was already a discipline of every day life[iv]. The other discipline was *chrematistic*, in other words a commercial market and money oriented discipline (Kaufmannskunst), which was criticised by Aristotle because of its excessive and unbounded nature[v].

Both sciences play a significant role in the development of economics and society in Europe[vi]. However, they both developed differently through various historical periods in various countries. In the pre-industrial agrarian society, the house was a unit for domination and subsistence. During this period, Europe was confronted with the challenge of trying to overcome underdevelopment and to integrate an ever-growing population. The answer to this was the development of an early market-economy which integrated the household into the economic system and gave orientation to this process[vii].

The Old European Economics had a considerable standing. Treaties and literature from various countries across Europe such as England, France, Italy, Germany, Poland, Hungary and Russia not only gave information on and for every day life in the house and agriculture, but also knowledge for cultural orientation as Christian values or ideas of the great European intellectual movements from the Renaissance through the Reformation up to the Enlightenment. The writings about this topic were a testimony of European Culture.

These Old European Economics disappeared with the transition from the pre-industrial to the industrial periods. The science for the acquisition, which adopted the name *economies*, developed to a general theory of production in acquisition and circulation of goods valued at the market[viii]. In the dominating system of these economics with their market-oriented valuation of achievements, the household shrank to a place of consumption. The work in the household, mostly done by women, was judged as unproductive, and this in the arising industrial societies, where productivity and achievement had a high appreciation. The devaluation includes important achievements which the national prosperity was dependant, as

the procreation and education of future citizens[ix] as a contemporary of that period said and is just now a discussed issue in countries of the European Union.

Problems in the context of industrialisation and in the education systems were the reasons for the establishment of a new discipline for the elementary living area called Home, Household, Huishoud, Haushalt, in different languages. A forerunner was the United States of America, where the science of Home Economics was introduced at universities since the end of the 19th century. The conception of a science for the "dailyness" of life, the management of resources in the context of nature and society was a model (Figure1 as example) for the development of this science in many other countries around the world[x].

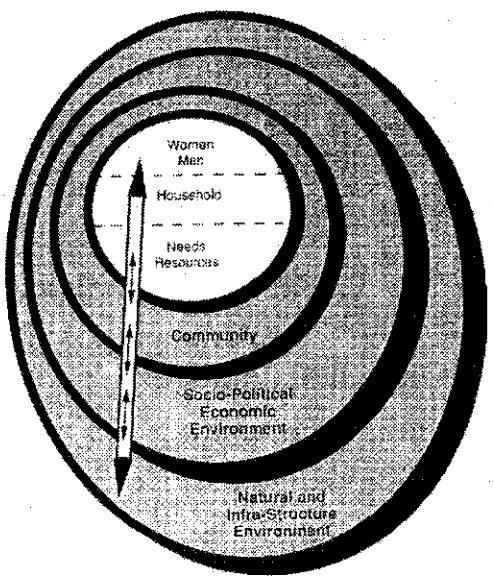


Figure. 1: Household and Environment

The Netherlands were with Finland one of the first countries in Europe after World War II, where the new Science was established[xi]. Here at the Landbouwhogeschool, later the University Wageningen the *Huishoudwetenschappen* were introduced[xii]. For more than a quarter of a century the unforgettable Prof. Visser worked on a very constructive development of the *Huishoudwetenschappen*[xiii] and also gave impulses for Household Science in Germany. I remember that in their theoretical approach the daily *Verzorging* or *care* of human beings was understood as a social phenomenon and not only under the consideration of suitability (Zweckmäßigkeitsregeln). Her definition of independent *"huishouding"* as a fundamental characteristic of the household, accentuated not only an important aspect for the development of Household Science, but also the understanding of the household as a socio-economic *Verzorging* unit (Versorgungseinheit)[xiv]. The English term *provision* and the German word *Versorgung* have, in my understanding, not the same dimension as the Dutch word *Verzorging*. The Dutch term *zorgend handelen*, (the care for life in the social units household and family) accentuates the social aspect of behaving and is far better than the English term for consumption which usually simply deals with the supply of goods.

Figure. 2: Prof. Clara W. Visser with Prof. Helga Schmucker (right) and Prof. Erich Egner (left) 1970 in Wageningen

If selected aspects of the household are encompassed from the bordering social sciences, by example social relations or consumption, then the household science, in turn, has to encompass the total complex of its object with its social, economic and cultural dimensions. It must also encompass the structural modification of the household as well as the changing situations and problems in the context of the natural and societal framework. In every- day life handle many factors and relations. There are many tasks with different dimensions, related to daily work and time[xv].

The human being as the decisive and active force, and not the market or specific economic or social relations, is central to Housholding, Huishouding or Household Management. It requires constant co-ordination between resources on the one hand and the security of existence on the other. Co-ordination is also necessary between the household members especially, in the division of labour. Moreover it needs to co-ordinate between decisions and behaviour in the household and the social and natural environment with their global perspectives, as sketched in the Figure 3.

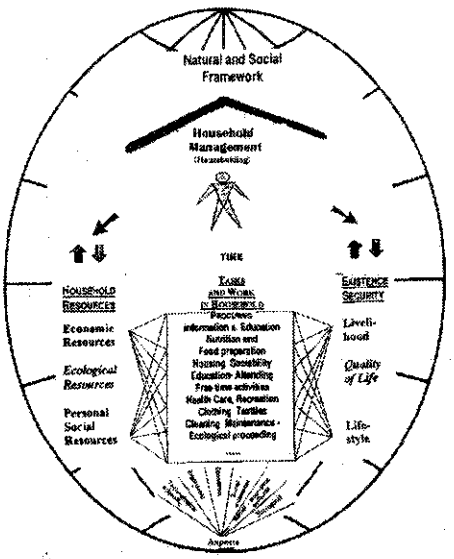


Figure 3: Household and Household Management or Householding

From the point of Household Science consumption is in the whole range of decisions only one part - between regarding the market and work-procedures in the home. Mostly in Business Economics the acquisition of goods was seen as equal with its utility. But the household is no fairyland, where the roasted pigeons fly into the open mouth, expressed in a German saying. Even now it is necessary to prepare the Christmas goose or turkey as well as the food for the children and the purchase of a washing machine alone will not clean our clothes.

Recently, the New Economic Theory[xvi] which adopted the name Home Economics with the attribute *New*, discovered the production in the household, but in the special sight the usual work in the whole of every day life is not the centre of this theoretical approach or of Business Economics.

One must also recognise, as in the historical explanations pointed out, that there are different disciplines with different intentions. Professor Egner, named as the mentor of household-science in Germany, warned of the extrapolation of market-oriented thinking and its effects on the households. He criticised it as foreign infiltration of acquisition and market-oriented thinking on the household, in German language "*erwerbs- bzw. marktwirtschaftliche Überfremdung des Haushalt*" [xvii]. Recently the, social-economist Heinz Steinmüller warned of non-reflected market-oriented thinking with its concept of competition and its negative effect on daily life and family. On the contrary, in household science the living with each other, familiarity, community, a holistic approach and integrated understanding, with includes the interaction with the environment with a global perspective in the long run are in the foreground[xviii].

Another problem is, that recently representatives of Business Economics and Consumer Education are increasingly trying to replace Home Economics in different curricula. Proposals for a new curriculum in the state of Brandenburg, located in East Germany, are not only criticised[xix] because of the deficit of qualifications for daily life and living together in the basic unit of society, but also because it is a plan from men for boys. It does not take into

consideration the living conditions and the continually disadvantaged situation of girls and women. The current change of the position of the women in democratic societies, where women and men have same rights and duties are not perceived. Emancipation of both girls and boys is the new challenge of our educational system.

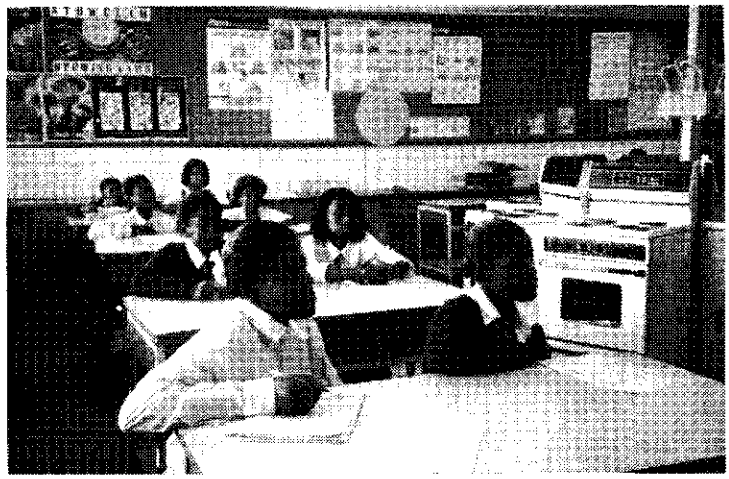
An other problematic example is the European Module for Consumer Education which tried to develop consumer education into a dominant subject which includes topics ranging from political learning, responsibility of the consumer in the market, to a central competence for daily life and new learning in the family[xx].

4 Household Science and Education in countries with a fundamental change

A better understanding for the elementary problems in every day life gave studies in countries which have had deep political changes in recent years as Nepal, the hinduistic kingdom in the Himalayas, the Islamic Sultanate Oman on the Arabian peninsula, the Republic Namibia in Southwest Africa and the East European countries Hungary, Latvia[xxi] and the east European countries Hungary, Latvia[xxii] and Poland. It can make clear, the active role Household Science or Home Economics and Home Economics Education for the improvement of the quality of the households and the welfare of the society. In the era of globalisation the observation of these elementary units in different environments, cultures and stages of development opens new perspectives. Although differences in historical and cultural conditions is common to all these countries, that Household Science and Education are actively involved in the deep societal changes currently underway. The reason is, that Household problems are also identified as problems in these societies and the active role of Household Science or Home Economics is accepted for the improvement of the quality of the households and the welfare of the society. It is to be remembered that many problems in the unit household are global problems. This can be observed in major UN Conferences which deal with issues such as nutrition, water, energy, habitat, environment, as well as the year and decade of the woman, child, elderly, etc.

I would like to restrict my report to two countries: Namibia and Latvia. Namibia reflects problems of less developed countries, while Latvia reflects the problems of countries which have to master abrupt political change and the introduction and initiation of the market economy.

Home economics science and education in Namibia has to deal with questions regarding limited energy, water, food resources because almost 30 % of the population have no jobs and have very low income, if any. Therefore, food production and nutrition are crucial points in the contents of curricula and studies at the University in Windhoek[xxiii]. The detailed explanations about these topics are also necessary in a country, where agricultural production plays a role. Preservation and storage of foods are also essential and information about nutrition and health vital. The Household Resource Management is another topic which includes the management of natural resources, as well as energy resources, water management and the protection of environment, human and financial resources. The workload of women, time management and task allocations are also on the plan, as are money management, family budget and insurance and credit opportunities. Actual problems as human development with population growth, fertility, family planning and gender perspectives and the tragic problem of AIDS are also reflected.



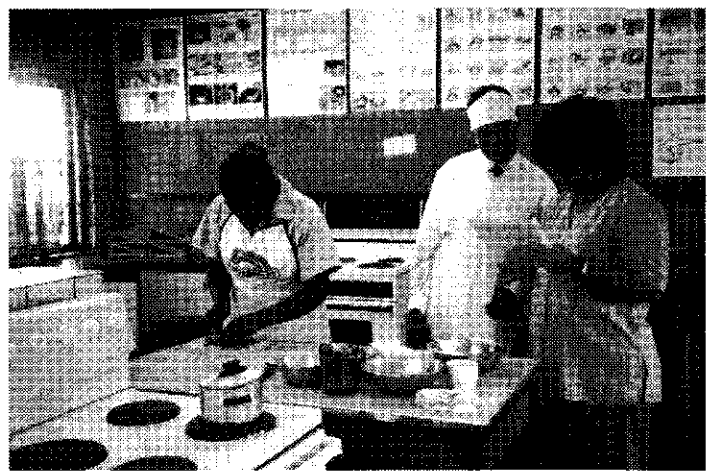


Figure 4 and 5: Theoretical and practical Home Economics Education in a school in Namibia

The definition of the household as being a group of persons who share a residential accommodation, responsibilities for production and consumption is a basic requirement for topics regarding Household Economics and. Consumer Studies. They take up traditional themes such as consumer behaviour, rights, human health and safety. In addition, new aspects are to be found in Household Economics such as: home business and enterprises, market research, marketing and entrepeneurship. Production can help the households improve their income. This is vital when one considers the high unemployment rate in Namibia. These chances are especially utilised by women who are responsible for the production and sale of handmade products which are typical Namibian souvenirs.

As the Studies at schools in Namibia[xxiv] and Latvia show, theoretical and practical work is combined. The reason behind this is to get better qualification and competence by having

hands-on experience in the household. In addition, it serves a creative approach to any other task.

The objectives and contents of teaching and learning clearly reflect social problems in these countries. The Curriculum of the Latvian Ministry of Education from 1998[xxv] is an excellent example of how to master the new situation in the market. The information in consumer education is very constructive. The starting point for learning about new behaviours required in the new market situations is the situations and problems within the household. Examples are: price information and calculation of food production, sales for finished products, consumer rights, and information about cost of housing, purchase or leasing, electrical power, water, gas, heating e.t.a. Another vital point is the organisation of one's own private household in a way not to pollute the environment. Squandering and daily consumption waste is also discussed thoroughly.

Namibia and Latvia are only two examples how science and education give answers to challenges in the household and societies. The direct relation to every day life in the context of social change have given a chance to master daily life with regards to old as well as new challenges and constructively help to overcome them.

5 New Valuation of the Household in Postmodernity

The studies in this emerging countries can also make clear, that the far reaching changes in our world cannot be mastered without the participation in the basic units of society in democratic and post-industrial societies. This may be one reason to identify the household in postmodernity as a place, where: "everything comes together", where persons interact in practical daily proceedings, their working - and living areas, as well as their social relations, are arranged and integrated[xxvi]. Households are perceived as a basic condition which gives the individual the chance for self-development and for participation in society and life[xxvii]. In addition, welfare research identifies the household as one of the central instances of the production of welfare, because whatever the individual can obtain and use in welfare services becomes filtered and formed within his or her own household[xxviii]. Furthermore the micro sphere of daily life is to be seen as the starting point for the sociable transformation of the (post) modernising of the world of ideas[xxix]. In addition, it is assumed, that social and political consciousness in the presence is not only influenced by areas of work and production, but also by the private sphere[xxx]. This and other examples may demonstrate in Postmodernity the perception of new dimensions and a new valuation of the household. Postmodernity is also connected a new interest in history as well with critical reflections of the constructions of reality, of dominant paradigms and old certainties as new hegemonious assumptions[xxxi].

6 Conclusion and Outlook

In the challenges our time it must not be overlooked, that acquisition and household, Business Economics and Household Science are complementary and indispensable for human life. Their common mission is to react and respond to different challenges in our post-industrial world. For example the constraints in the mad cow disease (BSE)- crisis make not only clear Adam Smith' s leading idea, that the consumption is the single purpose of production[xxxii] but also the interdependency of the chain; from beginning to end. Without the lack of demand and consumption of beef in the households, markets and production systems collapse. This

situation makes one become critical of viewing real situations in the context of the critical reflection paradigms in postmodernity[xxxiii].

This is a chance for new perspectives to be formed with regards to theoretical approaches pertaining to the household. This can help surpass the rather narrow conventional understanding of household and its achievements in every day life and its meaning for the natural and social framework in our world. It may also be a motive to discuss two central terms for our subject matter which are described in the congress programme *"...the other end of the chain"* and *"every day consumption"*.

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8 Figure Credits

Fig. 1 Balakrishnan, R.: Intra-Household Dynamics: Implications for Programme and Project Formulation. Rome: FAO/ESHW, 1993 in: Leena M. Kirjavainen/Marie-J. Mermillod: Emerging problems of households in the Third World as a challenge ahead for revitalizing research and curriculum development in Home Economics In Richarz, I. (Hg.) Haushalten in Geschichte und Gegenwart, Göttingen 1994, S.173

Fig. 2 Richarz, I.

Fig. 3 Richarz, I.

Fig 4 & 5 Richarz, I.

Childcare in Slovenia: facts, preferences, privatisation

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Abstract

Different from most transition countries, Slovenia has managed to retain most of its advantages and achievements in pre-school childcare attained in the socialist period, while, during the transition years, rather successfully reforming services according to principles of the market economy. Childcare services are not only available but also affordable due to high subsidies from public sources.

In 1996, the new Law on Preschool Childcare was enforced, which regulated the (already existing) private initiative and subsidising of private programmes through public sources. The latter is of utmost importance because parent fees are a critical issue allowing or preventing a free choice among providers and services. Since the share of children from age 1 to school age in organised public childcare reached 50.9% in 1991, it was not expected that it could be considerably increased by private initiative itself. This paper will evaluate the current position of private providers of child care in Slovenia as compared to the public ones: are there any constraints concerning their entering the network of providers, are they competitive and why, what are their advantages and drawbacks, etc.

People's attitudes and preferences regarding child care, as well as the arrangements they use(d) for care of their own pre-school children, were captured by the second round of the European comparative Population-Related Policy Acceptance and Attitude Survey (PPA2), conducted in Slovenia in June 2000. The paper analyses the obtained answers, including the evaluation of the burden, which the payment for child care represents/represented for family budgets.

1 Introduction

Since the end of the 1970s, the pre-school childcare services have been widespread and highly subsidised in Slovenia. The high level of availability, along with affordability, of organised childcare has been an important precondition for extensive female employment, which, in socialism, was considered as one of the elements of equality of sexes. Throughout almost the whole of the socialist period, public day-care centres were the only legitimate, formally organised and subsidised providers of pre-school childcare. The curricula and organisational forms of childcare were uniform to a great extent and thus not adequate for meeting different needs and interests of parents and their children. Family day-care (guest families) existed as well, but was legal only if associated with day-care centres and allowed only for children up to three years of age. Of course, there were also private child minders who were not registered for providing these services. This was quite a frequent form of grey economy and for some

parents the solution of the last resort. Others preferred this form of childcare because of its more individual treatment of their children, despite the negative effects and risks associated with it (higher parent fees than those charged by public day-care centres, absence of the quality control of services, insufficient or inappropriate education and training of private child minders, frequently unsuitable premises and equipment, etc.).

Different from the majority of transition countries, Slovenia has managed to retain most of its advantages and achievements in pre-school childcare attained in the socialist period, while, during the transition years, rather successfully reforming services according to principles of the market economy. In the 1990s, changes were gradually introduced. The first private day-care centres were already established in 1991 although it was only in 1996 that the new Law on Pre-school Childcare was enforced, formally allowing for private institutions/programmes.[1]

The aim of this paper is to both present the facts on childcare in Slovenia and discuss the people's preferences. It is based on the legislation and statistical data on the one hand, and on the survey data on the other. The data source used in the empirical analysis is a survey, which was conducted in Slovenia in mid 2000 as a part of the second round of the European Comparative Population-Related Policy Acceptance and Attitude Survey (PPA2). The data were collected through face-to-face interviews with 1550 people making a stratified, multi-stage sample representative of the population of Slovenia aged 20-64 as regards sex, age, type of settlement and region. They provided us with information on childcare arrangements, as well as on people's attitudes and preferences regarding childcare.

In Section 2, the facts on childcare in Slovenia are presented and complemented with some information about female employment. In Section 3, the people's preferences regarding the form of childcare are analysed. Section 4 explains the position of the private sector in Slovenia as compared to that of the public sector. Section 5 draws conclusions.

1 The term "private" is used in the meaning of "non-public". It encompasses private firms and physical persons, as well as different forms of voluntary and other non-governmental organisations.

2 Facts

2.1. Availability and frequency of childcare arrangements

In the school year 1999/2000 there were 3,523 class units in the Slovenian day-care centres (41 of them were guest families) in which 64,151 children were enrolled, 90.8% of them in programmes lasting 6-9 hours per day (Rapid Reports, 2000). 15.0% of children were below three years of age, 15.5% were aged three, 20.1% four, 22.5% five and 26.9% six or seven. Of all children in the corresponding age,[2] those attending programmes in day-care centres accounted for

- 16.5% of children aged one,[3]
- 36.3% of children aged two,
- 52.4% of children aged three,
- 67.7% of children aged four,
- 73.2% of children aged five and
- 86.5% of children aged six.[4]

Grouped by age, the share of children aged 1-2 attending day-care centres' programmes was 26.4%, while it was 70.2% for those aged 3-6. The share of children – in particular those aged 4-5 - not attending any pre-school educational programme is relatively high.

The research done in Slovenia has shown that it is the female employment rate which is the main factor influencing the demand for pre-school childcare services and not the number of children in an area or some other reason (Bregar, 1989). In the recent years, the activity rate of women aged 20-44 has been about 85%.[5] Nowadays, there are 21 children included in day-care centres per 100 employed women.

Parents may include their pre-school children in any pubic or private day-care centre, in any Slovenian local community. The existing childcare facilities (most of them being public day-care centres) almost fully meet the demand for pre-school childcare. 1.9% of children whose parents applied for a place in the day-care centre were rejected in the school year 1999/2000.[6]

The availability of childcare facilities, as observed by the respondents in the PPA2 survey, is presented in Figure 1. There obviously are great differences between urban and non-urban settlements. In the former ones, 86% of the respondents found the facilities sufficient, as compared to 63% of the respondents in non-urban settlements. Even more, 27% of the respondents from non-urban areas said that there were hardly any facilities in their neighbourhood. This, of course, does not mean that there is that much unmet demand. Many families prefer and opt for childcare arrangements other than that in a day-care centre or other paid childcare.

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2 Data include population aged 1-6 as of 31 December 1999.

3 Parents in Slovenia are entitled to a one-year parental leave with 100% compensation of their salaries.

4 The primary schooling normally begins at age seven and is gradually changing to age six. The process of integrating pre-school preparatory classes into primary schools will be completed once the nine-year primary education is introduced in all schools, most probably in the school-year 2003/2004.

5 In 1994, both parents of 88% of children attending day-care centres were employed on a full-time basis.

6 It does not mean that those children were not placed in any day-care centre; they just could not be included into a particular centre which first received their application. It may also well happen that the same child is counted as having been rejected several times if his/her parents have repeatedly applied in day-care centres with no vacancies.

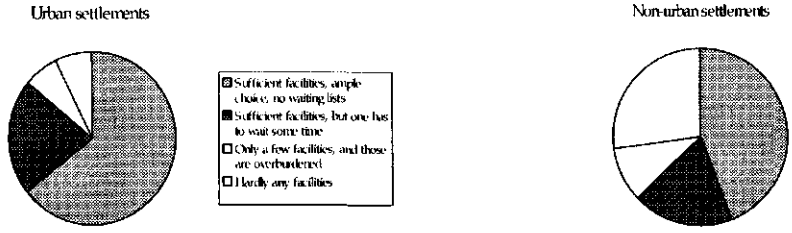

Figure 1: Availability of sufficient childcare facilities in the neighbourhood
Source: PPA2 database for Slovenia, own calculations.

On average, 58.9% of pre-school children over age one were included in formally organised childcare (i.e. in day-care centres and guest families) in the school year 1999/2000. And who cared for other pre-school children? Judging from the availability of the relevant data, this question does not seem to bother those responsible for pre-school care and education too much.

Still lacking appropriate data, we opted to use the information collected by the PPA2 survey on childcare arrangements for children of those surveyed. The numbers in Table 1 illustrate children in individual childcare arrangements rather than respondents.[7] Each respondent with her/his own children was allowed to give more than one answer. It should be noted that the data cover all children regardless of their current age. In order to make conclusions about changes in childcare arrangements in time, we may suppose that parents' age is roughly correlated with the period in which their children were of a pre-school age. Unfortunately, we cannot control for the mothers' employment status at the time when a family had pre-school children since only information about the current employment status is available.

It can be seen from Table 1 that grandparents and parents themselves care(d) for more than 60% of children while they were up to age three, and for more than 40% of those above that age. The share of grandparents as caretakers has remained more-or-less stable in the last three decades. A slight increase in their share in the last decade-or-so - evident from the structure of care arrangements for younger pre-schoolers - may be a consequence of a more frequent early retirement and higher unemployment rate in that period.

Comparing childcare arrangements for children of parents aged 50-64 and of those aged 40-49, it is evident for both age groups of children that about 10% of parents were substituted as caregivers by day-care centres. This corresponds to the fact that in 1971 an intensive construction of childcare facilities began in Slovenia.[8] For older pre-schoolers, day-care centres were and remain the most frequent parents' choice: more than half of these children are included in day-care centres' programmes. For younger pre-schoolers, day-care centres have been the second or the third most frequent childcare arrangement. From Table 1 one

7 In a number of cases, childcare arrangements differ(ed) for children of different birth order. Of course, some parents named more than one childcare arrangement also for the same child and for the same age group, but – judging from the answers given by parents of only children - this was not frequently the case.
8 In the period 1971-1985, almost 70% of the existing facilities were constructed (Vojnović 1996), while the number of children in day-care centres tripled.

could conclude that nowadays a smaller proportion of all pre-school children attend day-care centres than ten or twenty years ago,[9] but the statistical data show quite the opposite.

Do childcare arrangements for children of the same parent but in different pre-school age groups differ? The PPA2 data show that:

- about 22% of parents placed their children in public day-care centres only,
- about 17% of parents had childcare arrangements with children's grandparents during the whole pre-school period,
- about 15% of parents opted for childcare by grandparents while children were up to age three, while later children were placed in public day-care centres,
- about 11% of parents took care of their pre-school children by themselves,
- children of about 9% of those surveyed were taken care of by the other parent (partner of the person surveyed),
- about 6% of parents surveyed took care of their own children up to age three, while later children were placed in public day-care centres,
- children of about 5% of those surveyed were taken care of by the other parent up to age three, while later they were placed in public day-care centres.

Other alternative combinations were less frequent.

2.2. Affordability of childcare

Childcare services in Slovenia are not only available but also affordable due to high subsidies from public sources. Not much has changed in the size of the public subsidy for pre-school childcare during the transition period. In the last several years, public resources set aside for subsidising childcare have amounted to approximately 0.7% of the GDP. While the average subsidy amounted to 75% of the costs per child in 1990, it decreased to about 69% in 1998.

Prices of programmes performed as a public service (and this is a vast majority of pre-school childcare programmes) are determined by the founders of public day-care centres or concession[10] grantors (both being local communities) upon a proposal made by the pre-school day-care centre. All approved programmes of public and private day-care centres/providers are entitled to a subsidy. As pointed out by Bevc (1999), the more public funds are allotted to private providers, the greater are the possibilities for the development of the private sector, and the more legitimate is the public control over its performance (most aspects of that control are undoubtedly in the interest of users of private services).

Since January 1998, at least 20% of the price - including costs of education, care and meals, and excluding investments and maintenance costs - have been covered by local communities; this is a basic subsidy. The parent fee amounting to 80% of the costs is thus considered as full

9 This is most probably due to a relatively small number of parents among the respondents aged 20-29 in the sample, and consequently the small number of cases observed.

10 Concession is an authorisation given in the form of a contract between the state and the licensed non-public provider for the provision of services from the national programme. These services are performed as a public service, meaning that, in the public interest, they are guaranteed to everybody by the state or local communities. In the concession contract, the type and quantity of services to be provided by the non-public provider and the financial means to be paid to that provider from the local or the central government budget are defined. Rules concerning the calculation of prices and user fees are defined as well. A concession is granted on the basis of a public tender and for a fixed period of time (of course, it can be prolonged, also automatically). The criteria for choosing a concessionaire are: the needs for certain services at a certain location, price, complementary programmes, etc.

payment; it is paid by parents of about 3% of children. In these families, the gross monthly income per family member is over 110% of the average gross salary in Slovenia.
Additional subsidy amounts to 10%-70% of the price, depending on the income per family member as compared to the average salary.[11] The basis for fees paid by parents of children with special needs is the same as for other children in the same age group. If more than one child from a family attend the subsidised childcare programme, the fee for older children is decreased by one income group. Families on social assistance and those with income per family member below 25% of the average salary are exempt from paying fees altogether (in this group there were 4.2% of all children attending organised childcare in 2000). The pre-school educational programme in the year before the start of schooling is free of charge for all children.[12] If a local community decides to allocate more funds to childcare, it may lower parent fees. However, it is not necessary that the fee should be equally lowered to all income groups.

The above rules concerning parent fees apply only for (public and private) day-care centres that perform the public service; other licensed private providers may charge parents as they wish.

The respondents in the PPA2 survey were asked to evaluate the burden, which the payment for childcare represents/represented for their family budgets. Their answers are the following:

- for 10.4% the burden is/was very big,
- for 38.8% fairly big,
- for 36.1% not too big,
- for 4.1% negligible,
- 1.5% are/were exempt from payment, while
- 9.1% realized the unpaid childcare arrangement.

Unfortunately it is not possible to relate these answers to individual childcare arrangements. They are just a rough evaluation of the financial burden of childcare for the families in Slovenia in the last forty years or so.

[11] Not only the current income, but also a family's property is taken into account, however not in an explicit way. The local community has a discretionary right to judge if the declared income reflects the real socio-economic position of a family. In exceptional cases, the tax authorities or a social work centre may be asked to offer evidence on other facts and circumstances reflecting the real socio-economic position of a family, which are then considered by the local community in determining the level of the parent fee. The local community may not only increase the fee, but also lower it to families whose position is worse than could be judged from their declared income.

[12] 28% of all children in childcare attend the pre-school educational programme.

Table 1 Childcare arrangements for children of parents aged 20-64

Childcare arrangements	Up to age three, according to parents' age										After age three, according to parents' age									
	Total		20-29 years		30-39 years		40-49 years		50-64 years		Total		20-29 years		30-39 years		40-49 years		50-64 years	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
a	368	*25*	28	*27,5*	123	*29,4*	127	*28,3*	90	*17,9*	683	*50,1*	40	*51,9*	211	*55,7*	231	*54,6*	201	*41,5*
b	14	*1,0*	1	*1,0*	0	*0,0*	7	*1,6*	6	*1,2*	5	*0,4*	0	*0,0*	2	*0,5*	1	*0,2*	2	*0,4*
c	84	*5,7*	0	*0,0*	26	*6,2*	31	*6,9*	27	*5,4*	23	*1,7*	0	*0,0*	3	*0,8*	8	*1,9*	12	*2,5*
d	25	*1,7*	0	*0,0*	2	*0,5*	13	*2,9*	10	*2,0*	7	*0,5*	0	*0,0*	0	*0,0*	4	*0,9*	3	*0,6*
e	8	*0,5*	1	*1,0*	1	*0,2*	3	*0,7*	3	*0,6*	4	*0,3*	0	*0,0*	1	*0,3*	2	*0,5*	1	*0,2*
f	438	*29,7*	31	*30,4*	102	*24,3*	115	*25,7*	190	*37,7*	318	*23,3*	15	*19,5*	80	*21,1*	92	*19,4*	141	*29,1*
g	15	*1,0*	0	*0,0*	4	*1,0*	3	*0,7*	8	*1,6*	17	*1,2*	0	*0,0*	3	*0,8*	6	*1,4*	8	*1,7*
h	481	*32,7*	36	*35,3*	152	*36,3*	136	*30,4*	157	*31,2*	271	*19,9*	16	*20,8*	74	*19,5*	79	*18,7*	102	*21,1*
i	40	*2,7*	5	*4,9*	9	*2,1*	13	*2,9*	13	*2,6*	35	*2,6*	6	*7,8*	5	*1,3*	10	*2,4*	14	*2,9*
Total	1473	*100,0*	102	*100,0*	419	*100,0*	448	*100,0*	504	*100,0*	1363	*100,1*	77	*100,0*	379	*100,0*	423	*100,0*	484	*100,0*

Source: PPA2 database for Slovenia, own calculations.

Legend:

- *a Day-care centre*
- *b Guest family (family day-care organised through a day-care centre)*
- *c Paid private caretaker (individual day-care at the caretaker's home)*
- *d Paid childcare at the child's home*
- *e Exchange of caretaking duties with other parents*
- *f Parents*
- *g Older brothers/sisters*
- *h Grandparents*
- *i Other unpaid childcare (by relatives, friends, neighbours, etc.)*

3 Preferences

Most people's preferences regarding childcare, as recorded by the PPA2 survey, obviously could not be realized. Only 41.3% of parents were able to choose the preferred childcare arrangement for their children up to three years of age, and only 52.9% realized the preferred arrangement for their older pre-school children. The choice of the preferred childcare arrangement was made under the assumption that the level of payment were not a constraint.

For (their own) children up to age three, 32% of respondents would opt/have opted for a public day-are centre, 10% for private day-care centre, 18% for grandparents, 13% for paid childcare at the child's home, and 16% for their partner. It was expected that many parents would have opted for a private day-care centre; however, it is somewhat surprising that such a great share of respondents (32%) prefers public day-care centres. The number of respondents who prefer public day-care centres is three times the number of those who prefer the private ones. This undoubtedly reflects people's good opinion of the quality of programmes offered by the public day-care centres. It is curious that only 0.6% of the respondents would prefer (or would have preferred) to take care of their small children themselves. This may be due to the fact that this option was not offered in an explicit way; the 0.6% of the respondents named it by themselves.

The preferences are quite different for older pre-school children. The whole of 61% of the respondents would choose (have chosen) a public day-care centre and 15% a private one, while - among other options – grandparents and a partner were most preferred (by 6% of respondents each).

Comparing the preferred childcare arrangements for children up to age three with those realised (Figure 2), it seems that grandparents are not that popular as one would think on the basis of the realized arrangements. One can conclude that in many cases grandparents are/were an option of the last resort, maybe also due to the cost of paid arrangements. Also, parents themselves are not very much cherished as caretakers either, neither by themselves nor by non-parents.[1] Day-care centres and paid childcare at the child's home are preferred by much greater proportions of respondents than are their shares in the realised arrangements. The former can be partly explained by the fact that care in public day-care centres is a sort of underrepresented as the realised arrangement due to the lack of facilities at the time when children of the oldest parents in the sample were of a pre-school age. The reasons for the latter may be the high cost of the individual private childcare (because it is not subsidized) and difficulties associated with finding an appropriate person for this task.

After the child's age of three, preferences are very much different (Figure 3). Programmes offered by public day-care centres are preferred by almost two thirds of respondents, which is four times the share of those who prefer programmes offered by private day-care centres. This leaves little room for non-institutional childcare arrangements, and can be explained by the awareness of the importance of pre-school education and socialisation needed at that age.

The quality of programmes offered by day-care centres is a very important factor as well. The ratio of children per care and educational staff is 8.8. The legislation limits the number of

[13] Note that this option was not offered in an explicit way.

children per class to 12 children for those aged 1-3, and to 22 children to those aged four and over. The period of time when both a pre-school teacher and a child minder are present in a class amounts to six hours per day for younger children and four hours per day for older children. Child minders should have the secondary school education while pre-school teachers should complete the two-year university education.

4 Privatisation

This section focuses on the issue of possible constraints concerning the entering of private providers into the childcare network (in particular the public network of providers), competitiveness of private providers, and their advantages and drawbacks as compared to public providers.

In 1992 there were five private day-care centres, in 1995 six, in 1996 eight, and in 2000 fourteen.[2] The 1996 legislation regulated the (already existing) private initiative and subsidising of private programmes through public sources. The latter is of utmost importance because the level of parent fees is a critical issue allowing or preventing a free choice among providers and services.

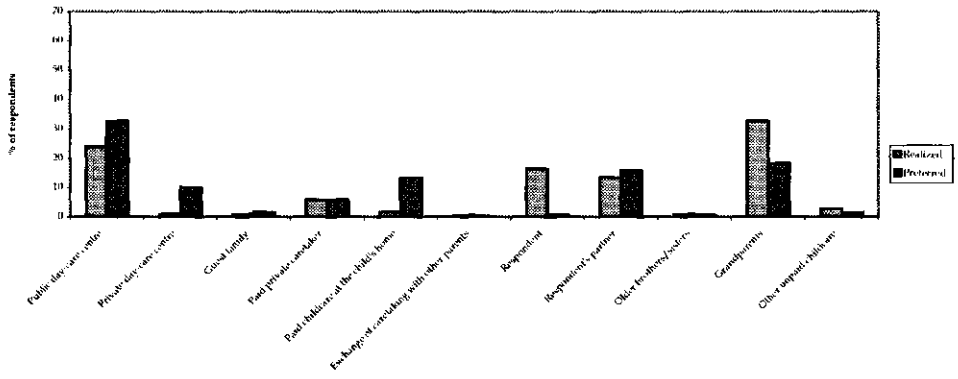

Figure 2: Realized and preferred childcare arrangements for children up to age three.
Note: Percentages of realized childcare arrangements are based on parents' answers for their own children (as in Table 1), while percentages of preferred arrangements are based on answers given by all respondents (N = 1550).

Source: PPA2 database for Slovenia, own calculations.

14 When speaking in absolute terms, that is, when counting the private providers of childcare in Slovenia, one should have in mind the size of the country's population, which is about two million, and the fact that the public sector was well developed when the transition started. Consequently, the number of private providers is small, but nevertheless important.

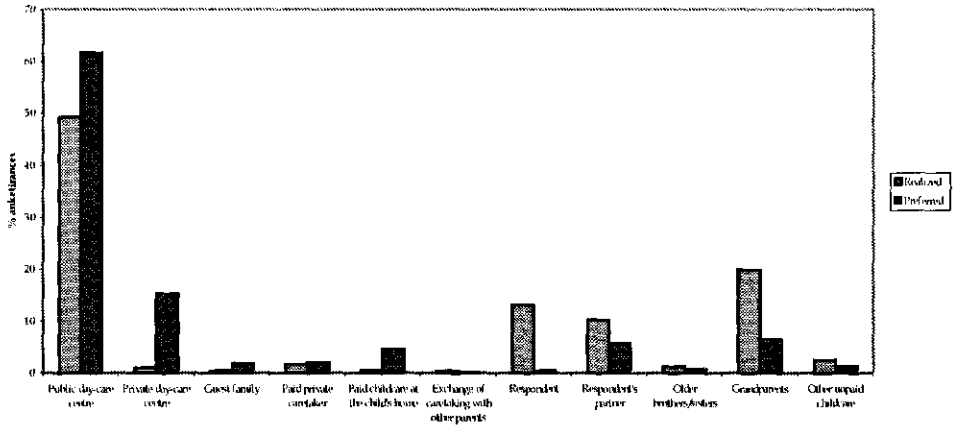

Figure 3: Realized and preferred childcare arrangements for children after age three
Note: Percentages of realized childcare arrangements are based on parents' answers for their own children (as in table 1), while percentages of preferred arrangements are based on answers given by all respondents (N=1550). Source: PPA2 database for Slovenia, own calculations.

According to the new legislation, childcare making part of the national programme is performed as public service and can be provided for either by public day-care centres or by non-public providers who have been granted a concession. The same kind of services may be offered by other licensed non-public providers (i.e. those not performing public service). Currently, five out of fourteen private day-care centres perform public service, meaning that their programmes do not differ much from those provided for by public day-care centres.[3] The Roman Catholic Church and Caritas have founded three of them, and the remaining two providers are parents' initiatives (associations). Programmes offered by other nine licensed private day-care centres differ in their curriculum and do not make part of public service. Six of these centres (founded by the Roman Catholic Church and Caritas) include religious elements into their programmes, two follow the Waldorf educational principles, while one lays its emphasise on teaching foreign languages.

Now, children of any age may be included in family day-care (guest families). Providers of family day-care may either be employees of day-care centres or private pre-school teachers. The 1996 Law regulated some new forms of childcare, too. These are, for instance, child minding at home (for children who are ill for a long period of time) and occasional child minding at home.

Due to the already existing dense network of public day-care centres offering quality subsidised services, and the declining birth rate in Slovenia, there is not much room for non-public providers of childcare. In compliance with the Law, public tenders are foreseen only if there is an unmet demand of a pre-school class size. Since the share of children from age one to the school age in organised childcare reached 50.9% in 1991, it was not expected that it

15 It should be noted that programmemes offered by public day-care centres are no longer as uniform as they used to be in the socialist period. It is just the common professional framework that is adhered to.

could be considerably increased by the private initiative itself. What people were looking for was availability of different programmes and organisational forms, and private initiative has indeed resulted in a greater diversity of services as far as their contents, work methods and duration of programmes are concerned. In order to retain their former position on the market, public day-care centres have reacted quickly by offering new programmes aimed at satisfying the various specific needs. Nevertheless, in the long run, private providers are expected to be more sensitive to changes in people's needs and preferences than the public ones.

Speaking in terms of the public subsidy, private day-care centres/providers that have been granted a concession are in a similar position as the public ones. They are entitled to a subsidy amounting to the average funds for salaries and material costs that a particular local community is paying for a child in public day-care centres in its area. Licensed private day-care centres that have not been granted a concession (and are thus not included in the public network of day-care centres) are entitled to a subsidy amounting, per child, to 85% of the average funds paid for salaries and material costs in public day-care centres in a respective local community area. Those of them, which were granted a concession prior to the enactment of the 1996 Law are treated in the same way as new concessionaires as far as the subsidy is concerned, although their programmes do not meet the new demands required for concession. This, however, is not necessarily and to a great extent reflected in the level of parent fees. In order to prevent major differences in prices/fees (and the outflow of staff from public institutions), any private day-care centre receiving public funds is obliged to follow the rules valid for salaries in public day-care centres – and the cost of labour accounts for up to 80% of all costs.

The subsidy for child minding at home shall be equal, per child, to the average funds paid for salaries and material costs in public day-care centres in a respective local community area (this form of childcare does not yet formally exist).

This means that the public subsidy does not affect the price competitiveness of private programmes, at least not to a great extent. It is important because of the impact of the subsidy on parent fees to be paid for the same kind and quality of services. Not many people are in a position not to mind how much they have to pay; on the contrary, for the majority, the fee is a decisive factor in choosing a particular programme and its provider. Also, one can speak of a really free choice only if the payment for the same programme offered by different providers is the same. On the other hand, less public funds mean more freedom in shaping and performing programmes, allowing for their better adaption to the users' needs and expectations (Stropnik, 2000).

5 Conclusion

The public sector and public service are well established and protected in Slovenia. Public providers of childcare offer quality programmes and form a dense public network of providers, but the on-going diversification of providers, services/programmes, methods, etc. undoubtedly leads to a more adequate satisfaction of the needs of pre-school children and their parents. Therefore, competition between the public and private providers should be stimulated.

Unlike the privatisation of pre-school childcare in some other transition countries, the one in Slovenia has proven to be just a minor positive change in the welfare state and not a reduction of attainments reached during the socialist period. Obviously, the tradition and public awareness of the importance of subsidised pre-school childcare in the country with most mothers being employed full-time have been strong enough to prevent privatisation in a narrow sense (meaning market allocation and predominant private financing).

6 Acknowledgements

The financial support by the Ministry of Science and Technology and the Ministry of Labour, Family and Social Affairs of the Republic of Slovenia (contract no. 3411-99-25 0656) is gratefully acknowledged.

