

Eating and Food Patterns/Feeding Frequency

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4.15 Better Understanding of Eating Pattern for Better Understanding of Human Nutrition

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Introduction

For our understanding of relations between nutrition and health methods of nutritional epidemiology are critically important. Only this research area provides direct information on the relations between the effects of food habits and health in free-living human populations. Such studies are particularly important for our understanding of the lifestyle-related diseases, which are common in modern civilised societies. The challenge for such kind of nutrition research is remarkable, since it is an immense field, which had to be observed and investigated.

Nutrition influences the whole course of human life. There are effects from the very start of a new life, the conception, pregnancy and lactation, till the end of it. Nutrition effects longevity and influences future generations [1]. Tremendous amount of food pass human organism during a life cycle; an individual may ingest almost 100 tons. The kind and number of substances in foods vary with time. Nutritional scientists were able to find out the essential and beneficial substances in this bulk of materials, but also harmful ones were detected. All these enter the metabolic pathways of different humans living in different environments (biodiversity and adaptation). The object of nutritional studies is more than multidimensional, it is apparently "ultradimensional".

In the history of human evolution food insecurity was prevalent, including nutrient deficiencies. In the process of civilisation many succeed to have a surplus of food and no need for physical work and the new lifestyle related diseases emerged. Their pathogenesis are not related to one cause concept, multifactorial models were applied in nutritional epidemiology. Considering investigations applying models which represent all important factors and their different interrelations seem to surmount all research capacities, even considering the improvements in information technology [2, 3]. This complexity can lead to a feeling of the impossibility to explore the universe of human nutrition. The aim of this contribution is to explain a strategy to approach the task.

Re-discovering of basic structures

Already in early pre-science phases of human history recommendations on lifestyle including eating rules were revealed by an mixture of instinct and "pre-epidemiological" skills [4, 5, 6]. Such orientations are needed for survival in polyoptional environments, and they are constructed by basic dimensions, which have distinct poles. Orientations are aiming for balances in these dimensions. Every culture has such sets of rules, those of Hippocrates in ancient Greece are a famous example [7].

Life sciences show **live is organised and structured**, this is found in all levels, like in biochemical (genetic codes, protein structures), cellular and organic one. The environment stimulates reactions of the organisms in a structured manner; the S(timulus)-O(rganism)-R(espone)-models of biological behaviour [8] apply also to higher levels of human communication; our verbal and electronic exchange of information use structured symbols.

Efficient structured "hardware" and appropriate "software" are the prerequisites of life. The basic needs for human live require basic competencies for the exchange of substances (eating, drinking, breathing; mobility, etc) and for the exchange of information (recognition; language, etc.). Every society need a social organisation with own rules and laws.

Cornerstones of every society are languages, households and eating. The language is the frame for communication; the household for the daily activities and eating the source for nutrients. Everyday activities have to be organised, they need structures and rules; they reduce the multitude of factors. It is natural: **Food intake - eating - is patterned.**

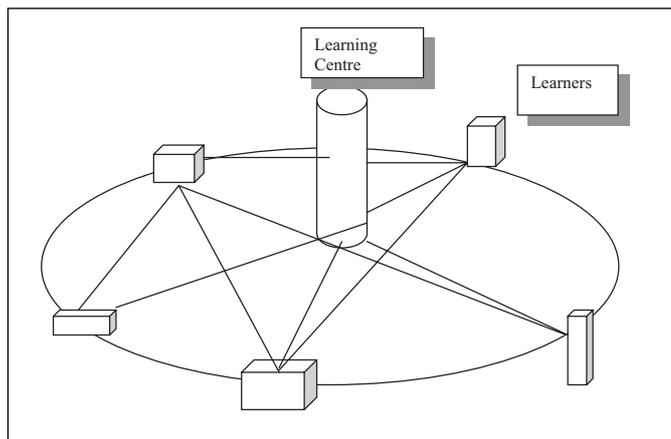


Figure 1. The structure of the learning Co-operative.

training for policy formulation, programmes design and management, and applied research.

Advocacy will focus on strengthening advocacy capabilities of the network including to learn to be better spokespersons and represent nutrition to heads of governments and policy and decision-makers, to convince them that investing in nutrition is critical for sustainable national development. To realise this, specific-training modules will be designed focusing at various levels of the training pyramid, starting with category three, including members of the Learning Co-operative.

