

RESEARCH REPORT

DIETARY FATS AND OILS: KNOWLEDGE AND PREFERENCES OF SCHOOL-AGED CHILDREN IN GREECE

ELENI ZIMVRAKAKI
GEORGE MAKRIS
KYRIAKOS ATHANASIOU

Abstract - *The study described in this paper investigates the knowledge and preferences of 176 Greek children, aged between nine and eleven, with regard to fats and oils. The results show that the majority of children cannot classify oils, butter, and margarine in the correct nutritional category. The great majority were of the opinion that it is healthier to use olive oil, rather than than seed oils, for salads and cooked meals. However, they also answered that seed oils are healthier than olive oil for fried meals. No statistically significant differences between the sexes was found in the answers, except for their preferences regarding the use of olive oil in cooked meals and salads. The results indicate that Greek children lack the information they need to make healthy food choices. In addition, there is a need to develop teaching strategies that focus on lipids and their impact on health.*

Introduction

The history of the olive tree, from whose fruit olive oil is produced, goes back to ancient times, and archaeological finds indicate that olive oil has been used for many centuries. Olive oil has always been one of the most important constituents of the Mediterranean diet, and cholesterol levels and the incidence of heart disease are much lower in people whose diet is rich in oleic acid in the form of olive oil, than in the inhabitants of northern Europe and North America.

Although, during the 1950s, Greece had the lowest rate of deaths from coronary heart disease in eight industrialised countries (Keys 1984), there is evidence that the death rate due to heart conditions has risen in Greece since the early '80s (Uemura & Pisa 1988). The reason seems to be that Greeks have moved away from the traditional Mediterranean diet, turning to a more 'northern' diet regarding the consumption of lipid acids. Between 1983 and 1990, consumption of butter and seed oils (in Greek terms, *seed oils* are all oils except olive oil) increased by 65% and 159% respectively, while olive oil consumption increased

by a mere 10%. The total per capita consumption of lipids (in Greek terms, *lipids* are all fats and oils, fats are solid fats, and oils are fats in liquid form) in Greece went up from 30.1 kg in 1983-4 to 43.5 kg in 1989-90. This was accompanied by a change in consumer habits. Whereas olive oil accounted for 70% of all lipid acids consumed in Greece between 1983 and 1984, it fell to only 54% in 1989-90 (Giannopoulou 1991).

Epidemiological, laboratory and clinical studies have established beyond any reasonable doubt the close relationship between elevated blood cholesterol levels and coronary heart disease (Keys 1972). When present in excess in the blood, low-density lipoprotein cholesterol (LDL) is deposited in the tissues and forms a major part of a build-up of atherosclerotic plaque on the artery walls. High-density lipoprotein cholesterol (HDL) levels, however, are inversely related to the incidence of coronary heart disease (Gordon 1977; Heiss 1980).

In recent years, a great many randomised trials of the effects of fat-controlled diets have been reported (Schaefer 1981; Kuusi 1985). The findings have established a relationship between high consumption of saturated fatty acids and elevated blood cholesterol levels. The beneficial effects of diets rich in polyunsaturated fatty acids on plasma lipids and platelet function has also been described (Jackson *et al.* 1978; O'Brien *et al.* 1976). Moreover, a diet rich in oleic acid has proved to be as hypolipidemic as a similar diet rich in linoleic acid, with no change in high-density lipoprotein levels, which tend to be slightly reduced by polyunsaturated fatty acids (Sirtori *et al.* 1986; Mattson *et al.* 1985).

The fact that the process of atherosclerotic build-up begins in childhood is attested by two findings. Firstly, autopsy studies have shown that in some populations aortic and coronary atherosclerosis starts early in life: the WHO Five Cities Study (Kagan *et al.* 1976), for instance, demonstrated that in certain European Countries about 10% of 10-11 year-old children already have atherosclerotic plaque in their coronary arteries. Serum cholesterol and other lipid fractions, pathologic fibrous plaques, and fatty streaks have also been found in the arteries of children (Wynder *et al.* 1989). Secondly, cross-sectional and prospective studies have identified a number of factors related to the development of clinically manifest coronary heart disease. When present in young children, these factors are likely to continue into adult life, thus both promoting the formation of early morphological lesions in the child and acting as precursors to clinical coronary heart disease later on (Tell *et al.* 1986).

These findings demonstrate the necessity for the early prevention of heart disease, and call for community-based programmes in the area of food and nutrition, targeting children and young people. Intervention through nutrition

education programmes directed at children is essential, as adult knowledge, preferences, and behaviour in health matters are known to be acquired and consolidated in the formative years of childhood (WHO 1993: 37-38).