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Household labour and personal injury for insurance assessments

Development of a method and the GITHA computer program to estimate personal injury with respect to household labour

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Abstract

Each year many households are confronted with a household member's incapacity to perform household labour due to personal injury resulting from an accident. A careful assessment this full or partial disablement is of great financial significance, both for the insurance company and for the injured party.

The computer program GITHA, developed by the authors, provides a method for estimating the damage by using reference times for separate household activities, based on empirical data. The program is an expert knowledge system, developed as a tool for ergonomists, claim regulators, personal injury lawyers and other professionals. The GITHA program produces estimates of the damage, expressed in units of time. It takes into account the complexity of household labour due to the diversity of household composition, living arrangements and household practices as well as the burden of the activities.

The paper will discuss the methodology of the program and its underlying assumptions, which are derived from the economic theory of the family. Also the paper will describe the data sets that were utilised as well as the way the data processing was carried out by using various multivariate methods. Finally the design and the lay out of the computer program will be discussed.

1 Introduction

The substantial amounts of money and time spent in the household sector makes households an important economic factor in the national economy. Although household appliances and other conveniences are widely used, the time spent in housework has remained remarkably constant over a long period (Vanek, 1974; Hart, 1995), so incapacity to do domestic work continues to represent a substantial loss in economic terms. Settlement of claims in the household domain is therefore of great financial significance, both tot the insurance companies and to the injured parties (Tromp, 1998). For this reason it is extremely important for the loss of ability to do domestic work as a result of total or partial incapacity to be assessed very carefully.

[1] GITHA was commissioned by ACHMEA Personenschade, Apeldoorn. We are indebted to André Koeman, ergonomist and team manager with this Insurance Company for his constant support and trust in our project from the very beginning. An advisory council representing various disciplines contributed to the project from their practical experience in the field of personal injury. We also wish to thank Maureen Schouten who wrote her Masters thesis on the subject. Her study served as a preliminary study for our project (Schouten 1997). Joy Burrough advised on the English.

companies and to the injured parties (Tromp, 1998). For this reason it is extremely important for the loss of ability to do domestic work as a result of total or partial incapacity to be assessed very carefully.

Because household labour is informal and non-regulated it is difficult to calculate the loss of capacity to do it. To date there has been no generally accepted method for assessing the damage with respect to household work. The outcome is widely divergent research results, repeated experts' assessments of the same case, protracted discussions, time- consuming procedures and more litigation. The GITHA computer program developed by the authors is an attempt to remedy this. It provides a method for estimating the damage by using reference time data for separate household activities. The program is an expert knowledge system developed as a tool for ergonomists, claim regulators, personal injury lawyers and other professionals. It produces estimates of the damage, expressed in units of time. It takes into account the complexity of household labour due to the diversity of household composition, living arrangements and household practices, as well as the load of the activities.

This paper will discuss successively the background to developing the program, the underlying assumptions, methods of data collection and processing, and finally the design of the program.

2 The study: background and aim

The insurance company that commissioned the program wanted us to develop a generally acceptable, unambiguous knowledge system for estimating the damage caused by total or partial disablement of the injured party with respect to household labour. The program had to be based on clear-cut basic assumptions and verifiable data. Furthermore it had to provide a framework for calculating a reasonable compensation for the loss of capacity for doing domestic work and, as much as possible, be applicable to different types of household, dwelling, household equipment and lifestyle characteristics. It had to be reliable and user-friendly to support ergonomists and claim regulators in their research at the home of an injury victim.

A prerequisite for developing a program that meets these specifications is reliable data on domestic work. Two categories of data can be distinguished: data on the economic value of household labour, and data on the task analysis and workload of the various activities. The data on the economic value are essential for assessing the extent of the damage, once it has been established which activities the victim is wholly or partly unable to perform as a consequence of the accident. Data on the workload of household activities are needed for determining to what extent a victim is incapable of performing one or more household activities. As it was impossible within the scope of the GITHA project to pay equal attention to both categories of data we decided to focus on data reflecting the economic value of household labour. Our decision was primarily based on discussions with ergonomists and claim regulators working in the field of personal injury, but also on our academic approach which takes as its starting point the economics and sociology of the household.

3 Basic assumptions

Before we were able to define the research problem, we worked out a series of basic assumptions with an eye to the prerequisites for the data set

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From a home economics point of view as well as from a neoclassical perspective, every household produces a characteristic set of commodities and services for its use. As input for this production process the household uses labour capacity, time, money, appliances, all sorts of commodities, etc (Becker, 1981; Bryant, 1990; Hagenaars, 1990). Starting from this theoretical approach we inferred the following assumptions:

1. Compensation of the damage based on the situation prior to the injury

When, as a consequence of an injury, someone suffers a loss or reduction of work capacity he or she will no longer be able to carry out all or part of the household production process. The damage thus can be defined as the portion of the household production process that can no longer be carried out. When estimating the damage it is not the loss of capacity for household labour as such, that is the issue at stake, but the household activities that cannot be carried out any longer. The reference situation is the situation before the injury was incurred. So the insurance company should compensate the victim in such a way that the original set of commodities and services continues to be provided as best as possible. It is irrelevant whether this is done by employing domestic help, using convenience foods, and household appliances or by using other forms of outsourcing.

2. Time as unit of measurement

The output of the household production process can be defined in terms of a clean and tidy home, prepared meals, well-cared-for children, etc. The results of this production process consist of large numbers of very different commodities and services that cannot be added up as such. Instead of using the output in calculating the value of household production, it is therefore common practice to use as a unit of measurement the input in terms of time spent on a given activity. The loss/reduction of capacity for household labour will thus be expressed in terms of activities and units of time, as will be explained below. It would be relatively easy to link price components to units of time. Since wages are subject to rapid changes and different users of the program will work with different price components, we did not include the monetary value of time units in our database.

3. Time use of households instead of time use by a domestic help

There are two possible approaches for generating a set of time use data to serve our purpose. Firstly, time use data of households of different composition, different housing conditions, etc could be collected. A second possible approach is to collect data on the time a professional domestic help spends on household activities under different conditions. For the development of our GITHA program we chose the first approach. The considerations which led to this conclusion were:

-Variations in magnitude-

Household production varies greatly between households, both with regard to composition and magnitude. Some people take most of their clothes to the dry cleaner's, dine out frequently, hire a domestic help for most of their cleaning, etc. Others are more self-sufficient. In some households the rooms are thoroughly dusted and cleaned every week whereas in others, the cleaning is more perfunctory. In sum, domestic work is not to be

conceived of as a fixed set of commodities and services (Davidson, 1986; Praag, 1997; SCP, 1996; Tijdens, 1994). Because these patterns and variations in household production are not well known, for the development of our database it was imperative to gain a clear insight into them.

-Variations in division of household labour-

Traditional patterns of division of household labour, with a housewife performing most of the household activities and a husband participating in the labour force, are rapidly changing, giving way to an increasing variation in task allocation. So who does certain tasks is not a foregone conclusion. The division of labour also needs to be mapped.

-Variation in work methods-

As a consequence of its informal, non-regulated character, household labour is not subject to standard procedures and methods. Every household has its specific habits and practices. Domestic workers also vary in their standards and how they perform the various household tasks, and are constrained by the specific demands of their employers.

-Variations in life style-

Finally there is a huge variation in household activities owing to life style factors such as household composition, type of dwelling, pets, etc.

Given the variations with regard to magnitude, division of labour, work methods, and life style factors, it did not seem sensible to develop our data set on the basis of time use data of domestic workers in a laboratory setting. An alternative could be to measure the time use of domestic workers in different households, taking into account the variations mentioned above.[2] For our goal this approach had drawbacks, however. In order to collect reliable data a considerable number of workers would have to have been hired, put to work in an equally large number of households and instructed to measure their use of time. This was not a feasible option given the constraints of our budget. We chose the second approach, largely because of the availability of the dataset of a large nation-wide representative time use survey conducted in 1995 (TBO'95). We analysed and processed these data in order to meet the criteria for building our database. A dataset collected specifically for our project was incorporated in the earlier dataset, as will be explained below.

The following basic questions drove our data collection and processing, taking into account the basic assumptions mentioned above:

1. Which household activities should be distinguished in the program?
2. Which factors affect the time spent on household activities?
3. What are the mean times spent on the various household activities, taking account of these factors?

4 Four household types, 29 activities

Before starting the data collection and processing we had to decide which household activities to distinguish. Firstly, we had to determine which activities to include in the program and which to leave out. Secondly, we had to consider whether certain activities, distinguished in

(2) Two methods, one German (KTBL 1991, Landau 1990) and the other Dutch (for agricultural enterprises) are based on this approach (Kroeze 1997).

TBO'95 should be subdivided or combined. Activities related to gardening, house maintenance etc. were left out. This decision was mainly based on discussions with ergonomists and claim regulators working in the field of personal injury but also on the fact that only part of the population own a garden or engage in house maintenance. We subdivided an activity when two criteria were met: significant differences in workload and the possibility of performing the new sub-activities independently of each other. This resulted in a number of 29 household activities distributed over five categories: activities related to food and nutrition, the home, textiles and footwear, shopping, and caring for household members (see Appendix I).

A quick scan of the literature (Schouten, 1997) revealed that household composition has a significant effect on the time use patterns of its members. For that reason and to enhance the transparency of the program we decided to start from a limited number of basic household types. We opted to build our classification on two characteristics: number of adults and presence of children in the household. This yielded four household types: single person household, childless couple, couple with children and single parent household. This classification does not differentiate according to number and age of children, but in the analyses these factors were taken into account. The other factors that were expected to have an effect on time spent on some or all of the household activities, such as type of dwelling and a number of household appliances, were also included in the analyses. Based on the results of the preliminary study (Schouten, 1997) and on the variables that were included in the dataset of TBO'95, 24 factors were eventually singled out for our analysis.

5 Methods of data collection, analysis and processing

The dataset to be developed had to provide a detailed account of the mean times spent on the whole range of separate household activities by different persons under different conditions. It should therefore be sufficiently detailed to be able to portray, how much time prior to being injured a person spent on the activities for which she/he is currently wholly or partly incapacitated. We used two sources to generate a dataset that matched our criteria:
1. National time use survey 1995 (TBO'95)
2. GITHA time use study 1999
The data collection, analyses and processing are discussed below.

5.1 National time use survey (TBO'95)

The Dutch national time use survey is carried out every five years. We used data from the 1995 survey because the data of the 2000 survey were not yet available. They comprised data on 3227 respondents, both male and female, aged 12 and above, one person per household. For a period of one week, respondents kept a diary in which every quarter of an hour they recorded their main activity and secondary activity. Additionally respondents completed two questionnaires, one before, the other after the week in which the time recording was done. This resulted in a large database containing time use data and a large number of socio-economic background data derived from the questionnaires.

In the GITHA project these data were used for two purposes:

a. Determining the variables that affect the variation in time spent on the various household activities.
b. Calculating mean times spent on the various household activities, accounting for the variables as they were determined under a)

As already explained, we based the design of the GITHA database on four household types. In addition to the mean times spent on household activities the effect on time use of 24 independent variables on household and individual characteristics was also studied. For each household type it was determined which of the independent variables had a significant effect on the time spent on one or more household activities. Sixteen out of these 24 independent variables had some effect (See Appendix II).

The next step in the process of constructing our database was to compute mean times for each of the separate household activities per household type, and controlling for the relevant independent variables. This was done by a series of exhaustive CHAID analyses.[3] For each activity we determined which breakdown of the time data into sub-categories provided the best explanation of the variance of the data. By doing so the entire set of 29 household activities was subdivided on the basis of the effects of the independent variables and, the corresponding mean times were computed (Appendix III gives an example of an exhaustive CHAID analysis).

The results show that of all the variables it was especially position in the household, hours per week employed, (notably for the partner), number of children and age of youngest child that have an effect on time spent on household activities. Contrary to expectations (see Schouten, 1997), owning household appliances, other than dishwasher and tumble dryer, had no effect at all. Another remarkable outcome of the analyses was the fact that type of dwelling only had an effect on the time spent on chores outdoors and not on cleaning activities inside. The data generated by these analyses were per household type, the mean times spent on each of the 29 household activities and controlling for the relevant independent variables (For an overview of the results, see Appendix IV).

5.2 The GITHA time use study.
In addition to deriving data from the TBO'95 survey, a study specifically designed for the GITHA project was carried out. It had two aims:
a. To collect more data on time spent on household activities that are generally performed less frequently (In appendix I, indicated by *)
b. To differentiate between sub-activities which form one activity in the TBO'95 dataset but differ in workload and in addition can be performed separately (In appendix I, indicated by **)

For reasons of practicality the data were collected in and around Breda, a town in the south of the Netherlands. Both rural and urban households were included in the sample, and these households had diverse socio-economic characteristics. The sample included 156 households, 39 per household type. Data were collected in two weeks in October 1999. This is the same

(3) Exhaustive CHAID (Chi Squared Automatic Interaction Detection) is included in the SPSS AnswerTree program.

season in which the National surveys are conducted, since it is a time without too many activities specific for summer or winter.

In order to obtain the data mentioned under b), households were asked to use a stopwatch to measure time spent on the corresponding sub-activities. Drawing on these data we computed the corresponding ratios and applied these to the times of the joint activities as derived from the TBO'95 data. We also asked the households to respond to two questionnaires, one before and the other after the week of the time measurement. This yielded data on the frequencies of performing certain activities and an estimate of the corresponding times spent. These were the type of activities that are generally not carried out frequently, as referred to in a).

6 Dataset for the computer program

The principal components of the GITHA database are the data resulting from the analyses of the TBO'95 augmented by the data derived from the GITHA time study. As indicated above, the database consists of series of mean times for all household activities under consideration, for all four household types and controlling for the independent variables, as discussed before. Furthermore we have developed a number of help texts to serve as a support for users of the program:

- Description of the activities and corresponding workloads.

In the first place a description of the constituent actions is provided for each household activity in the database; e.g. for machine washing: loading the washing machine, adding detergent, etc. Furthermore an inventory of physical workloads in terms of standing, squatting, kneeling, pushing, etc. is provided with each household activity.

- Outsourcing

For some relevant activities, mean scores for outsourcing per household type have been added to the database. Outsourcing refers e.g. to dining out, hiring domestic help, using convenience foods, etc. The mean frequencies have been derived from the TBO'95 survey.

- Distribution of mean times

In order to give the user of the program an impression of the range of the mean times as generated by the program, the range of two standard deviations is presented. 95% of the observations fall within this range.

7 The procedure followed by of the GITHA program

After the user has completed the first screen of basic data, both for the household and for the victim, the program leads the user through four consecutive steps:

7.1 Determining the time spent on household activities by the entire household prior to the accident

Before focusing on the victim's contribution to the household activities prior to the accident, an overview of time use data by the entire household is presented. For that purpose mean times are presented for each of the 29 household activities, taking account of the relevant independent variables such as number of children, kind of dwelling and various life style characteristics. After these mean times have been generated the user has to adjust these gross

times for the given household, taking account of the household's pattern of outsourcing: frequency of dining out, hours of paid domestic help, etc. No damage occurs for those activities the household did not perform before the accident. For these activities a percentage is subtracted from the gross times. Step one eventually results in a net pattern of household time use before the accident.

7.2 Determining the time spent on household activities by the victim prior to the accident.

Based on the net household times the program presents the mean times for the victim, taking into account the household's corresponding division of labour: between couples and between parents and children. To be clear: the program computes times for women and for men as well as for children over 12 years of age. The user again has the option of modifying these individual mean times to the victim's specific circumstances; for example regarding the labour-intensiveness of the home, children's' health, pets, or an unusual division of labour.

7.3 Determining the reduction in work capacity resulting from injury

Next the user determines the reduction of the victim's capacity to work, on the basis of a medical report and the corresponding constraints and loads profiles. Per activity the percentage of the reduction in work capacity has to be indicated, after which the program calculates the reduction in time units. These times thus provide a detailed account of the damage in terms of activities and times.

7.4 Compensation/solutions

The damage as calculated under 3) can be compensated in various ways. The obvious solution is to call in a domestic help to perform the activities the victim is unable to perform, but other solutions include acquiring household appliances, modifying the house, etc.

8 Role of ergonomist

As explained above the GITHA program has been designed to be used by ergonomists/claim regulators, but it does not replace them. The expertise and experience of the ergonomist are important factors in each of the four steps discussed above. The program cannot be applied at the desk without doing injustice to reality. In the first step, the ergonomist, in dialogue with the victim, has to trace the pattern of outsourcing before the accident. Furthermore the mean times have to be adjusted to the specific circumstances of the victim on the basis of an investigation at the victim's home. The ergonomist 's know-how is crucial for determining the percentage of work capacity reduction. These data have to be based on an investigation at the victim's home as well as on a medical record. Step four also has to be discussed and settled in the victim's home.

9 Report

In order to obtain reliable reports and an accurate calculation of the damage it is of the utmost importance to document the situation prior to the accident as soon as possible. All too often an ergonomist is not called in until after all kinds of temporary solutions have been

implemented. This makes it very difficult to get an accurate picture of the situation as it was before the injury. It is therefore important to get in touch with the victim as soon as possible. In each phase of the inquiry and settlement of the damage GITHA offers the possibility of clarifying the choices made. It does so by means of an option to make notes. All data filled in in the various screens of the program are transferred to the Word editor in which a standard format for reports is given. This aid also facilitates the calculation of various scenarios on the development of the victim's indisposition.

10 Conclusion

The GITHA computer program has only been on the market since early 2001. So it is too early to evaluate the users' acceptance. Early feedback is encouraging, however. We are confident that with the GITHA program we have created more clarity and transparency in the settlement of damage with respect to household work

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APPENDIX I: Overview of the household activities as distinguished in the GITHA program

Category 1: Food and nutrition

*preparing breakfast and lunch
*preparing dinner
setting the table/clearing the table
washing dishes

Category 2: Care of the house

*dusting
*vacuum cleaning
*mopping
*cleaning bathroom and toilet
*making beds
*changing beds
looking after pets
tending indoor plants
outdoor chores, incl. Car maintenance, bicycle, etc.
cleaning windows
**remaining cleaning and maintenance activities
cleaning ceilings and walls
cleaning radiators
tidying closets and cupboards
cleaning cooker hood
cleaning household appliances
cleaning/defrosting refrigerator and freezer
cleaning behind/under refrigerator, cooker, etc.
minor maintenance chores
cleaning ventilation grilles
washing (lace)curtains
polishing furniture
polishing silver/copper
cleaning screens
cleaning storage room

Category 3: Care of textiles, clothing and shoes

*collecting/sorting laundry
*machine washing
*washing by hand
*drying
ironing, folding, putting away
polishing shoes
mending textiles

Category 4: Shopping

shopping, including:
shopping for groceries
shopping for clothes and shoes
shopping for other items
travel related to shopping
waiting time related to shopping

Category 5: Care of household members

caring for grown ups
caring for baby
caring for other children
non-physical guiding activities (reading, talking, help with homework , etc)
physical guiding activities (playing, taking for a walk, etc.)
travel related to looking after children

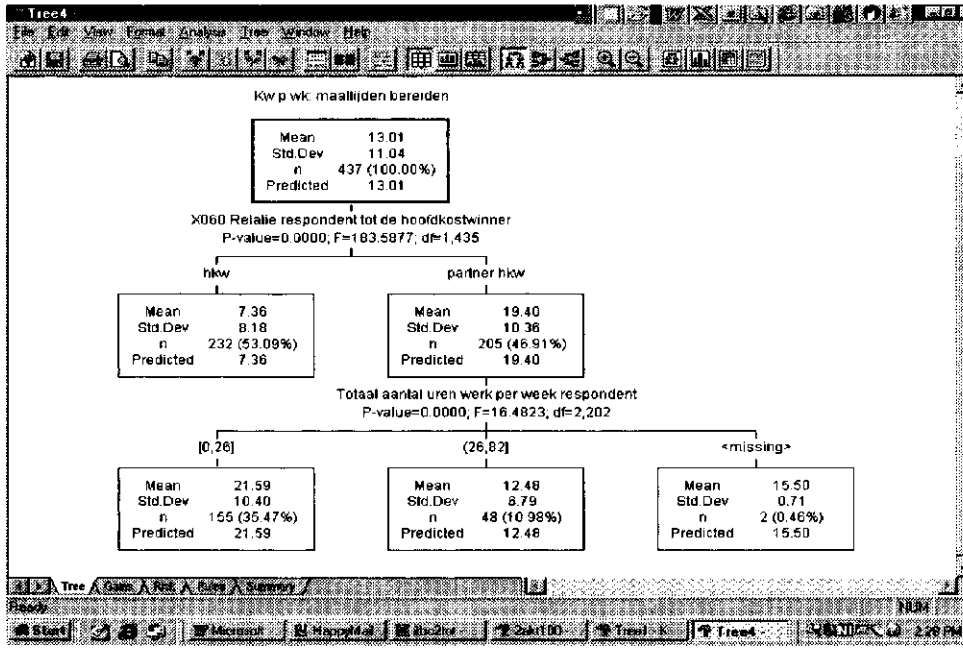
APPENDIX II

Overview of variables significantly affecting time spent on house/domestic work

	One person household	Childless couple	Couple with children	Single parent family
CATEGORY 1 FOOD AND NUTRITION				
Preparing meals	Duration of work week Educational level	Position in household Duration of work week	Position in household Duration of work week	Position in household Number of children
Setting table / Clearing table	Duration of work week	Duration of work week Position in household Age	Position in household	Position in household Educational level
Washing dishes	Duration of work week Age	Position in household Age Presence of dishwasher	Position in household Educational level Presence of dishwasher Duration of work week	Position in household Duration of work week
CATEGORY 2: CARE OF THE HOUSE				
Dusting / vacuum cleaning	Age Income	Position in household Duration of work week	Sex Position in household Duration of work week	Position in household Number of children Age
Cleaning floor/ bathroom/ toilet	Sex Age Educational level	Position in household Duration of work week	Position in household Duration of work week	Position in household Income
Making/changing of beds	Educational level Sex	Position in household Duration of work week	Position in household Educational level	Position in household Number of children
Looking after pets	Number of dogs Number of cats Presence of animals in cage/aquarium	Number of dogs Number of cats Position in household	Number of dogs Number of cats	Number of dogs Number of cats Presence of animals in cage/aquarium
Tending indoor plants	Educational level Age Sex	Position in household Duration of work week	Position in household Age	Position in household
Outdoor chores incl. Car and (motor)bike maintenance	Type of dwelling Presence of car Duration of work week	Position in household Duration of work week	Educational level	Age Sex
CATEGORY 3: CARE OF TEXTILES, CLOTHING AND SHOES				
Washing/ Tending/tumble dry laundry	Age Sex	Position in household Age	Position in household Presence of tumble dryer	Position in household Number of children Sex
Ironing/putting away laundry	Age Sex Presence of tumble dryer	Position in household Age	Position in household Number of children	Position in household Duration of work week
CATEGORY 4: SHOPPING				
Shopping (incl. time spent on travelling and waiting)	Duration of work week Sex	Duration of work week	Position in household Duration of work week	Position in household Duration of work week Presence of car
CATEGORY 5: CARE OF FAMILY MEMBERS				
Care of babies	n. a	n. a.	Age Sex	None
Care of other children	n. a	n. a.	Position in household Age of youngest child Number of children	Age youngest child Position in household
Non-physical guiding activities for children	n. a	n. a.	Position in household Age of youngest child Age Educational level	Age of youngest child Position in household
Physical guiding activities for children	n. a.	n. a.	Position in household Age of youngest child	Age of youngest child Position in household Degree of urbanisation
Care of adult household members	n. a.	None	Position in household	Age of youngest child
Travel related to looking after children	n. a.	n. a.	Position in household Age of youngest child Number of children	Age of youngest child Position in household

APPENDIX III

Example of Answer Tree analysis (exhaustive CHAID)



APPENDIX IV: Mean time spent on household activities according to position in household (persons 12 years and older) in hours per four weeks

	One person household	Couple without children			Couple with children				Single parent family		
	Main bread winner	Main bread winner	Partner	Total	Main bread winner	Partner	Child	Total*	Main breadwinner	Child	Total*
CATEGORY 1: FOOD AND NUTRITION											
Preparing meals	13.74 (n=259)	7.36	19.40	26.76 (n=437)	5.79	22.31	2.27	28.10 (n=871)	22.30	4.34	22.30 (n=88)
Setting table / Clearing table	1.76 (n=251)	4.04	7.10	11.14 (n=437)	2.75	8.36	1.30	11.11 (n=867)	7.33	0.88	7.33 (n=87)
Washing dishes	7.39 (n=257)	5.87	10.73	16.60 (n=440)	4.00	10.57	2.38	14.57 (n=871)	12.02	2.53	12.02 (n=87)
CATEGORY 2: CARE FOR THE HOUSE											
Dusting / vacuum cleaning	5.73 (n=447)	2.65	8.61	11.26 (n=715)	2.09	12.75	1.39	14.84 (n=1283)	9.33	2.24	9.33 (n=137)
Cleaning floor, bathroom, toilet	1.51 (n=447)	0.42	2.75	3.17 (n=713)	0.44	3.69	0.14	4.13 (n=1278)	3.33	0.26	3.33 (n=138)
Making/changing beds	1.24 (n=449)	0.42	2.31	2.73 (n=714)	0.29	3.39	0.30	3.68 (n=1274)	3.22	0.52	3.22 (n=138)
Looking after pets	1.79 (n=438)	1.98	4.31	6.29 (n=703)	2.24	2.95	1.44	5.19 (n=1268)	3.65	1.98	3.65 (n=136)
Tending indoor plants	1.17 (n=449)	0.32	1.45	1.77 (n=711)	0.15	1.04	0.10	1.19 (n=1280)	1.21	0.18	1.21 (n=136)
Outdoor chores incl. car and (motor)bike maintenance.	0.89 (n=449)	3.58	1.79	5.37 (n=708)	3.11	2.20	1.19	5.31 (n=1288)	1.95	0.82	1.95 (n=136)
CATEGORY 3: TAKING CARE OF TEXTILES. CLOTHING AND SHOES											
Washing/tendingtumble drying laundry	2.19 (n=440)	0.83	3.69	4.52 (n=709)	0.72	6.20	0.19	6.92 (n=1283)	5.31	0.32	5.31 (n=138)
Ironing/putting away laundry	2.12 (n=446)	0.69	4.09	4.78 (n=703)	0.76	7.36	0.21	8.12 (n=1275)	4.95	0.56	4.95 (n=138)
CATEGORIY 4: SHOPPING											
Shopping (incl. time spent on travelling and waiting)	18.65 (n=416)	16.48	22.09	38.57 (n=612)	12.55	24.72	9.84	37.27 (n=1056)	24.34	13.60	24.34 (n=126)
CATEGORY 5 CARE OF FAMILY MEMBERS											
Care of babies	n. a.	n. a.	n. a.	n. a.	n. a. or 13.71	n. a. or 27.62	0	n. a. or 41.33 (n=153)	n. a. or 30.00	0	n. a. or 30.00 (n=8)
Care of other children	n. a.	n. a.	n. a.	n. a.	4.58	11.16	0.06	15.74 (n=1288)	6.67	0.04	6.67 (n=138)
Non-physical guiding activities for children	n. a.	n. a.	n. a.	n. a.	3.75	6.91	1.22	10.66 (n=1278)	7.16	2.32	7.16 (n=137)
Physical guiding activities for children	n. a.	n. a.	n. a.	n. a.	4.79	6.36	0.23	11.15 (n=1271)	5.56	0.22	5.56 (n=136)
Care of adult household members	n. a.	0.31	0.46	0.77 (n=709)	1.05	1.90	0.13	2.95 (n=1273)	3.31	1.04	3.31 (n=136)
Travel related to looking after children	n. a.	n. a.	n. a.	n. a.	2.48	7.15	0.05	9.63 (n=1271)	6.58	0	6.58 (n=138)
TOTAL	58.18 (n=251)	44.95	88.78	133.73 (n=437)	51.54 or 65.25	139.02 or 66.64	22.44	190.56 (n=867) or 231.89 (n=153)	128.22 or 158.22	31.85	128.22 (n=87) or 158.22 (n=8)

The totals refer to adults in the household (main breadwinner and partner). Because the number of children older than 12 years per household is not known, the time spent on household activities by children are not included in the total per household. The aim of the table is to present the mean times spent on household activities in the four household types. In the definite database, a break down of the means according to characteristics of a particular household could be achieved.

Part 4

Energy and environment

Energy in Housing: Opportunities and Dilemmas

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1 Introduction and context

Households rely on the use of energy for an increasing range of activities and services considered to be essential for everyday life. The traditional uses of energy, for cooking, heating and lighting have been evolved in ways that deliver much greater convenience and comfort. Over the course of the 20th century, refrigeration for food preservation and a whole range of labour saving appliances have been adopted by many households and have increasingly become regarded as essential. More recently, households have been acquiring an increasing range of equipment for entertainment and communications, again adding to their dependence on energy supplies.

It has long been recognised that the supplies of the fossil fuels we rely on for energy production at present are finite and reserves are limited, particularly for oil. Shortages (and potential future shortages) of oil became a major focus for action by governments in the 1970s and 1980s and a number of European countries succeeded in significantly reducing their dependence on imports, both through to switching to alternative sources (notably nuclear power) and through using energy more efficiently. Although the problem of limited reserves remains, it is not currently a strong focus for energy policy, presumably based on the assumption that alternative supplies can be developed over the relatively longer period during which depletion of reserves would drive up prices.

The possibility that the use of fossil fuels by mankind could cause a rise in average temperatures was recognised over a century ago but was not viewed as a serious threat until recently. The first international agreement on reducing greenhouse gas[1] emissions was reached at he World Climate Conference in Kyoto in 1997. In was agreed that developed nations should achieve an overall reduction of 5.2% relative to 1990 levels over the succeeding 15 years, with the European Union contributing 8%, the USA 7% and Japan 6%. Studies have indicated that much greater reductions will be required to attain a sustainable level of emissions. (GCI, 2001; RCEP, 2000) This is especially so for developed countries, where energy use is already high and equity suggests that proportionately greater reductions should be made than for developing countries.

The contribution of households to overall energy use is considerable. Energy consumed directly by households in the European Union has been estimated to amount to 27% of total energy use and to account for a similar proportion of carbon dioxide emissions (Eurostat 1999). The does not include energy used in private cars (which is beyond the scope of this paper) or energy used indirectly, for example to manufacture and distribute the equipment used by households. It is clear therefore that households must contribute towards targets, such as those agreed in Kyoto, by reducing energy use where possible.

[1] The principal greenhouse gas attributable to human activity is carbon dioxide, which arises from the combustion of fossils fuels such as coal, gas and oil.

2 Energy efficiency

Households use energy to produce a variety of services and outcomes, including a comfortable and well-lit environment, a supply of hot water and to reduce the manual effort required to complete a variety of household tasks. In all cases, it is the production of the service that we value, rather than the use of energy itself. For example, space heating is assessed according to the comfort of the heated space rather than by the number of units of energy consumed. On the contrary, the most desirable performance would be a comfortable environment achieved with the minimum of energy consumed. This leads to the concept of *energy efficiency*: an energy efficient service is one that is achieved with low energy input.

Energy efficiency in housing and in household appliances has increased significantly over time. For heating, better insulated houses require less heat input to achieve comfortable temperatures and heating systems convert fuels to heat with greater efficiency. For lighting, a compact fluorescent light takes about a quarter as much electricity to produce the same amount of light as the equivalent incandescent bulb. And a modern colour television set produces a vastly better picture than its counterpart from 1970 using about a quarter of the electricity.

3 A free lunch?

Studies of the potential for energy efficiency improvements in housing and household appliances consistently identify opportunities for improvements that could be applied cost-effectively. If those improvements were to be realised quickly, they would lead to reductions in energy use of typically 15 to 30%. Some commentators have described such improvements as the equivalent of 'free lunch'; because they are cost-effective, they not only deliver energy and carbon dioxide savings but also a net return on investment. The problem is that their realisation depends in large part on millions of investment decisions made by individual households, for whom a theoretically a cost-effective investment may not look so attractive. The result is that the necessary investments are only made slowly, and often only with incentives from government.

Although energy efficiency has improved, the demand for household energy services has increased. Homes are better heated and household appliances such as refrigerators and clothes washing machines are now found in almost all European homes. Compared to fifty years ago, European households are using comparable amounts of energy but they are receiving a far higher level of service from that use of energy, thanks to energy efficiency.
It should also be noted that the number of households has increased faster than population, as the number of persons per household (household size) has decreased.
Consequently, even if energy use per household is decreasing in some countries, aggregate energy use by the household sector may still increase.

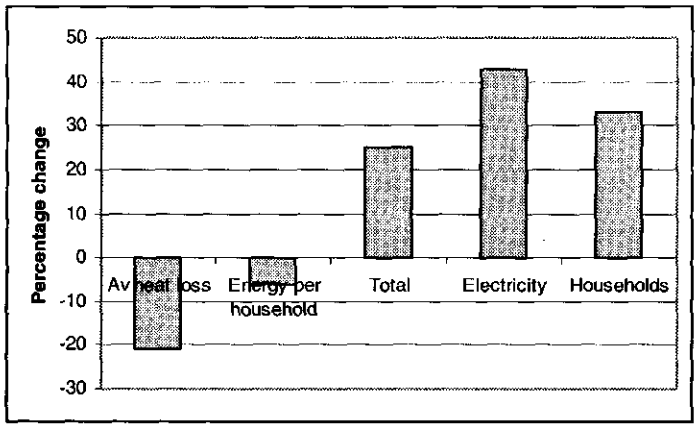

Figure 1: Changes in UK household energy use 1970 to 1999 (Sources: DUKES, 2000; Shorrock and Walters, 1998)

These trends are illustrated by Figure 1, which shows the changes in household energy use in the United Kingdom since 1970. Average heat loss per dwelling has decreased by about 20% and energy use per household has decreased by 6%. However, total energy use has increased by 25% because the number of households has increased by 33%. Electricity use has increased by over 40%. Comparable data are not available for the European Union as a whole but trends in other countries are broadly similar; efficiency gains are counteracted by rising household numbers and other factors, particularly greater use of electricity for household appliances.

The big question is this: can an accelerated programme of improvements to energy efficiency achieve the energy/carbon dioxide savings required in the household sector to meet the Kyoto commitments or ultimately to reach sustainability?

4 The significance of energy to everyday life in 2001

This section explores the extent and significance of the increasing range of uses of energy by households that I noted in my introduction.

4.1 Consumption

Figure 2 shows the energy used by European households, broken down by end use. Space heating accounts for about two thirds of all energy use by households. As noted above standards of comfort have improved, but houses are better insulated and heating systems have become much more energy efficient so the overall demand for energy is fairly constant. Improvements in insulation have been much more marked in new than in existing housing, as many older buildings are difficult to insulate economically. Heating systems, on the other hand, have improved in both new and old housing, as they are typically replaced several times in the life of a building.

Water heating has the next largest share of household energy use, and is often produced by the same heating system as space heat. As for space heating, provision and usage of hot water

has increased but efficiency has improved and energy use per household is currently fairly constant.
Energy use for cooking is probably in decline, due to greater consumption of prepared food items, the use of microwave ovens, and better efficiency of cooking stoves. As energy statistics for cooking are generally poor or out of date, this is an area in which further research is needed.

The 'other' category shown in Figure 2 consists almost entirely of lighting and household appliances. Although relatively small in terms of the total amount of energy delivered, it is significant because almost all the energy is delivered as electricity. In most European Union countries, electricity is generated largely from fossil fuels. In all cases the conversion of heat from fuel combustion to electricity can only be achieved subject to an efficiency limited by the laws of thermodynamics, which lies in the range of 30 to 50 % depending on the type of generating plant used. The result is that a unit of energy delivered as electricity can responsible for much emissions of carbon dioxide of 2 to 4 times higher than for natural gas. This clearly does not apply in countries with a large proportion of hydro-electric or nuclear generation. However, there are serious environmental concerns about nuclear power and limitations on hydro development. Also, electricity is generally much more expensive than natural gas, reflecting the high capital investment it requires in generation and distribution systems.

Although expensive and having high environmental impact, electricity is by far he most versatile and convenient form of energy for household use. Indeed, much of what is taken for granted in modern living would be impossible without it and most of the new equipment acquired and new uses of energy by households rely on electricity. It is no surprise, therefore, that this is the part of household energy use tending to grow most rapidly and the one that is tending to increase environmental impact the most.

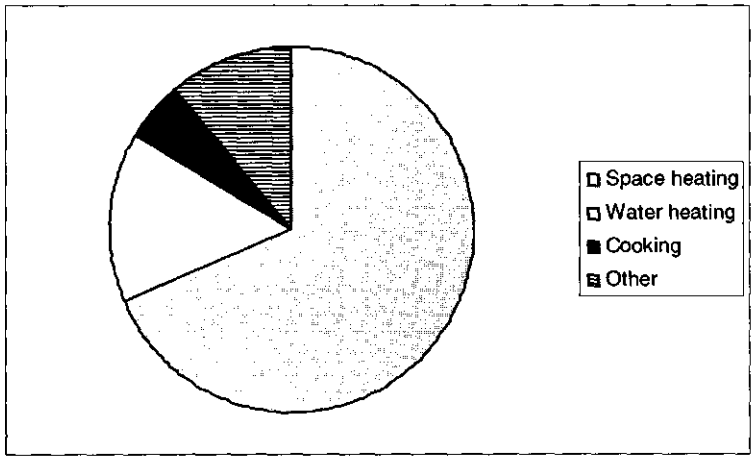

Figure 2: Uses of energy by European households (Source: Eurostat, 1999)

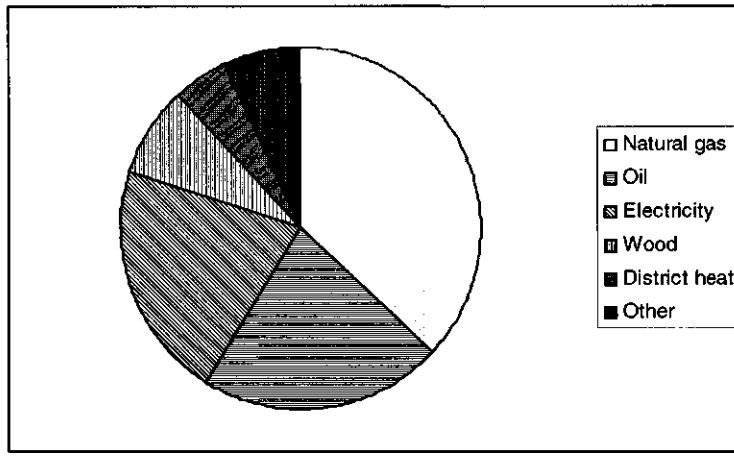

Figure 3: European household energy use by fuel (Source: Eurostat, 1999)

Figure 3 shows the fuels used by households in the EU, expressed as a proportion of their total calorific value. The use of natural gas has grown considerably, especially over the past two decades and it now easily the most widely used fuel. Oil is also widely used for heating and significant contributions are made by wood and district heat. Coal, which was once widely used for heating is subsumed within the 'other' category, which also includes liquified petroleum gas. Electricity accounts for 21% of the all energy use, of which just over half is by lights and household appliances and the remainder for heating.

4.2 Expenditure

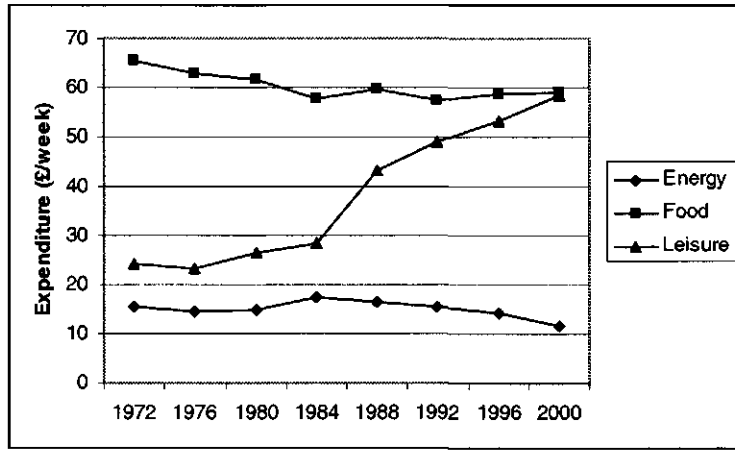

Figure 4: Expenditure on selected items by households in the United Kingdom

Figure 4 shows expenditure by households in the UK on energy, food and leisure in pounds sterling adjusted to values in the year 2000. (Source: UK Family Expenditure Survey (ONS, 2000)) Although there may have been some factors specific to the UK during the period shown, it is believed that the pattern shown in Figure 4 is reasonably representative of trends in Europe as a whole. Expenditure on both food and energy have declined slightly in real

terms, whereas expenditure on leisure has increased markedly over the three decades shown. This presumably reflects the division between 'essential' items, the need for which was satisfied throughout, and the 'luxury' of leisure expenditure, which has increased with increasing disposable income. Perhaps most significantly, we may observe that energy expenditure is currently low compared to both food and leisure.

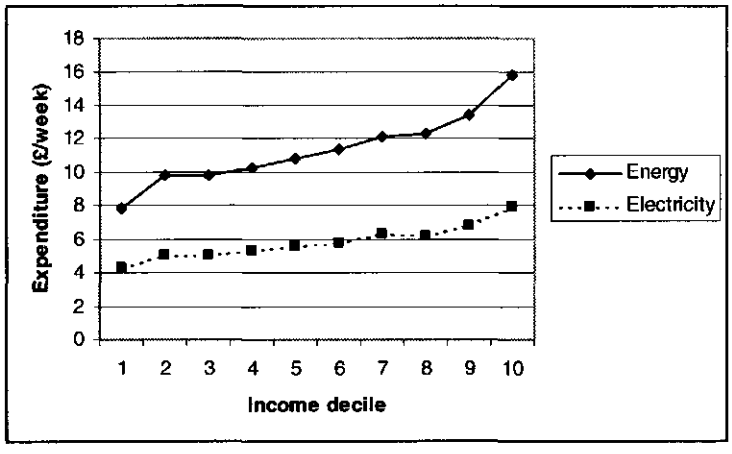

Figure 5: Energy expenditure by UK households by income decile

The 'essential' nature of energy expenditure by UK households is illustrated in Figure 5, which shows expenditure broken down by household income. (from the same source as Figure 4) This shows that energy expenditure has very low income elasticity; the 10% of households with the highest incomes spend only twice as much as the 10% with the lowest incomes. This should be seen in the context of the wide disparity in incomes that exists in the UK at present. The lower boundary for the income of the highest decile group is almost 9 times the upper boundary of the lowest group, which implies that the average income of the highest deciles is well over 10 times that of the lowest. An obvious conclusion is that low income households spend a much larger proportion of their incomes on energy than average. It has also generally recognised that the price elasticity of energy supplied to households is low, at least in the short term.

Eurostat (Eurostat, 1999) data show that energy expenditure lies in the range of 3 to 6% of all household expenditure for the EU countries. Although only a small part of average household expenditure, the UK data show that this average conceals a very wide range and that low income households spend a considerably greater percentage on energy. Overall, it seems fair to conclude that the expenditure data show household energy supplies to be a necessity that can be taken for granted by the average household, due to relatively low prices at present.