Training will include short-term courses, workshops and internships. Existing short courses will be supported and upgraded; new ones will be designed. Priority will be given to improve capacity in food and nutrition policy formulation, analysis, design and implementation of client-focused programmes and their evaluation.

These would include undergraduate and postgraduate programmes, at both degree levels dealing with harmonisation of existing curricula and development of new curricula. Activities should be structured so that they contribute to formal degree programmes. Training courses should be converted into discrete written modules, preferably of similar academic level and size. This will enable their use, across different institutions, as part of formal postgraduate degrees in applied nutrition.

The development and implementation of action-oriented research, aims to enhance capacity in action-oriented research for sustainable improvement in the nutrition situation of all countries and regions. Sound research is the only tool for identification of nutrition problems and their causes, the formulation of solutions and the evaluation of progress. Action-oriented research would contribute significantly to providing information that is necessary for improved nutrition programme design and performance, to ascertain what really works to improve the nutrition situations.

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Capacity development in Southern Africa

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Humans are omnivores, but no-one eats all foods. Humans are capable to eat at any time, but no-one eats continuously. Every human society exhibits its own eating culture. Only as biological active substances in foods were discovered, the eating rules became nutrient based; recommended dietary allowances tried to guide eating habits for some generations. This narrow view on the nutrition and health relations was broadened and to-days nutritional recommendations are based on food groups (e.g. dietary pyramid) and even some lifestyle approaches are propagated (e.g. the Mediterranean one, which includes some red wine, physical activity and relaxed ambience). The eating structures become re-discovered.

What are the dimensions of eating structures

The eating structures are related to the answers of such simple questions like: When? What? or Where? we are eating.

Time is one basic dimension of it. Every second one can consider to eat or not to eat. The organism is prepared to ingest in meal form, despite there is a continuous need for energy and nutrients. There are signals for the begin (appetite) and the end (satiety). Meals enable human beings to organise daily activities in ways, that procurement of food and eating will not interfere. Meal times belong to the socio-cultural characteristics of every society.

In principal all plants and animals are edible for humans, the natural resources can be processed in many different ways to yield safe foods. Every society has developed its own selection of foods. Humans can eat at almost every place, but every society has distinct eating places. Every household and each society has to plan carefully the tasks needed to safeguard the food needs. In order to organise the whole food chain (from the soil to the table), there are further dimensions which give structures. They are related to:

- economics (money, resources),
- competence (knowledge),
- food qualities (composition, sensoric, processing),
- food meaning (value, attitude).

Such dimensions build the frame for the patterns which can be observed and identified, at least in traditional societies, e.g. as a characteristic cuisine. There are patterns of rules when, what, where, with whom to eat; schedules of meals during the day, the week, the seasons etc. and there are restrictions and taboos.

The number of relevant dimensions is limited. In everyday practice of humans they are applied in forms of ordinal scales, despite they are representing continued values. Human decisions are depending on some few classes. Even dichotomies (e.g. yes /no) are applied for the single food dimensions. Some few examples illustrate this: hot/cold (thermal, cultural); raw/cooked; liquid/solid (texturic); sweet/sour (organoleptic), known (neophobic)/unknown (neophilic); healthy/toxic; natural/artificial, etc.

The guiding events for eating patterns are the meals. Meals are planned social interactions centred on food [9]. Even on the plates foods are arranged, e.g. the core-fringe model [10, 11], and eaten in portion sizes. Every social group uses limited numbers of meals, dishes, ingredients and food processing techniques. It seems possible to relate such patterns to specific cultures. In a very rough picture societies can be marked by single foods, e.g. the Asians are the people who eat rice every day, the Germans are the (sauer)krauts, the Italians the spaghetti, and Feta identifies a Greek. The regional products are legally protected by the authorities of European Union [12].

The eating structures have to be acquired by the society as whole and by every single member of it. The important process of orientation and organising daily activities to sustain life, needs a long time. In the process of socialisation individuals have to learn how to eat, how to communicate, etc. The related activities and tasks are trained, they are becoming accustomed. By this processes people become fit to survive in complex environments [13]. Societies invent new rules and structures during the process of civilisation [14]. On the base of such theoretical backgrounds research into food patterns seems successful.