School-age children in particular are a target group for nutrition education programmes for many reasons. They are very curious and eager to learn; their ideas, including those related to food and dietary habits, are still forming, in contrast to adults, whose ideas are more fixed (Fieldhouse 1982); children are open-minded and accept new ideas as part of the growing-up process, especially when they attend schools where there is continuous knowledge and behaviour interaction (Fieldhouse 1982); they also form a link with the family, whose dietary habits seem to be influenced by food and nutrition knowledge and behaviours that children bring home.

A number of researchers, including Contento and Michela (1984) and Turner (1991), have argued that, before developing health education programmes, it is necessary to examine children's 'common-sense' understanding of nutrition. This information increases the effectiveness of educational communication, since the way people perceive and understand their world is crucial to how they act (Contento *et al.* 1984). This research is part of an ongoing programme (Makris *et al.* 1994) that is investigating what children know about lipids as part of their diet and how they perceive the relationship between lipids and health.

The research focuses on the following questions:

1. How do children classify fats and olive oil as nutrients ?
2. Do children know about the suitability of various lipids for different types of food?
3. Are children aware of the connection between heart problems and oils?
4. What sort of lipids do children prefer in their food?

Research Method

The study took place in Thessaloniki, the second largest city in Greece, with a population of about one million. A random sample of nine primary schools was selected for the study, which was conducted in the winter of 1994-5.

Subjects

A total of 176 fifth-grade pupils took part in the study. Males accounted for 52.8% (n=93) of the sample and females 47.2% (n=83). The average age was ten, the range being from nine to eleven.

Instruments

Data were collected by means of a questionnaire. The time allowed for answering the 25 multiple-choice questions was 45 minutes. The questionnaire was designed to elicit information relevant to the research questions.

The internal consistency of the instrument and its specific vocabulary, as also the rate at which the questionnaire was read, were established by means of a pilot study conducted in the autumn of 1994.

Procedure

The survey was conducted by trained university students majoring in education. No teaching staff were present while the pupils answered the questionnaire during one school hour. The children were told that it was a game about knowledge and preferences and that their teacher would not mark or even read their answers. They were assured that the answers would remain confidential. Each question was read out loud by the researcher and the answer was filled in simultaneously by all children in the class.

Data analysis

176 completed questionnaires were collected. The statistical analysis was done with the help of the SPSS/PC. The non-parametric chi-square (χ^2) statistic was used to determine any significant differences in knowledge and preferences between the two sexes.

Results

Classification of fats and olive oil as nutrients

The data showed that, when asked to place the three types of lipids in the correct nutritional category, approximately half the children, regardless of sex, classified olive oil, butter, and margarine as lipids (45.5%, 40.3%, and 47.2% respectively).

The rest gave incorrect answers, classifying them variously as proteins, carbohydrates, or vitamins. Data from the questions as to whether oil, butter, and margarine are animal or vegetable fats showed that 93.2% of the children were aware of the correct answer as far as olive oil was concerned, while one in three was confused about butter and margarine. Butter and margarine were classified as animal and vegetable fats respectively by 63.6% and 64.8% of the children.

Knowledge about the suitability of fats and oils in different types of food

To assess the children's knowledge about the suitability of a specific fat or oil in various types of food, a score was created as the sum of the correct answers to three related questions on three types of food (salad, cooked meal, and fried meal). The maximum possible score was 30, while the actual average was 16.9. 86.4% of the children thought olive oil was the most suitable for use in salad; for cooked meals, 47.2% thought olive oil was the most suitable, 23.9% seed oil, and 13.1% butter; for fried meals, 38.6% thought seed oil was the most suitable, 35.8% olive oil, and 17.6% butter. No significant differences due to sex were observed.

Knowledge regarding the connection between heart problems and oils

The children were asked to choose from a list of oils the one they thought was the 'most healthy': only 42.1% chose olive oil, while 51.7% opted for seed oils (19.9% sunflower oil, 17.6% corn oil, 13.1% soya oil, and 1.1% cotton oil). Although 42.6% responded that the various seed oils help heart function, only 31.3% were aware that olive oil has a positive effect on heart function.