5 What determines household energy use?

It is clear that there are many factors influencing household energy use. *Physical* factors are important: thermal insulation, size and built form of dwellings and the efficiency of equipment are all clearly important. *Economic* factors clearly play a part: household income and the price of energy must be important despite the observations made in the preceding paragraph. But above all, the underlying demand for energy using services by households is

determined by *social* factors. Household size, noted above as a strong influence on aggregate energy use by households, is affected by attitudes to marriage, divorce and changing household composition. The levels of comfort expected in buildings are affected by culture and tradition (e.g. in the extent to which air-conditioning is expected in summer). (Shove and Wilhite, 1999). Other uses of energy may be variously attributed to convenience, aesthetics and fashion.

Analysis of household energy use is frequently conducted by specialists, whether they be physical scientists, economists or social scientists. Each group of specialists has a tendency to frame the problem in terms of its own specialist expertise: physical scientists in terms of energy conversion and heat flow; economists in terms of prices, incomes and elasticities; and social scientists in terms of household composition and social trends. This tends to overlook the fact that there strong interactions between the various influencing factors. Higher energy efficiency reduces the cost of the energy services provided. Higher energy prices tend to accelerate technological development. Higher incomes allow households to develop new consumption patterns, including living in larger dwellings with fewer persons per household. The result is that forecasts are difficult and estimates of what can be achieved through energy efficiency improvements are often overtaken by changing demand unless they can be applied quickly.

6 Can Europe meet the Kyoto commitments painlessly?

There is little doubt that European countries have the potential to meet their Kyoto commitments by applying cost-effective energy efficiency measures. However, there is doubt is that those measures will be applied quickly enough to counteract the underlying growth in the demand for energy using services by households. The European Commission has acknowledged that the EU as a whole will fail to meet its commitments and that further action is needed. On present trends and with present policies in place, greenhouse gases are likely to rise by at least 1%, rather than fall by 8% as is committed. (ECCP, 2001)

The 'policy measures' referred to in the previous paragraph are actions taken by the governments of member states, co-ordinated at least in part through discussion at EU level and, in some cases, taken in response to EC Directives. Policy measures may be broadly classified in three groups:

- Legislation, which requires individuals and businesses to take certain actions, such as applying insulation to their buildings;
- Financial measures, which uses taxation to influence the cost of certain actions or subsidise others; and
- Information, which persuades consumers to take advantage of opportunities to act on their own behalf.

For households, past government actions point the way to possible further actions. Legislation has been applied in the form of building regulations and minimum efficiency standards for boilers and refrigeration appliances. Grants and subsidies have been offered for a range of energy efficiency measures, including insulation, low energy light bulbs and high efficiency boilers. Information measures have taken the form of labelling certain appliances according to their energy efficiency, as well as general information campaigns explaining the benefits of energy efficiency and energy conservation. To date, taxation has been very little used as an instrument of policy aimed at reducing fuel use, except to encourage or discourage

switching from one fuel to another. For example, heating oil has been taxed in Denmark since its wholesale price fell from the high levels it reached during the 1980s to discourage households from switching back to oil from other fuels.

7 How will households be affected?

The improvements in energy efficiency required to meet the Kyoto commitments are not extreme and they can be met without adverse impacts on households or any significant reduction in the energy using services on which they rely. They are comparable in scale to improvements made over the past 10 to 20 years and they need to be accomplished at a rate comparable to that achieved in some European countries during the late 1970s and early 1980s. Nevertheless, improvements are currently not taking place fast enough.

A crucial difference between the present situation and that prevailing around 1980 is that now energy prices are relatively stable whereas then they were rising fairly rapidly. The use of taxation to exert price pressure on consumers seems unlikely. It was observed above that the price elasticity of energy supplied to households was very low, so the scale of the rise required to limit consumption would be so large as to be seriously unpopular. It was also observed that income elasticity is low, so that the effects of price rises would be mostly on low income households. Nevertheless, there may be scope of the imposition of a small levy on energy, which would be hypothecated to expenditure or energy saving measures. Examples include the levy imposed by the UK electricity regulator and spent on energy efficiency improvements in electrically heated houses.

While the Kyoto commitments can be met by evolutionary changes to the energy supply industries and to energy consumption patterns (including household consumption), there is no doubt that sustainability targets will require revolutionary changes. The actions required to reduce greenhouse gas emissions will include the development of alternative fuel sources, particularly 'renewable' sources, better insulation in dwellings and improvements to the energy efficiency domestic appliances and heating systems. However, unless those essentially technical improvements are made much faster than ever before, they are not going to be sufficient to reach the reductions required. At the very least, they are going to require vastly increased investment, which will not be cost-effective in terms of the energy cost savings it will produce. The clear implication is that our ever increasing demand for energy using services will have at least to be restrained and probably reversed. That transforms the problem from one that has been seen in predominantly technical and economic terms to one that must address essentially social issues.

8 The dilemma for policy makers

The established policies of encouraging technological development of equipment and better insulation in buildings have little direct impact on individuals and households. The small additional costs of building and new appliances are scarcely noticed and the benefits of better performance are acknowledged. However, any policy which sets out to restrain demand for energy services has to take account of the perceived value of that service and face possible opposition as a consequence. The clearest case might any restraint on heating standards, which could face objections on health grounds, but almost all energy using services are valued for reasons that range from the essential to the merely self-indulgent.

Education and information can promote understanding and help individuals make choices that are less environmentally damaging, and there is no doubt that this is already having an impact, albeit a small one. But governments face a real dilemma when they try to use taxation to reduce environmental impact; the fuel protests which spread across Europe last September showed the depth of consumer resentment of high taxation on road fuel. Equally the use to legislation to control what people do in their own time and in their own homes is viewed with extreme caution.

The big question is this: can we reshape our lifestyles to live with much less energy (and by implication, lower consumption of energy using services)? If not, the European Union's position of leadership in the climate change debate is based on false assumptions and differs from the position of America under George W Bush only in rhetorical terms.

9 New thinking is needed

The familiar model for energy policy making may, with considerable effort, be capable of delivering the European Kyoto commitment, but not to reach sustainable levels of greenhouse gas emissions in the required time scale. The extent of the changes, a possible model for allocating rights to emit carbon between countries is the 'Contraction and Convergence' proposal, advocated particularly by the Global Commons Institute. (GCI, 2001)

The geo-political process of negotiating targets is far from complete and its outcome is uncertain. In the meantime, however, we should prepare for action. The technical and economic analysis of energy efficiency opportunities needs to be extended not only to take account of social impacts but also to address the problem of rising demand for energy using services. This may prove to be one of the greatest challenges of the early 21st century and there are no obvious answers. I offer the following observations:

- It seems obvious that a more inclusive multidisciplinary approach is needed, which implies greater involvement by social scientists. For household energy use, home economics, which is inherently multidisciplinary in orientation, should have a significant contribution to make.
- One of the reasons why the environmental impacts of energy have been discounted to date is that they are not properly taken into account in economic appraisals. The emerging discipline of environmental economics needs to be further developed and its methods more widely used in impact assessment.
- Quality of life is too often assessed in narrow economic terms, such as GDP/capita. Alternative assessments that take account of the fact that greater consumption does not necessarily lead to greater satisfaction need to be developed and to gain wide recognition.
- 'Green consumerism', in which consumers make conscious choices to buy products or services with low reduced environmental impact, is an encouraging development. However, it needs to be developed considerably both in scope and in uptake before it can have major impact.

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Energy saving in the domestic setting; a μ-system analysis

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Abstract

Since the energy crisis in the 70's our society has gradually become aware that humans use more energy than the ecosystem can supply. Present societies energy management is not sustainable. Still too much energy is used and there should be sought for options to lower the consumption to a sustainable level. In this matter the energy consumption of households has a substantial contribution. On macro level a number of strategies to lower the domestic energy consumption have been developed and even introduced. But additional gains have to be found in the options for changing consumption patterns of consumers. For this challenge a profound understanding of the domestic system needed. In particular the opportunities and the limitations set by the domestic material infrastructure have to be understood. In this paper a rational model for explanation of the behaviour and dynamics of the integral domestic system is elaborated and discussed.

Key words

Domestic system, Household dynamics, Sustainability, Energy use, Consumer strategy.

1 Introduction

Households are responsible for a substantial part of the total societies energy consumption. For the Netherlands a share of ± 18% for the direct energy consumption is reported (EnergieNed, 2000). On a European scale there are national differences but in general the household energy consumption is a substantial part of the total energy consumption as well (see Henderson).
In the home energy, electricity and fossil fuels, is used for most domestic activities. Apart from this direct energy consumption, energy is used for the production and elimination of products that are used in the home; the indirect energy consumption. For the Netherlands the amount of indirect energy consumption is about equal to the direct energy consumption (Uitdenbogerd, 2000). The household direct energy consumption is increasing steadily. This concerns not only the total amount used but also the amount per household. In the Netherlands it rises on average 1.9% per household per year (Jeeninga and Uyterlinde, 2001). This increasing energy consumption leads to several environmental impacts. Because the total reserves of fossil energy resources is fixed and the energy used is for the larger part non-renewable, there is a threat of depletion. Combustion gasses that are emitted during the use of fossil energy lead to global warming, the greenhouse effect. These and other effects are the motives to reduce the societies energy consumption and so the domestic consumption to.

There are various approaches in the search for a sustainable energy management. Basic goal for all approaches is that energy should be used in a lesser quantity or/and should be of a sustainable nature (e.g. wind, coal, tidal, etc). Lower energy consumption can be achieved by using less, more efficient or less frequent.
Some studies focus on solutions at a macro level e.g. industrial transformations, economical mechanisms and policy solutions, while other zoom in on a level of individual consumers. Examples of the latter are technological solutions such as energy efficient appliances (Tweehuysen et al., 1982) or socio-psychological solutions like the behaviour and lifestyle changes of individuals.
The approach at the level of the household system, μ-system, is not very common. Nevertheless there are important reasons for a consideration of the energy issue from a household system point of view. Households, as the smallest social units, are at the end of many production chains and therefore the household behaviour and dynamics are important influence factors for both direct and indirect energy consumption. While at the other hand the material infrastructure of a household and the household standards of living set the options and limitations for energy saving measures.
In order to get a more insight in this matter, it is a necessity to gain a better understanding of the household; one has to 'dive' under the skin of the household system.

2 Household as a technological system

A household can be considered as a technological system (Terpstra, 1999). This household system can be though of as a package of complementary domestic activities, relations between these activities and inputs and outputs; an open system. Examples of domestic activities are clothing, housing and food preparation. The domestic activities themselves can be though of as sets of sub activities. Clothing for example includes acquisition of clothes, wearing, maintenance and cleaning and finally disposal. Each activity delivers a specific service. In this representation domestic living can be considered as the result of all domestic activities and their resulting services. The availability and the quality of the separate activities are determining for the level of domestic living.
An activity, in general, has energy, materials and human resources as inputs. The outputs consist of the desired services, undesired side effects and waste. Figure 1 shows a model representation of this technological system. For the technological representation of the household scientific concepts such as the conservation of mass and energy are applicable.

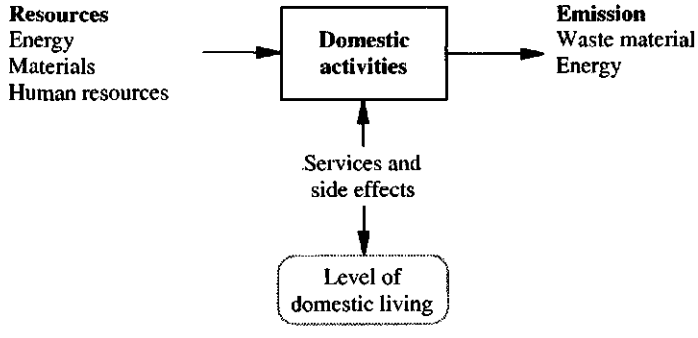

Figure 1: Technological model of the household system

Although the inputs energy and materials are shown as separate inputs, one should realize that the picture in reality is more complicated. For the production of the material goods that are used in a household raw materials and energy are used. As this energy is not consumed in the household it is called indirect energy. In a similar way materials are required for the production of energy. And the consumption of energy therefore leads indirectly to the use of materials also.

If the energy saving goal is projected on the technological model, it implies that the flow of energy through the household should be reduced. In this reasoning there is however one catch. In general the service delivered by a household activity is the complementary result of all three inputs. The meaning of this is that if the contribution of one of the inputs is reduced the contribution of the other inputs has to increase to maintain the original service level. In cleaning technology this concept is called the Sinner principle. Here the service of a cleaning process is the joint effect of mechanics (energy), temperature (energy), time (energy) and chemistry (materials). The energy consumption of a cleaning process often can be reduced easily by lowering the process temperature. But when the temperature is lowered the cleaning efficiency is lowered also (Terpstra, 2000). This can be restored by increasing the detergent dosage (chemistry) or the process time. The first measure however will result in a shift to indirect energy consumption and to other environmental impacts, depletion and pollution. The second measure will shorten the lifetime of textiles and therefore will increase the indirect energy use.

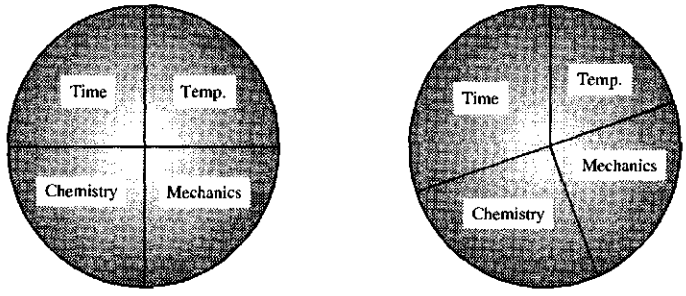

Figure 2: Sinner principle applied to a cleaning process.

Changing the inputs of an activity can have unexpected side effects. Household laundering for example is done to achieve an adequate level of hygiene, the reduction of numbers of micro-organisms to levels that do not pose a threat to human health. An old-fashioned boil wash kills almost all micro-organisms in the textiles. But when the wash temperature is lowered the hygienic effect reduces also. In household conditions the hygienic quality of the laundry after a 30°C wash appears to be lower than before washing (Terpstra, 2001). So this energy saving option easily can lead to inadequate hygiene and affect so the service level of the activity.

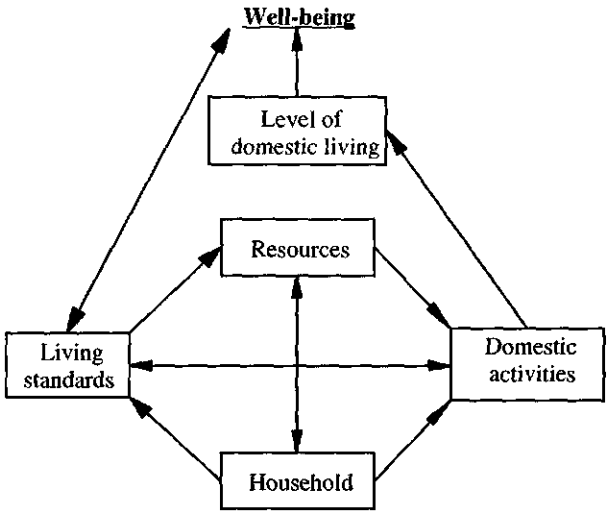

Figure 3: Household system and well-being (Zuidberg 1981)

3 Household as a relational system

A different representation of the household system is introduced by Zuidberg (Zuidberg, 1981). Her representation models the relations between the activities, actors and factors that determine
the level of well-being of a household. The model relies on two main assumptions:

- the level of domestic living is the joint result of the domestic activities
- well-being is related to the balance between the standards of living and the achieved level of domestic living

In this approach domestic activities involve resources and the human resources of the household. The result of the activities is a level of domestic living. The degree of well-being is determined by the extent to which the level of living meets the standards of living. And the standards of living are influenced by the achieved well-being. The Zuidberg concept is shown in Figure 3. The model concentrates on the dynamics of the 'human factor' and does not include the interaction of the household system with the environment. An elaboration of the Zuidberg model in which this interaction is taken into account is presented by Hardon (Hardon-Baars, 1994). Groot-Marcus e.a. developed models of the household system in interaction with society and of the relation between life cycle analysis of products and household activities (Groot-Marcus et al., 1996).

4 The Socio-technologic model

The technological model representation of the household system lacks the dynamics and behaviour of the household. The Zuidberg representation on the other hand is incomplete with respect to the physical interaction, e.g. mass and energy flows, of the household system with the environment. This makes the model not applicable for the description and explanation of behaviour of the household system with respect to environmental issues.

The completion of both representations may be found in their integration in combination with a suitable selection of the system boundaries. A model representation of this combined socio-technologic model is given in Figure 4. The system boundary of this model lies around the home. In the model mass en energy flows into and out of the system are consistent and the relations between the services of the domestic activities and the goals of the household are incorporated. This implies that material goods and energy are inflows and waste materials and waste energy are outflows. The human resources are generated within the system. In the stationary situation the model assumes equilibrium with respect to the elements: well-being, level of domestic living, standards of living and domestic activities. In that situation the resources-domestic activities-emissions chain is of a steady state nature.

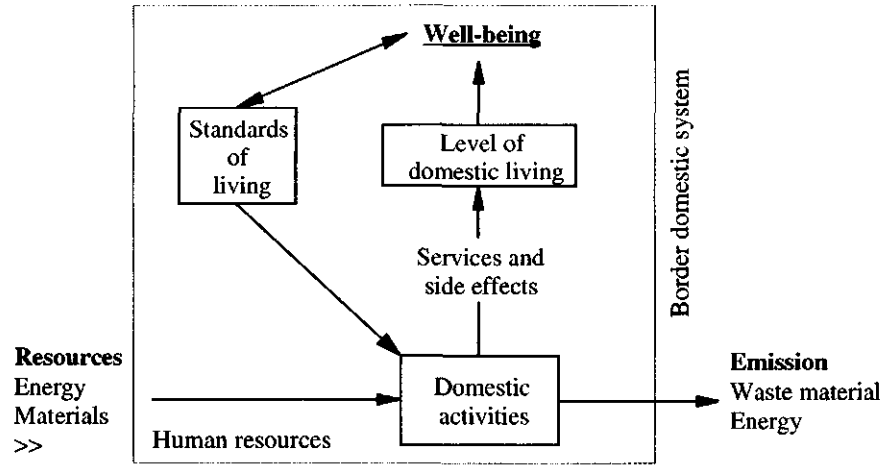

Figure 4: Socio-technologic model

4.1 Dynamics of the system; response to interventions

It is interesting to consider what kind of dynamic behaviour of the household the Socio-technologic model allows/predicts. And in particular how the model may respond to external interventions. Let us consider the case that the service level of an activity is becoming lower due to an external intervention. This may, for example, be through the introduction of energy saving appliances. At a certain level the performance will not meet the standard for that particular service any more; the equilibrium is disturbed. In that situation well-being, according to the model, is inappropriate and the household will respond with an attempt to change the situation such, that the equilibrium is restored and an appropriate well-being is regained. According to the model a household can chose for one of two strategies to regain well-being.

4.2 Regain strategy; the citizen as 'consumer'

Well-being is the balance between the actual level of domestic living and the standards of domestic living. So if the balance is disturbed by a lowered performance of an activity, implicit a lower level of domestic living, it can be restored by repairing the performance level of the activity. This response (Figure 5) represents the first strategy to regain well-being; this strategy is representative for a citizen in the role of consumer that does not accept a lower level of domestic living.

As has been argued previously, restoration of the service level is likely to modify the process inputs. In this case the reduction of energy use may shift to other environmental impacts. Only

in the case that the service level is restored by the use of more human resources, it may be that no alternative environmental effects are generated.

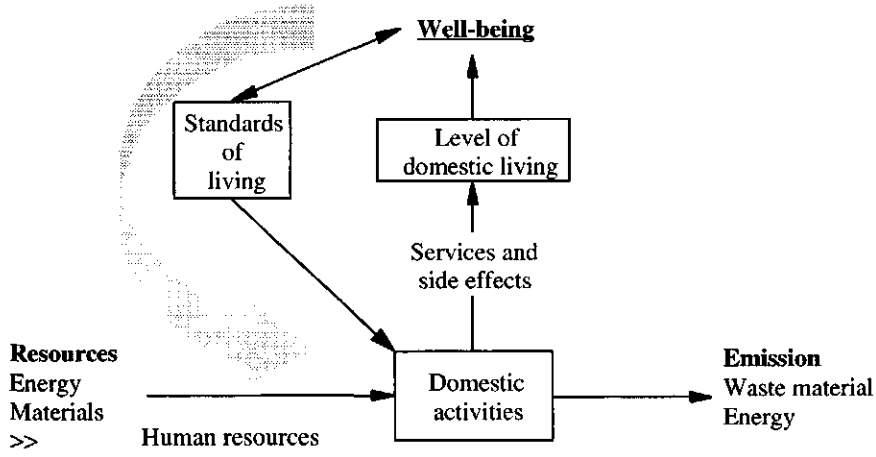

Figure 5: Consumer strategy to restore well-being

4.3 Regain strategy; the concerned citizen

The second strategy to restore the balance is the adaptation of the standards of domestic living for that particular service (Figure 6). It implies that a household adopts the lower service level of the activity as its new standard. This strategy addresses the awareness and consciousness of people. And it may lead also to a different life style and green consumerism, a shift towards behaviour with less environmental impact.

This strategy does not match with the concept of people as consumers. Still it should be considered as a promising option for sustainability measures for the future.

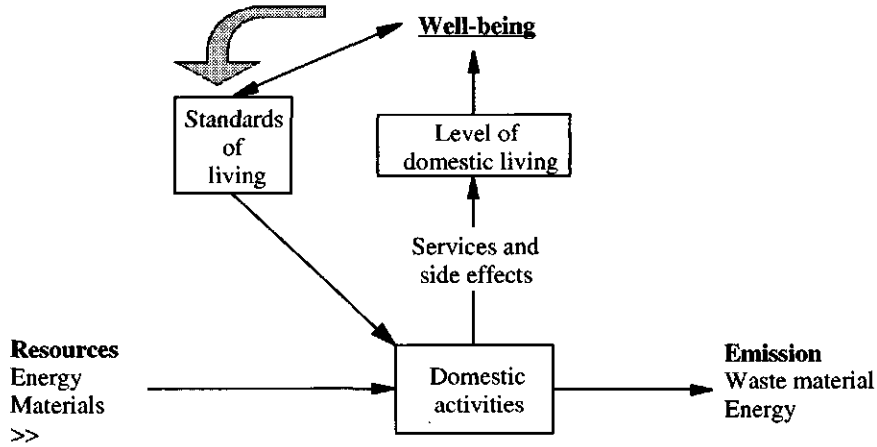

Figure 6: Strategy of concerned consumer to restore well-being

A research to obtain a better understanding about regain strategies of consumers is run by Roozemond (Roozemond, 1998). In his research the response of consumers to a reduced functional performance of textile maintenance is studied in a field experiment

5 Solving the paradox, conclusion and discussion

Both regain strategies presented have their drawbacks. Restoring the performance of an activity will substitute energy saving for other environmental effects while adapting the standards of domestic living will lower the quality of living. The search for solutions for this paradox will be one of the biggest challenges for the future.
One possible technological solution could be the prevention of performance loss when energy (or the environment in general) is saved. This implies that the industry should develop more appropriate technologies. In the past these efforts have not always led to improvement. It even has been mentioned that the use of efficient technology is used as a motive to consume more careless and to increase the usage of services. This is called the rebound effect (Andersson and Tuinstra, 2000). This phenomenon has been mentioned for energy saving lamps and the procurement of domestic appliances.
The association of well-being with other services than the ones with high energy consumption might incite people to accept a lower performance for the latter services. The quality and contribution of non-material activities and factors, such as living and working conditions, social activities, sport and nature should become more emphatic. But it is not sufficient just to develop a new way of assessing the quality of life. People should adopt this concept and change their lifestyle. To find out how this can be realised is one of the real challenges for the future. Research on how to develop sustainable standards for domestic living and how to diffuse these new standards into the society will be a mainstream in the future research of consumer technology. In this task different disciplines will have to cooperate in appropriate multidisciplinary research programmes.

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Changing Laundry Practices in Finnish Households

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Abstract

Washing of clothes – and care of clothing as a whole – is an example of an activity which, in order to achieve good results means fitting together a variety of different factors. Caring of clothing is an essential part in their use, by means of which their utility value can be maintained and their service life extended. A common feature in the life cycle of clothes is that consumers can best promote the conservation of nature through their own behaviour. Detergents, washing machines and textile materials have changed, but what has happened to the laundry practices and the practices with care for textiles as a whole. The care of textiles is not just washing, drying and ironing. It includes also the activities which promote longer using period before washing a garment.

This paper focuses on the following questions: What are the laundry habits and the practices with care of textiles like in Finland? What are the major changes in 25 years? Have the habits became more environmentally sound? The research methods include mail inquiry and textile washing diaries. Data collection was focused on families with children and single households. Altogether 443 responses were received through the mail inquiry and 52 washing diaries were filled out in spring 1999. These results have been compared with data collected 25 years ago. These results in this paper are a part of a wider set of research results (Aalto, 2001).

1 Introduction

Laundering is a frequently occurring household routine. Some refer to it as an inexhaustible natural resource, others see it as a necessary evil. In any case, we have to wash our clothing in one way or another in order to have something clean to wear. Disposable clothes are not compatible in environmental terms, nor does it seem likely that they will become common even in the future.

The role of sustainable development in the daily routines of consumers is an issue worth paying attention to. The effects of people's laundry practices, too, are important in the long term and with large amounts of washing. Consumers are hardly willing to make such changes to their laundry practices which would require complex arrangements or great effort for environmental reasons alone. They are not very enthusiastic, for example, about sorting their household wastes if this demands extra efforts. Laundering should not be made too complicated; instead, it should be an easy task and cause as little environmental loading as possible.

2 The purpose and implementation of the study

This paper is part of a study in which I examine the environmental soundness of consumers in the care of clothing. In this presentation I will particularly look at the changes that have taken place in the laundry practices of Finnish households as compared to the situation some 25 years ago. I will also see in which direction their laundry practices have changed with respect to their environmental impact. There is quite a bit of information available about environmentally sound textile care, but have consumers followed these recommendations?

The main questions which I aim to answer are:

- How have the conditions of laundering changed in the light of statistics?
- What changes have taken place in the laundry practices of Finnish households?
- Is the development trend good or bad from an environmental point of view?

This paper is a part of a wider set of research results (Aalto, 2001). The theory of the study is based on human ecology model (Bubolz et al., e.g. 1979).

3 The study data

The data for my study was collected by a mail inquiry. The inquiry was mailed in spring 1999 to a total of 1066 Finnish households, half of which (532) were families with children and the remainder represented single households of women (267) and men (267). Altogether 443 (42 %) households responded to the inquiry. In addition, a so-called "laundry diary" form was sent to a portion of the households, requesting them to record information on their laundry, washing temperatures, wash cycles used, etc., over a period of approximately one month. We received 52 (79%) washing diaries duly filled out.

The reference data from the year 1975 comprised 55 families with children which owned an automatic washing machine, and 89 were families which either had a pulsator machine or no machine at all. The average family size was 3.4 members. The number of single households in this data was so small that no reliable comparisons can be made on that basis. This study was focused on alternative ways to wash laundry (at home, in communal laundrettes in apartment buildings and in commercial laundries) (Aatola, 1975).

4 The changes in the light of statistics

Many changes have taken place on product level, which cause changes also at consumer practices. Finns buy nearly 15 kg of textiles and spend some 315 euro on clothing per capita per year. In addition, single households buy home textiles for about 46 euro and families with children for some 170 euro. The expenditure on clothes in single households is slightly lower than the average and in households with children slightly higher than the average – also if calculated per person. During the past few years, the share of clothing in Finnish consumption expenditure has been less than 3% in single households and close to 5% in households with children (Ahlquist and Pajunen 2000), whereas in 1975, clothes accounted for 7% of total consumption expenditure, although less amounts of textiles were spent (Aatola, 1975). The textile consumption of Finns is lower than of Europeans on average, whether compared as kilos or euros or as the proportionate share of total consumption expenditure.

Still during the 1970s, nearly a half of fibre production was cotton, whereas in 1990s its share had dropped almost down to a third (38%) and the share of synthetic fibres had grown from one third to nearly a half (43%) of total production. The proportionate share of regenerated fibres has also increased. A large part of clothing today is manufactured from mixed fibres.

In 1975, only every third household (35%) owned an automatic washing machine, the most common washing machine in the households (40%) still being the pulsator. Nowadays, nearly all families with children (96%) and most single households (70%) have an automatic machine (Aatola, 1975). Of Finland's total of 2.3 million households, an average 83% own a washing machine, and over 6% of them buy a new machine each year (Ahlquist and Pajunen, 2000).

As the ownership of washing machines has increased, the use of the communal laundrettes in apartment buildings has diminished similarly as the use of commercial laundries. Only slightly more than a half of the households with access to a laundrette in their apartment building actually use it. Judging by the average number of times that households wash their linens, they do it less often in laundry rooms (42%) than at home (48%) (Salo 1997). In the 1970s more than half of the linen laundry was washed in communal laundries, about 10% in commercial laundries, and a third at home (Aatola, 1975).

Less than 10% of Finnish households own a tumbler dryer or drying cabinet, while the corresponding share in most other European countries is much higher (Ahlquist and Pajunen, 2000). Drying habits among Finns haven't changed much. Finns still dry their laundry mainly on clotheslines, outdoors in summer and indoors in winter. A tumbler dryer is seldom used even if the household has one. Only a half of the owners of a tumbler dryer use it regularly in winter and every fourth one in summer. One reason for it might be, that half of the respondents (48 %) support the opinion that using a dryer is wasteful spending of energy. In fact, machine drying raises the energy consumption of laundering considerably. If all the laundry is dried in tumbler dryer, the energy consumed in drying the laundry is higher than that used for washing it.

Approximately 10% of household electricity (200-250 kWh) is used for laundering, not including the energy for heating. Every Finn consumes an average of 116 litres of water per day, 16 litres (14%) of which is used for washing laundry (Etelämäki, 1999). The total water consumption has decreased and the share of laundering has remained more or less the same, despite the fact that washing machines today consume less water than before.

During the past few years, Finns have used 3.7 kg of detergent per year and per capita, mostly phosphate-free washing powder concentrates. The amount of fabric softeners used annually per person is about 1 litre. The corresponding figures for 1975 were nearly 4 kg of detergent and about 3 dl of softener per person. The doses have grown smaller, but the specific weight of the detergent has simultaneously increased along with the introduction of concentrates. Product development together with voluntary and compulsory environmental requirements have steered development in detergents towards the use of chemicals that are less harmful to the environment. Finns' consumption of detergents and softeners is only about half the European average, which may partly be explained by the fact that almost all household water in Finland is soft (over 90% below 6.4 °dH), requiring only a small amount of detergent for washing.

Laundering is a women's job. Even though men in Finnish families increasingly take part in cooking and in child care, their participation in laundering and housecleaning has not much increased in the past 25 years. According to my data, in more than half (63%) of the families it is still the mother who takes care of the laundering nearly alone, in every four families all on her own. Only in every eighth (12%) family the other family members contribute to the care of textiles to a major degree, mainly by helping to hang the laundry to dry.

5 Changes in practises

5.1 Washing frequency

Those families with children that owned an automatic washing machine in 1975 did their laundry about 22 times per month. Families with only a pulsator machine or no machine at all washed their laundry clearly less often (15 times). Hand washes were not counted separately. The average family size in the sample was 3.4 persons.

At the turn of the millennium, on the other hand, households with 4 members did the laundry about 24 times and single people about 7 times per month. As the size of the family grows, so does the number of launderings, but the bigger households continue to have fewer launderings when calculated per person. In the households with a washing machine the number of launderings has remained more or less the same for the past two and a half decades. A part of the laundry is washed by hand in the majority of households (76%), on average approximately 5-6 times a month.

The trend has been the same as in other European countries. It appears that Finns do laundry less often than people elsewhere in Europe. In many other countries (such as other Nordic countries, the Netherlands, Great Britain) the monthly laundering frequency is about 6.5-7.5 times per person. Only every fifth Finns washes laundry this often, and more than a half (54%) less often.

5.2 Amount of laundry

In 1975, the average amount of laundry washed in families with children was 212 kg per person and 144 kg per adult. For pre-school children, the amount was about a third bigger than for adults. The households with children that did not own a washing machine washed around 150 kg of laundry per person annually.

The laundry diaries kept by the households (52) indicate that families with children nowadays wash about 192 kg (120-370kg) and persons living alone about 250 kg (94-430 kg) of laundry per person annually. The differences between various households, however, are quite marked.

The average number of washes has remained the same compared with 1975, but the amount of laundry washed at a time used to be bigger (whites 4.5 kg, coloureds 3.2 kg) then. If the household did not have a washing machine, the amounts washed at a time were even larger (whites 7.6 kg, coloureds 4.3 kg), but laundering was less frequent. Nowadays, the average amount of a wash cycle in households with children is 2.9 kg and in single households 2.2 kg (average in all households 2.6 kg). The fibres of a third (31%) of all washes today are cottons, nearly a half (41%) are blended cottons and a part (13%) are plain synthetics. The weights of the different wash cycles also vary: the amount of cottons washed at a time is 2.9 kg, blended cottons 2.7 kg and synthetics 1.9 kg.

Nearly all households (90%) pre-sort their laundry into lights and darks to be washed separately. Most of them (77%) also pre-sort the textiles by washing temperature. Every third household additionally sorts the laundry based on the fibre material (35%) or on how soiled it is (31%). Every fifth respondent (19%) claims to pre-sort the laundry more carefully than before. Only few households do not pre-sort their laundry at all.

Many studies have indicated that consumers find it hard to estimate how fully loaded the washing machine really is, and the same applies to the results of this study. A third of the respondents did not know the capacity of their washing machine. The majority reported that they washed with the machine almost full. Still, during the reporting period most of them (76%) washed only 2-3 kg of coloureds at a time, even though an almost full load would mean a load of at least 3.5 kg. Loads exceeding 3 kg were rare. Most respondents either actually think they have the machine fully loaded or, by responding like this, want to show that they behave correctly, even though the machine is clearly under-filled in reality.

5.3 Washing temperatures and wash cycles

Different textile fibres require different washing temperatures. Synthetic fibres wash clean in relatively low temperatures, whereas cotton, for instance, requires at least 60 °C to cleanse properly. Also the finishing or structure of the textile may have an effect on how well it withstands different temperatures. Lightly soiled textiles wash clean in low temperatures. The lower the temperature, the less energy is consumed, but the wash result is often not as good. Today's detergents, however, give a better wash result even in low temperatures than the detergents used decades ago.

Overall, laundry is washed in lower temperatures than previously. Still in the 1970s, about 17% of the laundry was washed as whites, about half (49%) as coloureds and a third (34%) as sensitive textiles. The share of whites had already diminished considerably compared to studies conducted in the 1950s, in which the share of whites was almost half of the total. The figures in these comparisons are only indicative, since the older studies do not give the actual washing temperatures. Thus, white laundry is interpreted to correspond to a temperature of over 80 °C, coloured to 60 °C and fine wash to 40 °C.

More than half (54%) of all laundry is nowadays washed at 40 °C and a third (35%) at 60 °C. Temperatures lower than these are used more often (8%) than higher temperatures (3%). Nearly all households wash laundry both at temperatures of 40 °C and 60 °C, but only every second household (45%) used temperatures exceeding these. The average washing temperature was 48 °C. The washing temperature is generally chosen according to the care instructions of the textiles.

Washing machines offer nowadays a variety of wash programmes to choose from, and manufacturers even seem to compete in the number of available cycles. Different wash cycles are required for different fabrics, but also for intensive or light washes and, for example, if there is a need to wash with the machine half-loaded.

Laundry is most often (62%) washed with the cotton programme, that is, with the wash cycle for coloureds or whites. Every fifth (22%) is a fine wash and every tenth (10%) a short wash. Other wash cycles are used less often. No differences were found in the use of these wash programmes between families and single households, but extra options such as the ½ load button, prewash and economy button were used more by the families with children.

The energy consumption with the main programme at 90 °C is about 1.6 kWh, at 60 °C about 1.1 kWh and at 40 °C about 0.6 kWh (Alkula et al., 1997). Washing with the fine wash instead uses up slightly less water and energy per wash, but more per kilo. Water consumption does not depend so much on the temperature as on the wash cycle. By using the half-load programme to wash cottons it is possible to save water per kilo of laundry as compared to the main programme, but although the energy consumption with the half-load cycle is lower per wash it may be as much as double if calculated per kilo of laundry. Prewash, on the other hand, raises the water consumption by 7-20 litres per wash. The short-wash, again, does not reduce the electricity or water consumption to any significant degree, but it shortens the wash time. The average duration of coloured washes in the newest machines are nearly a half-hour longer compared to machines a couple of years ago. The programmes for coloureds today take slightly more than an hour at their shortest; in some machines they take more than two hours. A lower temperature does not always shorten the duration of a wash cycle. It does seem, however, that a longer wash time or higher energy consumption often ensures a better washing performance[1].

5.4 When to launder?

The environmental load and one's own work input can be reduced by washing less often, particularly by avoiding doing laundry that is almost clean. One can as well remove stains or brush and air one's clothes. The amount of laundry also depends on the criteria which people use in assessing when their textiles need laundering. Comparative data on these practices in the 1970s are missing.

In most families with children (73%), the primary reason for laundering is that a garment is clearly dirty and that underwear is changed daily (70%). For persons living alone the reasons vary more. It appears that people launder less than the average do it mainly because the textiles are dirty. The reason why those who wash most frequently seem to get a lot of laundry is probably that they are in the habit of changing their clothes at given intervals without evaluating how dirty they are. The laundering criteria appear to differentiate other practices as well. People who base their laundering decision on the dirtiness of the clothes also remove stains more often than those who do their laundry at certain intervals. Every sixth (16%) respondent estimated that today he or she puts cleaner clothes into the laundry than a couple of years ago, and only few (6%) were of the opposite opinion.

More than every second (57%) respondent never removes stains from clothes. Only every tenth (19%) person does this often and every third one occasionally in order to postpone having to wash the whole garment. Brushing, airing and hanging the clothes neatly helps to keep them clean and postpones laundering. Every fourth respondent, in fact, reported that he or she frequently tries to postpone the time of laundering by brushing and airing the clothes, and every second one does this only rarely. The majority (86%) keep their clothes neatly folded or on hangers. Wearing protective clothing such as aprons would prevent the other clothes from getting dirty, but only every fifth respondent uses an apron. However, nearly all (91%) change into other clothes at home to prevent the better clothing from getting dirty or from wearing out. Although comparative data in the 1970s are missing we can assume that the actions, which could prevent soiling and postpone the time of laundering, are nowadays made less.

[1] Washing machine comparisons: Kuluttaja 8/2000, pp. 6-10; Tænk+test 9/2000, pp. 34-35; Which?, August/2000, pp. 36-39.

5.5 Consumers need for changes in laundry practises

Generally speaking, the respondents are satisfied with their wash result, and only few had problems of stains or dirtiness after laundering. Every third respondent (30%) has sometimes found that the laundry was still dirty after washing, and three out of four (72%) said they had occasionally found stains on the washed textiles. However, hardly anyone had such problems often. Under the circumstances there seems to be no need to wash at higher temperatures or increase the amount of detergents.

Most respondents (62-78%) said their laundry habits have remained much the same during the past few years. The majority of the changes that had occurred indicate a shift toward more environmentally sound practices, except for the fact that every fourth respondent washes laundry more often than before. About every third one reported being more careful in choosing a detergent in the purchase situation and washing laundry by hand less often than previously. Every fifth respondent pre-sorts the laundry more carefully, doses the detergent more accurately and has reduced the use of detergents, softener and stain removers, and is also more careful in pre-sorting the laundry than before.

A further indication of the willingness to act in an environmentally friendly way is that most people try to save energy in laundering (68%), buy clothes only when they need them and not just for fun (80%), and try to use them for as long as possible (88%) as well as aim to recycle the clothes that are reusable (85%). More people are also ready to pay more for clothes with a timeless style (62%) than for the latest fashions (10%).

6 Environmental impact of the changes

The environmental effects of laundering have increased in the sense that more households now own a washing machine. Because of product development, a considerable reduction in water and energy consumption has taken place, especially during the past decade. The water and energy consumption of machines has, in fact, dropped to almost a half of what it was about 25 years ago. In most of the newest washing machines, the energy consumption per wash at 60 °C is 1.1 kWh and the water consumption about 55 litres. Washing at 40 °C uses about half of energy consumed by a 60 °C wash cycle.

Energy consumption of washing and the amount of chemicals have became nowadays lower, mostly because of product development but also because of the changed practices. The use of lower washing temperatures has increased considerably as compared to the 1970s. One reason for this is that the share of synthetic fibres and coloured textiles has grown, while that of cottons and white textiles has diminished. This, added to the fact that detergents today wash efficiently already at 40 °C, has made it possible to lower the washing temperatures without affecting the washing performance. The product development of detergents has also led to less harmful chemicals and smaller amounts per dose.

From the environmental point of view, laundering practices have changed in a favourable direction. The reduction of energy consumption follows the universal trend. In compare to many other countries Finnish households appear to have environmentally friendlier laundry practices than households in many other countries. However, there remains room for improvement. The washing machine could be loaded more full, and the number of washes could still be reduced by removing stains and airing the clothes more. People might also be

more careful to avoid washing textiles that are almost clean. Such changes require the adoption of new operating practices, which obviously is difficult without a clear motive. Environmental conservation in itself is hardly a sufficient motive for changes. An awareness that changing practices could also ease one's own workload might provide a better incentive. However, the entire family should have to adopt the new practice, and this is still an obstacle to change in many households.

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DoMUS a model to communicate energy and water issues in households

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Abstract

Simulation models and games can be a valuable tool to communicate complex issues. Environmental problems in general and the problem described here in particular, are not always easily to explain. To communicate the issues of household energy and drinking water use, energy and drinking water reduction and shifting of energy expenditures in the context with sustainability issues, DoMUS (Domestic Metabolism User friendly Simulated) was developed. DoMUS is based on the results of several research project which focused on the environmental impact of households and consumer activities. DoMUS can be used in three ways: as game, as an educational tool and as a personal meter. Depending on goal and target group one of these modes can be used.

1 Introduction

Simulation models are often used as tools in environmental sciences. Simulation models substitute real life experiments which are hard, very expensive or impossible to carry out. This is mostly due to the possible danger, the large scale or the long time horizon. An additional advantage of simulation models is the quality to communicate complex issues, like environmental problems often are.
The Center for Energy and Environmental Studies (IVEM) is a research as well as an educational institute. We try to incorporate the results obtained from our research programs into our environmental courses. If suitable we make our research results available (often as models or games) for a broader public.