The Practice of Eating Pattern Research

A review of activities in empirical nutritional sciences indicates there is insufficient consideration in research on eating patterns [9]. There were a few early

attempts and suggestions for it [15, 16], but in the mainstream of nutrition epidemiology it was neglected. Even in a recent summary there was the step from nutrients to foods recommend, but not the next one to food patterns [17]. Empirical studies of habitual food intake, observing human everyday activity in the natural context are difficult tasks related to the amount of needed information and their quality. In former time the sheer amount of data (along the food chain; food composition, food processing, bioavailability, etc.) limited the analyses. Results of dietary studies were condensed to average intake per day, and neglected time, food and meal combinations. Due to the rapid developments in information technology the information size is no longer limiting.

Investigations into eating patterns follow the principle to condense information to relevant structures. This can be done in two principal ways; a theory guided one, and by explorative data analysis; in such data mining processes the computer groups related data.

A simple theory-guided approach is to look for the most common eaten foods [18, 19] or even the core food in a diet [10, 20]. Related to this approach are comparisons of actual diets with recommend ones and creating food scores. This is used for dietary goals, like those of the diet pyramid [21, 22], the diet pagoda [23], or to the Mediterranean diet [24]. Another theory-guided approach is related to observed meals (related to time, portion size and composition). Meal patterns are analysed for a day, for a week, within seasons, during a year or more. Meal patterns are not evenly distributed within the time, the population, and social groups. How many days, how much information is needed to identify a pattern? Interesting studies are possible in populations who migrate, since then stable and labile pattern can be traced, and reveal which aspects in food patterns are related to the changes in the life, and which are stable despite the new environment. Longitudinal studies are important in this regard, as well as investigation in which way eating structures are influenced by other everyday activities (e.g. shift work, lifestyle structures). Related to this it seems necessary to investigate the mind-structures of people related to food. Everybody has an own food-classification pattern, which are related to different food quality aspects, like taste, satiating, utilisation, social relation, health, culture, religion, etc. [25].

The theory-guided research for eating structures can be supplemented by the explorative data analysis procedures, as it was proposed more than two decades ago [15, 16, 25]. In current nutrition research one can find some good examples of cluster analysis [26-30] and factor analysis [31, 32].

Comparing the relevance of research into eating patterns, the practice is not sufficient yet. There is

Challenge for the future

At first the scattered research on eating patterns should be bundled. There were some efforts in this regard, which can be used as focal points for it [33-36].

Future research has to focus on the basic dimensions of eating patterns, being the time of eating, the environment of eating relevant situations (“settings”) and the competence of consumers to handle and to eat food, which includes use of information on food.

Research is needed on methods for the basic dimensions. Emphasis should be placed to measure them in the way consumer “measures” food and eating; and control their everyday activities. The control mechanisms of humans are decision-oriented (“stop or go”). Gathered information is mainly sensory related, and “softly” or “fuzzy” classified. To decide by the eye (“Augenmass”) or by smooth touch (“Fingerspitzengefühl”) has to be trained. Appropriate methods to investigate this are qualitative, ethnographical ones. There are some examples for this type of research concerning proper family meals [37, 38]. The eating patterns have to be seen in the context of other everyday tasks (life management) [39-41].

The identified different eating and food patterns should be brought into relationship with physiological functions and to health aspects (e.g. in [42-44]). Different nutritional biographies, beginning from infant feeding (breastfeeding vs bottle feeding; meal pattern vs snacking, and so on) and ending in late life of the elderly, can be related with morbidity and mortality. Today such information is available and accessible in principle; longitudinal nutritional epidemiological studies are on the way. Limitations given by ethical issues have to be considered.

The trend of globalisation with indication of erosion of traditional eating cul-

tures and related eating patterns does not indicate a disappearance of eating patterns, but a transition. The marketing targets for ubiquitous nutrition: eating every time, everywhere in arm length, lead to different eating structures. We eat not longer on tables, we are developing to one-hand-eaters on the way to work and leisure places. There is indication for individualisation; even in nutrition. The biochemical individuality needs individual dietary recommendations. But all these is bound to structures. The essential structures are remaining; from the same parts it can be constructed old-fashioned patterns, but also new ones. Future marketing needs more such structures for constructing customised mass-individualisation. The "individual" consumer of to-morrow selects his favourite dimensions and structure elements, e.g. by electronic support he designs his own product ("e-design"), and in the modern factory the automate produces such individual ordered products. Such producer-consumer (or prosumer) systems need structures in order to be economic efficient for all. Research in eating structures has benefits on better understanding of nutrition and health, and also for improvements in food and nutrition policy.

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