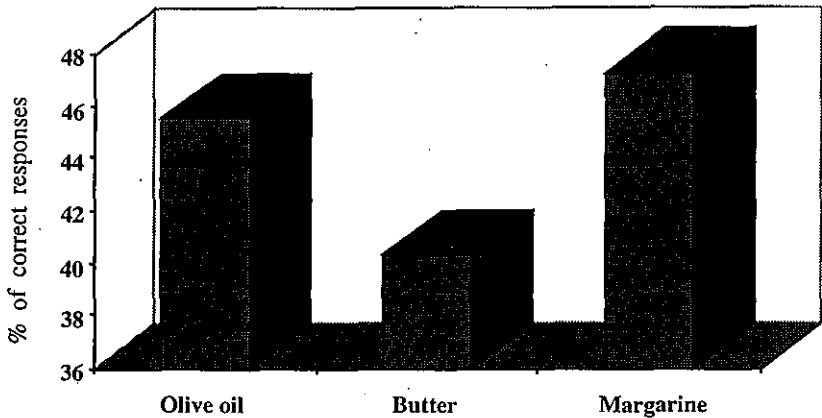
Preferences regarding the use of different lipids in food

From the statistical analysis a score was created as the sum of the answers relating to preference for olive oil in three types of food (salad, cooked meal, and fried meal). The maximum possible score was 30, while the actual average was 13.9. A statistically significant difference was noted between the sexes ($p = 0.05$): specifically, when the children were asked to choose between olive oil, seed oil, butter, and margarine in their cooked food, 17.6% of the boys and 9.1% of the girls expressed a preference for olive oil. The same difference emerged when the children were asked which oil they preferred for salad: 42.6% of the boys and 29.5% of the girls chose olive oil (see Table 1).

TABLE 1: Children's preferences for olive oil in two types of food

	Boys	Girls	x ²	d.f.	p
Salad	75 (42.6%)	52 (29.5%)	7.09	2	.05
Cooked Meal	31 (17.6%)	16 (9.1%)	10.96	4	.05

FIGURE 1: Children's knowledge about the classification of olive oil, butter and margarine to lipids



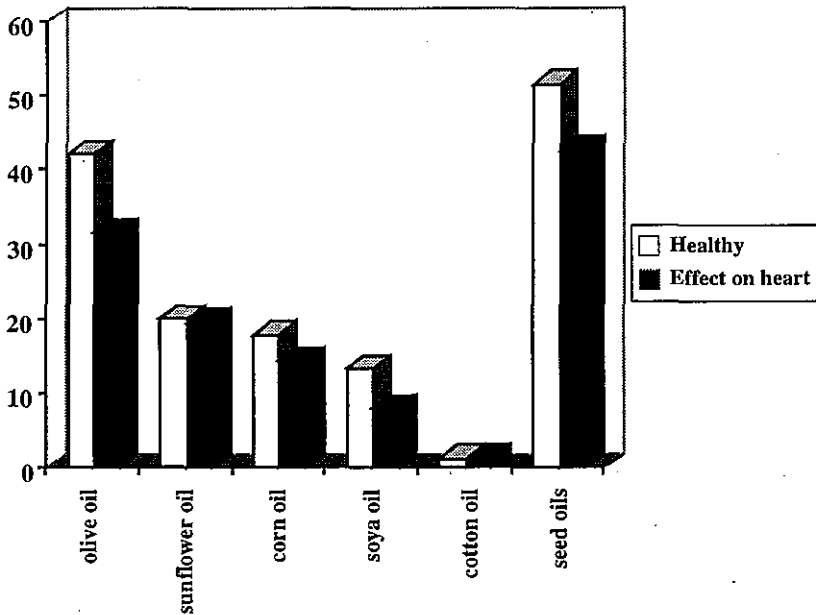
There was no statistically significant difference between boys' and girls' preferences in fried food: olive oil came first (40.3%), seed oil second (22.2%), and butter third (10.2%).

Discussion

Children appear to have only limited knowledge about the correct nutritional classification of oils, butter, and margarine, as is shown in Figure 1. This is not surprising from the point of view of developmental theory. Nutrients are abstract concepts and it has been remarked that: *'It is not clear that young children can, or should be expected to, understand the reason why certain foods are grouped together and others not'* (Contento 1981). This limited understanding could account for some of the response patterns observed in the present study. Furthermore, work with primary-school children in the U.S.A. (Michela & Contento 1984, and Resnicow & Reinhardt 1991), the U.K. (Turner 1991), Scotland (Ross 1995), and southern Australia (Magarey *et al.* 1986) supports the finding that children rarely use formal classification systems when they are allowed to group foods as they wish.

However, the children were more aware that olive oil is a vegetable fat. This may be due to experiential factors, because olive trees are found in abundance in Greece and Greek school textbooks contain frequent verbal and pictorial references to the origin of olive oil. Unfortunately, as discussed below, these are not accompanied by health education messages.