1.1 Relevant IVEM research

In this paper we describe the DoMUS model. DoMUS stands for **Do**mestic **M**etabolism **U**ser friendly **S**imulated and is a result of several IVEM research projects in the nineties. Some of these projects which contributed to DoMUS are:

- Energy analysis : EAP model (Wilting, 1996; Wilting et al., 1999; Benders et al., 2001; Kok et al., 2001);
- Greenhouse: aiming at a multidisciplinary assessment of approaches to diminish substantially the direct and indirect greenhouse gas emissions related to household consumption within a few decades (Nonhebel, 1998; Nonhebel and Moll, 2001);
- Lifestyles: aming at the reduction of CO_2 emission by lifestyle changes (Biesiot and Moll, 1995; Noorman et al., 1999);
- HOMES (HOusehold Metabolism Effectively Sustainable): aiming at description of the past trends and future prospects of the Dutch household metabolism and at design of more sustainable household metabolism patterns (Noorman and Schoot Uiterkamp, 1998; Biesiot and Noorman, 1999);

- The implementation of household drinking water consumption and waste production in DoMUS (Meijer, 2001).

In 1996 the idea came up to look for a way to communicate research results from the projects mentioned above.
DoMUS can be used to gain insights in the energy use and drinking water consumption of households. The model offers the possibility to:

- determine the yearly total (direct and indirect) energy use and drinking water consumption;
- explore alternative routes to reduce environmental impacts of the combined effect of technology and behaviour;
- determine the difference of environmental impact *between* households as a consequence of different life styles: e.g. other household expenditures.

1.2 Research background

A household is the smallest economic unit in our society. A large part of the consumption flows through these households. This consumption is associated with environmental pollution and resource depletion. The integral pattern of natural resource flows, into and out of households, is called household metabolism (Noorman and Schoot Uiterkamp, 1998). A more complete overview of the metabolic flows related to consumer patterns in households is shown in *Figure 1*.

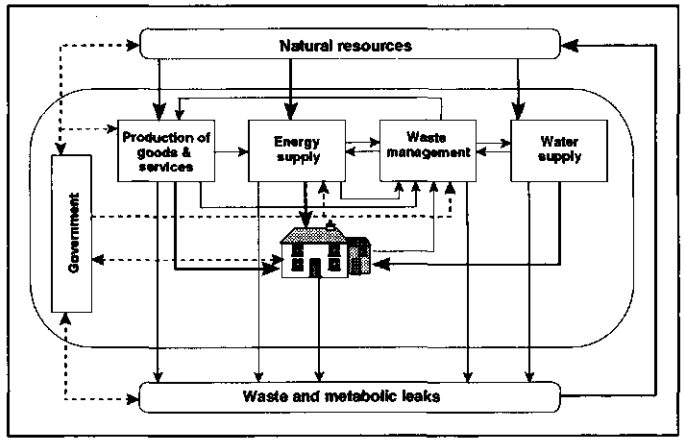

Figure 1 Household metabolism adapted from Noorman and Schoot Uiterkamp (1998)

Natural resources are used to meet material and non-materials needs of the population. At present only a small part of the produced waste is recycled. The reduction of resources (energy and other materials) by closing the relevant cycles is seen as a necessary step to a more sustainable future.

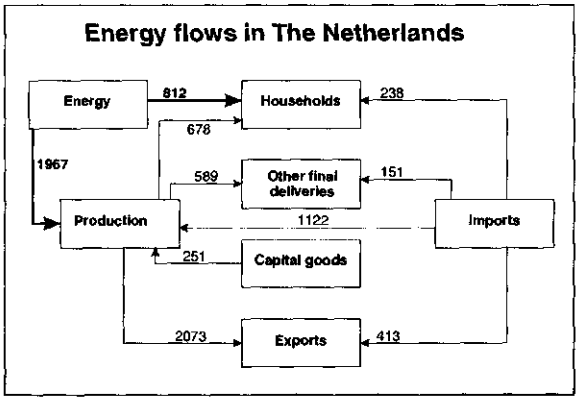

Figure 2 Direct (thick) and indirect (thin) energy flows(PJ) in The Netherlands in 1990 (Wilting 1996).

Usually household energy consumption is seen as the literally consumed energy in houses (electricity, fuel for space heating) or via households (car fuels). However, households also use energy in a indirect way by purchasing goods and services. The energy directly used during production of these goods and services can be considered as indirect energy from the household perspective. We assume that the economy is based on the production of goods and services on behalf of the household consumption. So the total energy consumption needed to produce these goods and services can be assigned to households (taking into account import and export flows). *Figure 2* shows the direct and indirect energy flows through the economy of the Netherlands 1990.

The relation between the consumption of goods and services and the accompanied energy consumption is a rather complex one. Based on detailed information of household budget spending categories and a LCA like methodology energy consumption per category can be calculated. The methodology we used is a hybrid method, partly process analysis and partly input-output analysis (Engelenburg et al., 1994). The methodology is outlined in *figure 3.*

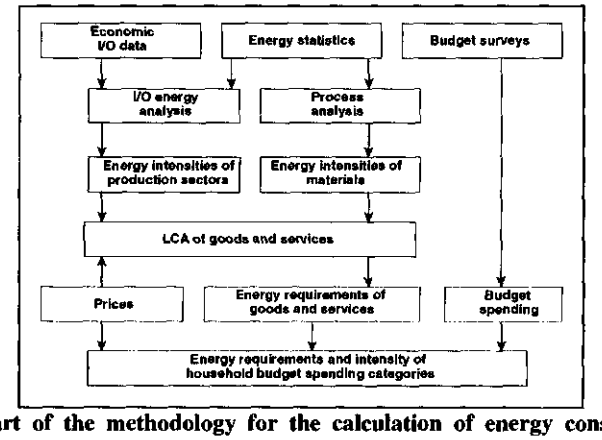

Figure 3 Flowchart of the methodology for the calculation of energy consumption through budget spending categories.

This methodology requires reliable statistical data concerning energy consumption in all economic sectors, energy production, economic input-output data, household budget surveys and prices of goods and services, transport systems and waste processing. Energy analysis is used to determine the energy intensity of frequently used basic materials (over 100) in the economic sectors to produce consumer goods. Both, the hybrid methodology and the data are combined in a software program EAP with which the energy intensity of consumer goods and services can be determined (Wilting et al., 1999; Kok et al., 2001).

2 The DoMUS model

The DoMUS model is developed to communicate energy and drinking water consumption issues to a broader public in such a way it can be comprehended by laymen in this field of research. The goals of DoMUS are to give insight in:

- the total energy use (direct as well as indirect) of a household;
- the drinking water consumption of a household;
- the relative importance of several energy consuming products and services;
- the possibilities to reduce energy use and drinking water consumption;
- the connection between energy and money, with which is meant that saving energy can also save money and the question than is what people are going to do with this 'extra' money? Will they spend it to energy extensive or energy intensive goods and services?

The user of DoMUS is confronted with the fact that only a part of the reduction of energy use and drinking water consumption in the household can be achieved by the introduction of better technologies. The other part of the reduction should come from changing habits and consumption patterns.

The model can be used as an educational tool, as a personal meter or as a game. In the *educational* context we offer students a guided tour illustrated by two fictive households. This tour is completed with some questions. In the *personal meter* option the user can define his or her own household at this moment and from this starting point the user can try to reduce his/her energy use and drinking water consumption. He/she receive immediately feedback on their decisions on: energy, drinking water consumption and money. In the *game* option the players become member of a predefined household with a role description for all the members of this household. They are ordered to reduce their energy demand to a certain level with the restriction of spending all (within 5%) their money and within the characteristics of their specific roles.

2.1 Household energy use in DoMUS

Energy use for households can be divided in direct (for example needed for space heating and lighting) and indirect energy use (for example needed to produce a washing machine, grow vegetables or to deliver services). Each consumptive expenditure of a household implies a certain use of energy. The life-style: the way a household spends their income, determines the amount of energy used by this household.

For the Netherlands the energy use of an average household is calculated. This concerns a household of 2.4 persons. The average energy use is about 249 GJ/hh.year (GJ per household per year) or 102 GJ/p.year: (GJ per person per year) (Kok et al., 2001b). In DoMUS 80% of this energy use will be covered, this correspond with 200 GJ/hh.year or 83 GJ/p.year. In figure 4 the total Dutch energy consumption in households is given. It is remarkable that indirect energy is almost 50% of the total energy consumption.

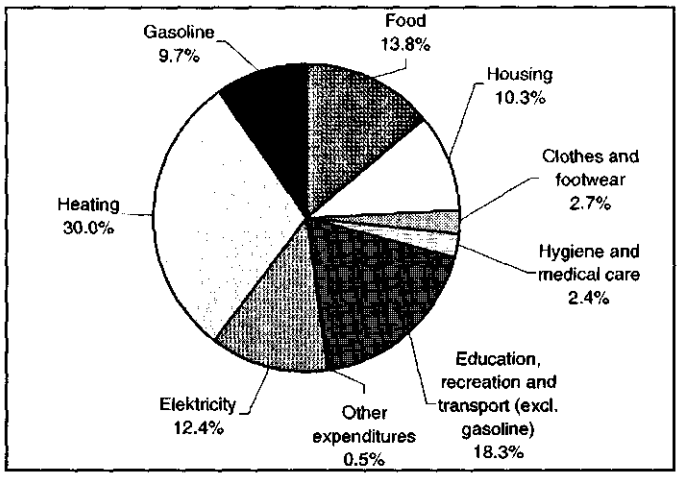

Figure 4 : Total Dutch energy consumption (1996). Direct energy left side and indirect in the right side of the graph.

Not all national energy use flows through the households or can be imputed to the household expenditures. This concerns energy used for e.g. the army, health care, education and infrastructure. Furthermore there are expenditures which flow through the households but are difficult to impute to products or services (for example assurances or savings). When *total* Dutch energy use will be imputed to the households, energy use per household will be 335 GJ or 148 GJ/p (Wilting, 1996).
This means that about 60 % of the total Dutch energy use is covered by the DoMUS model.

Table 1 In the model the different energy consuming functions are divided into 7 categories

	Description
Space heating	Energy needed to compensate transmission and ventilation losses, heating equipment;
The house itself	Indirect energy for the building and insulation materials and the energy gains from solar PV and sun boilers;
Apparatus	Apparatus for the functions: cooling, washing, dish washing, showering, cooking and lighting;
Transport	All transportation's except those for holidays
Food	Up to 10 different options which deviate from an average meal (e.g. vegetarian);
Holidays	Up to 10 different types of holiday destinations;
Miscellaneous	Several options in three sub categories: hobby, sport and others.

Above is described that not all household energy use is taken into account in the DoMUS model. Categories not present in the model, mainly concern the indirect energy use for clothing, furniture, personal care, medical care and maintenance of the house and garden. The reason behind this selection is to obtain a balance between completeness and to much details. So we left out those categories which do not contribute to a large extent or do not have great potentials for change in energy use as the result of a different expenditure in these categories. Figure 5 shows to which extend the energy and water flows through households are covered in DoMUS.

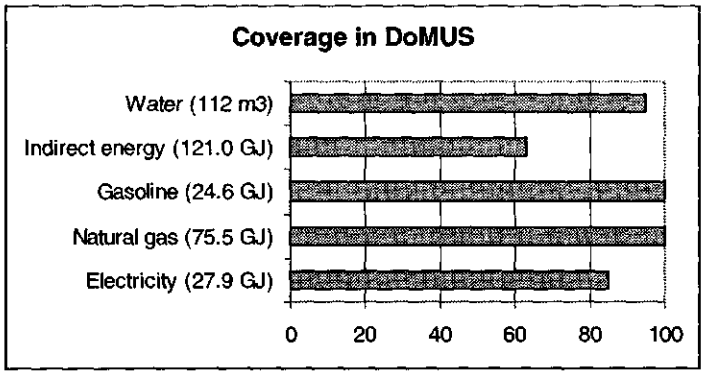

Figure 5 Coverage of energy and water consumption in DoMUS. The absolute numbers are per household (2.4 persons) and per year.

2.2 Drinking water consumption in DoMUS

The use of drinking water in Dutch households increased substantially the last decades. Reasons for this increase can be found first in the penetration of new water using technologies like washing machines and dishwashers. The second reason lies in the increase water use for shower and bath. The use of drinking water at this moment in the Netherlands is about 130 litres per person per day (VEWIN, 1999). The main categories of drinking water use are summarised in table 2.

Table 2 Dutch drinking water use by category (VEWIN 1999).

Partial use	1998 l/pp/day
Bath	6.7
Shower	39.7
Washbasin	5.1
Toilet flushing	36.2
Laundry, by hand	2.1
Laundry, machine	23.2
Do the dishes, by hand	3.8
Do the dishes, machine	1.9
Food preparation	1.7
Miscellaneous	7.6
Total	127.9

The household drinking water consumption is determined by the availability of certain equipment, the number of persons per household, the age of the household members, their income and their behaviour.

Most of the categories in table 2 are implemented in the model (see *figure 5*). Only the category Miscellaneous is not completely implemented. Although users can not influence all uses of drinking water, e.g. the use for drinking water in the category food is only influenced by the number of persons in the household, there are many possibilities to reduce drinking water consumption.

2.3 DoMUS the interface

As the acronym DoMUS suggests, we tried to develop a user friendly model. Besides an easy to use interface a short term feedback on decisions made are important. For this short term feedback the user is offered two graphs. One gives an overview of the energy used and the drinking water consumption divided in the seven above described categories (see *figure 6*). This overview is given for the reference and the actual scenario so differences in expenditures and behaviour can immediately be compared. Between these graphs a comparison can be made for the total energy requirements (direct + indirect), direct and indirect separately, the drinking water consumption and the costs. The costs between both scenarios have only a relative meaning.

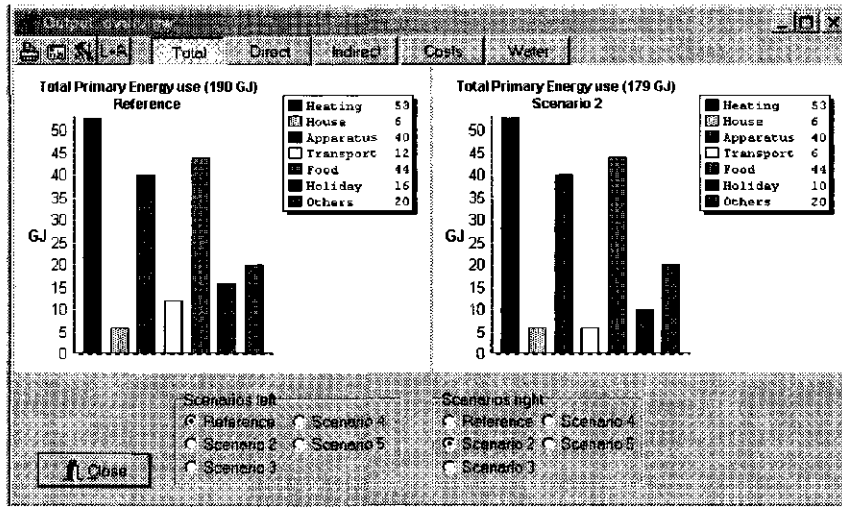

Figure 6 : Overview of the costs, energy use and drinking water use for the seven categories.

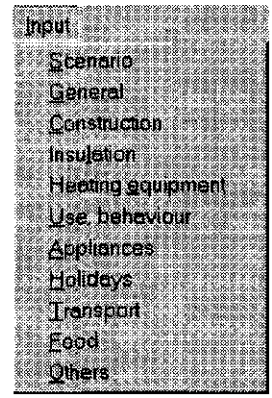

Figure 7 : input menu

To reach the goal (game mode) or to improve your own energy use (one person mode) the user has to change his/her behaviour or his/her expenditures on the categories as defined in DoMUS. The user is offered 11 input windows, see *Figure 7*. The *Scenario* submenu let the user select the scenario to work with. Scenario 1 is disabled for use so remains unchanged and can be used as a reference (e.g. the average national energy use). The *General* submenu lets the user define the household: number of persons, their age etc. *Construction* lets the user define his/her house: the kind of house, the contents, orientation, window surface etc. The next three options: *Insulation Heating equipment* and *Use, behaviour* concern all the energy used for space heating. *Figure 8* shows the possibilities the user has to adjust his/her space heating behaviour.

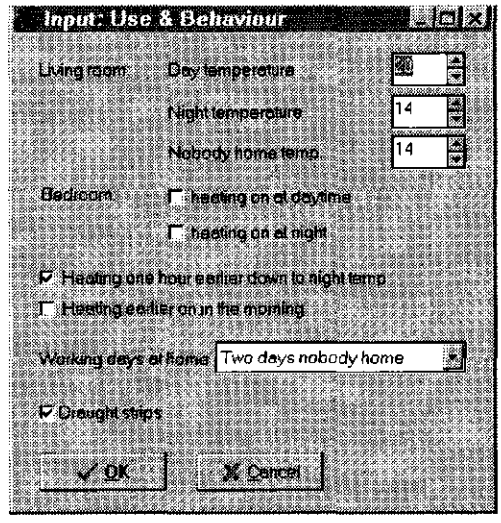

Figure 8 : input screen for space-heating behaviour

When the options heating on in the bedroom is selected, the model assumes a temperature a few degrees below the living room temperature.
The *Apparatus* submenu gives the user for 7 household functions (cooling, washing, dish washing, cooking, showering, lighting and toilet use) the option to select the desirable apparatus or a set of apparatus (see *Figure 9*). *Figure 9* (right hand window) also shows the possibility the users have in almost every window to ask for background information by popping up second window. The submenu *Holidays* let the user select one or more predefined holiday(s). The number of family members joining the specific holiday and the frequency (each year once in two years etc) should also be entered here. In *Transport* the number of kilometres per transport mode (bicycle, car, train etc.) per year can be entered. These kilometres are exclusive those made for holidays. In the input window for *Food* the options the users have to adjust their food habits is shown.

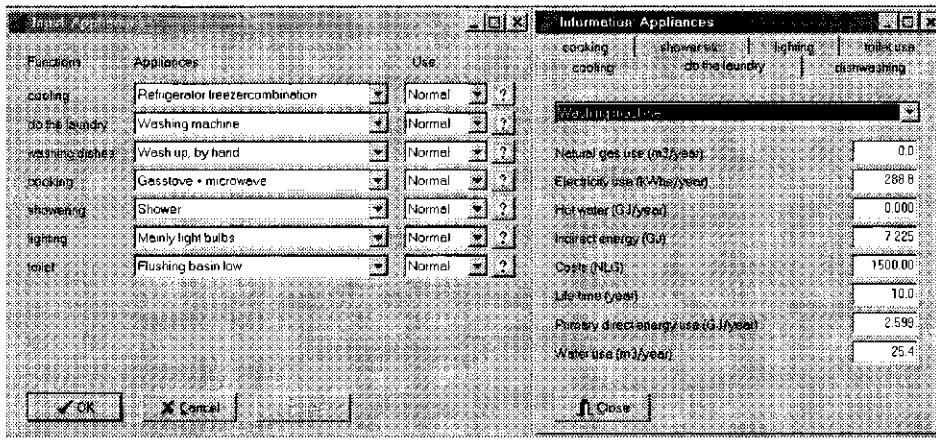

Figure 9: input window for appliances options, with information window

The default values for food corresponds with average national habits. Only variations in habits concerning the evening (hot) meal are available. The other meals are no subject for change thus are seen as constant. When selecting one or more options the difference in direct and indirect energy are added or subtracted from the default values.
The last submenu: *Others* is divided in three categories: Sport, Hobby/go out and Others. Each category contains a set of options the users can select. Examples of these options are: swimming in a heated pool, going to the cinema and keeping pets (dog or cat).

For examining the results and the comparison of scenarios different graphs and a table can be viewed.

3 Conclusion and Discussion

The relative new environmental science/studies meet some other problems compared with traditional sciences. Its complexity, its societal relevance and the need for new techniques to instruct in a learning by doing way. Simulation models and games can perform the role to communicate its complexity, to communicate environmental issues to others than experts and to perform as a learning by doing tool.

DoMUS can be a valuable tool for communicational and educational purposes. Although we do not have the illusion to reach every household with DoMUS or in general with any such model or game, we believe that such models can contribute to a better insight in environmental problems and specific for DoMUS the reduction of energy consumption in households.
The focus on energy and drinking water use as indicators for the impact of households on the environment is one sided although both energy and water use are important ones. Energy gives insight in the problem of depletion of finite resources (fossil fuels) as well as the global warming problem. Water gives insight in the problem of local shortages of a crucial resource. Other possible environmental indicators for household consumption could be: greenhouse gas emissions, waste consumption and the amount of space used.

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Urban Households and Consumption Related Resource-Use, URRU: case studies of changing food habits in Sweden

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Abstract

An extraordinary challenge is to create awareness of the connection between global environmental change and everyday life. In view of this challenge, ten households living in urban areas in Sweden were involved in experimenting with more energy efficient diets as part of the URRU research project. Energy inputs over the life cycle were calculated for over 200 food items and options for more efficient diets were identified and communicated to the households. Food diaries completed by the households before and after the experiments were analysed, as were recorded interviews. The results from three households show that they are willing to experiment with new diets resulting in lower meat consumption, higher consumption of legumes and vegetables and an increased consumption of organic foods. Factors related to labour market and medical considerations influence households' capacities to implement and maintain new diets. The energy savings achieved by the households were at most 35%. The changes towards less energy consuming diets that were documented in this experimental study also showed that they caused other changes in turn, such as the relations in the division of labour in the households and power balance in decision-making and deep rooted food culture.

1 Introduction

An extraordinary challenge, everywhere and at all levels in the world today, is to create awareness of the connection between resource management in everyday life and global environmental change. Even more challenging is to change everyday habits in order to fulfil internationally agreed goals of ecological sustainability (UN, 1992). Consumption patterns must be changed, especially in the richer parts of the world, in order to stabilise emission of greenhouse at acceptable levels (IPCC, 1996).

The "green" household is thus seen as a necessary collaborator, and a new societal demand for ecological rational household behaviour is growing. At the same time, the question arises: What opportunities and motivation are offered to households to meet this demand? This points at the need to explore the characteristics, motives and reasoning when making decisions about resource use in everyday life in order to find answers to how effective interventions should be shaped. For example, how can information be conveyed to households about such complex issues as environmental impact in order for households to make informed decisions in everyday life? Research shows that information alone has not been found to be

very effective (Sjödén, 1994). On the other hand, information on the consequences of ones own resource handling has been found to contribute to changed behaviour (Dwywe et al., 1993). Involving households in experimenting with new lifestyles have also shown to be effective, at least in a short time perspective (Shanahan & Zetterstrand, 1993; Vrom, 1999).

This paper present some preliminary findings from the project Urban Households and Consumption Related Resource Use, URRU carried out in Sweden from 2000 to 2001. The project addresses the issue of food consumption focussing on management in households and changing behaviours towards food habits that cause less environmental impact. Several types of environmental impact related to food consumption and production can be identified. Depletion of water resources and salinisation of the soil during cultivation; contribution to climate change due to emissions of greenhouse gases from fossil fuel use and eco-system damage due to release of toxic substances during pest control and land-filling are some of them. In the URRU project energy use was chosen as the indicator of environmental efficiency because of it's particular relevance for curbing climate change. At the start of the project it was already known that considerable energy savings could be achieved through changing food habits. During recent years, a number of studies have mapped the environmental impact during the life cycle of foods and diets. Significant reductions in energy use and greenhouse gas emissions could be achieved by switching to diets with less meat and cheese. Such diets also ought to include more in-season vegetables, more locally produced food, fresh foods and less foods with low nutritional value, such as soft drinks and snacks (Carlsson-Kanyama, 1999; Kramer et al., 1999; Jungbluth et al., 2000).

The questions to be answered in the URRU project are related to opportunities and constraints households may encounter when trying to abide to such recommendations. Which changes can be made within the framework of households' everyday life situations? How are efforts for ecological diets influenced by factors related to job market and family composition? What are the consequences on meal patterns, labour division and gender roles when striving for such changes? In order to measure the results we also developed information about the energy inputs during the life cycles of diets and food products.

2 Design of the study

Ten households have been intensively studied. At the start of the project the selected households all lived in apartments in a city on the West Coast of Sweden. The households had similar characteristics in mean size, age of adults, number of children, education, type of work and working time. (Ekström & Shanahan, 1999). For this paper three households were selected. We name them "green enterprise", "busy-as-usual" and "slim and green"

The food diary is central for the registration of choice of food, cooking, composition of meals and meal patterns in the households. The food diary has been used in a number of research projects (Ekström, 1990) and has been useful for an orientation of food habits in private households.

The members of the households have registered what they have eaten both at home and outside home a) during a period of 2 weeks and b) during a period of 4 weeks. What has been taken and when, is registered. There is also information on labelling and where the foodstuffs come from, ie, country of origin in the second registration. The first period of registration, in 1998, was in order to register current food habits in the families. The second period of

registration was in November-December 2000. In addition to food consumption, the first period of registration also covered registrations of several other types of activities. For example, the households also kept records of their time use, waste weights and exchange of resources with the near environment. The purpose was to obtain as an holistic picture, as possible of the households' management of resources, in order to relate food habits to the overall situation.

Food intake is recorded in the food diaries as the number of portions of different foods. The weight of food is calculated using information about Swedish standard portions. The supply of nutrients from the first diary was checked and all households ate well, with some overconsumption of protein. The supply of nutrients in the second recording remains to be analysed.

Energy use over the life cycle of a large number of food items is calculated, based mainly on data about energy use in food product life cycles published in Carlsson-Kanyama and Faist (2000). Life cycle assessment is a rather well defined method with an ISO standard and methodological development, carried out mainly under the auspices of the Society for Environmental Toxicology and Chemistry, SETAC.

During autumn 2000, feedback was given to the households about their energy consumption related to present food habits. Moreover, a manual for low energy and environmentally friendly foods habits was developed as a guideline for the households. The manual contains general recommendations for energy efficient food choices, such as lower consumption of meat and cheese, more seasonal vegetables and more locally produced and ecological foods. It also includes recipes with energy inputs for different meals: those with high-energy inputs and those with lower energy inputs. The recipes were developed in co-operation with a nutritionist and a recipe developer and the manual was carefully designed and presented personally to the households by the project staff.

With the help of the manual, the ten households planned and implemented new food habits recorded in the second diary. Households were interviewed about their experiences when trying out the new food habits. The interviews are currently being analysed while the new food diaries are analysed for energy inputs. Some preliminary results from these analyses are presented in this paper.

3 Energy inputs during the life-cycle of food consumed in Sweden

Substantial work in the URRU project consists of calculating the energy inputs during the life cycle of large number food items commonly consumed in Sweden. There was no relevant study available at the start of the project, although data for enabling it had already been collected (Carlsson-Kanyama and Faist, 2000).

The first step was an inventory of food commonly available at Swedish shops and markets. Visits to shops followed by telephone interviews with food producers gave valuable information concerning origin of ingredients, place of production and storage time for food products. Recipes were used for additional information. The functional unit during the calculation of energy inputs was one kg and one portion of the selected food items. The system boundaries include farm production with production of farm inputs, drying of crops,

processing, storage and transportation up to the seller. The system boundaries exclude production of capital goods such as machinery and buildings. They also exclude packaging material, waste treatment, transportation from the seller to the consumer and dishwashing. The economic value of products and by-products was the basis for allocation of energy use during processes with multiple outputs. The energy use was calculated as process energy with no inclusion of production and delivery energy, conversion and transmission losses.

The estimates revealed and confirmed some important characteristics that determine the magnitude of energy inputs for food and diets. Apart from (again) demonstrating that meat and vegetables grown in greenhouses are energy intensive the survey also showed the large differences in energy inputs between wild and farmed fish and the potentials for energy efficient substitution between various protein rich products (see figure 1). In fact, one kg of protein rich food such as legumes, egg, fish and meat can be produced with energy inputs ranging from 8 MJ to almost 60 MJ. The energy use per portion for the same products varies from 1.6 MJ to 7 MJ.

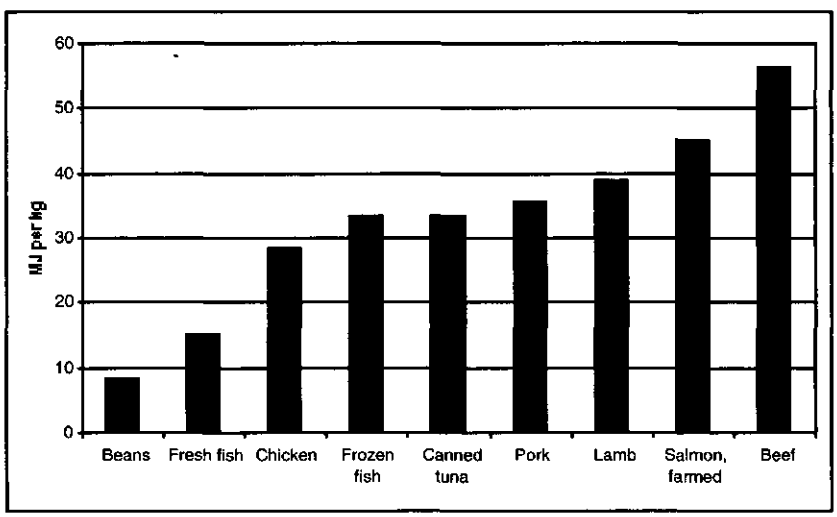

Figure 1: Energy inputs in MJ per kg ready-to-eat product during the life cycle of some protein rich food.

Also, it was found that energy use for cooking can be a dominating stage in the life cycle of staple foods. Trials were carried out to measure the variations in electricity inputs during cooking depending on number of portions prepared, cooking appliance and food item. The study showed that electricity use per portion for cooking staple foods varies between 0.11 MJ and 5.1 MJ, and was greatly influenced by the choice of cooking appliance and the number of portions cooked (Carlsson-Kanyama and Boström Carlsson, 2001). The life cycle energy inputs for producing one portion of ready-to-eat staple foods vary from 0.33 MJ to 6 MJ. The lowest inputs were found for barley cooked on a hotplate with three other portions and the highest inputs for potatoes baked in an oven as one portion.

For cakes and buns, the total life cycle energy inputs were highly determined by the amount of butter used. About half of the energy inputs can be related to butter when commonly

available recipes are adhered to. Baking with vegetable oil could be one way of achieving more energy efficient cakes and buns. The energy inputs for jam, a product consumed frequently in Sweden, depend largely on whether or not the berries or fruits were farmed or harvested from nature. For breakfast cereals, the energy inputs were determined by the amount of sugar and dried fruit relative to cereals. In all food categories, substitutes for more energy efficient diets could be identified

Altogether, more than 200 food items are included in the analysis of energy use over the life cycle for foods. Additional work is needed for establishing the magnitude of uncertainties in results. Of particular importance are assumptions about food losses, storage energy inputs and storage time and allocation rules for distributing energy use among animal body parts.

4 Changes in households' food consumption habits

4.1 Changes in quantities of food consumed, all households

The overall results concerning changes in quantities and types of food consumed in the ten households are shown in Table 1. All changes less than 20 % are called negligible in the Table because of uncertainties in recordings and their interpretations. Among the changes of most importance for lowering energy inputs are less meat (pork and lamb), more vegetables and fruits and especially vegetables grown in the open, more fowl, eggs and fish and an increased consumption of legumes. The households frequently bought organic food, choose products from Sweden instead of imported ones and used electric kettles for boiling water for coffee and tea as part of their efforts to achieve more energy efficient diets. The overall impression is that the households made substantial efforts to abide by the recommendations given.

Table 1 Changes in quantities of food consumed in the ten households participating in the URRU project.

Food category	% change in quantity consumed for 10 households
Legumes and Seeds	132
Egg	97
Fowl	55
Vegetables	86
Fruit, Berries and Jam	25
Fish	22
Pork	-30
Lamb	-22
Bread, Beef, Drinks, Fermented Milk, Cheese & Yoghurt, Food Composed of Several Food Items, Porridge & Cereals, Potatoes, Pasta, & Rice, Pastries & Sweets, Ice-cream & Desserts	negligible

4.2 Changes in meal patterns in three households

The food diaries from three households were compared in order to categorise meal patterns and quantities of food consumed before and after the ecological effort. Two of the families consist of husband, wife and two children, and the third household is composed of a female adult and a teenage daughter.

The results from the comparison between meal patterns are shown in Table 2. The concept "proper meal" used in Table 2 (Charles & Kerr, 1988), also described as "a cooked dinner" (Murcott, 1983), according to the original definition was composed of meat, potatoes,

vegetables and gravy, and was the symbol of a proper family. In our study, a proper meal is meat, fish, chicken or sausages and potatoes, rice or pasta.

Table 2 A comparison between meal patterns during the first and the second registration of food consumption in three households.

	Household Green Enterprise Husband, wife, 2 children		Household Busy-as-Usual Husband, wife, 2 children		Household Slim and Green Single mother, 1 child	
Number of meals during 2 weeks	1st reg	2nd reg	1st reg	2nd reg	1st reg	2nd reg
Weekdays at home	63	34	40	27	17	36
Holidays at home	29	9	13	23	12	16
At work, school etc	47	55	51	58	13	32
Total number of meals	139	98	104	108	42	84
% of meals at home	66	44	51	46	69	62
Proper meals						
Weekdays at home	24	12	14	9	5	14
Holidays at home	7	2	6	7	1	4
At work, school etc	15	28	34	18	11	15
Total proper meals	46	42	54	34	17	33

As can be seen in Table 2, the households *Green Enterprise* and *Slim and Green* show the greatest changes from the first to the second registration period. In *Green Enterprise*, the total number of meals has decreased and in household *Slim and Green* the total number of meals has increased; actually they have doubled. In all three households the proportion of meals eaten at home have decreased; in *Green Enterprise* from 66% down to 44%. Finally, household *Slim and Green* has doubled the number of proper meals. Household *Busy-as-Usual* only slightly changed the meal patterns from the first to the second period.

4.3 Food consumption and energy inputs for three households

When looking closely at the conditions in each household and at the changes which are made, one has to take several facts into consideration, including the households' attempts at more environmentally friendly diets. First of all, the households might have changed the method of registration, doing it more or less precisely than before. The living conditions might have changed, ie, parents are no longer on parental leave, children are at school, or parents are now working. Changes in diet due to medical reasons might also influence food habits and meal patterns. The following section describes each of the three households and discusses how and why meal patterns changed during the project period. We also briefly analyse how the roles of household members were affected by the ecological efforts undertaken and comment upon the energy savings achieved.

Household *Green Enterprise*

The household consists of two adults and two children; at the time of the 2nd registration the girl was 7 and the boy 3 years of age. One change in this family is that the parents no longer are on parental leave. Both husband and wife are now working full time. This could be observed in the changed proportion of meals eaten at home. Also, in the first registration, the youngest child had baby food quite frequently which is not the case during the second registration.

There are no major differences in the description of meals in the first and second registration period. The ingredients are described in detail, rather elaborated and the meals usually consist of three or more elements.

In this household, conflict between different interests is observed. The husband has a deep interest in ecological issues. He wanted to test the possibilities of changing to less energy consuming food habits. He therefore took a larger than normal interest in the responsibility for food planning, shopping and cooking. "How far can we go?" was his question. The problem is that he was not quite aware of the importance of his wife's interest in food culture. She, on the other hand, was not initially aware of her own interest in creating a food culture in the family. It was slightly difficult for her not to have the control and not, as usually, to be responsible for the meals. Her comment was: "I did not realise how difficult it is to change habits." The changes deal not only with "having sun dried tomatoes or not" but also, and may be much more important, with changed roles in the family.

With regards to changes in energy efficiency, the most remarkable change in this household was a sharp decrease in the consumption of pork and lamb meat. The consumption of pork fell from 6.4 kg in the first registration to 1.6 kg in the second registration. Legumes were not eaten at all during the first registration but burgers made of chick-peas were cooked at home on one occasion during the second registration. Fish consumption changed towards more fresh fish from the Swedish west-coast and less salmon and fish fingers. The consumption of fruits and jam increased by 28 % while the quantities of vegetables consumed remained the same. Apple juice was preferred over orange juice in the second registration. Swedish products were common in all food categories and organic food purchases were frequent; ranging from bananas, apples, jam, cucumbers and carrots, to coffee, meat, potatoes, milk and egg. Of interest also for other than environmental reasons is that the share of fresh fruits increased from 88 % to 98 % when the two recordings concerning "fruits and jams" were compared.

Preliminary estimates of the life cycle energy inputs for the food consumed according to the two recording indicates a decrease by about 35 %.

Household *Busy-as-Usual*

The household consists of two adults and two girls; at the time for the second registration teenagers. Both parents are working on a similar time schedule as during the first registration. Some months before the second registration they bought a house, but at the time for the first registration they lived in an apartment, as the other families in the study.

Household ***Busy-as-Usual*** has kept the rhythm of the meals and has the same meal patterns as in the first registration. In this household, the meals were described rather instrumentally, not as elaborate and detailed as in the other two households. One example was "sausages, rice and milk". There were also rather often deep frozen, industrially produced products, or pizzas.

Household ***Busy-as-Usual*** decided to continue their food habits as usual and their planning was expressed as follows: Buy ecologically labelled products, packages made of paper (not metal) and Swedish and local products as often as possible. Use a kettle when boiling water.

With regards to changes in energy efficiency, this household lowered pork consumption from 7.1 to 2.3 kg. This is rather surprising as it was not a strategy openly expressed by the household members. The consumption of lamb remained at zero at both recordings, the consumption of beef remained unchanged and fish consumption doubled. Fresh fish from the

West Coast of Sweden was preferred in the second recording. No legumes were consumed at either occasion. Consumption of vegetables doubled while the consumption of fruit lowered. The total amount of food remained the same, and organic products were bought occasionally including coffee, cereals, carrots, milk and eggs. The electric kettle was used frequently.

Preliminary estimates of the life cycle energy inputs for the food consumed according to the two recordings indicate an decrease by about 15 %.

Household *Slim and Green*
The household consists of one adult and a teenage girl. From the first to second registration the household has more than doubled the number of meals eaten at weekdays. This is the case both for meals eaten at home or at work. The total number of cooked meals has increased. When looking at the meal patterns and the food culture in this household, a change in diet is obvious. The woman joined the Weight-Watchers programme some months ago, and for that reason has changed to a more healthy diet for her with less fat and more vegetables and fruit. Also a more regular time schedule (ie, breakfast, lunch and dinner) and a more evident composition of meals, ie, "proper meals" is noticed, and less "grazing".

In this household the meal patterns have changed considerably. In the first period there were rather few proper meals eaten at home. During the second period there were proper meals registered every day; the meals were elaborated with neat descriptions of ingredients.

Comments given by this household were that planning and registration were difficult to fulfil. It was interesting to take part in the project and one learned a lot about what to eat and how to plan.

A striking change in the food consumption patterns of this household is the increase in the amount of food consumed. This amount was 28 kg according to the first diary and 52 kg in the second, twice as much. This increase is certainly related to the dietary changes undertaken as part of the Weight Watchers program where the strategy is to eat a lot of food with low energy content such as fruits and vegetables and less food with high energy content such as fat cheese. The first recording could also be an underestimation since grazing may be overlooked in the food diary. Despite this increase, household *Slim and Green* decreased consumption of beef, pork and pastries. Small amounts of legumes were consumed in the second registration but not in the first and the consumption of fruits increased nine times. Organic foods were bought rather frequently, including coffee, tea, salmon, apples, vegetables, cereals, meat and eggs. The electric kettle was used sparsely and products imported form USA sometimes replaced Swedish products.

A preliminary estimate of the life cycle energy inputs for the food consumed according to the two recordings indicates an increase by 40 %. This may be compared to the increase of almost 100 % in the quantity of food consumed.

5 Discussion

The first findings from the URRU project indicate that households are able to experiment with new diets for environmental reasons if given information and support. If this change is sustained in the long run remains to be seen. However, each household chose its own strategies within the family's living pattern, which can hopefully have a greater potential for

permanent change. Energy savings can be significant, although much work still remains for portraying the energy consequences of the changes in an accurate way. Factors influencing food consumption patterns are numerous and include external factors such as the mad cow decease and the EU agricultural policy. Such factors alter possibilities for households to effect changes, and there are also many other aspects that households may consider such as, solidarity, economy and ethics.

Changes in households' work in the labour market and also changes in the family situation can alter opportunities for more environmentally friendly diets, even though households are eager to comply with recommendations. More work outside home changes meal patterns, with less control and information about ingredients and cooking method. Dietary programmes may include consumption of energy demanding but lean products. An approach extending beyond the borders of the household is therefore needed.

The changes towards less energy consuming diets that were documented in this experimental study also showed that it caused other changes in turn such as the relations in the division of labour in the household, power balance in decision-making and deep rooted food culture.

In the on-going work of the URRU project, methods for feedback to households will be developed together with educational classes in cooking and planning for meals. When considering large-scale interventions for more sustainable consumption patterns, results from the URRU project can be of substantial value.

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Shopping behaviour of private households towards regional food

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Abstract

Objectives: An important aim of this study is the encouragement of an increased dialogue between market partners (producers, processors, retailers and consumers) in respect to a sustainable consumption of regional food. The analysis of shopping behaviour of private households is part of a co-operation project called "Regional food: Encouragement of sustainable food consumption".

Methods: 486 members of private households in charge of shopping were interviewed (semi-structured interviews). Specific questions were asked: the understanding of regional food (definition), expectations, motives for buying regional food, information behaviour and their attitude towards acceptance of paying a higher price for these products.

Results: The respondents link three main dimensions to regional food: origin (distance), ecological aspects (short transportation distance) and social aspects (supporting farmers). Expectations concerning the quality of regional food hardly vary from expectations concerning non-regional food. The most important quality attribution to these products is freshness. Buying motives are short transportation distances, support of local farmers and also freshness. Respondents receive most of their information about regional food from friends/family, from local newspapers as well as from food packages. Information given orally is trusted more than written information. A higher price for regional food is accepted by the majority of the respondents.

Conclusions: For a constructive interchange between market partners it is very important to know the consumer's motives and expectations as well as the fact that information orally given positively influences the selection of regional food.

1 Introduction

Everyday food choices are influenced by a large variety of factors. Overwhelming food supplies, modern marketing strategies as well as distrust in "technical food" lead consumers to have a critical look at their consumption and shopping behaviours. Food scares such as BSE (Bovine Spongiform Encephalopathy) and foot-and-mouth-disease have shaken consumers' confidence again. In search of safe food, regional produce is often attributed to be an alternative. Regional food is characterised by short distances between production and consumption. Knowledge of the producer and the location of food production, support of local farmers and the local food economy and a high quality potential (harvest when fully ripe,

fresh and flavoursome) are seen as important values of regional food (Bruhn et al., 1992; Ross et al., 2000; Bayrisches Staatsministerium für Ernährung, Landwirtschaft und Forsten, 1999).

1.1 Objectives

The study on the shopping behaviour of private households is part of a co-operation project called "Regional food: Encouragement of sustainable food consumption".[1] The project analyses the demand for regional food (questioning consumers) as well as the provision of regional food (questioning producers, processors, retailers and the consumer council).
There are two main aims of the project:

- the encouragement of an increased dialogue between market partners (producers, processors, retailers and consumers) in respect to a sustainable consumption of regional food and
- the development of new counselling concepts for private households promoting sustainable consumer behaviour, i.e., that private households have the opportunity of changing their food shopping behaviour as well as their food consumption behaviour in the long term (Dorandt et al., 2000a; Dorandt et al., 2000b).

The goal of this article is to present central results of the consumer survey. In the following this article adresses:

- What do consumers call regional food?
- What do they expect of regional products?
- How is it purchased?
- Which shopping motives concerning regional food do consumers have?
- How do they get their information about this produce?
- Are they willing to pay higher prices for regional food and why?

1.2 Definition of regional food

In the literature there is no unique definition for "regional food". Some studies focused on this food are based on "geographical origin", such as "grown in the federal state" (Ross et al., 2000; Hauser, 1994). Other studies, for example Wirthgen et al. (1999), defined "regional food" as products and specialities which are produced in the local region by farmers, the local food industry as well as by local processors.
This study defines regional food as "food produced (raised), processed, packaged if necessary, appropriately labelled and sold in a region". To meet the "regional food" claim in our definition the majority of the ingredients (more than 50%) has to be from the region.
How is "region" defined in this study? Given the various definitions in the literature, we developed a model to define "regionality" for our study (see Fig. 1).

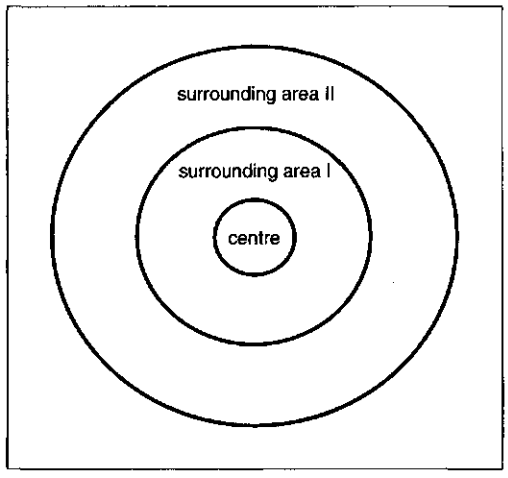

Figure 1: Model of definition of region. Centre = research site/city and suburbs, surrounding area I = area of direct-marketing, surrounding area II = federal state.

There are three sectors within the model. The first (inner) sector is the "centre". It corresponds to either one of the three research sites of this survey (Osnabrueck, Muenster and Dortmund) and an additional 10-km-radius around these cities (suburbs).
The second sector we defined as "direct-marketing area". This is an area within a radius of 30 km of the first sector often in accordance with the borders of the *Landkreis* (county). In this area, there are direct sales outlets such as farmers' markets, street markets[2], roadside stands and pick-your-own operations. The radius of 30 km has been chosen, since most consumers drive up to a maximum of 30 km to purchase food (Albers et al., 1998).

The third sector corresponds to the boundaries of the federal state in which the cities are located: Lower Saxony or North Rhine-Westphalia. For this model it is prerequisite that suppliers of regional food located in surrounding area II have sales outlets in the centre (e.g. a stall at farmers' or street markets, sales outlets in supermarkets, health food shops or specialist shops).

2 Methods

In Autumn 1998 and Spring 1999, 486 consumers living in private households and in charge of shopping were interviewed. Interviews were semi-structured, i.e., most of the questions were closed-end with multiple choice options, and additional questions were open-ended. The respondents were interviewed in their homes by trained students of Nutritional Science and Home Economics. Research sites were chosen from three different cities: Osnabrueck (Lower Saxony), Muenster and Dortmund (both North Rhine-Westphalia). In Osnabrueck 227 consumers were questioned, 219 in Muenster and 40 in Dortmund. These cities were chosen firstly because of their different structure (rural – urban, characterised by industry – administration), secondly because there is already a supply of regional food at all three research sites.

This survey is quantitative, but non-representative. Sampling for this study was purposeful and stratified (Schnell et al.,1992; Friedrichs, 1990). It was stratified into two major aspects.

1. Sampled households should cover all income groups: high, middle and low incomes.
2. All household-types of life span should be represented: younger and older single-households, families with younger and older children as well as younger couples and older couples (retirees).

In order to reach these different target groups, various institutions were asked for recruitment (such as women's associations, large companies, social service departments, nursery schools, religious organisations and associations, consumer councils).

Besides a descriptive analysis, chi-square tests were applied to investigate factors influencing the purchase of regional food, buying motives and willingness to pay higher prices for regional food. The variables which were analysed are: household structure (household size, children living in the household, income) and personal factors (gender, age, level of education and place of residence). Interview data was calculated using SPSS/PC version 9.0.

3 Results

3.1 Description of respondents

Table 1 reveals the majority of this collective as females, i.e., that women today are still responsible for the households' shopping. The majority of respondents are 31 to 43 years and 57 to 69 years. 30% of the respondents have an educational level described as "secondary technical school" thus denoting a "middle range" educational level of the study sample. Over one-half of the respondents are singles or live in two-person-households. Less than one-fifth lives with three persons, less than one-quarter lives in households of four or more persons. There are few respondents who live with and care for children under the age of 18. The overwhelming majority (73.5%) has no children in this age group.[3] If the data on income is compared to the general German income data (Statistisches Bundesamt, 1997), the lowest monthly income level (under 500 €) in this study is over-represented (about one-third), while the income levels 501 to 1500 € per month are under-represented. The higher-income levels reflect the general German population.

Table 1: Socio-demographical structure of respondents

1 Gender structure (n= 486)		4 Household size (n= 486)	
female	87.4%	1 person	23.0%
male	12.6%	2 persons	35.0%
		3 persons	18.3%
		4 persons	15.4%
		5 and more persons	8.2%
2 Age structure (n= 486)		**5 Number of children (under 18), living in the household (n= 485)**	
18 – 30 years	20.6%	no children	73.5%
31 – 43 years	25.1%	1 child	11.1%
44 – 56 years	20.0%	2 and more children	15.4%
57 – 69 years	25.1%		
70 years and older	9.3%		
3 Level of education (n= 486)		**6 Monthly household income (n= 486)**	
nothing	1.0%	under 500 €	8.2%
primary school	22.8%	501-1000 €	13.8%
secondary technical school	28.8%	1001-1500 €	17.5%
'A' level, high school	26.1%	1501-2000 €	16.0%
university degree	21.2%	2001-2500 €	14.4%
		over 2500 €	16.9%
		no comment	13.2%

3.2 Definitions of "regional food" by the households

The consumers were asked to provide their own definition of the term "regional food". In a second step they were then given items which could be linked to "regional food". They were asked to link given items to "regional food".

Regional food is predominantly linked to the origin of this produce (geographical origin). Respondents associate regional food with food which is grown usually in the region they live in and relate it to food which is hardly processed (staple foods such as potatoes, vegetables, fruits, meat, butter, milk).

If in the questionnaire the respondents are given items, social aspects ("support of local farmers and the local food economy") and environmental aspects ("short distance") are as important as the aspects of origin (such as "food grown/raised close to my place of residence") (see Fig. 2).

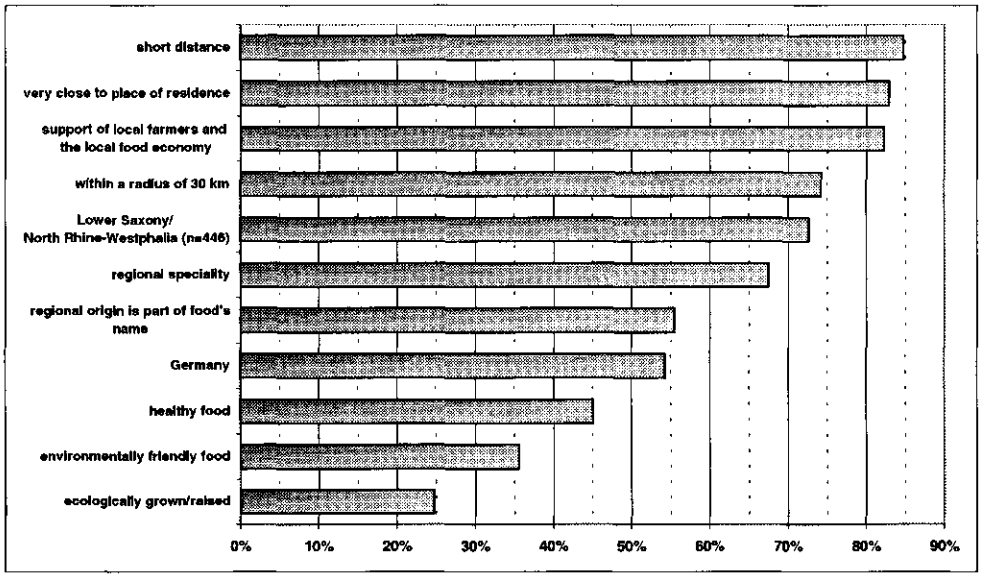

Figure 2: Attributes of "regional food" from consumers' point of view (n= 484) – multiple responses were possible.4

3.3 Expectations concerning the quality of regional food

Expectations concerning the quality of regional food hardly vary from non-regional food as displayed in Figure 3. Almost 80% of the consumers expect regional food to be fresh. One-third of the respondents expect regional food to be free of pesticides and to be as free of contamination as possible. For the respondents, food labelling with an indication of the origin is of minor importance. Only 20% of the interviewees relate to this. This result is much lower than the author expected.

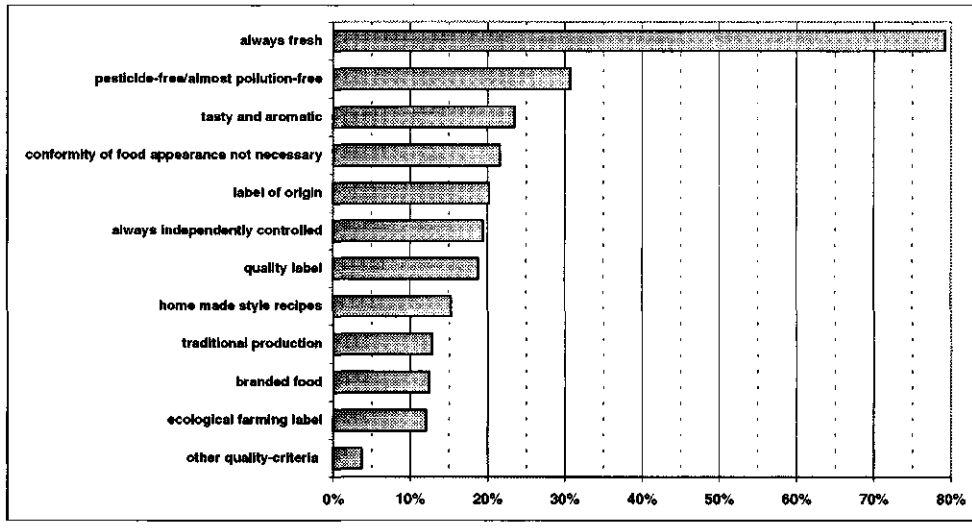

Figure 3: Attributed quality characteristics of regional food (n= 485) – multiple responses were possible.4

3.4 Purchase of regional food

The responses to the question "Do you buy regional food?" show that over three-quarters of the interviewees assume that they buy regional food. Only ten respondents never buy this produce and 11% of respondents are not sure they do so.

Chi-square analysis was done to relate socio-demographical factors to influencing factors on regional food purchase. For this analysis the respondents were divided into two different groups: "frequent purchasers" and "less frequent purchasers". "Frequent purchasers" buy regional food often or very often (self-assessment of respondents; 51% of respondents), "less frequent purchasers" buy those products sometimes or rarely (self-assessment; 35% of respondents).

There is almost no statistical significance (at the 0.05 level) between household structure and frequency of purchase except for income. Consumers with a lower income (less than 1000 €/month) are rather "less frequent purchasers", consumers with income between 1501-2000 €/month or with the highest monthly income (more than 2500 €) are "frequent purchasers". The level of education was not significant. "Frequent purchasers" are predominantly respondents who live in Muenster, women[5] and older respondents (57-69 years old). "Less frequent purchasers" can be described as respondents who live in Osnabrueck and Dortmund, men as well as younger respondents (18-30 years of age).

3.5 Shopping motives

The most important motives for choosing regional food are the short distance between its place of production and its point of sale (almost three-quarters of the respondents), support of local farmers (two-thirds of the consumers) and freshness (one-half of the respondents) (see Fig. 4). Chi-square analysis (at the 0.05 level) reveals that freshness is significantly important for those who are older than 57 years, live in two-person-households and live without children. More than 40% of the respondents want to provide their family and themselves with healthy food. Women, respondents with a lower level of education, elderly consumers (57

years and older) as well as those with monthly income between 1001 and 1500 € predominantly buy regional food. Over 40% of the interviewees like to know where food is grown/raised, most of whom live in two-person-households and without children.

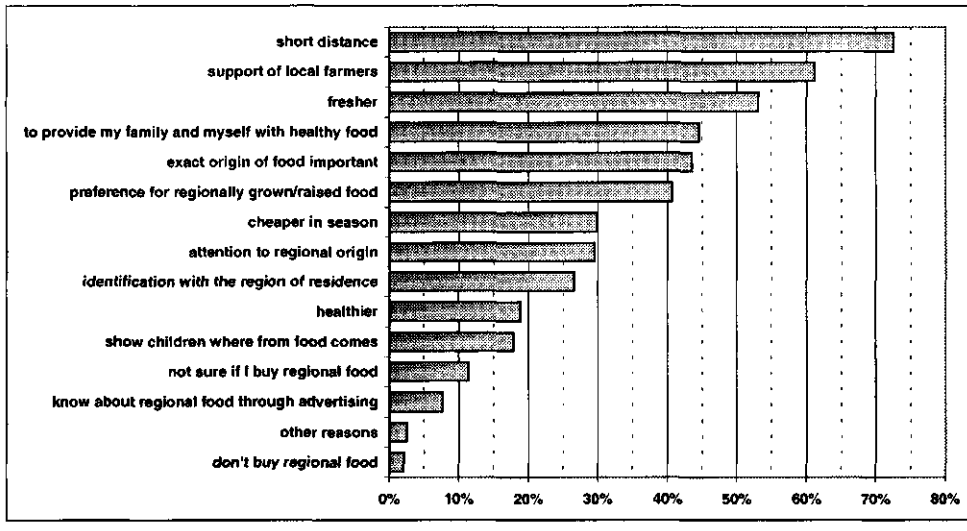

Figure 4: Reasons for choosing regional food (n= 482) – multiple responses were possible.4

3.6 Information behaviour

Respondents in this survey receive their information about regional food mainly from friends (63%) and from family (39%), from local newspapers (61%) and from food packages (49%). There is consent in the literature that generally oral information is more trusted than written information (Vogelsang, 1996; Bergmann, 2000). This was supported in our study. The more the consumers know the informant and his/her competence, the more the consumers trust the given information. Additionally, information provided orally (e.g. from producers, family, friends or sales promotion) prompts a positive decision to purchase regional food far more than written information (e.g. newspaper articles, brochures or advertising).

3.7 Willingness to pay a higher price

An overwhelming majority (63%) of the respondents are willing to pay higher prices for regional food. For products associated with a high quality consumers are willing to pay more: for freshness, better quality and support of the local economy (see Fig. 5). Only 37% of the consumers questioned are not willing to pay more for regional than for non-regional food. They do not accept higher prices due to their financial situation (18%). A minority (12%) of the respondents believe that higher prices are unwarranted (in their opinion regional food causes less costs for transport, storage and staff).

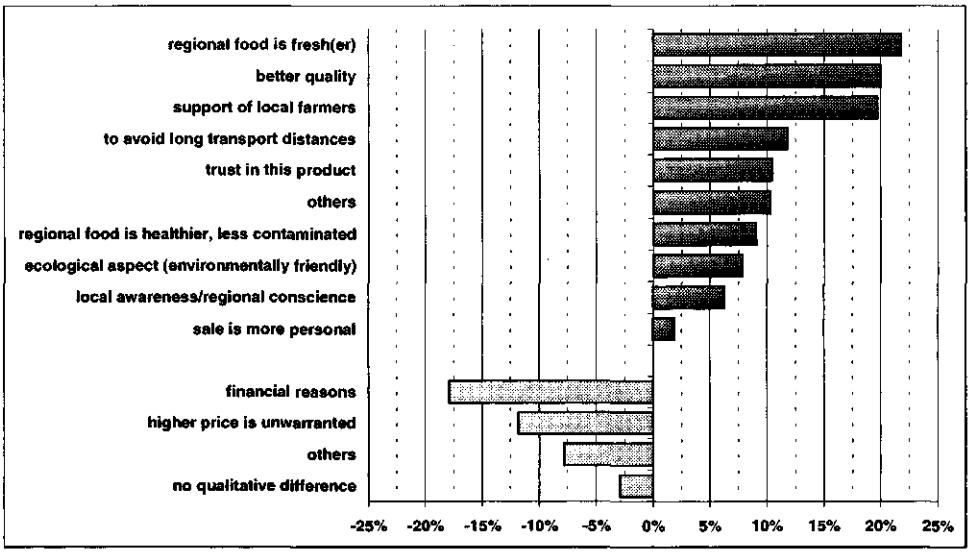

Figure 5: Reasons for acceptance (dark grey) and disapproval (light grey) of higher prices for regional food (n= 476) – multiple responses were possible.6

Chi-square test were applied to analyse if certain socio-demographical variables influence the willingness to pay higher prices for regional produce. Surprisingly only two socio-demographical variables significantly influence the willingness (at the 0.01 level): age and income. It is not surprising that younger respondents (aged 30 and younger) and lower-income households (less than 1000 €/month) are not willing to pay more for regional food. On the other hand, older consumers (aged 44 and older) and higher-income households (more than 1501 €/month) are willing to do so.

4 Discussion

Compared to the literature this quantitative, but non-representative study displays that in the sample questioned a unique definition of the term "regional food" does not exist either (Ross et al., 2000; STMELF, 1999; Wirthgen et al., 1999; Hauser, 1994). Nevertheless it displays aspects which are underestimated by the literature. Uninfluenced by a certain definition, consumers associate "regional food" with food which is grown usually in the region respondents live in and relate it to food which is hardly processed. This might reflect how respondents perceive regional food at present. In contrast with the free definitions of "regional food" provided by the interviewees, the interviewees' agreement with pre-set statements reflects consumers' expectations and wishes concerning "regional food": local origin, short distance between production site and point of sale as well as support of regional farmers and the local food economy. Respondents could recognise with the help of the given items what in their opinion is important or less important about regional food. These answers can be used to shape a clear profile of regional food (Dorandt et al., 2000a).

This survey reveals certain trends concerning regional food:

- There was already an interest in regional food before the German BSE-crisis. It is likely that at present there exists an even greater interest and demand for regional food. Therefore the awareness and importance of regional food has to be stressed among all the different consumer groups (through educational advertising and through an active interchange between producers and consumers).

- Regional food is known and bought by an overwhelming majority of respondents, but there are large differences between self-assessment and real behaviour (purchase of regional products, willingness to pay higher prices).

- Since there is no major difference between quality expectations of regional and non-regional food, it is necessary that regional food combines high quality aspects (harvested when fully ripe, fresh, aromatic, tasty, quality brands) with local origin to shape its profile.

For a constructive discourse between market partners it is important to know the consumer's motives and expectations. In the authors' opinion there are consumer's motives to buy regional food which are underestimated by producers: the ecological and social values of regional food. Producers could use these aspects to increase the sale of regional products.
A direct dialogue between suppliers and consumers could improve confidence on both sides, thus enhancing the demand and retailing of locally produced food. Since it is impossible for suppliers to engage in interchange with every potential customer, multipliers could be interposed. A project on female farmers, farmers' wives and/or women in marketing and producing as multipliers showed that these women are competent and know about food production as well as food preparation (CMA no year). At the point of sale they explain the advantages of regional food. Consumers have the opportunity to ask questions and sample regional food.

One major drawback of this survey is that the aims of stratification were not reached. The income levels represent the German population, but types of households reflecting all stages of live, as would have been desirable, are not proportionally represented. In fact it appears that in this survey consumers who are older, live in two-person-households, have no children and have higher incomes are especially interested in the purchase of regional food. Families were under-represented in this survey, but it seems that families consider buying regional food as well, though they are not yet totally convinced of the advantages of these products. The study rather displays that there are different target groups which could be reached by suppliers with different strategies.

5 Conclusion

Regional food is seen as an alternative to regain the confidence of consumers in safe food. This is important in times of various food crises. By giving regional food a certain profile consumers know what they can expect of regionally produced food.

Therefore the next steps of the co-operation project "Regional food: Encouragement of sustainable food consumption" are:

- Shaping a clear, understandable profile of the term "regional food"
- Development of counselling concepts for private households to improve their competence concerning the production, processing and retailing of food in general and especially of regional food.

6 Endnotes

(1) Co-operation partners are „CMA Centrale Marketing-Gesellschaft der deutschen Agrarwirtschaft" (Central marketing Society of German Agriculture), extension services "Landwirtschaftskammer Weser-Ems (Osnabrueck)" (Chamber of Agriculture Weser-Ems (Osnabrueck)) and "Landwirtschaftskammer Westfalen-Lippe (Muenster, Dortmund)" (Chamber of Agriculture Westphalia-Lippe (Muenster, Dortmund)) as well as "Verband der Landwirtschaftskammern" (Association of Chamber of Agriculture).
(2) In Germany the two terms "farmers' market" and "street market" can not be used as synonyms, because there is a difference concerning their definitions. "Farmers' markets" are subject to strict rules. One major rule is that only farmers from the region receive the permission to sell their (regional) products at the farmers' market (Landwirtschaftskammer Hannover 1997). In contrast with the farmers' market street markets allow any kind of supplier (e.g. farmers, retailers, processors) to offer their produce.
(3) We defined "households with children" as households who live and care for children under the age of 18.
(4) Closed-end question with multiple choice options.
(5) The aspect "gender" must be relatively assessed because of the over-representation of women in this survey. Open-ended question.

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Food consumption patterns and the land required for the production of this food

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Abstract

For the production of food vast amounts of land are required. The area suitable for growing crops is limited. In this paper attention is paid to the impact of food consumption patterns on land requirements. In a previous study land requirements per food item were determined. In this paper these data were combined with different consumption patterns, leading to information on land requirements per consumption pattern.
Land requirements for several types of consumption patterns were evaluated varying from subsistence to affluent. Finally, the impact of changes in consumption patterns on future land requirements is discussed.

Keywords: Food consumption pattern; Land requirement for food; Ecological footprint; International comparison; Agricultural productivity, Dietary change

1 Introduction

Vast amounts of land are required for the production of food. However, only 31% of the global soil surface is suitable for growing crops, while an additional 33% is suitable for grassland (Penning de Vries et al., 1995). Agricultural land is becoming a scarce resource due to ongoing industrialisation, urbanisation, infrastructural development, land degradation and desertification (Oldeman et al., 1999). Total land requirements for a populations food need are determined by production systems and by consumption. On the one hand, the influence of food consumption is determined by the size of the population, on the other hand, by the types and the amounts of specific foods consumed, the food consumption patterns. Several authors have shown the importance of consumption patterns on land requirements (Van Vuuren and Smeets, 2000;Wackernagel et al., 1997), while studies on food security have estimated that a shift from a vegetarian diet to an affluent diet with meat (Penning de Vries et aL., 1995;Bouma et al., 1998;Groot et al., 1998) will lead to a tripling of the land requirement.
In 2001 the world population was 6.1 billion people, while according to the medium projection of the United Nations the population will reach 8 billion in 2025 (United Nations, 2001); 98% of this increase will take place in the world's poorest countries, where average food intakes are even lower than requirements on the subsistence level (Azoulay, 1998). In developing countries rising incomes will increase food intakes and hence increase land requirements. This change direction has been shown for Benin, Bhutan and Costa Rica (Van Vuuren and Smeets, 2000). If consumption patterns in developing countries shift toward the affluent menus in western countries, related land requirements might rise substantially.
In a foregoing study on land requirements relating to food consumption patterns (Gerbens-Leenes et aL., 2001) a method has been developed to calculate the land required to produce

individual food items (m^2 year kg^{-1}). In combination with data on household consumption (kg $year^{-1}$) land requirements related to the Dutch consumption pattern in 1990 have been determined. The study has shown that large differences in specific land requirements for individual foods exist, resulting in large differences between land requirements for food groups on a household scale level.
Food has several functions; a basic one is to provide enough energy for body functions and physical activity. To provide health for the total life span, diets should conform to nutritional constraints, while cultural and emotional requirements imply diets, the actual food consumption patterns, that are much more varied than the diets advised by nutritionists. The actual patterns also contain foods low in nutrient density, for example coffee or cakes.
In this study the different food functions are defined on three scale levels: (I) the basic level providing enough energy, (II) the subsistence level providing energy and nutrients, and (III) the cultural level, containing the actual food consumption patterns. These food functions are all related to different land requirements. The specific aim of the study reported here is to assess the extent of the per capita land requirement for the different functions of food defined. Therefore, the gap between land requirements for basic and subsistence levels on the one hand and requirements for food consumption patterns on the other will be calculated. In order to evaluate the effects of changes in food patterns on land requirements, attention is also paid to inter-generational differences. The paper starts with a description of food systems, food consumption patterns and the factors that determine these patterns. Data on per capita consumption are available from various sources (e.g. FAO, LEI/CBS).
Existing studies on food security that are generally based on comparison of food energy supply with dietary energy requirements have shown that future generations can be fed. However, foods low in nutrient density that are important on a cultural scale level (e.g. coffee) or higher quantities of specific foods have not been taken into account in these studies. The results of this study can give a contribution to the discussion on future agricultural requirements so that not only physical but also cultural requirements related to food can be met.

2 Food systems

Food systems are quite complex and show a lack of transparency of physical streams. Systems can be divided into two subsystems: (1) food production and (2) food consumption. These subsystems determine the total land requirement for food. Figure 1 shows a simplified model of the factors that determine land requirements for food.
Agricultural production can be divided into primary and secondary production. In primary production crops are grown. Yields per hectare depend heavily on production systems applied so that yields show large variations. For example, average wheat yields in the Netherlands around 1900, when little fertiliser was used and cereals were grown in rotation with legumes, were about 2.0 Mg ha^{-1} (Spiertz et al., 1992). In 1995 Dutch wheat yields have risen to 8.7 Mg ha^{-1} (Food and Agricultural Organisation of the United Nations (FAO), 1999). The crops from the primary production system form the basis for the secondary or livestock production.

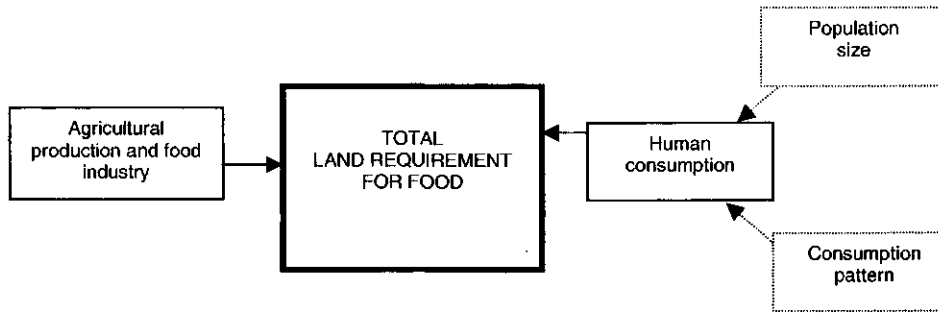

Figure 1 : Factors that determine the total land requirement for food.

The food industry processes commodities for the manufacturing of an enormous variety of foods. Most of these foods are made using ingredients from different production systems and with different land requirements. To make a cake, for instance, basic ingredients such as sugar, flour, eggs and butter are needed, and these all have different land requirements. Therefore, land requirements for individual food items can differ considerably. Total food consumption is determined by two factors: (1) the size of the population and (2) the amounts and types of foods that are consumed, i.e. food consumption patterns. This is shown in Figure 1.

3 Food requirements

Food has several functions. A basic one is to provide enough energy for body functions and physical activity. To provide health, diets should also confirm to nutritional constraints and provide enough vitamins and minerals. When cultural and emotional requirements are met, menus also contain foods low in nutrient density or provide more foods than needed to stay alive. The actual food consumption patterns are found on the cultural level. The different food functions are all related to different land requirements. The specific aim of the study reported here is to assess the relation between the functions of food and the land required. Therefore, this paper distinguishes three scale levels for the different food functions: the basic, the subsistence and the cultural level. These levels are shown in Figure 2.

3.1 Dietary requirements for the basic and subsistence level

On the first level, the basic level, energy requirements were met by wheat consumption. It can only be maintained for a short period of time because many essential nutrients are lacking. Food requirements on the second level, the subsistence level, are optimal from a nutritional point of view. This diet was based on a selected number of nutrient-dense foods such as milk products, meat and vegetables. It is recommended by nutritionists, providing bodily health for the total life span.

3.2 Food consumption patterns

Dietary requirements on the third scale level, the cultural level, form the actual food consumption patterns. They also contain foods low in nutrient-density. For example, coffee, cakes or chocolate, or higher amounts of foods than requirements for the subsistence level

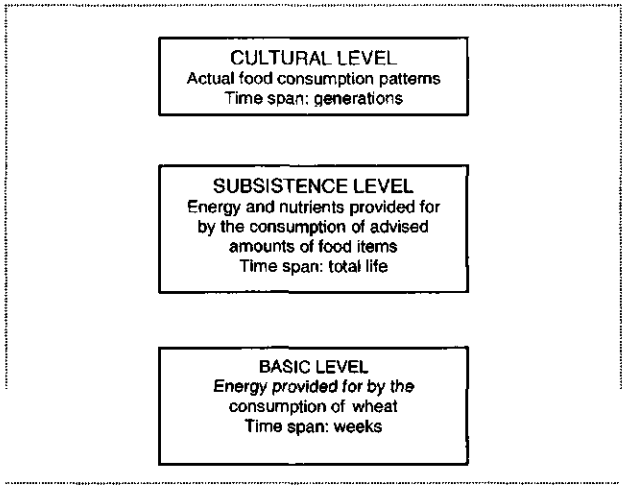

Figure 2: Three scale levels for food requirements. Requirements for the basic and subsistence levels are hypothetical requirements, for the cultural level actual requirements.

Food consumption patterns were defined as repeated arrangements observed in the consumption of food by a population group. They have to do with types and quantities of foods and their combinations into different dishes or meals. Food consumption patterns depend on several factors such as: personal preference, habit, availability, economy, convenience, ethnic heritage, religion, tradition, culture and nutritional requirements (Gerbens-Leenes et aL., 2001). Until recently, consumption patterns were strongly influenced by the local availability of commodities, resulting in large regional and inter-generational differences (Jobse-van Putten, 1995). During the 20th century modern transportation and food conservation techniques developed, resulting in more varied consumption patterns.

Table 1 Specific land requirements for foods showing large consumption (m^2 year kg^{-1})

food item	*specific land requirement (m^2 year kg^{-1})*
Beverages	
Beer	0.5
Wine	1.5
Coffee	15.8
Tea	35.2
Fats	
Vegetable oil	20.7
Margarine	21.5
Low fat spread	10.3
Meat	
Beef	20.9
Pork	8.9
Chicken filet	7.3
Milk products and eggs	
Whole milk	1.2
Semi-skimmed milk	0.9
Butter	13.8
Cheese	10.2
Eggs	3.5
Cereals, sugar, potatoes, vegetables and fruits	
Cereals	1.4
Sugar	1.2
Potatoes	0.2
Vegetables (average)	0.3
Fruits (average)	0.5

Source: Gerbens-Leenes, 1999

4 Materials and methods

Total per capita land requirements for food were determined through combining the specific land requirement per food item by the amounts of foods consumed. Results of studies on land requirements relating to food consumption patterns (Gerbens-Leenes, 1999;Gerbens-Leenes et aL., 2001;Gerbens-Leenes et aL., 2001) were used as the basis for the calculations. In those studies, a method to calculate the land required to produce individual food items has been developed and applied to the Dutch situation in 1990. This has resulted in an overview of specific land requirements for over a hundred commodities and food items (m^2 year kg^{-1}). Table 1 shows some requirements for foods with large consumption. Land requirements (m^2 $capita^{-1}$) for the three scale levels defined above were calculated by multiplying consumption (kg $capita^{-1}$ $year^{-1}$) per food item by the specific land requirement for that item (m^2 year kg^{-1}) and summing the results. Data on consumption were obtained from various sources (Eurostat, 1993;Food and Agricultural Organisation of the United Nations (FAO), 1999;Landbouw-

Economisch Instituut and Centraal Bureau voor de Statistiek, 1981;Landbouw-Economisch Instituut and Centraal Bureau voor de Statistiek, 1986;Landbouw-Economisch Instituut and Centraal Bureau voor de Statistiek, 1996;Landbouw-Economisch Instituut and Centraal Bureau voor de Statistiek, 1998;Vereniging van Nederlandse koffiebranders en theepakkers, 1961).

At the basic level, energy requirements were met by the consumption of wheat. This menu only contained bread. For the calculation of land requirements, Dutch data on advised energy intake were used: 10 MJ per adult performing low physical activity per day. The assessment of land requirements on the subsistence level was based on Dutch recommended daily amounts of foods and energy intake. Data were obtained from the Dutch Nutritional Council (Voedingscentrum, 1998). These recommended daily amounts are shown in Table 2.

At the cultural level, land requirements related to various consumption patterns were assessed: Dutch per capita land requirements during the period 1950-1990 and requirements for fourteen European countries in 1995 (The Netherlands, Belgium, Luxembourg, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Austria, Portugal, Finland and Great Britain). Land requirements for food were put into five categories: (1) *beverages* (beer, wine, coffee and tea); (2) *fats* (margarine, low fat spread, vegetable oil); (3) *meat* (beef and veal, pork, other meat, poultry); (4) *dairy* (full fat milk, semi-skimmed and skimmed milk, buttermilk, condensed milk, butter, cheese) *and eggs*; and (5) *cereals, flour, sugar, potatoes, vegetables and fruits.*

Table 2 Recommended daily amounts of food items per adult per day

food item	*recommended daily amounts (grams)*
Bread	200
Potatoes	200
Vegetables	175
Fruits	200
Milk and milk products	375
Cheese	30
Meat (raw)	100
Meat products	23
Low fat spread	30
Margarine	15

Source: Dutch Nutritional Council (Voedingscentrum, 1998)

5 Results and discussion

The per capita land requirement for food in The Netherlands calculated in this study was the actual requirement. The other results were based on the same data set and must therefore be interpreted in a relative way. Where possible, results are given as a number, with Dutch requirements in 1990 set to 100, indicating the relative land requirement for the consumption pattern studied.

5.1 Land requirements for the basic and subsistence levels

Based on an average energy requirement of 10 MJ per capita per day and the consumption of wheat, the relative land requirement for the basic level was 23. If recommended daily amounts of foods advised by the Dutch Nutritional Council were consumed, the relative requirement rose to 67, three times higher than for the basic level.

5.2 Consumption and related land requirements for the cultural level

5.2.1 Dutch food consumption and related land requirement in 1990

In Table 3 shows Dutch food consumption in 1990. Based on the Dutch production situation in 1990, the per capita land requirement in The Netherlands in that year was 1909 m^2. Figure 3 shows land requirements per food category. Large differences were found between consumption categories. The categories of fats and meat were the largest categories requiring 576 m^2 (30.2% of the total) and 566 m^2 (29.6% of the total) respectively. 323 m^2 was needed for dairy and eggs (16.9% of the total). The area needed for the category of beverages was 223 m^2 (11.7% of the total). The requirement for this category was heavily dominated by only one item: 60% of the area was needed for coffee. Although the consumption of basic foods (kilograms of cereals, potatoes, sugar, vegetables and fruits) was a factor of four higher than of meat, the land required was only 222 m^2 (11.6% of the total). This was even lower than the land needed for beverages.

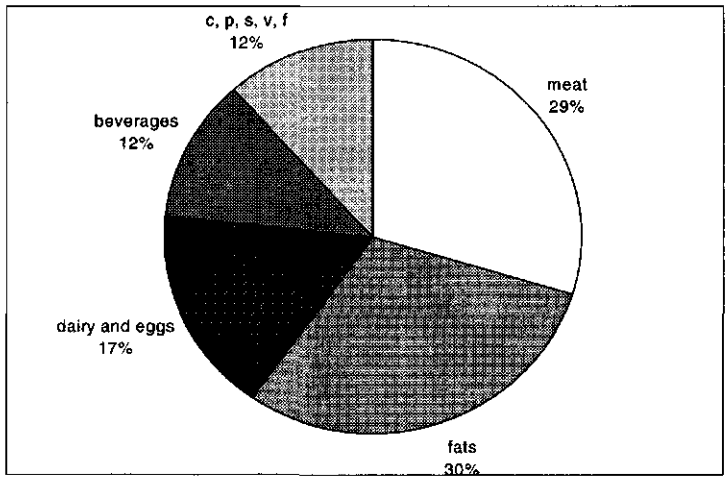

Figure 3: Per capita land requirements in the Netherlands in 1990 for five food consumption categories: meat; fats; dairy and eggs; beverages; and cereals, potatoes, sugar, vegetables and fruits (c, p, s, v, f)

5.2.2 European consumption patterns and related land requirements

European food consumption patterns showed large differences. In the category of beverages for example, beer consumption varied by a factor of six between Ireland and Italy, while butter consumption varied by a factor of sixteen between Denmark and Spain. These large differences in the consumption of specific foods resulted in large variations in the agricultural area required. Figure 4 shows the relative land requirements for consumption patterns in Europe in 1995.

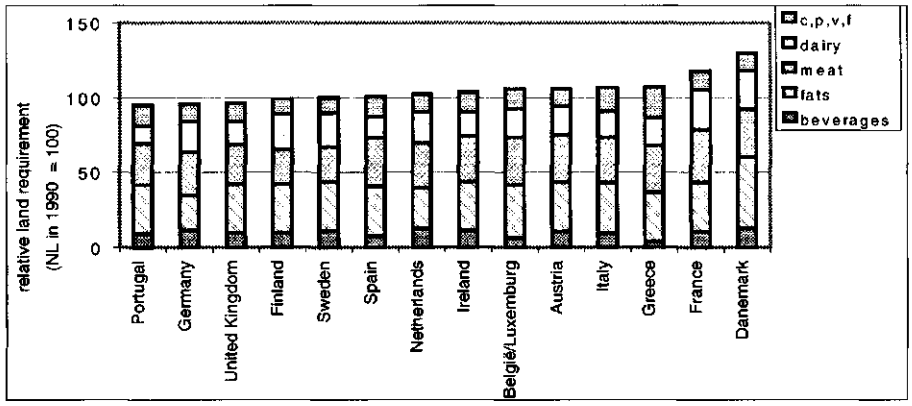

Figure 4 : Relative per capita land requirements for food divided over five consumption categories for 14 European countries (c,p,s,v,f = cereals, potatoes, sugar vegetables and fruits)

Relative land requirements based on European consumption patterns in 1995 varied between 95 and 130, a difference of 37%. Relatively large requirements were found for Denmark and France with requirements of 130 and 118 respectively. The large requirement for Denmark was mainly caused by the large consumption of fats, coffee, pork, milk products and butter; for France by the large consumption of wine, meat and cheese. Medium requirements were found for countries with medium consumption of foods with high specific land requirements, while foods with low requirements were preferred. Examples are Sweden (relative land requirement 100) and The Netherlands (relative land requirement 102). Relatively small land requirements were found for countries with small consumption in most of the categories. These were Portugal and Germany (relative requirements 95 and 96 respectively). Figure 5 shows that relative land requirements for the basic level on the one hand and for the largest requirement for the cultural level on the other varied between 23 and 130, a difference of a factor of six. This is much more than the factor of three mentioned by (Penning de Vries et aL., 1995;Groot et aL., 1998;Bouma et aL., 1998)). In all European countries per capita land requirements were higher than requirements for the subsistence level.

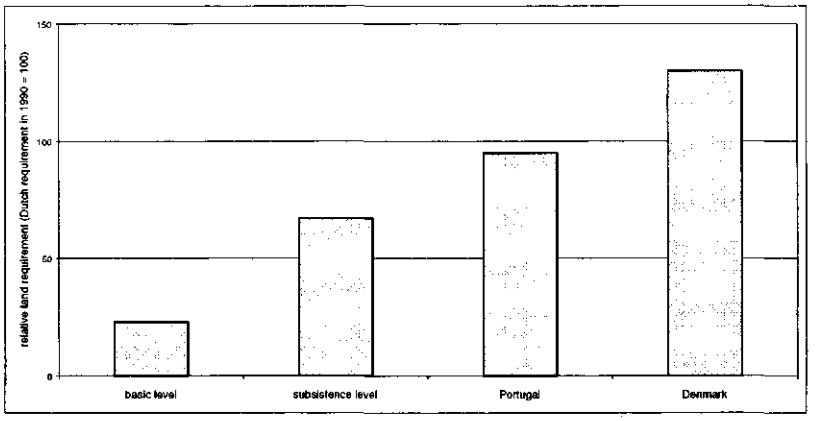

Figure 5: Relative land requirements for two hypothetical food consumption patterns, the basic and subsistence level, and for two existing European patterns related to the smallest and largest land requirements (the Portuguese and the Danish)

5.2.3 Development of Dutch food consumption and related land requirements during the period 1950-1990

Table 3 shows Dutch food consumption between 1950 and 1990. Rising incomes favoured more expensive foods, like meat, coffee and wine, while the consumption of cheap bulk foods, such as flour and potatoes, dropped. In the category of beverages, only tea consumption remained constant, while the consumption of coffee, beer and wine rose by a factor of eight to fifteen. Total fat consumption remained constant. In the category of meat, consumption rose by a factor of three, but shifts between types occurred within this category. In 1950, mostly beef and veal (40% of the total) and pork (54% of the total) were consumed. By 1990, the proportion of beef and veal had dropped to 24%, while pork consumption remained high (53% of the total). In 1950, consumption of poultry was negligible, but in 1990 this type formed 20% of the total meat consumption. In the category of dairy and eggs, milk consumption dropped by 36%, while cheese consumption tripled. A shift could be shown toward varieties of milk with lower fat content. Egg consumption rose by a factor of two and a half between 1950 and 1960, but then remained constant. In the category of cereals, sugar, potatoes, vegetables and fruits, potato consumption dropped by 33%, while consumption of citrus fruits rose more than a factor of seven.