FIGURE 2: Children's knowledge about how healthy olive oil and seed oils are and their effect on heart function



The results demonstrate that children know that olive oil is generally good for their health, as is shown in Figure 2. This finding is supported by Backett and Alexander (1991), who have proved that children recognise that certain foods are 'good for them'. In the present study, the children answered that olive oil is healthier than seed oils for salad and cooking, while they considered seed oil healthier than olive oil for frying. Children's information about nutrition and health comes mainly from the family and the media; their textbooks make little or no reference to the subject. The link between oils and health is certainly emphasised in every advertisement for olive oil or seed oil. Nevertheless, since firms producing seed oils are either more abundant or more active in promotion and advertising in Greece, they have managed to instil a better impression of their products among the public. This, coupled with the powerful influence of the media on youngsters' nutrition (Garner 1992), may very well explain why children have a more favourable opinion of the use of seed oils for frying.

The present data suggest that children are able to identify and rank different types of oils according to their positive influence on heart function (Figure 2). It seems, therefore, that they are able to conceptualise the relationship between the

health benefits of an oil and good heart function. However, the data also suggest confusion, and possibly misinformation, about the positive effect of various oils on heart function. This classification schema may be based on parental or societal attitudes toward specific oils, rather than on an understanding of their inherent nutritional composition. The extent to which this confusion is due to insufficient education rather than to the media remains to be determined. At the same time, the recording of the children's preferences showed that there are differences between their views and their knowledge. This is not surprising, since it is now known that consumers' behaviour does not always accord with their knowledge. The recording of children's preferences may also be a useful tool for identifying the whole family pattern, since the two parameters are interrelated (Birch & Sullivan 1991; Perry *et al.* 1985). Such preference recording may be of use in the planning of nutrition education programmes.

The fact that the majority of the boys expressed a preference for olive oil in their cooked meals and salads, in contrast to the girls, may probably be explained by psychosocial considerations: although both sexes are subject to the same consumer patterns, girls adopt the stereotype of the mother-housewife role, since they are involved in food preparation at home, and their preferences more closely reflect the habits and 'laws' of the kitchen. As already mentioned in the introduction, in the last ten years there has been a considerable increase in the consumption of seed oil in Greek households. The girls see their mothers using seed oil in various types of food and as a result express a preference for seed oil, rather than olive oil, in their salads and cooked meals. The boys' preferences, on the other hand, are not influenced by the 'laws' of the kitchen and reflect their level of knowledge about the suitability of olive oil for use in the three types of food.

Conclusion

These findings about how children classify different fats and oils and how they conceptualise the effects of lipids on their health provide an insight into the framework within which they view such things. Curriculum developers and teachers therefore should more often ask the children themselves what they prefer and what they eat. This type of information can serve as a basis for developing effective nutrition education programmes, as it is widely accepted that one must study the learners themselves if one wants to find out how they learn.

The present study also suggests that Greek children lack essential information for making positive nutritional choices, and we need to investigate further how issues relating to health and lipids can be meaningfully discussed with children so as to have an impact on their food choices and heart function.

The present study suggests too that it is necessary to examine the role of parental influence in food preferences, as opposed to the influence of the media and other societal factors that have a strong impact on individual values and, therefore, choices. Lastly, there is need for a better understanding of the educational messages presented by the media, as they seem to be easily comprehended and remembered.

Eleni Zimvrakaki, *Chemist, Ph.D. candidate, Department of Primary Education, Aristotelian University of Thessaloniki, 54006 Thessaloniki, Greece.*

George Makris, *Statistician, Ph.D. candidate, Department of Primary Education, Aristotelian University of Thessaloniki, 54006 Thessaloniki, Greece.*

Kyriakos Athanasiou, *Professor of Environmental and Health Education, Director of Environmental and Health Education Section, Department of Primary Education, Aristotelian University of Thessaloniki, 54006 Thessaloniki, Greece. Fax number: +31-842 187.*