Table 3 Food consumption (kg per capita per year) in the Netherlands during the period 1950-1990

food item	*consumption (kg per capita per year)*				
	1950	*1960*	*1970*	*1980*	*1990*
1. Beverages					
Beer	11	24	57	86	91
Wine	1	2	5	13	15
Coffee	1	4	6	7	8
Tea	1	1	1	1	1
2. Fats					
Margarine	17	20	18	13	10
Low fat spread	0	0	1	3	3
Vegetable oils	5	5	8	11	13
3. Meat					
Beef and veal	14	18	19	22	20
Pork	19	23	27	40	45
Other meat	2	2	3	3	3
Poultry	0	2	6	9	17
4. Dairy and eggs					
Full fat milk	188	127	107	60	42
Semi-skimmed milk	0	0	0	28	42
Skimmed milk	0	15	17	17	20
Buttermilk	16	14	11	10	11
Condensed milk	2	17	24	23	17
Butter	3	5	3	4	3
Cheese	5	8	9	14	15
Eggs	4	10	10	10	9
5. Cereals, sugar, potatoes, vegetables and fruits					
Flour	81	71	57	54	66
Sugar	35	42	46	42	37
Potatoes	129	100	85	83	87
Vegetables	66	67	81	60	63
Fruits	30	37	34	37	34
Citrus fruits	8	17	24	39	61

Source: LEI/CBS 1980, 1985, 1996

Figure 6 shows the changes of per capita land requirements for food between 1950 and 1990 as a result of changing consumption patterns (based on 1990 yields). Requirements increased rapidly from 72 to 100, 39% in 40 years. The rise was mainly due to a higher consumption of meat and beverages. However, in the period considered increased production per hectare and larger import streams could satisfy higher demand and resulted in surpluses of certain commodities. Agricultural areas could even be taken out of production and were used for other purposes, leading to the general feeling that there is more than enough land. An indication of the development of actual land required for food in The Netherlands was calculated after a correction for the Dutch yield increases. This is also shown in Figure 4. After this correction, requirements dropped from 168 in 1950 to 100 in 1990, implying that in The Netherlands higher production in agriculture could keep up with higher demand. This study separates the different impacts of production and demand factors on the land requirements for food, so that the large influence of food consumption becomes evident.

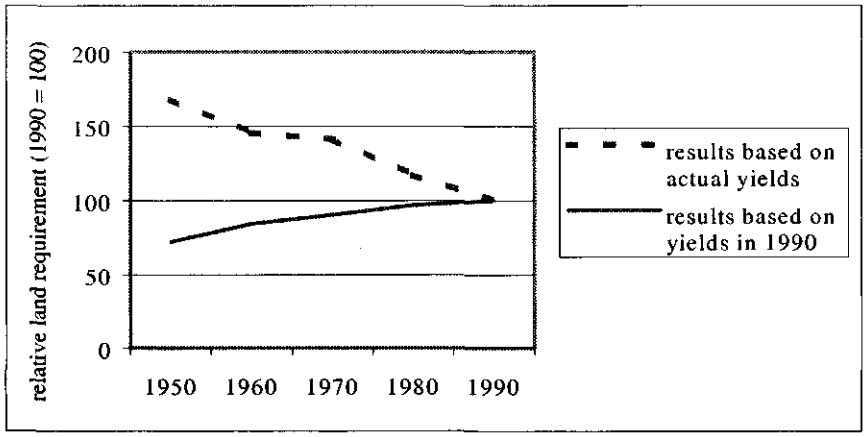

Figure 6 : Development of Dutch land requirements for food between 1950-1990. Calculations were made using yields in 1990 as input data An indication of actual requirements is given by correcting these results for lower yields in the period considered

6 Conclusions

The aim of this study was to define the relationship between food consumption patterns and land requirements. Despite the physiological limit to food consumption, a difference of a factor of six was found between the land requirement for a hypothetical diet based on wheat and the requirement for an affluent diet based on existing consumption patterns. Even in Europe, large differences were observed between land requirements for existing food consumption patterns. Food consumption patterns can change rapidly over time, leading to other claims on the available land. In The Netherlands in the period 1950-1990, the higher demand for more affluent foods such as cheese, beverages, fruits and meat led to a 40% rise of the per capita land requirement.

The method described and the results presented in this paper have led to new insights with respect to the large impact of food consumption patterns on the use of natural resources. This knowledge can be a valuable contribution to research concerning land required to feed future generations.

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Energy consumption in children's day nurseries

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Abstract

Price increase for energy and awareness of environmental problems on the consumer's side (parents, nursery school teachers) and on the other side efforts of local authorities to save money led to projects advising nurseries in saving resources. In Germany children's day nurseries are obligated to offer warm lunch. Efforts to increase consumption of industrially prefabricated meals and the fashion of centralizing kitchens („cook and chill") decreased kitchens and domestic personal especially in children's day nurseries. Some local authorities think, that prefabricated frozen meals would be sufficient, but practically warm drinks and some additional or alternative food-components (diets, specials) are prepared. It causes various problems in children's day nurseries, if only big appliances (fridges, freezers, ovens) are installed. To regard not only political and physical aspects but also to focus energy consumption - esp. of preparing fresh or heating up frozen meals - a survey was hold in ten children's day nurseries. Quantitative aspects (to compare dates of these institutions) and qualitative questions (concerning behaviour and valuation of the personal) are implemented in the written questionnaire.
Results of applied research work show details of energy consumption, e.g. ignoring of energy consumption for food and warm drinks in children's day nurseries, even this is quite a remarkable rate of energy consumption altogether.

1 Introduction

Price increase for energy and an awareness of environmental problems on the one hand (parents, nursery school teachers) and on the other side, efforts of local authorities to save money led to projects advising nurseries in saving resources. These projects mainly focus on technical aspects (e.g. heating) as primarily engineers are involved and in many cases technical replacements are preferred over sustainable changes in behaviour (Ministerium für Wirtschaft und Mittelstand, Technologie und Verkehr des Landes NRW, 1999). As a Home Economist and Nutrition Scientist I want to discuss various aspects of energy consumption in a day's nursery, not only regarding energy resources and consumption, but also looking at the children and the nursery school teachers.

2 Aim

The **original idea** was to gain more information about **energy consumption and energy prices** of children's day nurseries and to compare these data with those of big private households in rural areas, which are especially focused by our faculty of Agroscience and our studies of Home Economics and Nutrition Science.
According to programs encouraging rural households to get new chances for earning a steady income at home, to create news jobs for women in rural areas and to start new usage of empty

earlier farm buildings, taking care of children - **esp. concerning food-support** - seems possible and should be discussed on various levels. Also data concerning appliances in use and their energy consumption should lead to recommendations what appliances these households should have if they would like to take over this job.

In a **Pre-Study** (autumn 2000) it turned out, that rural households are quite well informed about their energy expenditures, but hardly any children's day nursery was informed about details of their energy consumption or costs, except those, which had actively taken part in an energy advise program (supported by some German countries and communities (Ministerium für Wirtschaft und Mittelstand, Technologie und Verkehr des Landes NRW, 1999). As most of the nurseries could not answer the questions about their specific energy consumption, **the original aim** had to be **changed** as preliminary examinations had to take place at first. So children's day nurseries were asked **about their equipment** of energy-consumption (quantitative data) **and their use, especially on the preparation of fresh food** (mainly qualitative data). Results should show, if rural households could support this process in comparing appliances used in nurseries and private households.

3 Frame

In Germany, children's day nurseries are obligated to offer **warm lunch** to all children staying longer than half a day. Food quality criteria may be fixed by representatives running day nurseries, but this is not obligatory (Küp, 1998). In theory lunch should cover appr. 25 % - 35 % of the daily energy intake of a child, which is supposed to need about 1400 kcal (5880 Joule) in daily life there often is to much fat and not enough care on mineral substances (Peinelt, 2001). Children's nutrition should take special care on a sufficient amount of carbohydrate, calcium, iron and vitamin B (Froeleke et al., 1989). In daily practise the main criteria are: food acceptance of the customers, preparation conditions and money. Controlling the energy balance or contents of food (e.g. fat) normally does not take place (Peinelt, 2001). Often the personnel is not qualified enough to take care of these nutritional aspects or even to think of energy saving preparation-methods (e.g. using convection ovens on two or three levels at the same time).
The only regulation that has to be fulfilled in any respect deals with hygiene and has been renewed in Germany recently (LMHV 01.08.1998). This provides a careful handling of any sort of food and regular controls on **hygiene safety** (Auswertungs- und Informationsdienst für Ernährung, Landwirrtschaft und Forsten (aid) 1999). Therefore, some institutions – esp. those working with changing volunteers (like different parents every week) – are wondering, if their work meets these requirements. Experts building household appliances assure that **automatic regulations** (e.g. temperature control integrated in ovens) could guarantee food hygiene safety. So in many days' nurseries, new (expensive) kitchen - appliances came into discussion, even if careful handling with food and control-plans and checks would fulfil the new hygiene rules in old appliances in the same way.
On the other hand at the same time, efforts to increase consumption of **industrially prefabricated meals** and the fashion of centralizing kitchens **(heated or „cook and chill")** started to decrease the number of kitchens for preparing fresh food for children and domestic personnel especially in children's day nurseries. In many local authorities external food supply is considered to solve the hygiene problem and the high personal expenses at one blow. This is underlined by actual campaigns of industrial food-producers to present especially for days' nurseries not only their wide range of products (mainly frozen complete menu's, but also the appliances, which are necessary to reheat these prefabricated meals. It

also happens that this industry branch leases these appliances (especially expensive steamers), so there are no costs to buy these appliances for the institutions. Only the (high!) energy expenses for its use have to be paid by the day nurseries or related communities. Due to this simple „solution" some local authorities think, that prefabricated frozen meals would be all right, but practically warm drinks and some additional or alternative food-components (diets, specials) have to be prepared in day nurseries (Vereinigung städtischer Kinder- und Jugendheime der Freien und Hansestadt Hamburg e.V., 1996). The vanishing of kitchens and the replacement of household appliances in these kitchens by only one steamer may be insufficient and, therefore, is also examined in this research project.

4 Methods

A questionnaire of four pages had been personally presented or posted to more than 50 day nurseries in Germany (Osnabrück, Ruhr Area, South Germany) in the beginning of 2001. The type of questions mainly could be answered by „yes" or „no", but all sorts and numbers of appliances etc. had to be fulfilled by hand (like numbers of bulbs, time appliances are in use etc.) and comments were added. 12 had taken the effort of answering, which took them about four hours, and sent the questionnaire back. Two had tried, but obviously could not answer most questions and therefore were taken out of the sample, so 10 children's day nurseries are taken into evaluation further on. The low rate of response may have its reason in insufficient information on the personnel's side (the questionnaire started answering quantitative data), time for answering may have seemed to long and – definitely known for children's day nurseries in one little town – the leaders were not allowed to answer by local authorities.
Quantitative aspects should provide more information about the institution itself, its personnel, the equipment and appliances using energy and covered the following questions:

- number of children
- number of personnel (professional and volunteers)
- hours of business
- number and sort of buildings and rooms (if possible square meters)
- direction of the rooms
- energy in use (gas, oil, electricity)
- number of heaters or radiators and their regulation system
- number of lights and bulbs („normal", energy saving", fluorescent tubes, halogen)
- appliances in use using energy
- time of utilization for appliances

Qualitative aspects were investigated concerning the dealing with energy aspects in daily life in the children's nurseries:

- information and discussion of energy saving with children, personnel and parents
- using sun and daylight instead of electric light
- using warm water considering its energy consumption
- variation of room temperature
- valuation of the equipment and appliances (age, energy consumption)

Eight of ten children's day nurseries want to be informed about the results, four of them are run by the Protestant church, which supports energy advise for their institutions in general. Hopefully the others take the questionnaire as a basis for discussion about their energy consumption or at least to think about it.

5 Results

The results of this applied research work show details of the basis for energy consumption in children's day nurseries (total: 10), especially with quantitative data:

Number of children: The amount varies from 45 to 115 children in one children's day nursery.(average: 75).

Hours of business: The times vary starting from 7.00 a.m. until 6.00 p.m., mostly from 7.30 a.m. until 5 p.m.. All children's day nurseries have „freedom", that means that bringing the children is possible not only on the spot but during the mornings (until 10.00 a.m.) and they can be taken home from 2.p.m. This may vary from day to day. All 10 children's day nurseries have holidays, the range of business days runs from 220 to 320 per year, nearly all are open five days a week (monday to friday), one opens on special saturdays (fair and so on).

Number of personnel (professional and volunteers): Only three nurseries work with volunteers, nearly all part-time. Professionals altogether vary from 6 to 12.

Number and sort of buildings and rooms (if possible square meters): Only one of the nurseries was informed about the square meters. All nurseries are using only one building. The number of rooms used for regular activities (except toilets, corridor) varies from 8 to 12. They comprise the following functions: rooms for children's groups, sports, handicrafts, „Snoezel"room (for recreation and reducing aggression), kitchen, dining room, office, wash-room, room for personnel.

Direction of the rooms: The main direction of the building with most windows is either South or South East or South West in all nurseries answering. This does not mean that all rooms for children's groups can use the South side, but none obviously is directed to the North, which is according to theoretical demands (Walden, 1999).

Energy in use (gas, oil, electricity): The energy used in any case is electricity. Six nurseries use oil for heating and four have natural gas for preparing warm water and / or heating.

Number of heaters or radiators and their regulation system: All nurseries have central heating systems. The number of radiators vary from 10 to 40 – depending on the size and number of rooms.

Number of lights and bulbs („normal", energy saving", fluorescent tubes, halogen): This was – according to additional comments – a game in two nurseries: They walked through the rooms and counted with the children of their groups, using the chance to discuss the necessity of bulbs and their time of use.
The number of light switches varies from 11 to 25, the lights from 24 to 136. It is remarkable that in some nurseries there are mainly normal bulbs, in one only energy –saving-lamps, in one nearly everywhere fluorescent tubes and only in one nursery Halogenlights are installed. Some comments show, that fluorescent tubes are felt to be uncomfortable in rooms where children play. All nurseries answered that lights are switched off as often as possible and light switches therefore are important. Two comments showed, that the switches could be installed in lower height to be accessible for children as well.

Appliances in use, using energy: The number of tubes providing warm water varies from 2 to 19. This depends on the architecture of the building (from one central area of sanitary facilities or situated near each children's group rooms).
There is an amazing variety of appliances using energy being in use at nurseries, mainly for the purpose of showing children, how these appliances work or they are used for entertainment (fig. 1)

Appliances in children's day nurseries

⇒Radio, tape, cass. recorder, CD-player, video set, TV, telefone (ISDN), computer, printer, typewriter
⇒adding machine , coffee machine , microwave
⇒ hairdryer, sewing machine , iron, vacuum cleaner, blender, waffle iron , toaster
⇒ drill, fret-saw, screwdriver
⇒ illumination , spotlights
⇒ aquarium
⇒ adhesive - pistols
⇒ washing machine , drier
⇒ fridge, freezer, oven, hotplates, steamer, popcornmaker , blender kettle , dishwasher

Figure 1: Appliances in children's day nurseries

For special working purpose of the personnel it was mentioned: computer and printer, adding machine, washing machine, drier, fridge, freezer, oven, hotplates, steamer, blender, kettle, coffee machine, dishwasher, microwave, popcorn maker. Sometimes there is more than one appliance of one type (e.g. three fridges or ovens), depending on the course in the nursery, the separation of groups, the number of children and so on. For big appliances special contracts for maintenance exist in 6 nurseries, this might prove that the technical standard is o.k. Only in one nursery natural gas is used for cooking (gas range) otherwise it is all electric.
Cleaning in any case is not in responsibility of the teachers, therefore the appliances for cleaning do not belong to the nurseries but are owned and organized by the professionals working with it.

Time of usage for appliances: The usage is very different in children's day nurseries. It is remarkable that TV and Video are a lot less in use than radio, cassettes or CDs. Of course for the preparation, food kitchen appliances are used regularly during business times, especially hot plates, ovens and steamers. Special attention should be paid to those appliances running all day like fridges, freezers, coffee machines, illumination and radios. Fridges and freezers might be in use throughout the year, as mentioned in an additional comment, not only fixed on business hours. Washing machines and driers run at least twice a week, mostly once a day.
Concerning „soft facts" it turned out, that none of the nurseries had a systematic training concerning energy topics. In addition of that hardly any of the nurseries knows the facts about the specific energy consumption or costs, no motivation to save energy or even to think about it.

Information and discussion of energy saving with children, personnel and parents: The personnel in 6 nurseries said, they speak with their children about waste of energy, combined with lighting the rooms during the days. They discuss shadowing, candles and temperature connected with that. Parents are not involved in 9 nurseries.

Using sun and daylight instead of electric light: All nurseries mentioned that lights are switched off as often as possible, except lightening for special purposes (like theatre, parties, birthdays).

Using warm water considering its energy consumption: The use of warm water seems to be necessary, none of the nurseries related this with waste of energy

Variation of room temperature: Temperature is regulated automatically in 7 nurseries, in all these cases individual changes of room temperature is possible and done as well. For safety reasons in children's rooms radiators have to be protected, that no child might get hurt falling against it or touching it.

Valuation of the equipment and appliances (age, energy consumption): Comments mainly point out, that normal household dishwashers are insufficient and quicker industrial types would be useful. Also the age of some appliances (washing-machine) is mentioned. Altogether the nurseries seem to use the appliances they own and the equipping seems to be sufficient. Special questions concerning the preparation of fresh food can be gathered in „it works as it is".

6 Discussion

All **quantitative data** should be regarded for each nursery separately. Comparisons are extremely difficult due to the various criteria (number of children, rooms, groups, personnel, business hours...). The **example** of one – the biggest - nursery, answering with relatively concrete data (compared to the other nurseries) shall show the relevance of this research work: In this nursery the average consumption of electricity in total (using fried and prefabricated food) was 89 kWh per business day, which means 0,8 kWh per child and business day. This 0,8 kWh is the average electricity consumption of a fridge, there are two fridges in a nursery (average) and the answers showed, that most of the fridges run all day throughout the year, even if nurseries have about 1/3 less business days per year. The energy consumption of the fridges summarizes up to 584 kWh / year / nursery or – with an average of 75 children in a nursery – 7,8 kWh per child / year for cooling food and drinks (data for nurseries preparing fresh food).
It is common, that heating and lighting are important regarding energy consumption and that temperature and light are important criteria for children feeling cosy. (Walden, 1999). But otherwise, especially concerning energy consumption of small appliances or appliances using energy all day (like fridges, freezers) the personnel is hardly familiar with any concrete data. Energy consumption of appliances is more like a miracle in children's day nurseries. Relations of energy consumption e.g. of a coffee machine (appr. 800 W), washing machine (2,6 – 3,3 kW), fridge (appr. 150 W) blender (appr. 500 W) as a result of connecting load and time the appliance is in use seem to be unknown (Lichtenberg, 1994).

Advisory programs therefore should provide information **especially on energy consumption of all appliances** used in children's day nurseries and not only concentrate on „traditional"

topics like heating and lighting. But surely campaigns so far have influenced consciousness of the personnel of energy consumption connected with room temperature and light. Home economists and nutrition scientists should now concentrate on more household – related appliances, their specific energy consumption and the differences of technologies (e.g. preparing food), sizes and types of appliances.

In nine nurseries fresh **food** is prepared, one is delivered with frozen food which is reheated in a steamer. This nursery still has a fully equipped kitchen allowing to prepare additional or alternative components of meals or warm drinks, which also is regularly done. 90 % of the 10 children's day nurseries examined have kitchen appliances for normal private households (about 3,5 kW for the oven and 6,5 kW for four hotplates) so kitchens seem to be comparable, except one nursery where three ovens are in use.
The size of steamers in minimum enables to fill in 6 trays or containers with catering trade standardization measurements. The minimum connecting load of the smallest type of steamer is 10 kW, mostly the minimal size steamers have 17 kW. With this energy about 60 pieces of meat (roast), 90 meatballs, 180 sausages or chicken legs, 75 portions of vegetable or 90 portions of baked puddings might alternatively be produced. Having mentioned that lunch is only obligatory for children staying more than half a day in a nursery and relatively free times to bring and take children there, not always all children take part in catering (Küp, 1998). Experience shows, that children – due to their individual habit of nutrition (sorts and times of meals) not always like to have a full meal for lunch and may vary their wishes from day to day – also dependent on the food offered (Peinelt, 2001).

Research has shown, that nurseries with an average of 75 children get along with normal household appliances. In this context it is necessary to know, that normal portions (as mentioned to be possible in steamers) may be divided for children, who normally need between 40 and 70 % of adults portions of food (depending on sort of meal, see remarks above in chapter„frame"), so 75 children would mean to calculate about 40 portions. This means that regularly even the smallest type of steamer is too big (connected with waste of energy) if only one sort of food is prepared for average nurseries. In addition to that, steamers are quite expensive to buy, enabling not only reheating, but the complete process of cooking meals with various techniques. So they only would make sense, if fresh food is prepared with this appliance, if most of the children take part in catering (appr. 100 children would be an economic sensible basis) and various components are offered. In surplus, concerning energy consumption, the amount and time of keeping ready prepared and delivered frozen food would had to be considered.
Otherwise the size of normal household appliances seems to be sufficient and would also work but eventually be unnecessary (complete ovens)., if food would be prepared not inside nurseries but in other households,
All nurseries seem to be satisfied with their equipment, except the dishwasher, which should work quicker (comment of three nurseries) and therefore be a professional not a household appliance. If private (rural) households would deliver fresh food to nurseries they also could take home used dishes, so a professional dishwasher would not be necessary in a nursery and energy consumption for nurseries could be decreased this way as well.

Energy consumption in children's day nurseries has to be measured in detail for a longer period with a comparison of consumption e.g. during a first year and a second one after intensive advice concerning energy data of appliances and their use has taken place. In surplus energy consumption should be specifically measured in kitchens preparing fresh food and compared to a kitchen using the same amount of prefabricated frozen food reheating it.

As energy data are not available yet to nurseries themselves advisory programs should be installed to cause interest in these field combined with information about energy consumption with daily work in nurseries.

Private households with knowledge of Home Economics surely could offer meals cheaper and more individually than central institutional kitchens. Therefore the original idea of this research work in encouraging rural households to contribute to children's day nurseries is continued.

With the questionnaire an offer was made to inform nurseries about average energy consumption compared with the data investigated and possibilities to save energy, eight nurseries mentioned their interest and hopefully encourage themselves in learning more about their energy consumption and the part, preparation of food takes over in this field.

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Commodities and Commodity Science: past, present and future

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Abstract

Since the earliest ages the characteristics of commodities and their frauds have been well known in every human community. The word Warenkunde (although already present in the German language) was used for the first time in 1793 by Johann Beckmann to indicate the Commodity Science. The adoption of Commodity Science in the High Schools of Commerce happened at the beginning of the XIX century. The study of the literature shows that the books relative to the teaching and research of Commodity Science dealt with the description of botanical, mineralogical, physical and chemical properties of commercial products and their falsifications.
The cultural approach of Commodity Science remained more or less unchanged until 1940's.
Later, an increasing interest has been addressed to the study of the production processes and the analysis of the materials and energy flow throughout the production and consumption phases.
A particular attention has been turned to the use of natural resources and raw materials and to the effects of wastes and by-products on the environment. Therefore, the Commodity Science has become the study of the "natural history of commodities", namely the analysis of the cycle: nature-production-consumption-nature.
This paper analyses the historical evolution and the prospects of the Commodity Science in Italy.

1 Introduction

Commodities have always existed at the centre of the life of human beings. Apart from satisfying primary needs, they represent the basis of all economic activity. By nature of their inherent variety, they become objects of desire, through which the individual expresses his own personal tastes and interests, within the context of the society in which he lives.
Due to the individuality of commodities and the multiplicity of their functions, it becomes difficult to assign to them, objectively, a well-defined value. There are many parameters to take into account when attempting to evaluate them: the type of need they satisfy – primary (food, shelter, health etc.), complementary (personal, such as hygiene, beauty etc., transport, communication etc.) and those which might be described as non-essential, but which, except in cases where they become expressions of status – status symbols – are essential from a psychological point of view, affecting the balance and harmony of the individual.
Obviously, within a free market economy, commodities assume the value of merchandise, evaluated in terms of how much money is needed to buy them, an amount that rarely corresponds to their effective use-value.
The discipline that occupies itself scientifically with the study of the production, the characteristics and the use of commodities, is Commodity Science.
In this paper, an analysis of the role of the Commodity Science has played from its birth to the present day is carried out, considering the future. This is done also with reference to the

development of the commodity use and the market introduction of new commodities: both the phenomena are often little compatible with the environment protection. In particular, this study is about the Italian situation even though there are several references to the situation of other European countries especially as to the past.

2 The Birth, Growth and Transformation of Commodity Science

In 1993, the 200th anniversary of the birth of Commodity Science as a scientific discipline was celebrated (De Marco, 1993). The discipline evolved in Germany, in the hands of Johann Beckmann (1739-1811), an eclectic Man of Science of the eighteenth century, a professor of Economics, a philosopher, a keen student of agrarian science, botany and technology, who, in 1793, published a work with the title "Vorbereitung zur Waarenkunde" (An Introduction to Commodity Science) (Beckman, 1793). Beckmann's work, and this date, therefore, have come to represent a moment of passage from an empirical knowledge and practical treatment of commodities, towards a new phase of scientific research and teaching, by experts in the field.

Beckmann himself, some twenty years earlier, in another of his works entitled "Anleitung zur Technologie" (The Teaching of Technology) (Beckmann, 1777), applied himself to Technology, coining the term from the Greek ('techne': art, and 'logos': discourse or definition). In this work, he defines the term as follows:

"Technology is the science of arts, which is different from the history of arts, in the same way that the history of nature is different from the science of nature. Technology illustrates working processes in their different phases, in a complete, organized and clear manner. The essential element of Technology regards the exact definition of raw and auxiliary materials, so-called Technological Materials or Knowledge of Materials."

Beckmann was also the author of "The History of Inventions", his monumental work that was immediately translated into English, re-published in several editions (Beckmann, 1780-1805).

Beckmann worked principally in Gottingen, the heart of new interests, at the highpoint of the Enlightenment and the dawn of the Industrial Revolution. This cultural and political climate, which was widespread across Europe, led to the production of new commodities, often as an alternative to those coming from the colonies, and encouraged the diffusion of "Waarenkunde", (Commodity Science) as a discipline destined, as Beckmann himself suggested, to become essential for economic agents who needed to understand, in greater depth, the nature of commodities and the processes of production.

In Italy, the discipline took the name "Merceologia", but similar terms, with similar semantic valences, did not become a common part of the English, French or Spanish languages. The Dutch word "Warenkennis" or the Swedish "Varukannedom" or the Russian "Tovarovedenie" are perhaps more analogous to the German "Waarenkunde" or the Italian "Merceologia" (Goldan, 1963).

In the first half of the nineteenth century, the teaching of Commodity Science as a scientific discipline spread across Europe, alongside the teaching of Technology in Germany. Several books were published on the subject during this period, in Italian, German and other languages.

In this initial phase of the teaching of Commodity Science in the Technical Schools in Italy and Europe, special attention was given to raw materials, of a mineral, vegetable or animal origin, focusing on the transformation cycles of natural resources into commodities, on methods used to analyse commodities generally, and on the study of fraud.

In the teaching of Commodity Science, different principles were used, taken from the fields of botany, zoology, mineralogy, physics and chemistry, in order to characterise commodities

from the point of view of quality and, at the same time, to offer a more complete culture to the recipient of the learning process.
Commodities themselves became more numerous, growing at the same rate as the growth of scientific knowledge itself, in particular chemistry, but also metallurgy and nutritional sciences, with their practical applications to the industrial and agricultural branches.
In Europe, after the institution of the Commercial High School at University level, the importance of Commodity Science grew, with three-year courses becoming more frequent. The Commercial High School of Antwerp was founded in 1852, that of Paris in 1861, Venice 1868, Genoa 1884 and Bari 1886.
It was becoming more important, during this period, to try to characterise commodities by applying safe analytical methods to defend against fraud and the sophistication of materials. The tests carried out at the time by commodity scientists, reveal the preoccupation of the era: the desire to protect the merchant, rather than the consumer, from the dangers of fraud. Leaving aside such doubtful preferences, it is clear, however, that the problem of fraud, which, while as old as mankind itself, developed in importance within the Commodity Science, having undoubted consequences on a social and economic level.
In the same period, at the end of the nineteenth century, a huge inquest into fraud began in England (1875), and in France, in 1877, the very first national organization for the repression of fraud was established, headed by the great Pasteur (Nebbia and Menozzi, 1986).
In Italy, in 1896, the first edition of a fundamental work in the field of Commodity Science was published, "Il Dizionario di Merceologia" by Vittorio Villavecchia (1859-1937). Villavecchia had already won a Chair at the University of Bari, but continued his profession as Director at the Central Laboratory of Customs. With his published work and scientific stature, he effectively determined the growth of the study of Commodity Science in Italy for more than half a century. In the preface to his Dictionary, he declares his desire to offer:
"to the Italian public an essentially practical book, useful to industrialists, tradesmen and government officials, a book that presents succinctly everything that refers to the different types and quantities of commodities, which are today the object of commerce and exchange" (Villavecchia, 1929).
Thus Villavecchia confirms the principles of the discipline: an interest in certain privileged interlocutors, who are not consumers, the descriptive characteristic of Commodity Science, attention on the recognition and prevention of fraud.
With the transformation of the Commercial High School into University Faculty of Economics and Commerce, the space occupied by Commodity Science as an autonomous discipline began to disappear: the three-year course became a two-year course, and finally a one-year course. At the same time, paradoxically, commodities continued to assume even more importance, diversifying continually.
This period, the inter-war period, was connected to the discovery of alternative raw materials, and to the production of goods using domestic materials. In Italy, the period is characterised by the Fascist regime, in Germany, by the Nazi regime, but it was also an important period of transformation in the U.S.A., the period in which the "Farm Chemurgic Movement" developed. The movement was conceived by William J. Hale, a chemist from the Dow Chemical Company, which attracted the attention of important men of the day: Henry Ford, on the industrial level, Henry Wallace, on the political level and George Washington Carver, on the intellectual level. The term "chemurgia", from the Greek "chemia": chemical and "ergon": work, was coined by Hale himself, to describe the process of obtaining industrial, chemical substances from agricultural products (De Marco, 1989).
The fervour surrounding this idea and following initiatives was interrupted by the outbreak of the Second World War.

It was not until the 1950s, that Walter Ciusa, Professor of Commodity Science at the University of Bologna, with the publication of two books (Ciusa 1948, 1954) destined originally for his students, defined a new path for Commodity Science. For Ciusa, the discipline had to expand its interests, from the description of goods and fraud, towards the production cycles through which natural resources are transformed into intermediates and finally into commodities, studying the efficiency of processing procedures and the destination of the various products.

Ciusa's view was taken up and amplified in the research and teaching of other commodity scientists (Calzolari 1988, 1989), and the discipline moved towards analysing the flow of materials and energy through the economy, assuming a technical-economic character.

In 1965, almost 200 years after the birth of the "Technology" of Beckmann, the first course in Technology of Production Cycles, was founded at the University of Bari, autonomous from Commodity Science, whilst still within the same disciplinary field. This new discipline spread to other Italian Universities, almost always linked to the Commodity Science and, in recent years, substituting it (De Marco 1979, 1987).

The new conception of Commodity Science has created the possibility of facing strictly economic questions with a different and significant approach. For example, by studying the production processes of commodities, it becomes possible to draw up a balance, conceived in terms of physical units, not in money, and, by comparing the commodities that share the same function, identify the "cheapest", in terms of the amount of materials and energy needed to produce it.

Currently, the problems faced by Commodity Science are related to the production of new commodities, those, for example, deriving from the petrochemical industry. The economic boom of the 1960s, in Italy, for example, coincided with the first signs of environmental degradation connected to the production and use of certain commodities. Synthetic detergent products, plastics, artificial fertilizers, the intense use of fossil fuels, particularly oil, created evident problems of pollution and awakened the fear of a possible and imminent exhaustion of natural resources.

At the same time, the decline of natural products, in favour of synthetic alternatives, also had a negative effect on the economy in some countries. As a consequence, Commodity Science turned to the technical-social aspect of production cycles, offering suggestions of preference for the production and utilization of commodities, based on different evaluation parameters: technical, economic, social and environmental.

In this period, Professor Giorgio Nebbia, from the University of Bari, developed a new path for Commodity Science: the study and teaching of Social Technology (Nebbia, 1968 a, b). The direct correlation between natural resources – commodities – environment was thus analysed by commodity scientists, and the discipline applied itself not only to the technological aspects of the transformation of natural resources into commodities, but also to the consequences of production on the environment, the problem of pollution, the quantity and quality of generated waste, the treatment of waste and the eventual possibilities for recycling.

From the 1970s onwards, Commodity Science has concentrated on analysing production cycles, not only in terms of the quantity, but also of the quality of the materials utilized, looking at economic goods (minerals, fuels etc.), natural resources considered 'free' (air, water, land etc.), and the emissions (solid, liquid, gaseous) generated during the processing phases.

In other words, in the last 30 years, Commodity Science has responded to the necessity of considering commodities by studying the complete "natural history", as a discipline, it has revealed itself capable of making a valid contribution to the economic education of direct

interlocutors: students, consumers and tradesmen, through a widening of technical knowledge and a new interpretation of 'progress' and 'development' concept.
The development of Commodity Science in recent years is not, however, reflected in the Academic World or in the Schools. Until the end of the 1960s, the discipline was taught mainly by teachers with a degree in chemistry, and in the Universities, degree courses were to be found predominantly in Faculties of Economics and Commerce, or, in some cases, in the Department of Chemistry, as Analysis of Commodities or Commodity Chemistry, with a predominantly analytical stamp.
Successively, university teachers have tended to come from an Economics and Commerce background and for this reason the discipline has felt the effects of this double nature, which has often not been understood or appreciated by colleagues from the two faculties involved, who have sometimes tolerated the presence of Commodity Science even whilst aware that the subjects treated by the discipline, particularly in Faculties of Economics, have an important impact on society. These courses often, from being obligatory have become optional; in many Universities it has even disappeared or has been substituted by Technology of Production Cycles, which in the opinion of the economists, particularly of the professors of Business Management, is considered more acceptable.
The same thing has happened in the High Schools. Commodity Science was taught in some Technical-Commercial, Industrial and Girls Institutes, by teachers with a degree in Chemistry. Reforms, both partial reforms made in the last few years and the recently approved but still not applied, total reform of the School, have in part, or completely eliminated the teaching of Commodity Science. The same has happened to the teaching of Domestic Science, relegated in Italy to certain Technical Girls Institutes.

3 The future of Commodities and Commodity Science

With the third millennium, the future has already begun. Increasingly, new commodities are presented on the market with an aesthetic element designed to attract, and are the focus of interest for manufacturers and consumers.
Manufacturers try to vary the products offered with goods that are endowed with added value, products with a continually advanced level of technology, in order to increase their market share. Every day the consumer is encouraged to buy and to try new "things", with specific characteristics: from food products to communication devices, from pharmaceutical products to medical products, from cosmetics to cleaning materials, composite materials, metal alloys, offered through advertisements in an obsessive but, at the same time, pleasant way. At the same time, however, the consumer finds himself facing new problems, unexpected but often serious, connected to the use and the consumption of such commodities. Total disinformation renders the consumer a victim, incapable of making informed choices and, in consequence of this, he can become excessively alarmist or, on the contrary, superficial.
The consumer, generally speaking, does not know what genetically modified food is or how to recognize it in a supermarket, or what functional food is or whether it is better to use organic food. Are not all foods organic? Are not all foods functional? Why does advertising describe such foods as better and, therefore, worth spending more on? Who teaches the consumer to distinguish between one commodity and another and why do manufacturers, and also scientists, use misleading terms?
It is said that genetically modified food was invented in order to reduce the use of chemical fertilizers and to render plants more resistant, increasing productivity. Others say, however, that these plants and their fruit are resistant, for example, to antibiotics and this resistance can be transmitted, through the food chain, to human beings. How can the consumer distinguish

between such conflicting information? Is there any subject taught in the Schools or at Universities that deals with these aspects?
Commodity Science, where it is taught and for as long as it is taught, deals with these subjects and other important current issues. In the University courses of Commodity Science, students are taught which commodities have caused the hole in Ozone layer, or the greenhouse effect, subjects which Heads of State have pretended to concern themselves with periodically, without having achieved a positive conclusion, in fact, going back on decisions already taken. A student in the Faculty of Economics knows what enriched uranium is because, during his course, he studies nuclear energy and looks at what generates it. When hearing about the Balkan wars and depleted uranium bombs and their consequences, it easier for him than for others to understand what type of "new" commodity is being discussed.
In the same way, it is possible to understand what unleaded petrol is, if it is less or more polluting or the same as leaded petrol.. It is possible, moreover, by studying material and energy flux, in the economy of a city, a country, or the world, to understand how true the hypothesis of a tendency towards dematerialization is. Another problem that such a student can understand, is that of the scarcity of water, which, it is said, will characterize this century, evidence of which is already manifest with the growth of desert areas.
All of these subjects which regard commodities, important for the economy, but also for the survival of human beings, are part of the competence of Commodity Science, to which the Institutional Bodies have given an inferior role in the University reform, in Italy. Recently approved, the reform places the discipline, in Economic Science and Business Management courses, among integrative courses. The responsibility for this is without a doubt that of who, while planning the reform, gave priority to political rather than scientific reasoning. But it is also the fault of those who work in the specific field and who did not adequately explain the importance of Commodity Science in an economic education. It was not explained clearly enough, and perhaps not noisily enough, that evaluation in economics cannot be made only in terms of monetary units but that we need to begin to think in terms of available resources, of commodities and also of waste products, expressed in terms of physical units.
It is necessary we realise that the earth capacity to carry the weight of a continuously growing population having the need of a greater and greater amount of commodities is very limited. These commodities are produced through the exploitation of often no renewable natural resources and with, sometimes, irreversible environmental damages. Therefore, it is necessary to control the production, the use of commodities and the waste disposal. It requires a basic formation, different from the cultural point of view, of the consumer that can lead him to a more compatible lifestyle with the environmental protection.
For this reason it is more difficult to accept this "decline" of Commodity Science in the Faculty of Economics when researchers from other fields, like architects, are at the same time trying to invent a Commodity Science to meet their needs, which they call "Contemporary Commodity Science", concentrating particularly on the role that design has on the production and exchange of commodities (Celaschi, 2000). A careful critical analysis of the formulation of this "new" Commodity Science is necessary, because its inventors, referring only to the Commodity Science of Villavecchia, ignore the evolution of the discipline in the second half of the twentieth century. This need, however, is in itself significant.
Commodity Science, notwithstanding all the difficulties and perhaps with an alternative name, still has a lot of work to do and an important role in Italian society, in Europe and in the world.

4 Conclusion

This study leads towards a positive evaluation of the role of the Commodity Science in the academic and social fields. The Commodity Science has always been the only discipline of reference for the consumer in order to have adequate knowledge to realise more conscious choices in buying and using commodities. The production of new commodities, manufactured with materials completely man-made in laboratories even though coming from natural resources, has caused heavy environmental problems. In fact, the responsible organisms for the metabolic process are unable to use these transformed materials. In its evolution and thanks to the other field disciplines, above all the Technology of Production Cycles, the Commodity Science has faced the environmental themes with an economic approach, usually unrelated to the scholars of the other disciplines, such as engineers, chemists and naturalists. The commodity scientists can analyse the whole production cycle of the different commodities, starting from the natural resources. In the different steps they consider the exploitation of resources and the waste emissions till the end of the chain, i.e. the finished product (commodities or services), its use and finally its "consumption" and waste production coming back to the environment causing its degradation. Therefore the material and energy balance of commodity and service production falls with the competence of the commodity scientist. He can also estimate the environmental effects expressed in physical units that can be translated, with some limitations, into monetary units. For example, it is difficult to estimate economically the damages caused by the greenhouse effect, the hole in Ozone layer and by the watercourse pollution. The secondary role the legislator has assigned to the Commodity Science in the curricula of secondary schools and Italian universities can cause an inadequate formation of a correct behaviour of the future consumer, an Italian but also a European citizen.

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Products for the flooring maintenance: a comparison from an environmental point of view

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Abstract

When a consumer has to choose the floor coverings for his house, the market supplies a variety of products with different prices and technical - esthetical characteristics. But, an aspect which is rarely taken into account in the consumer decision process is the flooring maintenance (an operation which will be repeated several times during the flooring life). In order to maintain its characteristics, every flooring typology needs to be periodically treated with chemical products that can represent a source of risk both for the user health and for the environment. In this paper the laying and maintenance phases of various floor coverings (ceramic, marble, parquet, carpet) have been analysed with a life cycle perspective in order to identify their environmental impacts.

1 Introduction

Building materials represent an important research field in the environmentally responsible architecture (Wyley et al., 1996). Different studies have analysed the floor coverings in order to identify the so-called environmental "hot-spots" during their whole life cycle (Sjöberg et al., 1997; Günther et al., 1997; Potting et al., 1995), but very few have taken in account the environmental burden due to their laying and maintenance operations. This exclusion is due to different reasons: some authors argue that it is impossible to generalise the laying and cleaning of the floor coverings, others that vacuum cleaning is the main method of maintenance for all floor coverings, consequently it is possible to exclude it from the comparative analysis; other authors argue that the data quality of the cleaning and maintenance activities is very poor and also that their frequency and the selection of cleaning agents in residential buildings can be assumed to depend more on personal cleaning habits than on the choice of floor coverings.
But, all the cited authors agree on the point that, in a life cycle perspective, the energy consumption of the use phase of the floorings, could be very high if compared with the energy used in their production. It is true that the data quality of these operations is poor and that the cleaning habits are highly subjective, but, it is also true that in order to be long-lived every floor covering has to be properly laid and cared with appropriate cleaning and maintenance techniques. These techniques are different for the various floorings: every typology requires specific products and operations whose instructions are stated by the producers (Marazzi ceramics, 2000).

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In this paper a comparative environmental analysis with a life cycle perspective of the laying and the maintenance of the following floorings has been done: ceramic, marble, parquet, carpet. The analysis has been made by taking in account all the treatments used for the various floor coverings.
The choice of these typologies of floor coverings is due to their relevance in the Italian and European economy, to their wide spread and to the growing interest in environmental concerns in the building sector. Italy is the most important producer of ceramic and marble tiles for buildings, with a production respectively about 18% and 23% of the world output in this sector (Santoprete, 1993; Assopiastrelle, 1997). There are three kinds of flooring ceramic tiles: unglazed (fired ware, red stoneware, porcelain stoneware, clinker), double-fired glazed, single-fired glazed. Consequently there are three productive processes which differ in the use of glaze and in the number of firing cycles. The 1999 Italian production of tiles exceeded 600 million m^2, of which 57% was single-fired, 15% double-fired, 22% porcelain stoneware, and the remaining shared among other products as plain fired and complements (Assopiastrelle, 1999). In this study the single-fired flooring tiles are assessed.
The worldwide production of marble is concentrated in a limited number of countries, particularly the European Union which supplies 46% of the globally extracted marble. Even in this sector Italy plays a primary role, since it is the main producer of raw and decorated marble with 58% of the world exportations of marble products.
The parquet production of the countries of the European Parquet Federation in 1999 exceeded 61 millions m^2 (Mondolegno, 2001). The production of the various typologies of parquet is shared in the following percentages: 69% multi-strata prefinished, 14% solid, 10% laminated, 7% mosaic. The main parquet producing countries are Sweden, (23%), Germany (17%), Denmark (10), Norway (9%) and Italy (8%). It is estimated that in 1999 the parquet has reached a market share equal to the 4.8-5% of the whole European flooring market (EU and EFTA).
The 1999 European carpet production is estimated being around 190 millions m^2. The main European producers are joined in the GuT (Gemeinschaft umweltfreundlicher Teppichboden) whose goal is to ensure environmental friendliness and consumer protection at every stage of the carpet's life-cycle.

2 Goal and scope definition

Goal of this paper is to analyse the environmental profiles of the laying and maintenance operations of ceramic, marble, parquet and carpet floorings in order to add new data and results to the "less-studied" phases of the flooring systems life cycle. The results of this study could be used in the decision process of the consumer which is interested in the purchasing of the most environmental-friendly floor coverings. All the activities which allow the floorings to maintain unvaried their function through the years (to ensure a proper cover of a building floor) have been taken in account (laying, ordinary and extraordinary maintenance). The functional unit chosen is 100 m^2 of floor covering over a period of forty years. The environmental impact assessment of the four systems has been carried out by developing some indicators relative to the material and energy consumption and to the human and environmental risk.
The useful life of every floor covering has been assumed being the following (Carani et al., 1997):

- ceramic, 20 years;
- marble, 40 years;
- parquet, 20 years;

- carpet, 5 years.

Therefore, over the considered period, the following operations have been assumed taking place:

- ceramic, no. 1 tilling and restoration operations;
- parquet, no. 1 tilling and restoration operations;
- carpet, no. 7 tilling and restoration operations;

The other assumptions relative to the systems are shown in Table 1 (laying operations) and in Table 2 (maintenance operations).

Table 1 - Assumptions relative to the floor laying phase

operations	frequency of the operations				No. of total operations for functional unit			
Laying	ceramic	marble	parquet	carpet	ceramic	marble	parquet	carpet
building of the support	1/40y	1/40y	1/40y	1/40y	1	1	1	1
grouting the joints	1/20y	1/40y			2	1		
Polishing-buffing		1/40y				1		
dusting with cement 325	1/20y				2			
preparation of subfloor			1/20y				2	
laying with adhesives			1/20y				2	
Gluing				1/5y				8

y = year

Table 2 - Assumptions relative to the floor maintenance

operations	frequency of the operations				No. of total operations for functional unit			
extraordinary maintenance	ceramic	marble	parquet	carpet	ceramic	marble	parquet	carpet
underlying treatment after laying	1/20y	1/40y			2	1		
dewaxing		8/40y				8		
Waxing		8/40y				8		
extraordinary polishing-buffing		1/20y				1		
revarnishing of 50% of floor			1/20y				2	
spray extraction cleaning				1/y				32
ordinary maintenance								
dusting with vacuum cleaner	220/y	220/y	220/y	300/y	8800	8800	8800	12000
Washing	50/y	50/y	50/y		2000	2000	2000	
Washing with wax		10/y				400		
Polishing with floor polisher		10/y	2/y			400	80	
Washing with polishing product			2/y				80	
dusting with refreshing machine for carpet floor				50/y				2000

y = year

3 Inventory analysis

3.1 Ceramic tile inventory

The ceramic tile productive cycle is made up by two different stages: the first relative to the body manufacturing, and to the glaze manufacturing, the second to the laying of the glaze on the body and the subsequent firing of the glazed body.

The body preparation consists of these phases: raw materials acquisition, mix preparation, forming and drying. The process starts with the wet grinding of the raw materials (argillaceous, degreasing, soldering and recovered materials) in order to obtain a semi-

manufactured that, after forming, is dried in kilns. 1.15-1.2 t raw materials are required to obtain 1 t of finished product.
The glazes are the vitreous coating of the tile working surface. They are applied to the surface of the body in order to make it impermeable, harder and more resistant, easily cleaned and more attractive. Part of the raw materials must go through a thermal treatment, called fritting, which provides insolubility in water. Therefore glaze manufacturing is composed of raw material acquisition, frit preparation and grinding. The last phases to produce a ceramic tile are enamelling and firing of the glazed body. The conventional technique of enamelling is the wet one; the firing enables the tile to obtain the mechanical characteristics required for the different uses and the properties of chemical inertia. The firing can be conducted in different types of kilns. The operative temperature is about 1150-1200° and the fuel used is methane (Busani et al., 1995).

3.1.1 Ceramic tile laying and maintenance

3.1.1.1 Laying
The laying of the ceramic tiles can be divided in three phases:

- Support preparation;
- tile laying;
- grouting of the joints.

The support preparation is carried out by laying the mortar (1) with a thickness of about 3÷5 cm and then the surface is dusted with cement 325 (5÷7 kg/ m^2). Afterwards, the tiles have to be laid and scutched with a pressure roll or by hand. The scutching operation helps the constipation and deaeration of the binder layer. After a few days, the joints among the tiles will be filled with a binder (constituted by 5 parts of cement and two of sand and water) using a rubber knife. The quantities of materials used in the different operations relative to the functional unit are shown in Table 3.

3.1.1.2 Cleaning and maintenance.
The ceramic coverings present excellent cleaning and hygiene characteristics because, contrarily to other materials, are easily clearable with water and detergents, do not need treatments with wax and polishing and do not hold the dirty (if a correct choice of the tile typology and laid techniques linked with the type of indoor environment has been done).
The first cleaning operation, which is carried out at the end of the laying, consists of a floor cleaning in order to eliminate and remove from the ceramic surface the mortar and stucco residues. Usually, following the indication supplied by the producers company and taking in particular consideration the resistance of the laid tiles to the acids, an acid solution is kept in contact with the tiled surface. After this operation the ceramic floor does not need any other maintenance treatment different from the ordinary cleaning. This consists of a daily dusting with vacuum cleaner (power of 250 W, length 24 min/100 m^2) and in a weekly cleaning with specific detergents for tile in order to restore the natural brightness of the tiles (Afidamp, 2000). The quantity of materials used for the different operations referred to the functional unit are shown in Table 4.

Table 3 - Inventory of the operations of laying for the different floor coverings

operations	materials/products/energy				quantities for functional unit (100 m^2 *40 years)			
Laying	ceramic	marble	parquet	carpet	ceramic	marble	parquet	carpet
building of the support	cement/ sand	cement/ sand	cement/ sand	cement/ sand	900 kg	900 kg	900 kg	900 kg
	water	water	water	water	300 L	300 L	300 L	300 L
grouting the joints	cement/ sand	cement/ sand			37.2 kg	36.7 kg		
	water	water			10,8 L	10,5 L		
Polishing-buffing		e.e.				287 kWh		
dusting with cement 325	cement 325				1200 kg			
preparation of subfloor			primer				40 L	
			diluent				20 L	
laying with adhesives			adhesive				170 kg	
Gluing				glue				260 kg

e.e. = electric energy

3.2 Marble tile inventory

The productive cycle of the marble tile is constituted by the following phases: quarry operations, raw blocks cutting, cutting of the standard size blocks and polishing, buffing.

The marble is extracted from the quarries using different techniques depending on the characteristics of the rocks and deposits. The main technique utilises the diamond wire that, running on the rocks, makes a linear cut. After the rocks have been cut the quarry operations end with sectioning and cutting of the blocks. In the factories the blocks are classified, sorted and cut. The cutting technology of the flooring marble tile features the cutting of the larger blocks in smaller sizes. The last sawmill operation is the cutting of the standard size blocks, in order to obtain products of the required thickness (Corbella et al., 1988). The polishing and buffing operations can be carried out in factories but, more often, they take place after the laying. In this study it has been assumed that the first polishing and buffing belong to the marble tile laying phase.

3.2.1 Marble tile laying and maintenance

3.2.1.1 Laying

The laying of the marble tiles is constituted by the following operations:

- support preparation;
- laying of the marble tiles;
- grouting of the joints;
- polishing and buffing.

The support preparation is carried out by laying on the covering surface a stratum of cement mortar, with a thickness of about 4 cm, which features the required resistance characteristics. Afterwards, the marble tiles are laid and the interstices are filled by using a white or coloured mortar. Then the polishing and buffing with particular machines is carried out; the energy consumption of this phase is relevant, about 2.87 kWh per m^2. The materials and energy consumption is shown in Table 3.

3.2.1.2 Cleaning and maintenance

The marble flooring requires a first intense cleaning after the laying. In this case the use of acid product is to be avoided because of the sensibility of the calcareous materials which react with the acids, consequently a neutral detergent is used. Moreover dewaxing and alkaline

products, which could damage the brightness of the flooring, are to be avoided. The ordinary polishing of these floorings requires the daily use of vacuum (power of 250 W, length 24 min/100m^2) and a weekly cleaning with marble specific detergent (Afidamp, 2000). They are much more sensible compared to other floorings, so it is necessary the adoption of further maintenance operations. First of all, every month a cleaning with water and wax solution has to be done to protect and polish the surface; then, the polishing machine has to be used to increase the polishing effect. In this paper the use of a polishing machine with a power of 0.4 kW has been considered (length of each operation: 20 seconds/m^2).
Moreover, the extraordinary maintenance consists of a dewaxing/waxing operation (once every four years) and a polishing and buffing one (once every twenty years). The products used for the dewaxing have an high solubilization power leading to a fast removal of the stratum of wax accumulated during the years. The products used for the waxing are acrylic metallic emulsions which enable to maintain an high grade of brightness. The materials and energy consumption is shown in Table 4.

Table 4 - Inventory of the operations of maintenance for the different floor coverings

operations	materials/products/energy				quantities for functional unit (100 m^2 *40 years)			
extraordinary maintenance	ceramic	marble	parquet	carpet	ceramic	marble	parquet	carpet
underlying treatment after laying	acid detergent	neutral detergent			1 L	1.25 L		
dewaxing		dewaxing product				16 L		
Waxing		wax				40 L		
extraordinary polishing-buffing		e.e.				288 kWh		
revarnishing of 50% of floor			varnish				22 L	
spray extraction cleaning				detergent				80 L
				e.e.				38 kWh
ordinary maintenance								
dusting with vacuum cleaner	e.e.	e.e.	e.e.	e.e.	880 kWh	880 kWh	880 kWh	1680 kWh
Washing	neutral detergent	neutral detergent	neutral detergent		360 L	666 L	360 L	
Washing with wax		liquid wax				332 L		
polishing with floor polisher		e.e.	e.e.			89 kWh	18 kWh	
washing with polishing product			liquid wax				120 L	
dusting with refreshing machine for carpet floor				e.e.				88 kWh

e.e. = electric energy

3.3 Parquet inventory

There are different typologies of parquet, traditional and prefinished: the first one is constituted of solid wood and is obtained only by one timber essence; the prefinished is made by different wood strata and during its production is stabilised, smoothed and painted. Usually, the upper stratum is made by an high quality timber, whilst the support is made by average quality one. In this paper the prefinished parquet has been considered. The production process of the parquet flooring starts with the cutting of the wood sawing to obtain the lamellas (thickness of about 5 mm) that, afterwards, will be glued to the wood support with high resistance glues. After pressing the semi-manufactured is subjected to a stabilisation period and only after 30-60 days it is ready for the last productive steps. On the product, which is calibrated with high precision lapping machine, different strata of acrylic varnishes with an higher resistance than the polyurethanic varnishes, are laid and polimerized with UV rays. The production process ends up with the drawing of the product. It is known that wood contains VOC which are slowly released in atmosphere. On the basis of a previous study (Jönsson, 1999), a quantity of about 2000 grams of VOC released during the forty years has been estimated.

3.3.1 Parquet laying and maintenance

3.3.1.1 Laying

The laying of parquet can be schematically divided in three operations (Berri et al., 2000):

- preparation of subfloor, using a primer;
- laying of the parquet, using a glue or an adhesive;
- finish.

The products which are used for the first phase should have three characteristics: anticrumbling, consolidation and impermeabilization. The materials used for the primer manufacturing are isocyanic prepolymers that solidify at the atmospheric conditions. In the laying of the parquet a glue or an adhesive is used; the epoxy or epoxy-urethanic ones are more and more used for this scope. Usually for the no-prefinished parquet a finish operation with the application of wax, oils and varnishes is carried out. In this paper the prefinished parquet has been studied, consequently there are no further treatments to take in consideration in the laying phase. The typologies and the materials used are shown in Table 3.

3.3.1.2 Cleaning and maintenance

The maintenance of the wood flooring is extremely easy and does not require particular treatments (Afidamp, 2000). The ordinary maintenance is carried out using daily the vacuum cleaner (power of 250 W, length 24 min/100m^2) and making a weekly cleaning with a wet cloth and neutral detergent; washings with ammoniacal solutions are to be avoided because could whiten the varnishes film. The extraordinary maintenance is carried out once every semester with premetallized waxes in water solution, followed by the use of a floor polisher machine. Because of the protection supplied by the acrylic lakes varnishing hardened with UV rays, the prefinished parquet does not require the typical maintenance treatments which are used for the other parquet typologies (replaning, grouting, sandpapering, revarnishing). A revarnishing of the 50% of the flooring surface (the most trampled area) carried out during the tenth year has been included in the analysis. The most common varnishes used in this operation are the polyurethanic. The typologies and the quantities of materials used are shown in Table 4.

3.4 Carpet inventory

A carpet floor is made up by a plush, a primary and a secondary support. Plush is the upper stratum and it is constituted by fibres and yarns anchored to the bottom. It can be velvet or bouclè. The primary support is the weft which can be made by jute, rope or synthetic, on which the plush is fixed. The secondary support is the material on which the primary support is fixed; generally it is constituted by jute, or foam latex; it is constructed to better the carpet stability (Ullmann's encyclopedia, 2000).

3.4.1 Carpet laying and maintenance

3.4.1.1 Laying

The carpet laying can be carried out with different modalities, but the most reliable is that which involve the use of glue. This technique can be used with every carpet flooring and on every subfloor which has been previously degreased, cleaned, levelled and dried in order to have a perfect and lasting bond. The quantity of glue used is 260 kg/100 m^2 of flooring (Table 3).

3.4.1.2 Cleaning and maintenance

The carpet maintenance has to be done with particular care, because carpet can represent a potential risk for the human health if an accumulation of dirty took place giving origin to the diffusion of mites or microorganisms. A regular cleaning with daily aspiration (maximum power of the vacuum cleaner 350 W length of the operation 24 min/100 m^2) represents the most important part of the maintenance because is the main method to remove the dirty (Afidamp, 2000). It is preferable not to often wet the carpet, because the excessive humidity helps the growth of bacteria; therefore a spray extraction cleaning is carried out yearly; this cleaning consists of the spray application of the detergent on the carpet (power 750 W) and, after, the removal of the mixture detergent/dirty through aspiration (power 550 W). The typologies and the quantities of materials used are shown in Table 4.

4 Environmental impact assessment

As can be seen from Tables 3 and 4, the laying and maintenance of the floorings studied require the consumption of energy and chemicals. The environmental impact assessment of these two phases of the floorings life cycle requires the quantification of the resource used and the estimation of the risk connected to the quantity and quality of the chemicals used. In Figure 1 the energy consumption of the four systems normalised to the highest (carpet, 1806 kWh) is shown. Similarly, Figure 2 shows the water requirements normalised to the marble one (about 41 m^3 including the water for cleaning).

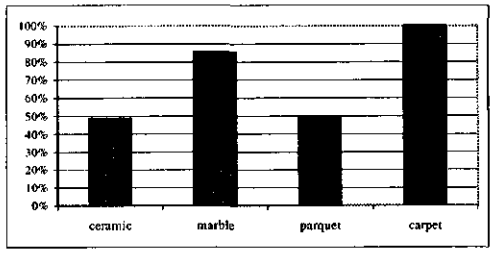

Figure 1: normalised energy consumption of the four systems

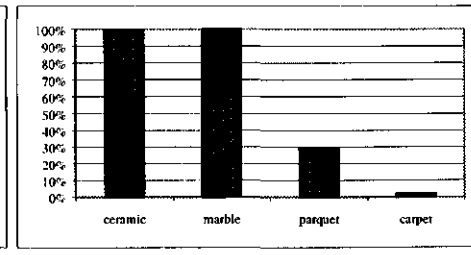

Figure 2: normalised water consumption of the four systems

In order to estimate the risk of the chemicals used for man and environment in the four flooring systems (Table 5), it has been regarded appropriate taking into consideration the Italian legislative and ministerial decrees which put into practice the EU directive relative to the classification, packaging and labelling of dangerous substances and chemicals (Legislative decree, 1997; Ministerial decree, 1992). This legislative support enables to classify the chemical substances or their mixtures in danger categories (explosive, comburent, highly inflammable, easily inflammable, inflammable, highly toxic, toxic, harmful, corrosive, irritant, sensitizating, cancerogenic, mutagenic, toxic for the reproductive cycle, dangerous for the environment) and to define a weighting factor (index which shows the relative relevance of the danger) for every category (Keller et al., 1998). By multiplying the quantity of every chemical for its weighting factor (relative to its belonging category), an index of dangerousness of that chemical can be obtained; finally, by adding the values of all the chemicals used in every system an "index of dangerousness" relative to the phases of laying and maintenance of every floor covering will be calculated.

In Figures 3 and 4 the normalised "indexes of dangerousness" are shown; they are calculated by assuming equal inter-categories weights and are respectively relative to both the phases and just to the maintenance one. It can be noted that the parquet "total index of dangerousness" is clearly higher to that of the other three systems. If the analysis will be limited only to the maintenance phase, the "index of dangerousness" of the ceramic covering becomes very close to the parquet one; also "index of dangerousness of the marble and the ceramic systems are much higher than the carpet one. From the same figure it can be noted that the systems with the higher "index of dangerousness" are those requiring a smaller energy consumption during their maintenance.

Table 5 - Inventory of the operations of maintenance for the different floor coverings

Substance	Quantity (g)			
	ceramic	marble	parquet	carpet
1,2-cyclohexanediamine*			1600	2600
1-methoxy-2-propylacetate*			4000	
2,4,6-tris[(dimethylamino)methyl]phenol*			4000	6500
2-propanol			2000	3250
sec-butyl acetate			5300	
n-butyl acetate			12400	
formic acid		38		
sulphamic acid		156		
isopropyl alcohol	93300			2800
Ammonia		7200	7200	
sodium carbonate	30			
EDTA		1900		
ethyl acetate			20500	29250
Na-ethylenediamine tetraacetate	5		1800	400
ethylene glycol		7920	7200	
2-phenoxyethanol		1200		
monoethylether-ethylene glycol		17150		
MDI (diphenylmethane-di-isocyanate)*			10000	
2-amino-ethanol		720		
4-nonylphenol			4000	6500
[(oxydodecyl)methyl]oxirane derivatives			28800	46800
polyethylenepolyamines			4000	6500
hydrocarbon solvent			90000	
epoxy resin (MW<700)*			7200	11700
Na-metasilicate		1200		
TDI (toluene-2,4-di-isocyanate)*			10200	
Toluene*			7500	

* the quantities relative to these substances are obtained on the basis of the minimum concentration value in the product

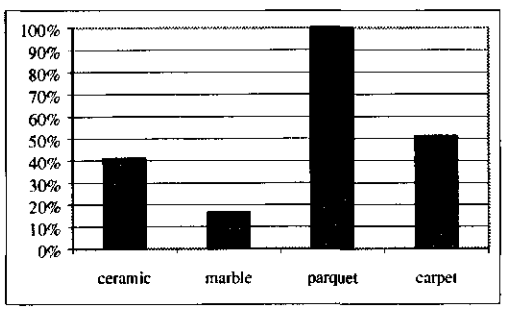

Figure 3: normalised "index of dangerousness" of the four systems

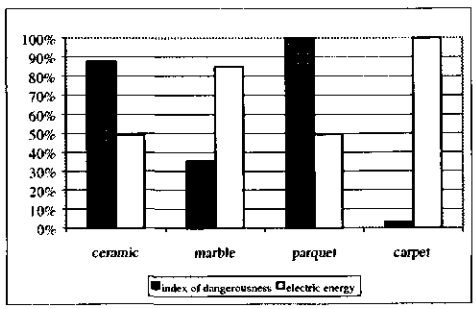

Figure 4: normalised "index of dangerousness" and energy consumption in the maintenance phase of the four systems

5 Conclusions

Aim of this paper has been the proposal of an environmental "life cycle approach" to the laying and maintenance phases of the floor coverings. The methodology proposed takes in account both the materials inputs and the energy consumption of the systems; it uses the dangerousness categories identified by the EU relative to chemicals and to their mixtures and suggests the calculation of an "index of dangerousness" of the systems studied on the basis of the quantity of inputs and of the relative danger category to which they belong. An inter-categories weighting has not been made.
The main results of the analysis are the following:

- the carpet flooring is the most energy consuming system (more than the double compared to the ceramic and parquet system);
- among the four systems, the parquet flooring is the most "dangerous" one.

6 Endnotes

(1) Mortars are mixtures of cement, sand (possibly river sand), water and, eventually, hydraulic lime to increase the formability, plasticity, impermeably characteristics and resistance.

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Rural household energy and water usage in selected parts of KwaZulu-Natal, South Africa

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1 Introduction

South Africa, with a population of 40,58 million of whom 76,7% are African is filled with human and environmental potential, but the country is suffering from both former and current constraints hampering the unlocking of this potential. South Africa is a middle-income developing country with an abundant supply of natural and other resources, at the same time, the country is faced by the challenge to create a strong and balanced economy in order to eliminate poverty and develop a dynamic human resource capacity. Although the new Government, in spite of many hurdles, scored well in various areas of socio-economic development such as the provision of housing, tapped water, electricity and rural health care, the majority of the South African population has inadequate access to basic services. (CSS, 1998)

1.1 Background

In rural areas where piped water and electricity is not available, women spend long hours fetching water and gathering wood for fuel and are the managers of household resources, yet this reproductive work is frequently underreported and undervalued (Lipton, 1996; Moser, 1989). The development of women in relation to water management is important since women are not only the traditional custodians of natural resources in rural areas, but suffer most from degradation of water and other natural resources. It is important that women are represented at all levels of activities, in political, technical and managerial positions, but their participation is restricted due to limited time and low social and cultural status (Mjoli, 1999).

Water is as essential to our survival as the air we breath, with household and the majority of economic activities depending upon it. Absence of potable water and sanitation services (basic toilet facilities) makes people vulnerable to poor health, which reduces their quality of life and productive capacity. In rural areas more than 80% of poor households have no access to safe water or sanitation and 74% of rural African households need to fetch water daily. Under apartheid, distribution of water-use was racially biased and access to water and the benefits from its use was a privilege of those with political and economic power. The aim of the South African Department of Water Affairs and Forestry is to provide water supplies to 90% of the currently non-serviced population by 2004. Equitable access to clean water including the benefits from water resource use and sanitation can reduce mortality and morbidity and save time for productive tasks thereby improving quality of life and reducing poverty (May, 1998; Department of Water Affairs and Forestry, 1997).

Energy poverty is defined as having insufficient daily energy consumption to maintain a minimum standard of living. Apart from limiting household engagement in economic activity

it also results in various negative impacts on health and nutrition. Despite the accelerated electrification programme less than half of South Africa have access to electricity. By the end of 1995 most energy was still obtained from inconvenient and unhealthy sources such as fuel wood (65%), coal (9%), illuminating paraffin (8%), and a small amount from liquid petroleum gas. Increasing amounts of coal, paraffin and gas are used in areas where wood has become scarce. Some low-income rural households cannot afford to use electricity optimally even if they have access to it. The complexity of multiple fuel use in households where fuels are required to meet a range of energy needs such as cooking, space and water heating and lighting, is not yet fully understood requiring further research. Energy is also required for productive activities such as informal home-based industries and small-scale agriculture. Everyday life is inconceivable without energy, but poverty limits energy use and hinders development (May, 1998; Department of Minerals and Energy, 1998).

1.2 Provincial and district profile

According to the October Household Survey of 1994, a source of indicators of social development, 59,5% of the inhabitants of the KwaZulu-Natal province live in non-urban areas. Only 25,9% of the Blacks have access to running tap water in their dwellings compared to 99,1% of the Whites and 97,9% of the Asians, while only 30,7% have access to electricity, with wood as the main source of energy for cooking and heating for the remainder.

The Hlabisa district in the Northeast of the province, where the fieldwork was conducted, is characterised by an essentially rural African population, high population growth, unemployment (32,2%), migration and poverty. Main economic activities recorded in 1994 included, agriculture and forestry in the primary sector and manufacturing in the secondary sector (CSS, 1995). The area with its subtropical climate and high rainfall is characterised by rivers, and lakes surrounded by natural forest. Water pollution is unfortunately a problem and should receive urgent attention, since rivers supply a large proportion of the rural population with water, and drinking contaminated water resulted in more than a 100 000 cases of cholera, an intestinal disease, reported in the last year. In May 1998, the Ministry of Water Affairs and Forestry allocated money to KwaZulu-Natal for the implementation of rural water-supply projects. In spite of the government's accelerated electrification programme most rural households still lack a sustainable and affordable energy supply (www.gov.za/yearbook).

2 Conceptual framework

At the heart of a sustainable rural livelihoods framework developed by the Department for International Development (DFID) lies an analysis of the five different types of capital assets/resources upon which individuals draw to build their livelihoods. Resources are classified by Carney (1998) as well as by Engberg (1990) as: natural (including land and water), social, human (including the ability to labour and good health), physical (such as basic services and infrastructure) and financial. Household access to resources can be anything from individual ownership to customary use rights for groups. People aspire to a range of livelihood outcomes such as increased well-being and income, more sustainable use of natural resources, and reduced vulnerability, with the quality and quantity of resources as indicators of vulnerability. It should though be understood that for vulnerable households short-term survival frequently takes priority over sustainable resource use.

Niehof (1998) discusses livelihood sustainability as opposed to livelihood vulnerability focusing on the ways and strategies people use to achieve livelihood security. Ellis (1998)

referred to livelihood sustainability as including two aspects, namely environmental sustainability as an external impact and social sustainability as an internal capacity. According to Niehof (1998) resources provide the means necessary for livelihood generation. To be able to use resources one has to have access to them, described by Chambers and Conway (1992:11) as "the opportunity in practice to use". Access, according to Niehof (1998) and Carney (1998), is obtained through claims and entitlements at individual level (ex. individual income) or collectively (ex. land at household level and water at community level) and to be used effectively the resources need to be controlled.

In a model for improving the livelihoods of rural women, Lipton, et al. (1996) indicated that women spend most of their time on survival activities such as fetching water and gathering wood for fuel. Lipton et al. (1996) and Mjoli (1999) attributed women's limited participation in commercial activities to time spent on household activities and their under representation in beneficiary organisations to low social and cultural status, placing them at a disadvantage when such organisations provide inputs and services. An enabling environment is required to move women from survivalist to more rewarding commercial activities. Improved infrastructure and services, such as the provision of basic sanitation, water and electricity, can relieve the time constraints facing women in rural households.

It is important to note that this study was confined to rural households, with rural referring to the means of living or a way of living, rather than a geographical location or to population density (Niehof, 1998). The use of the household as unit of analysis for the study of rural livelihoods is motivated by Lipton et al. (1996) according to whom individuals in rural areas are generally organised in households and very few live alone or even in nuclear families. Rudie (1995:228) describe a household as "a co-residential unit, usually family-based in some way, which takes care of resource management and primary needs of its members." Writers on developing countries tend to use the term 'household' rather than 'family', because these households are usually embedded in a much wider network of family and kin.

Livelihood is a complex concept encompassing many other concepts. According to Chambers and Conway (1992:6) "a livelihood in its simplest sense is a means of gaining a living".
Carney (1998:4) slightly modified the definition of sustainable rural livelihoods originally developed by Chambers and Conway as follows: a livelihood comprises people and their capabilities, tangible and intangible assets and productive and reproductive activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base and providing sustainable livelihood opportunities also for the next generation. According to Niehof (1998:1) this ability of households to provide for their own basic needs in a sustainable manner can be referred to as livelihood security as opposed to livelihood vulnerability. According to Swift (1989:8) vulnerability is not just another word for poverty, although poor people are usually among the most vulnerable, where livelihood vulnerability refers to a situation in which households cannot provide for their own needs, either immediately so, or experience a lack of assets to do so in future. According to Carney (1998) it is assumed that people aspire to a range of livelihood outcomes/outputs, including more income, increased well-being, reduced vulnerability, improved food security and more sustainable use of natural resources. These can also be used as indicators of sustainable rural livelihoods, but it should be understood that for vulnerable households short-term survival will take priority over sustainable resource use.

According to Dennill et al. (1996:32), "safe water for drinking purposes should be colourless, odourless, pleasant to taste and free from disease-producing organisms...It should be available within walking distance and a minimum of 20 litres per person per day is required. Sanitation must be safe in that there should be an adequate number of toilets and an effective system of removal and disposal of household waste." Energy can be divided into three sub-sectors: electricity, hydro-carbon (including coal, gas and paraffin) and biomass (mainly wood, dung and crop waste). Most low-income rural households use wood or a combination of hydro-carbon and biomass fuels, with fuel switching or multiple fuel use being a common practice and with both associated with health and safety hazards (May, 1998).

3 Methodology

3.1 Research aim and objectives

The main objective of the research is to gain knowledge and understanding on the acquiring and utilisation of water and energy as part of livelihood generation of selected rural households in the Hlabisa district in the KwaZulu-Natal province of South Africa. The research focus on selected rural households and by no means attempts to generalize findings to all rural households or compare findings with urban households.
Research objectives:

- To determine access of selected rural households to basic services.
- To describe the sources of water used by these households and the distance from these sources.
- To describe the sources of energy used by these households and the distance from fuel wood where used.
- To determine whom is responsible for activities relating to the fetching and usage of water and fuel wood.

3.2 Data collection

A household composition survey was conducted during June/July of 1999 to collect basic data on the composition and size of rural households. This was followed by a qualitative component where eight households were selected from the 29 for in-depth study of their livelihood generation during August and September of 1999. The criteria used for selection included: household size, gender of the head of the household, gender and age distribution of household members, the employment status and occupation of the head of the household and other household members and the location and accessibility of the homestead. The data collected as part of the survey together with a review of literature were used to develop an interview and observation schedule to be used for the collection of descriptive data on the resources used and activities engaged in by selected rural households. Since the researcher is not fluent in Zulu, the native language, a research assistant was used to translate questions and record data. Extensive field notes was taken to capture detailed information that was later interpreted and summarized by the researcher.

Although the research included extensive description of the people and their capabilities, all resources utilized, all activities engaged in by rural households and most gains or outcomes of their livelihood generation, only findings on selected resources (water and energy) and activities (relating to water and energy) will be reported below.

4 Results

4.1 Household characteristics

Household characteristics are summarised in Table 1.

All the households belong to the African population group. All homesteads, except case 2, are easily accessible by tar road, with only the last few kilometres being dirt road, sometimes of very poor quality. All the households, except for cases 2 and 8, have been residing at their current locations for more than nine years, some of them more than 50 years.

Household size of the case study households varied between four unrelated adults in the smallest household, up to 29 members in the biggest living under the same cluster of roofs. Household 8 is unique in that it consists of four migrant workers temporarily residing together. Age distribution of household members are important because those of 14 years and younger are too young to be formally employed, the group aged between 15 and 60 years are seen as the potentially economically active members of the household and the 60+year age group should be seen as representing a very important source of income in the form of old-age pensions. Because of the high rate of unemployment however, very few of the middle age group are actually formally employed, while the other two age groups frequently engage in minor productive activities and play and important role in reproductive activities.

Three of the households are headed by women, either widowed or separated, as opposed to five headed by men, all of whom are married, one in a traditional marriage with two wives. All three female heads are self-employed, with crafts as the main source of income for two of them, while the third is a fruit trader supplementing her income with craft sales. A higher level of education does not necessarily translate into formal employment. Two of the male heads have migrated to work or look for work elsewhere, and even though they spend most of their time away from the homestead, they are perceived by other household members as the head of the households since they are the chief decision makers.

Average monthly household income, one of the livelihood outputs, proved to be very difficult to calculate and only a rough estimate is provided. Referred to here is income in the form of money from various sources including different kinds of employment, agricultural production for the market and claims made to the state (pensions) or community received as money. Most of the income reflected here originates from entrepreneurial activities resulting in great monthly variation.

4.2 Access to sanitation, water and energy

In Table 2 and 3, household access to and utilisation of services (sanitation and electricity) and natural resources (water and energy) is summarised.

Table 1 Household characteristics

CASE	SELECTED HOUSEHOLD DATA						HOUSEHOLD HEAD DATA					ESTIMATED HH INCOME
	HH size	Gender		Age			Gender	Marital status	Education	Work status	Occupation	South African Rand (R8=$1)
		M	F	<15	15 to 60	>60						
1	5	2	3	4	1	0	F	Widow	Primary school incomplete	Self-employed	Crafter	R725
2	8	5	3	4	4	0	M	Married Civil	Secondary school incomplete	Self-employed	Crafter	R2900
3	29	14	15	11	18	0	M	Married Traditional	Primary school incomplete	Employed	Labourer	R4210+
4	12	5	7	5	6	1	M	Married Civil	Secondary school incomplete	Unemployed (migrated)	Plumber	R1235
5	17	8	9	6	10	1	F	Separated	Primary school incomplete	Self-employed	Trader	R1680
6	10	5	5	4	4	2	M	Married Civil	Secondary school complete	Employed (migrated)	Labourer	R2450
7	23	11	12	12	10	1	M	Married Civil	Never to school	Not Working	Pensioner	R3000
8	4	1	3	0	4	0	F	Single	Secondary school complete	Self-employed (migrants)	Crafter	R800

Table 2 Resources: sanitation and water

CASE	SANITATION				WATER				
	No toilet	Ordinary pit latrine	Ventilated pit latrine	Flush toilet	Main source		Distance to main water source		
					Communal pump/tap	River or spring	<100m	100m to 1km	>1km
1	X					X		X	
2		X			X		X		
3		X			X				X
4		X				X			X
5	X					X		X	
6			X		X			X	
7	X					X			X
8				X	X		X		

At three of the homesteads there is no latrine or toilet. Not one of the households has access to piped water at the homestead, expressed by most of them as their biggest need. For half of the households water from the river/spring is indicated as the main source of water for household use, while one other household indicated the river as a secondary source. Those using communal taps/pumps pay for the water they collect, either a fixed amount per month, or per container. Those using communal taps or pumps also sometimes have to use rivers/springs when they do not have money to pay for water or when pumps are broken, sometimes for long periods of time. Some of the households have to walk further than one kilometre to reach the river. Many of the households complained that rivers are used by animals, and that this affects the quality of the water negatively. Apart from collecting rainwater at the homestead, this is the only source that they do not pay for and many of them have no alternative but to use this water. Although all households indicated that they are aware of the prevalence of cholera, none of them were directly affected by it. Most households purify drinking water by adding a well-known chlorine bleach to containers of water and then leave it to stand for a few hours before use. Using rivers also present other dangers such as crocodiles. The waiting time at communal taps/pumps frequently exceeds an hour. Containers are usually taken to the water source, filled with water and carried or transported by wheelbarrow to the homestead for household use such as washing, cooking and cleaning with laundry usually taken to the river for washing.

Table 3 Resources: electricity and other sources of energy

CASE	ELECTRICITY	OTHER SOURCES OF ENERGY					
		Sources used for cooking			Distance to nearest source of wood		
		Wood	Paraffin	Gas	<100m	100m to 1km	>1km
1		X	X			X	
2	X	X	X	X			X
3		X	X	X	X		
4		X	X				X
5		X	X				X
6		X		X	X		
7		X	X		X		
8				X			

Case 2 is the only household that has electricity at the homestead, a prepaid metered system that allows one to purchase units that provides limited use. When it does not rain most of the households use wood for cooking on an open fire outside. Those households that do not use wood every day use it to cook for traditional functions and to cook food that requires a long cooking time such as beans. The households that can afford the luxury of expensive gas use this to boil water and prepare quick cooking food such as rice and phutu (a stiff porridge prepared from maize meal). Wood is not the only source of energy used by the households, most of them also use gas and/or paraffin. Gas and paraffin are used when the weather does not allow cooking outside on the open fire, especially when there is no traditional kitchen where they can make a fire inside. Both gas and paraffin are quite expensive and result in a major household expense. The main source of wood is natural forest around the homestead, although some of them have to walk more than two kilometres to find suitable wood without having to pay for it. Some households indicated that they have wood delivered at the homestead, but for most of them this is a paid for luxury they cannot afford. When asked whether they have to walk further now than in the past to find suitable wood, all respondents replied "no". Apart from using wood as a source of energy, wood is also used by all the households as building material together with stones and clay. Although wood, paraffin and gas are the main sources of fuel for cooking and heating, households also use illuminating paraffin together with candles for lighting. Car batteries are used by most households to power television sets.

4.3 Reproductive activities

Apart from livelihood not being equal to income, livelihoods are also not only generated through productive activities, but also reproductive/household activities. Gender division of labour for selected household activities is summarised in Table 4 and 5.

Table 4 Collecting and usage of water

CASE	Person responsible			Frequency of task				Approximate quantity of water used per household per day		
	Adult women	Female children	All children	Twice a day	Once a day	Thrice a week	Once a week	<100l	100 l to 150l	>150l
1	X	X		X				X		
2	X	X		X				X		
3		X		X						X
4	X		X		X				X	
5	X		X	X						X
6			X			X			X	
7	X	X					X			X
8	X			X				X		

Table 5 Gathering of wood

CASE	Person responsible		Frequency			
	Adult women	Female children	Every day	Once a week	Twice a month	Once a month
1	X	X		X		
2		X				X
3		X	X			
4	X			X		
5		X			X	
6	X					X
7		X		X		

Apart from women's involvement in productive activities such as craft production for the market and subsistence farming, they are also responsible for most of the reproductive/household activities including collecting of water and gathering of wood. Fetching of wood and water are mainly done by adult women, sometimes with the help of some of the older children, especially the daughters, thus reinforcing traditional gender roles. Women often spend a long time waiting in line to collect water at communal taps, and although this is a valuable opportunity for meeting with other women it limits women's time available for productive activities. Cooking is mainly done by adult women, with male and female children helping with cleaning and laundry.

Apart from women's involvement in productive and reproductive activities, they are frequently also involved in community activities, most of the time related to the church. Involvement of women in household and community activities are usually expected rather

than by choice. Involvement of especially women in community activities should be perceived as an investment in reciprocity, although there are no immediate benefits, you or your household will also one day benefit from it.

5 Conclusion

More sustainable use of the natural resource base is a long-term outcome for rural households and frequently not a priority. Lack of access to clean water and sanitation close to the homestead and lack of accessible affordable sources of energy may contribute to household vulnerability, but should be assessed with other vulnerability indicators since it is frequently the interaction between indicators that contribute to an increase or decrease in vulnerability rather than one in isolation. Households were requested to comment on the quality of natural resources, but the researcher got the impression that this is not an issue they think about, for them it is probable just part of everyday life. Sustainable use and quality of natural resources, including water, trees and soil should rather be measured by means of an environmental assessment.

Diversification in the use of water and energy sources can be seen as a strategy followed by rural households to cope with environmental degradation and lack of money to pay for services. Rural households are to a great extent directly dependent on natural resources for the generation of their livelihoods. More secure access to and better management of natural resources can contribute to reducing household vulnerability. Households should also not be seen in isolation, but within a broader natural, social, economic and political environment that determine the resources they have access to and the alternatives they can choose from. In a region where people are very dependent on the natural environment for water, wood for fuel and land for food production, environmental degradation may increase household vulnerability.
Rural households engage in a variety of productive and reproductive activities to generate livelihoods. Although productive activities are important since they contribute directly to increased income, the importance of reproductive activities, especially engaged in by women, are frequently under recorded and under valued. Reproductive or household activities are not represented in income and expenditure surveys, yet they contribute greatly to the well-being of the household. Equitable access to basic services and natural resources can contribute to a healthy environment within which women can have more time and energy to engage in commercial activities.

Although the South African government made progress in the supply of basic services in many parts of the country there is still areas in desperate need of clean water, sanitation and sustainable sources of energy. It should though be considered that the cost of services is a concern for households while the fact that homesteads are scattered makes the provision of services more expensive. The answer is not necessarily the provision of flush toilets, piped water inside the home or electricity, the search should continue for socially, naturally and financially sustainable alternatives. The sustainability of rural household livelihoods can be increased and vulnerability reduced in two ways, by improving people's capabilities to enable them to firstly withstand stress and shocks better and secondly to enhance their asset base. These two are interrelated, it is people's inherent capacity to withstand stress and shocks that should be built up by expanding their options and choices. This requires the development of

policies and institutions that provide people with more alternatives and that at the same time remove constraints, such as unequal access to resources and services.

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Buying second-hand clothes – consumer interpretations

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Abstract

To implement strategies for sustainable consumption, active consumer participation is often required. There is thus a need for studies of individual consumers' activities and product use from an environmental and resource perspective. A concrete consumer action in line with the concepts of dematerialisation and recycling is to buy second-hand clothes instead of new clothes. Although there are obvious advantages from an environmental point of view, as well a relatively good supply at low prices, there is a wide variation in how many second-hand clothes consumers buy. The purpose of this paper is to contribute to the understanding of why Swedish consumers buy second-hand clothes to a varying degree. Twelve persons were interviewed in order to pursue the meaning that individual consumers attach to buying second-hand clothes. Four qualitatively different ways of interpreting the purchase of second-hand clothes were found: (1) second-hand is a good way of reusing clothes; (2) second-hand clothes are cheap and different; (3) on the second-hand market one may find fancy clothes for certain occasions; and (4) it is unpleasant to own clothes that someone else has used. Consumers representing interpretations (1) and (2) buy second-hand clothes regularly, consumers representing (3) buy second-hand clothes occasionally, and consumers representing (4) do not buy second-hand clothes. The results from this study suggest that if consumers are to be influenced by information in order to increase their proportion of clothes bought second-hand, this information should take into consideration different consumer perspectives on buying second-hand clothes. All consumers may not be influenced by the same message. Depending on the meaning that buying second-hand clothes has for the consumers, they presumably vary in openness to information about buying second-hand clothes.

1 Introduction

The use of material and energy in Western societies has dramatically increased over the last few decades and has become one of the main threats to the environment. Dematerialisation has thus become a main strategy in the work towards sustainable development and consumption. A useful indicator of the scale of the change required has been the goal set by the Wuppertal Institute for a 'factor 10' reduction in the use of materials and generation of pollution by the middle of the next century (Schmidt-Bleek 1996, in Robins 1999). Several ideas have been put forward on how this dematerialisation can be achieved. For instance, the Swedish Environmental Protection Agency (1998) has suggested the following approaches: products using less material and energy, increased product lifetime, substitution, multi-purposing and pooling.

Implementation of strategies for sustainable consumption often requires active consumer participation. In Agenda 21 several activities to achieve sustainable consumption are suggested; among them, consumer information, and encouragement of values that support

sustainable consumer behaviour, are considered fundamental (Agenda 21:4:20-26). The increasing awareness of threats to the environment has thus increased pressure on individual consumers to participate actively in creating a sustainable society.

One approach in line with the dematerialisation perspective is to promote long product lifetimes and ensure that products are used during the whole potential lifetime. A concrete consumer action which supports these concepts of dematerialisation and recycling is to buy second-hand clothes instead of new clothes to a larger extent. The arguments behind the claim that an extended lifetime of clothes would principally be favourable from an environmental point of view are based on the fact that clothes belong to a product group which has low resource consumption and environmental influence during use, as they only require maintenance. This is in contrast to products that also require energy or material to be used, e.g. washing machines, and products that are also dependent on an external system, e.g. cellular telephones. Furthermore, the maintenance per time required for clothes is not considerably affected by the garment's usage time. In particular, a garment with longer lifetime is not washed more frequently than a garment with a shorter lifetime, but a short lifetime means that new clothes need to be purchased more frequently. The usage time of clothes may also be extended if they are taken good care of through airing, repair and brushing. This kind of maintenance has little or no impact on the environment.