References

- Backett, K. & Alexander, H. (1991) Talking to young children about health: methods and findings. *Health Education Journal*, Vol.50(1), 34-38.
- Birch, L. & Sullivan, S. (1991) Measuring childrens' food preferences. *Journal of School Health*, Vol.61(5):212-214.
- Contento, I. (1981) Children's thinking about food and eating - A Piagetian-based study. *Journal of Nutrition Education*, Vol.13(1), S86-S89.
- Contento, I. & Michela, J. (1984) Spontaneous classification of foods by elementary school-aged children. *Health Education Quarterly*, Vol.11(1), 57-76.
- Fieldhouse, P. (1982) Nutrition and education of the schoolchild. *World Review of Nutrition and Dietetics*, Vol.40, 83-112.
- Garner, D. (1992) Pathogenesis of anorexia nervosa. *Lancet*, No. 341, 1631-1635.
- Giannopoulou, A. (1991) *Foods and Drinks*. Athens: Institute of Economics and Industrial Research. (In Greek).
- Gordon, T. *et al.* (1977) High density lipoprotein as a protective factor against coronary heart disease in five years. *American Journal of Medicine*, Vol.62, 707-714.
- Heiss, G. *et al.* (1980) The epidemiology of plasma high density lipoprotein cholesterol levels: The Lipid Research Clinics Program Prevalence Study: Summary. *Circulation*, Vol.62 (suppl. 4), 116-136.
- Jackson, R. *et al.* (1978) The role of dietary polyunsaturated fat in lowering basal cholesterol in man. *Circulation Research*, Vol.42, 447-453.
- Kagan, A. *et al.* (1976) Atherosclerosis of the aorta and coronary arteries in five towns. *Bulletin of the World Health Organisation*, Vol.53, 485-645.

- Keys, A. (1972) Probability of middle-aged men developing coronary heart disease in five years. *Circulation*, Vol.45, 815-828.
- Keys, A. (1984) The seven countries study: 2289 death in 15 years. *Preventive Medicine*, Vol.13, 141-154.
- Kuusi, T. *et al.* (1985) Concentration and composition of serum lipoproteins during a low-fat diet at two levels of polyunsaturated fat. *Journal of Lipid Research*, Vol.26, 360-367.
- Magarey, A. *et al.* (1986) Childrens thinking about food: Knowledge of nutrients. *Journal of Food and Nutrition*, Vol.43, 1-9.
- Makris, G. *et al.* (1994) Estimating the level of knowledge of Greek students on cancer aetiology and ways of prevention. *European Journal of Cancer Prevention*, Vol. 3, 443-450.
- Mattson, F. & Grundy S. (1985) Comparison of effects of dietary saturated, monounsaturated, and polyunsaturated fatty acids on plasma lipids and lipoproteins in man. *Journal of Lipid Research*, Vol. 26, 194-202.
- Newman, W. *et al.* (1986) Relation of serum lipoprotein levels and systolic blood pressure to early atherosclerosis: the Bogalusa Heart Study. *New England of Journal Medicine*, Vol.314, 138-144.
- O'Brien, J. *et al.* (1976) Effect of diet of polyunsaturated fats on some platelet function tests. *Lancet*, Vol. II, 995-997.
- Perry, C. *et al.* (1985) Modifying the eating behaviour of young children. *Journal of School Health*, Vol.55(10), 399-402.
- Resnicow, K. & Reinhard, J. (1991) What do children know about fat, fiber, and cholesterol? A survey of 5,116 primary and secondary school students. *Journal of Nutrition Education*, Vol.23(2), 65-71.
- Ross, S. (1995) 'Do I really have to eat that?': A qualitative study of schoolchildren's food choices and preferences. *Health Education Journal*, Vol.54, 312-321.
- Schaefer, E. *et al.* (1981) The effects of low-cholesterol, high-polyunsaturated-fat, and low-fat diets on plasma lipid and lipoprotein cholesterol levels in normal and hypercholesterolemic subjects. *American Journal of Clinical Nutrition*, Vol.34, 1758-1763.
- Sirtori, C. *et al.* (1986) Controlled evaluation of fat intake in the Mediterranean diet: a comparative study of activities of olive oil and corn oil on plasma lipids and platelets in high-risk patients. *American Journal of Clinical Nutrition*, Vol.44(5), 635-642.
- Tell, G. *et al.* (1988) Studies of atherosclerosis determinants and precursors during childhood and adolescence. *Bulletin of the WHO*, Vol.64(4), 595-605.
- Turner, S. (1991) Research into childrens' understanding about food: What are the implications for teaching? In J. Coolahan (ed.) *Teacher Education in the Nineties: Towards a New Coherence*. Papers from ATEE Conference, 2, 349-362.
- Uemura, K. & Pisa, Z. (1988) Trends in cardiovascular disease mortality in industrialized countries since 1950. *World Health Statistics Quarterly*, Vol.41, 155-178.
- WHO (1993) *Health for all targets: The Health Policy for Europe*. European Health for All. Geneva: WHO.
- Wynder, E. *et al.* (1989) Coronary artery disease prevention: cholesterol, a pediatric perspective. *Preventive Medicine*, Vol.18, 323-409.