Moreover, in production of textiles, chemicals harmful both to the environment and to human health are extensively used (SEPA, 1995, 1996; Westberg, 1994a,b; Carlsson, 1994). The substantial environmental problems connected with textiles and the fast-growing consumption of clothes, together with the fact that clothes are often thrown away before they are worn out, were important reasons for choosing the purchase of second-hand clothes as a consumer action to study. In addition, Swedish consumers are active in leaving clothes for reuse[1] and there are numerous shops[2] selling second-hand clothes.

The expected growth in the consumption of new clothes (Wikström, 1997) indicates that even more clothes will be discarded before they are worn out. On the other hand, there is also a growing interest in reuse among Swedish consumers and in the number of shops selling second-hand clothes. These somewhat contradictory trends indicate that a spread can be expected in how many second-hand clothes are bought by different consumers. In this ambiguous situation, motivation and information are possible measures to influence the balance of trends in an environmentally friendly way. The purpose of this paper is to contribute to the understanding of why Swedish consumers buy second-hand clothes to a varying degree.

2 Method

The study was carried out using a qualitative approach. A fundamental assumption behind the qualitative research tradition is that a person's understanding of his/her situation decides and explains the person's behaviour. "Human beings constitute meaning by interpreting their situations and on the basis of these interpreted meanings they act in certain ways." (Sandberg, 1995:1.) To fulfil the aim of this paper, the ways in which individual consumers interpret buying second-hand clothes were pursued.

The empirical data were collected in an interview study with the overall purpose of understanding how consumers interpret bringing environmental concern into their choice, use

and disposal of clothes. To buy second-hand clothes was one of the issues covered in the interviews. The method used to collect the empirical data was the qualitative research interview as described by Kvale (1996). Twelve persons were interviewed from May to December 1999 – nine women and three men, aged 20 to 57. According to the qualitative research literature, new interviews should be conducted until a point of saturation has been reached at which variation within the group is both accounted for and understood (Kvale 1996:102; Morse 1994:230). Kvale (loc. cit.) states that, for an interview study, the number of interviews tends to be 15 +/- 10.

In this study the interviewees were selected to reflect variation in two respects – their stated interest in clothes and fashion, and their stated interest in environmental issues: 'active' versus 'passive'. A clear majority of Swedish consumers have in some sense a positive attitude towards environmental issues, but despite homogeneity in attitudes the part taken by them in active environmental behaviour varies to a great extent; see for example Solér (1997), Bennulf (1994), Biel and Dahlstrand (1996).

The interviews were accomplished using an interview guide. The interviews were tape-recorded and fully transcribed. The author carried out all interviews and transcriptions. During the interview analysis for this paper, the focus was on the interpretations of buying second-hand clothes expressed by the interviewees, and these were condensed into more succinct formulations. The interpretations were also categorised. The categories used were derived from the interview material itself, and were based on differences and similarities between the interpretations found. The interpretations found were also related to actual consumer actions, i.e. to what extent second-hand clothes were bought and with what restrictions. From these categorised interpretations, different ways of interpreting the purchase of second-hand clothes were examined; the main characteristics of each way were identified, and will be described below.

Based on the empirical data collected through the interviews, it has been possible to make claims about the different ways in which individual consumers interpret buying second-hand clothes. However, it has not been possible to make claims about what proportion of the Swedish population is represented by different ways of interpreting. In order words, it is possible to generalise about the phenomenon but not to the population.

3 Results – ways of interpreting purchase of second-hand clothes

Four qualitatively different ways of interpreting the purchase of second-hand clothes were derived from the interviews:
(1) Second-hand is a good way of reusing clothes.
(2) Second-hand clothes are cheap and different.
(3) On the second-hand market one may find fancy clothes for certain occasions.
(4) It is unpleasant to own clothes that someone unknown has used.

The main characteristics of each interpretation are described. To make the interpretations meaningful, they are also related to actual consumer actions, i.e. to what extent second-hand clothes are bought.

(1) Second-hand is a good way of reusing clothes

The consumers representing interpretation (1) have a perspective on buying second-hand clothes that focuses on *reusing*. For these consumers the environmental aspect of reuse plays a salient part in their perspective on buying second-hand clothes, as may be illustrated with the following quotations.

> "It [second-hand] is quite cheap in comparison. And, as I mentioned before, it is better from an environmental point of view to actually use clothes many times and these are clothes that no one has any use for any more. Either because they think they are ugly or because someone has died or whatever. ... So it is a sensible idea. And I think that here economy and ecology may walk hand in hand. Well, take this as an example, this [pointing at the shirt he is wearing] is an old military shirt. And it can be used perfectly well." (Interview 1a)

> "I think I do that at least once a year. Go to a second-hand [shop], or maybe two. For leaving [clothes] and I may go there just to take a look too. I think it is an excellent way of reusing. If I get tired of something that is still all right, then I first take it to a second-hand shop. And if they don't want it then I give it to Save the Children or some other [organisation]. But if you could get something for it and then buy something else in the shop, then I think it is very good. So I actually make use of it [second-hand]." (Interview 1c)

These consumers regularly look for clothes in second-hand shops and, if they find something they like, they find it pleasing since it is seen as good for the environment – and for the wallet. That is, besides the reuse aspect, another salient feature in these consumers' perspective on buying second-hand clothes: that one may find good clothes at a good price.

> "One can find a lot of nice stuff for very little money." (Interview 1b)

Consumers representing interpretation (1) regularly buy second-hand clothes for everyday use. Since buying second-hand clothes is regarded as favourable by these consumers, they actively try to find clothes at second-hand shops. These consumers also express both pros and cons related to buying second-hand clothes: for instance, second-hand shops provide possibilities to find clothes of good quality at low prices, but on the other hand it may be quite time-consuming to find what they are looking for if they have a clear picture of what they want.

(2) Second-hand clothes are cheap and different

Consumers representing interpretation (2) have a perspective on buying clothes second-hand that focuses on *style and price*. For these consumers the environmental aspect of reuse is not salient in their perspective on buying second-hand clothes. They go to second-hand shops regularly and if they find something pleasant and at a good price they buy it. These consumers also buy clothes for everyday use, as may be illustrated by a quotation:

> "I'm not looking for clothes to a fancy-dress party or a garment from the Seventies. But for something that I could use, something that is up-to-date, that would fit me now. And it is often cheap." (Interview 2a).

Second-hand is also seen as a possibility to find clothes that are different from what one may find in "ordinary" clothes shops:

> "When I was younger I bought almost everything second-hand. ... It was important to stand out, and then one could find clothes that nobody else had, on second-hand. And then it was cheap too. But that wasn't the most important thing, which was to find different clothes." (Interview 2b)

(3) On the second-hand market one may find fancy clothes for certain occasions
Consumers representing interpretation (3) have a perspective on buying clothes second-hand that focuses on *certain occasions*. These consumers have not thought of buying second-hand clothes for everyday use. This is not due to any particular values regarding buying or not buying clothes second-hand; it has just never been in question.

> "I guess it is as simple as that, it [buying second-hand clothes] has never been in my mind for the simple reason that I'm not grown up with it and when I was little there were almost no second-hand shops. At least not in the part of the world where I'm from." (Interview 3a)

These consumers have never bought any second-hand clothes for everyday use, but it may have happened that they have bought something fancy for a special occasion, for instance a masquerade. For these consumers, buying clothes second-hand is interpreted as a way of getting fancy clothes at a low price for certain occasions.

(4) It is unpleasant to own clothes that someone unknown has used
The consumers representing interpretation (4) have a perspective on buying second-hand clothes that focuses on *dissociation*. These consumers dissociate themselves from second-hand clothes. Clothes are seen as something private, and to buy and use clothes that someone unknown has used is interpreted as unpleasant or even disgusting.

> "I think clothes are so private. I would like to have them for myself. I would like to have bought them myself and only had them myself. On the other hand, when I was younger I got some clothes from my mother's friend's children and then I thought these clothes were fun. But then I knew who had had them. But to have clothes that someone unknown has had, no, I don't think I would like that." (Interview 4d)

> "I find it disgusting. Second-hand clothes. It doesn't attract me at all. Then I prefer to buy cheaper clothes." (Interview 4c)

There are also other reasons for the dissociation from buying second-hand clothes, for example:

> "I want to have new things. ... But that goes for everything, not just for clothes. If I were to buy a camera I would like to buy a new one and not second-hand, because then I know it's all right, that it works." (Interview 4a)

For most of these consumers the environmental aspect of reuse is not prominent in their interpretation of buying second-hand clothes. But for some of them it is, and this may cause a dilemma when they think that there is a considerable wastefulness regarding clothes and yet experience second-hand clothes as unpleasant, as may be illustrated by the following quotation:

> "[Second-hand clothes] are nothing for me. And that's totally wrong. But I think that these things, they smell and so forth. I haven't felt a need for this kind of clothes. They

don't attract me. But I guess that's stupid. I have thought about it regarding children's clothes. Because it's very expensive and it is really wasteful. You buy something and then they [the children] use it for a very short time and then you just put it in a bag." (Interview 4b).

4 Concluding discussion

The results presented above show that the variation in how many second-hand clothes Swedish consumers buy can be explained by the different ways in which they interpret buying second-hand clothes. Consumers buy second-hand clothes if they interpret this as meaningful for them. In this study, four qualitatively different ways of interpreting the purchase of second-hand clothes were found. The number of different interpretations is in line with other studies analysing ways of interpreting specific situations, where usually two to six different interpretations have been found (Sandberg & Targama, 1998:61).

The main characteristics of the different interpretations of buying second-hand clothes are illustrated in figure 1.

Interpretation (1) *Second-hand is a good way of reusing clothes.*	Interpretation (2) *Second-hand clothes are cheap and different.*	Interpretation (3) *On the second-hand market one may find fancy clothes for certain occasions.*	Interpretation (4) *It is unpleasant to own clothes that someone else has used.*
Buy second-hand clothes regularly.	Buy second-hand clothes regularly.	Buy second-hand clothes occasionally.	Do not buy second-hand clothes.
• Environmental issue • Good clothes at • Low prices • Everyday use	• Good clothes at • Low prices • Everyday use	• Fancy clothes at • Low prices • Occasional use	• Dissociation

Figure 1: Characteristics of different ways of interpreting purchase of second-hand clothes

The consumers who represent the interpretations "second-hand is a good way of reusing clothes" and "second-hand clothes are cheap and different" regularly buy second-hand clothes for everyday use. The main difference between these two interpretations is that the reuse aspect is a salient part of the first interpretation, but not of the second. The kinds of garments bought second-hand are jackets, trousers, skirts, outdoor clothes etc. Underwear, T-shirts etc. are not bought second-hand. The consumers who represent the interpretation "on the second-hand market one may find fancy clothes for certain occasions" buy second-hand clothes very seldom, and the clothes they buy second-hand are mainly intended for use on a specific occasion. The consumers representing the interpretation "it is unpleasant to own clothes that someone unknown has used" do not buy clothes second-hand. However, it is important to notice that for all consumers in this study, the main way of getting clothes is to buy new clothes.

From a dematerialisation perspective it is interesting to observe that, mainly for consumers representing interpretation (1), the environmental aspect of reuse plays a salient part in their

perspective on buying second-hand clothes. Some of the consumers representing interpretation (4) also include the reuse aspect in their interpretation of buying second-hand clothes, but since the most prominent aspect is dissociation this may be experienced as a dilemma. For consumers representing interpretations (2) and (3), the environmental aspect of reuse is not conspicuous in their perspective on buying second-hand clothes. However, it should be emphasised that the above does not imply that consumers representing, for example, interpretations (2) and (3) are generally uninterested in environmental issues.

An evident precondition for an increased proportion of second-hand clothes, derived from this study, is that second-hand clothes must be seen as an *alternative* to new clothes. For consumers representing interpretations (1) and (2) this is already the case. For consumers representing interpretation (3), second-hand clothing is not a regular alternative, but on the other hand they do not dissociate themselves from it. For consumers representing interpretation (4), second-hand clothing is definitely not an alternative to new clothes and they dissociate themselves clearly from it. The potential for an increase of the proportion of second-hand clothes may thus be different among different groups of consumers.

The results from this study suggest that if consumers are to be influenced by information in order to increase their proportion of clothes bought second-hand, this information should take into consideration different consumer perspectives on buying second-hand clothes. All consumers may not be influenced by the same message. Depending on the meaning that buying second-hand clothes has for the consumers, they are presumably differently open to information concerning such purchases..

Finally, this paper has had the ambition of further illustrating the importance of understanding how individual consumers interpret the situations and actions that may be relevant to influence from an environmental perspective. Consumers act in line with the meaning they have attributed to a situation, and different interpretations result in different ways of acting. This is a significant aspect to take into consideration when working with strategies to promote more sustainable consumption.

5 Acknowledgements

This study was financially supported by the Foundation for Strategic Environmental Research (MISTRA). Thanks are also due to the author's supervisor, Professor Sven Dahlman, for valuable advice and support throughout the study.

6 Endnotes

(1) 18,600 tons of clothes are collected by charity organisations each year in Sweden. The textile waste from Swedish households is estimated to be 50,000 tonnes annually. The group of textiles, gum and leather is estimated to be 2% of the total household waste in Sweden. Textiles disposed with ordinary household waste are not recycled, but burned (40%) or deposited (60%). (SEPA, 1996.)
(2) At least 292 second-hand shops in Sweden (Gula sidorna 2001).

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About the relation between Washing Performance and Washing Behaviour: Influence on detergent dosage

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Summary

In developing consumer products by changing product technology and possibly the functional performance with it, it is of social and scientific interest to know how application of the product and with it consumption of resources is affected. For the domestic activity of laundering this research aims to interrelate the functional performance of the domestic laundering process and the consumer's washing behaviour. Two formulations of a detergent with a visual perceptible difference in washing performance have been made in a laboratory research. The washing behaviour of 50 private households, using these two formulations, has been monitored in a field experiment with data-acquisition equipment and by means of an inquiry. There was no systematic relation between the dosage and the two formulations of the detergent found. This complies with the findings of the inquiry where no difference in influence of the formulations on changes in washing practices was observed. The washing performance of the laundering processes in daily practice in which the modified detergent has been applied, has not been significantly affected. Apparently the modified detergent has failed in lowering the washing performance of the practical laundering process enough to make consumers change their washing behaviour.

1 Introduction

In the development of consumer products, changes in product technology may affect the functional performance of the product (Tromp, 1993). This can imply performance increase as well as performance decline. Examples of the first are the introduction of bleach activators in textile cleaning and dishwashing detergents (Croud and George, 1977). Examples of a decline of the functional performance are the lowering of the washing temperature in washing and dishwashing machines (Terpstra, 1997) or the substitute-ion of tripolyphosphate in fabric detergents (Lovingood et al., 1989). Because consumers are customers to manufacturers, target group to policy makers and subjects to scientists, the experiencing of and the dealing with those changes by the consumer should be of interest to the professionals mentioned. Systematic research on the influence of such performance changes on consumer behaviour has not been published (Skolnik and Hohenberg, 1987, Woodard et al., 1990). As the latter is an important subject for debate in many social and environmental issues, it is of social and scientific interest to develop knowledge about and insight into this relation. The domestic activity of laundering is chosen as case in which to study the relation between functional performance and application of the products by the consumer. In this case the research question reads: Does a change in the functional performance of the domestic laundering process make consumers change their washing behaviour? And if so, which element(s) of the

washing behaviour change? The aim is to interrelate the two concepts and to describe the mechanism of the behaviour change.

2 Making operational and methods

The central idea of the research is that the performance of the laundering process is modified at the consumer's home and the influence on their washing behaviour is studied. To enable the assessment of the relation between the consumer's washing behaviour and the performance of the laundering process, both variables have to be determined in the experiment.

2.1 Washing performance

The first variable to concentrate on is the performance of the domestic laundering process. The laundering process can be described as a combined action of washing machine, detergent and programme in order to restore the functional properties of the textiles at home. The function fulfilment of the domestic laundering process can be distinguished into aspects such as soil and stain removal, tint, smell, hygiene and softness (Nieuwenhuis et al., 1965). Because 92% of the consumers does not accept stains (Zuidberg and Baak, 1986), soil and stain removal is taken as a measure for the performance of the domestic laundering process. The IEC 456 International Standard (IEC, 1994) offers a method for measuring soil and stain removal and describes washing performance as follows: "the washing performance of a washing machine is characterised by the reflectance, measured with a photocolorimeter, of different types of specimens with standardised soilings washed in the machine under test, together with a ballast load of clean textiles". The IEC 456 method is originally meant for measuring the performance of electric clothes washing machines for household use as the complete title says. The method used to determine the washing performance actually measures the degree of soil and stain removal of the washing process no matter where or in which situation the process is operated. Therefore this method to determine the washing performance is very well applicable for this research.

The washing performance of the domestic laundering process is a function of the Sinner factors: time, mechanical action, chemistry and temperature. Or in everyday use: a function of washing machine, detergent and the actions performed upon them. In order to study the washing behaviour as a dependent of the washing performance, it is necessary to change the latter. In this research the change is achieved by altering the formulation of the detergent. Changing the washing performance by altering peoples private washing machines would be noticed and keep participants from joining the experiment.

To bring about a change in the washing performance of the domestic laundering process, it is chosen to add filler (sodium sulphate) to a detergent with an average washing performance. The change in washing performance should be large enough to be noticed by the consumer: the so-called "visual perceptible difference" needed for this research. From the method for visual assessment of the washing performance the magnitude of a visual perceptible difference as percieved with the human eye could be established. And because of a correlation between visual assessment and the IEC 456 method (Terpstra, 1997) it is possible to determine a visual perceptible difference using a photocolorimeter and artificially soiled pieces of cotton cloth. In a series of laboratory tests the concentration of filler needed to reach a visual perceptible difference in washing performance is determined. The tests were run in accordance with the measurements for the washing performance in the IEC 456 International Standard (IEC 1994) and it is concluded that a concentration of 50% sodium sulphate is

necessary to reach a visual perceptible difference in washing performance (Roozemond, 1998).

Subsequently the two formulations of the detergent were distributed among the participants of the field experiment. The washing performance of their laundering processes in practice was measured with the same materials as used in the IEC 456 method. This yielded the data set with information about the washing performance of the domestic laundering process in practice.

2.2 Washing behaviour

The second variable to concentrate on, is the consumer's washing behaviour. This is defined as the actions the operator of the domestic laundering process performs in order to restore the functional properties of textile. Examples are the washing frequency, the chosen wash program and pre- or after treatment of the textile articles. The consumer's washing behaviour is measured with data-acquisition equipment and by means of an inquiry.

2.2.1 Washing patterns

With data-acquisition equipment washing frequency, detergent dosage, energy and water consumption are registered. These data will be referred to as washing patterns. Energy and water consumption are not actions performed but the result of it. However measured changes in consumption can reveal changes in behaviour.

2.2.2 Washing practices

In the inquiry detailed questions about changes in the washing behaviour were asked. Elements of the washing behaviour asked after are: sorting, soaking, pre-washing, loading, program and temperature choice, use of special buttons (E(nergy), saving, wash load, extra water, extra rinsing, short, intensive), detergent choice, dosage, applying stain remover/softener/builder/bleaching agent, wash frequency and amount of dirty laundry. These inquired data will be referred to as washing practices. The inquiry was held after the data-acquisition equipment was taken away.

2.3 Other variables

Next to the performance the washing behaviour is influenced by other variables. Literature research (Groot-Marcus and Scherhorn, 1991-93) and interviews with experts pointed out that changes in the household characteristics (e.g. size of the household) are also strong determinants of changes in the washing behaviour. To attribute changes in the washing behaviour to the changed performance, these variables will be kept constant by means of selection criterions for the participants or measured. The applied selection criterions for the participants are:

- the age of the washing machine is less than 10 years;
- the size of the household is larger than one person;
- the age of the participant is between 35 and 55 years.

2.4 Field experiment

The washing behaviour is measured at the consumer's private home because an object of the research is to study a possible behaviour change shown under real life conditions. That makes this part of the research a field experiment.

The number of participating households was 50. The measurements lasted one year, from mid-January 1998 to mid-January 1999, of which the initial situation was monitored for 3 months. After three months the participants were divided into two groups and each group got

a different formulation of the detergent. After five months the formulations of the detergent were shifted over the groups. The participants were not informed about this change. The participants were visited monthly, supplied with detergent and the washing pattern data were collected. The field experiment was held in the suburbs of Arnhem. The design of the field experiment is schematically represented in figure 1.

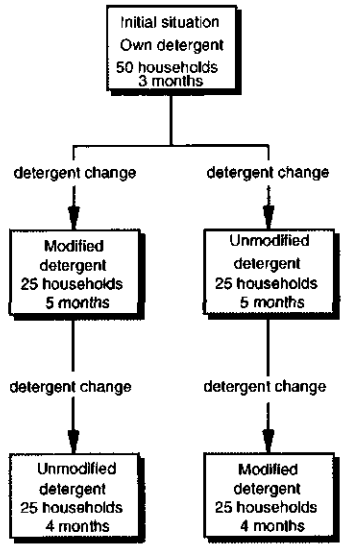


Figure 1: Design of the field experiment.

3 Results

The field experiment yielded three types of data sets:

- the data set from the data-acquisition equipment containing information about changes in washing patterns;
- the data set from the inquiry containing information about changes in washing practices and
- the data set from the artificially soiled pieces of cotton cloth containing information about the washing performance of the domestic laundering process in practice.

These data sets are analysed for relations between the formulation of the detergent as the independent variable and the washing patterns, the washing practices and the washing performance of the domestic laundering process in practice as the dependent variables. If one of the elements of washing patterns or washing practices changes statistically significant than it is assumed that there is an influence of the washing performance on the behaviour. The scheme of analysis used is graphically displayed in figure 2. In this paper the results and analysis elaborated so far are presented. These concern the influence of the formulation of the detergent on the element dosage of washing patterns, all elements of washing practices and washing performance of the domestic laundering process in practice.
In the following charts and tables the unmodified detergent is abbreviated as un, the modified one as mod and the detergent used by the participants in the initial situation as own.

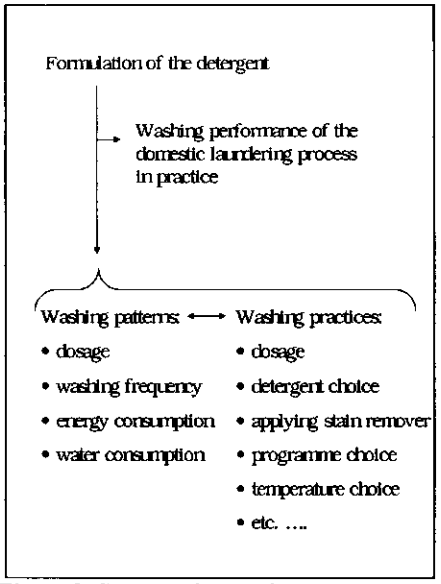
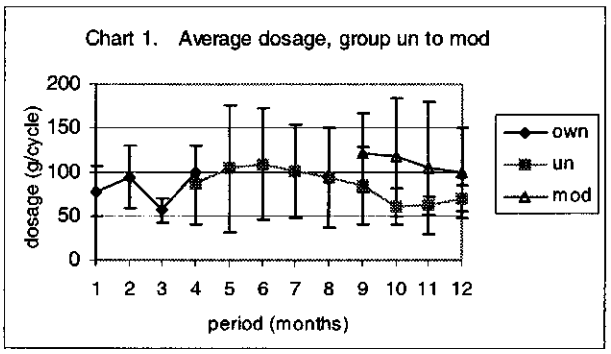
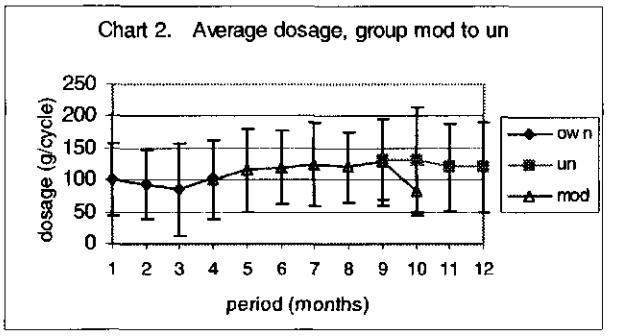


Figure 2: Scheme of analysis.

The average dosage each month of the group participants that first received the unmodified detergent and next the modified one, is in chart 1. In chart 2 the average dosage each month of the group participants that first received the modified detergent and next the unmodified one is displayed. Not all participants started using the last formulation at the same time, simply because some of them had more of the former formulation in stock than others. Therefore the number of participants of which the average dosage of the last formulation is calculated gradually grows each month and the number of participants using the former formulation declines proportionally. For the analyses this is corrected by leveling the month in which the shift of use of the formulations took place.





The influence of the formulation of the detergent on the dosage is analysed in two ways. By mutually comparing the average dosages of the various formulations in the first and the last month of each successive period of use and by comparing the average slopes of the logarithmic regression lines of the dosages each month of the various formulations with an expected value and mutually. The latter method of analysis is valid in this case for one of the premisses of this research is that the possible change will take place gradually with time. For both the formulations and the ways of analysing there was no influence on the dosage found ($p > 0.05$, 2-tailed).

The influence of the formulation of the detergent on washing practices is analysed by chi^2 tests on the crosstables of change of detergent formulation and changes in washing practices. These analysis have been done for the attributes smell, washing performance, rinsing in and out and all these attributes together in which the washing practices are regarded as changed when the participant reports that his or hers practices have changed by at least one of the attributes. For all the attributes together and for rinsing in the two formulations differ in influence on changes in washing practices ($p < 0.05$). Rinsing in is the only attribute showing its influence in both detergent shifts with the smallest probability and is therefore considered as the explanatory variable of the found relation between all attributes together and changes in washing practices, as is shown in table 1. There was no difference found for the attribute washing performance ($p > 0.05$) as is shown in table 2.

Table 1. Change of detergent formulation and changes in washing practices for the attribute rinsing in.

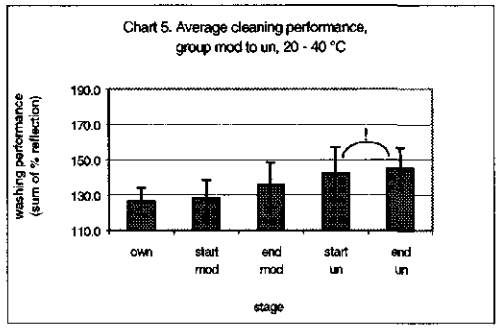
number of participants[1]		change of detergent formulation			
change in washing practices		own → un	own → mod	mod → un	un → mod
	yes	0	12	0	8
	no	25	13	23	16
chi^2-probability (p)		0.00		0.00	

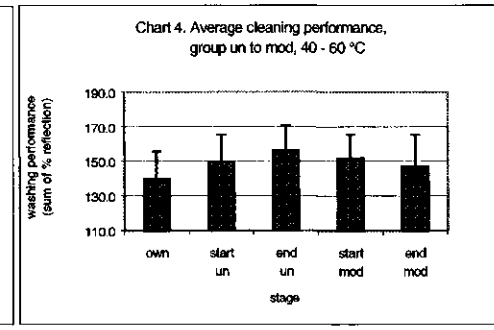
Table 2. Change of detergent formulation and changes in washing practices for the attribute washing performance.

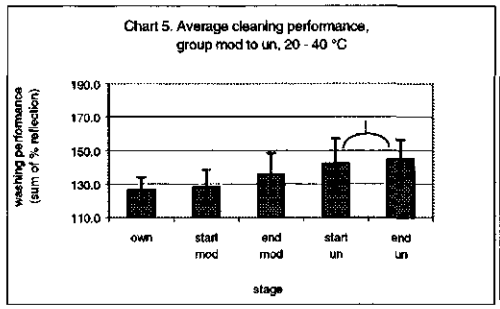
number of participants[1]		change of detergent formulation			
change in washing practices		own → un	own → mod	mod → un	un → mod
	yes	4	10	0	2
	no	21	15	23	22
chi^2-probability (p)		0.06		0.16	

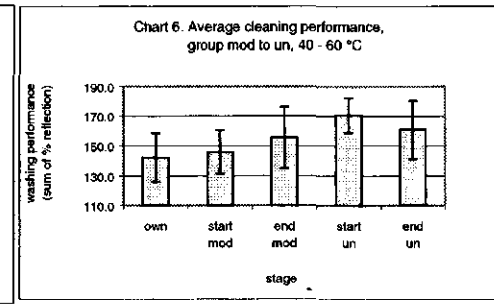
[1] A few participants did not experience the second shift of detergent formulation because they ceased participating or made do with the first formulation.

The average washing performances of the 20 - 40 and 40 - 60 °C wash cycles per group









participants at the beginning and at the end of each successive period of use are displayed in charts 3, 4, 5 and 6.

Each time the formulation of the detergent changed the average values of the washing performances before and after the change have been compared for each group of participants and wash temperature. At two of these transitions the washing performance of the 20 - 40 °C domestic laundering process in which the unmodified detergent has been involved, has been significantly affected (t-test, $p < 0.05$). That occurred when the group participants that first received the unmodified detergent shifted from the private detergent to the unmodified detergent and with the group participants that first received the modified detergent when the washing performance at the start of a period using the unmodified detergent is compared to the one at the end. These are the marked transitions in charts 3 and 5. The washing performance of the laundering processes in which the participants applied the modified detergent, has not been significantly affected.

4 Conclusions

There was no systematic relation between the dosage and the two formulations of the detergent found. This complies with the findings of the inquiry where no difference in influence of the formulations on changes in washing practices was found for the attribute washing performance. There was a difference in influence found for all attributes together but that was most probably caused by the rinsing in of the modified detergent. In two cases the washing performance of the 20 - 40 °C domestic laundering process in practice in which the unmodified detergent has been involved, has been significantly affected. The washing performance of the laundering processes in practice in which the modified detergent has been applied, has not been significantly affected.

5 Discussion

In spite of a visual perceptible difference in washing performance in the laboratory it looks like the modified detergent has failed in altering the washing performance of the participant's laundering process. This could explain why a change in behaviour is not observed.

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Part 5

Evaluation

Speech by N.G. Röling

Professor Communication and Innovation Studies, Wageningen University.

Ladies and Gentlemen:

One of my most prized audio-visual aids is a small video made by what is now called the Group Consumer Technology and Product Use, but what was then part of the Wageningen Department of Household Studies.

It is a video of hands, very old hands, and these hands try to open a modern container of processed food. One sees an old marked pair of hands wrestling with a jar of onions, then another pair of hands with a bottle of juice with a twist top, then yet another pair of hands with a pot of jam.
And it goes on, and on. And some of them succeed to gain access to the food. The apotheosis comes when a pair of hands tries to use a special device to twist on the cap of a bottle of tomato ketchup. By that time the observer is biting his nails. There is nothing more agonising to watch than this old wrinkled sparkled pair of hands trying the device, trying yet again to apply their inadequate strength and grip.
A great video without a word said, it brings a powerful message. A message of the arrogance at the technical fix, a message of the lack of communication between interviewer and those interviewed upon, a message of powerless old consumers vis-à-vis the people who design their lives.

A message, finally, of the importance of household and consumer studies, human ecology if you will. I think you will have little difficulty with my conclusion that household and consumer studies is great!

And reaching the age where I cannot open food containers myself, I hope to benefit.

Having said that...
I will now progress to my topic: "Evaluation of the themes"

It is a wonderful topic. It leaves everything to me. I can blast everything you good people have done in the last two days with damnation. I can give every speaker a grade. I can even do a mini-academic visitation to assess whether you all have a right to academic existence. It is a theme that gives the speaker a wonderful sense of destructive power. I have not felt like that ever since I was a small boy:
"Niels, what are you doing?"
"Nothing, mama."
"Stop it immediately!"
Is this care about? Taking care, care giving or care receiving?

So what shall I do? I must say that it was not easy for me to visualize my task. You bunch are like the proverbial husband: hard to catch and hard to hold on to.
You represent a range of traditions in household and consumer studies: maybe you are not even part of household and consumer studies, but represent commodity science, technology studies, energy studies, population studies, sociology, economics,

microbiology, geography, process management, and even my own field, communication and innovation studies.
You have been discussing a wide range of topics. At one point when I was desperately trying to think of what could be the themes, I counted 15 of them, including gender, textile, history, energy, nutrition, gerontology, food safety, care, markets and even French fries, one of my favourite home meal replacements.

But, I am not an old professor for nothing: I figured it out! I think. And I am grateful for the help I got from the various people whom I have consulted during the past two days and to the chairpersons of sessions who gave me information. I am also grateful for having been invited and become reacquainted with a fascinating field, and a fascinating topic.

I think that a focus on the other end of the chain was brilliant. Chain thinking tends to be dominated by product thinking. We have a product, how do we move it down the chain and how do we remove the obstacle in the chain to ensure a smooth flow of the product from source to destination, the "end user"? I come from a field, agricultural knowledge system, where the "end user" tends to be the farmer. We often don't even think of the consumer.

So, I think that a focus on the consumer at the end of the chain is brilliant and it highlights the importance of the field. Especially if we take the chain as problematic inactive with it becoming longer, more differentiated, diverse.

I personally think that the consumer, the household, the voter, the citizen is the key to designing a viable future. My work has logically taken me to a point where I realize that neither technology nor the market alone can help us get out of our predicament of global inequality, the relentless anthropogenic destruction of the frail and fraying web of life and the inevitable conflict over resources.
The only way out seems to be collective learning, an informed public, a democratisation of science, or a post-normal science, as Funtowicz and Ravetz call it, that extends the peer community to include self approved-activities and extends the facts to include people's opinions.
I was very encouraged this morning when both Mr. Henderson and Paul Terpstra attitude change, life style efficiency and living standards. An informed public must also be an active public, an empowered public, a public that can agree to overcome social dilemmas, a public that can build a trust and social capital to take the designer of the future into its own hands.
So yes, we need to study, but above all to mobilize the "other end of chain".
It is from this perspective that I will try to make a few observations of an evaluative nature about the last two days. I will touch the following topics:
1) Multi-disciplinary
2) Beta-gamma science
3) System thinking
4) Normative and interventionist stand
5) Research methodology

6) Promising themes
- Market fundamentalism
- History of daily life
- Emergence

1 MULTIDISCIPLINARITY

The first point I want to make is that this conference was special. It was not a conference of home economists in the strict sense of the word, not even a conference in household and consumer studies as a discipline. What we had was a conference with an interesting topic ("The other end of the chain") that has attracted people from a wide range of disciplines. I found that very refreshing and stimulating and very effective in the sessions.
I myself have for many years been a member of the International Farm System Association and gone to its conferences. The conferences are very different from disciplinary conferences on rural sociology, agricultural economy, agronomy and what not. They bring together their and other disciplines around a theme and a focus on the small farm and rural economy. IFSA has international and regional chapters. It is a vibrant community. It is remarkable that I know of no university, let alone Wageningen, that have a farming system department. I know that people at this conference notice that the unit of household and consumer studies is broken up by distributing the different chair groups over departments. But, as my FSR experience shows, this does not mean the end of the field.
I believe that multidisciplinary gatherings such as the one we had can be very important for dealing with real issues. I was glad to hear of the international network of consumer studies. I hope that the IFHE takes heart from this meeting, to organize household and consumer studies meets the other end of the chain in the future.

2 BETA-GAMMA SCIENCE

In addition to multi-disciplinarity I would like to draw special attention to Beta-gamma science. I use this term, although I know it does not make sense in English. The concept draws on the continental tradition of calling the humanities alpha, the science beta and the social sciences gamma.
Beta-gamma science, the integration of natural and social sciences, is a very exciting phenomenon in our university. Technical disciplines, such as irrigation, poverty, entomology, and so on have experienced that it is impossible to be professional, and impossible to train good qualified students, without taking the social side into account. In irrigation, for example, paying attention to collaboration, to social capital and to collective action can increase yields and the total output of the irrigation schemes.
In forestry, it soon became evident that forests only exist to the extent and in the manner that people want them to exist. So now we speak of social forests, community forestry, co-management etc.

A remarkable aspect of the Wageningen experience is that sociology hardly contributes to the emergence of Beta-gamma science. The sociologists are too disciplinarian.

I was very heartened to find the strong emergence of Beta-gamma science here at this conference, among nutritionists, food scientists, household technologists, energy specialists, and so on. And as an agriculturian, sociologists who are interested in this subject are hard to find. I understand that Van Otterloo is the only sociologist in the Netherlands who is seriously engaged in food studies.

3. SYSTEM THINKING

The third aspect I want to draw attention to is system thinking. I was very heartened by the system focus in many of the presentations. Let me try to explain more in detail what I mean by system focus. I use the Miller quadrants to do so:

	Holism		
	II Eco-centric (apply IPM)	**III** Holo-centric (construct critical learning system)	
Positivism (objectivism)			Constructivism (subjectivism)
	I Techno-centric (spray Bud Worm) Reductionism	**IV** Ego-centric (pray)	

Miller, Canadian, New Brunswick, forests, Spruce Bud Worm
Miller observed his colleagues to classify them, he used two dimensions: reduction versus holism and positivism versus constructivism.

The four quadrants:
In I, more disciplinarian, reductionist, positivist scientists. Their recommendation was "spray".

In II, still hard positivist scientists, but with a system perspective. They were used to look at pesticides as part of the ecosystem. Their recommendation: IPM.

Miller observed very few scientists who took a soft system perspective: people who looked at the new Bovaswick forests as having people as key elements of the system. Yet, one could argue that the whole problem of bud worm was anthropogenic. After all, it was Lisma Greed that had led to plenty a uniform mono-species forest that led to the problem in the forest places.

The fourth quadrant I leave aside for the moment, since it is not relevant here.

I find the quadrants very useful to understand the development of system thinking, for example at our university. At first, Wageningen was organized on a strictly disciplinarian base. Scientists sat in their departments and did their thing. Then in 1970, the late Cees de Wit, one of Wageningen's most prominent professors, formulated a definition of agriculture, which became the basis for the disciplinarian integration of the Wageningen applied sciences into crop growth simulation models and a system approach. De Wit and his students moved Wageningen from quadrant I to II. It was a great achievement.

Now, with the emergence of beta-gamma science, Wageningen is moving to quadrant III. There is much interest in the soft side of the land use, institutions, social dilemma's, communication etc. As I said, I was very heartened to find that the move from II to III is also in full swing in household and consumer studies.
A typical example is the recognition of paradoxes. In hard system thinking, objections are given, goals are assumed so that one can focus on goal seeking. In soft system thinking, however, goals are the bone of intention. One cannot assume them.
The recognition of the paradox in food studies where people are focused to give the highest priority to health but to eat things that they know are unhealthy. Or people to say they behave in green issues, while they actually engage in Bush behaviour. The recognition of such paradoxes is the start of soft system thinking.
I want to make one very important point about systems before I move on. I might have suggested that I consider III to be better than I and II. This is explicitly not the case. It is true that, if one remains in II, one cannot think in III.
But, I believe that one needs all three quadrants to effectively release maximal opportunity. It is all very well to understand people's motives, but one also needs to be able to develop hard systems that work. And we need social reductionist science to develop systems that work.
I think this is a core aspect of Beta-gamma science: the integration of work in I, II and III. It is something that we must continuously work on and I am heartened by the extent to which people in the area of household and consumer studies are already moving in this direction.

4 A NORMATIVE AND INTERVENTIONIST STAND

My own field of communication an innovation studies has always had a fundamental difference of opinions with the sociologists and anthropologists. Sociologists are debaucher observers; they look at the arena of social life from a hide in order to draw starting conclusions and to feel self-reflection. We in communication and innovation studies want to change the world. We are not afraid of dirty hands. We embrace participatory methods, persuasion, and otherwise unabashedly hearts to change people.
Sociologists call us social engineers, more or less the lowest form of life they can imagine. But there it is!
I was happy to see that consumer and household studies is also driven by a mission, by the desire to change things. Norms and values are explicitly on the table, there is talk of how to get people to engage in energy saving, of life style efficiency, of changing living standards, there is concern over the qualities of services, of freedom, equality, solidarity, efficiency, and optimisation.
The focus on norms and values, and on intervention calls for a strong interest in methodologies and instruments. And sure enough, there was lack of legislation, regulation, fiscal policy, and information campaigns. What is more, there is a clear recognition of a point we have also reached in our field we need to go beyond information campaigns.
We need to change attitudes
We need to raise awareness
We need to turn around consumerism
We need to help people by making feedback audible

In the end, that is the only basis for hope to get us out our anthropogenic predicaments such as obesity, global warming and destroying the fraying web of life. I strongly urge household and consumer studies to move in this direction. You will find communication and innovation studies on your side!

5 METHODOLOGY

Let me move to methodology. After all the praise must also be a bit critical. What I missed during the congress was a pre-occupation with methodology, especially research methodology. It is one thing to carry out a consumer survey. But it is quite another thing to develop integrated design, to engage in action research, and to involve consumers and households in the development of knowledge and technology. I think that it is impossible to develop such a complex multi-facetted and interactive oriented field, without paying attention to methodology.

60 promising issues, Madam Chair, please allow me to use my last few minutes to exploit my prerogative to the fullest by suggesting a few issues that I think are of importance to household and consumer studies.

History

The first one is history. I was very interested to find so much reference to history as a prerequisite to understanding and relativating current phenomena. We heard about the introduction of potatoes and their slow integration into European diets. We heard of how the English used to shiver in their cold houses. We looked at a Jan Steen painting.

I think much more can be made of this. I believe that historians are moving from great events to the history of everyday life (there they are a logical part of your network).

The impact of market fundamentalism

I am one of those people who have indicated that they are willing to pay a bit more to purchase clean electricity. On the whole I was proud to be a Dutchman. A country that is working so hard for a cleaner environment. And what do I hear the other day. Dutch electricity is getting dirtier and dirtier! Since we have privatised our electricity market, we are buying the cheapest energy available and that is electricity produced by suppliers bearing brown coal and nuclear power. Meanwhile Dutch companies that invested in clean technology have gone broke. The explanation by our liberal minister Jorritsma made it very clear: this is the logical outcome of the market doing its work.

As I hear the mood of this conference, the need to help consumers make better choices in terms of food, energy, services, care and so other, you are a lot that is not suffering from market fundamentalism. But you will have to deal with it, one way or another!

Emergence and aggregation

Household and consumer studies by its very nature, seems inclined to have a micro focus. The move to macro is by aggregation. Yet I think this is dangerous. One easily falls into the trap of methodological individualism. In system terms, one could call this a focus on emergence. That is, elements at the lower level interact. What emerges are new properties at the system level.

An example is classical economics. Individual consumers are economic agents who seek to optimise their outcomes. But at the macro level, the interaction among the selfish agents leads to the market and the greatest good for the greatest member.
Such methodological individualism needs to be counter balanced by a focus on institutions and other macro phenomena as they affect the micro level. I believe this to be an important issue for all of us.

Ladies and gentlemen. That was it. I thank you for hearing me in your midst. I enjoyed it.

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