Perceptions of Healthy Eating among Pakistani Immgrant Women in Oslo

- *Influences on dietary habits*

Mari Helene Kårstad

Supervisor: Margareta Wandel

Co-supervisor: Benedikte Bjørge

Master Thesis
Department of Nutrition
Institute of Basic Medical Sciences, Faculty of medicine

UNIVERSITY OF OSLO

2008

Acknowledgements

The work presented in this master thesis was carried out at the Department of Nutrition, University of Oslo, and was part of the InnvaDiab intervention project.

First of all, I would like to thank my supervisors, Margareta Wandel and Benedikte Bjørge for excellent supervison throughout the whole research process. I would also like to thank the InnvaDiab research team.

Many thanks also to Aysha Hussain, a fellow master student working with the same project, for her friendship, and for interesting discussions, talks and Urdu-lessons.

I am forever thankful for all help with language and numbers, and with motivation, from Arthur Chortatos and from Jo Roislien at Department of Biostatistics.

Executive Summary

Background: South Asians are known to have a high risk of type 2 diabetes (T2D), therefor Pakistani immigrants in Norway constitute a high risk subgroup of the population. In particular, the Pakistani immigrant women exhibit a high prevalence of T2D. There is convincing evidence that T2D can be efficiently prevented by lifestyle modification in high-risk individuals. Prevention includes dietary changes, physical activity and weight control. In order to give appropriate dietary advice for making changes it is important to understand the influences that motivate food choice.
Aim: The aim of the study was to explore perceptions of healthy eating among Pakistani immigrant women and how this relates to food choice and dietary patterns.
Methods: The sample consisted of 197 Pakistani women aged 25-62 living in a urban area (Søndre Nordstrand) in Oslo and participating in a randomized controlled lifestyle intervention, InnvaDiab. All except for one were first generation immigrants, and the median age at immigration was 22.4 (95 % CI=21.3, 23.1). Only the baseline data were analyzed in the current study. These included demographic and socio-economic variables, command of Norwegian, intake frequencies of fruits, vegetables, fish, high fat and high sugar foods and perceptions of healthy eating (healthy/unhealthy foods, awareness the 5-a-Day recommendation, important factors guiding food choice and motivational stage for dietary change), and were assessed through a pre-coded questionnaire. Data collection was performed by means of an interview with Urdu/Punjabi-speaking interviewers. Statistical analyses with chi-square and binary logistic regression were use to analyze relationships between socio-economic and demographic variables, command of Norwegian, years of residency in Norway, dietary intake and perceptions.
Findings: The results showed that vegetables were mentioned by 89 % of the women and fish by 54% as foods important in a healthy diet. As unhealthy components in the diet, sugar was mentioned by 65% and too much oil by 60 %. The large majority of the women perceived as very important/important *that the children like the food* (90 % of the women), *that the food is healthy and balanced* (89 %) and *that it has little fat* (88 %) when planning/cooking dinner. Furthermore, the women were asked to

select the factor they perceived most influential for dinner food choices; 30 % of the women considered health aspects (e.g. healthy food/a lot of vegetables/low fat content) as most important, e.g. “health oriented”. These women had a higher intake frequency of fruits ($p=0.010$) and vegetables ($p=0.139$), and a lower intake frequency of high fat foods ($p=0.014$).The majority (57 %) reported that cooking food in accordance with the preferences of children/husband/other family members was most important when planning/cooking dinner meals, e.g. “managing relationship oriented”. These women reported a lower intake frequency of fruits ($p=0.025$) and vegetables ($p<0.01$), and a higher intake of high fat foods ($p<0.01$) as compared to the rest. Only 24 % of the women were aware of the dietary recommendations of eating five portions of vegetables a day (the 5-a-Day message). Message awareness was positively associated with years of residency in Norway ($p=0.015$) and degree of formal education ($p=0.038$). Message awareness ($p=0.049$) and command of Norwegian ($p=0.031$) predicted a higher intake frequency of vegetables when controlling for socio-economic and demographic variables. Similarly, perceiving fish as part of a healthy diet was predictive of a higher frequency of choosing fish for dinner ($p<0.01$) when controlling for socio-economic and demographic variables. Stages of change distributions were also associated with dietary patterns: intake frequency of fruits and vegetables was higher and intake frequency of high fat foods and high sugar foods was lower in the action stages as compared to the pre-action stages ($p<0.01$ for all food groups). A higher level of formal education was related to “health oriented” attitudes, being aware of the 5-a-Day message and being in the action stages for increasing vegetable consumption and reducing fat consumption.
Conclusion: This study gives support to the assumption that perceptions of healthy eating, including attitudes, knowledge of recommendations, and motivational stage, relates to dietary patterns. The influence of family members was perceived as most important in food choice by most women. It also shows that within one ethnic group there were socio-economic differences with regard to perceptions of healthy eating and motivational stage. Such differences should be taken into consideration when designing health interventions and in communicating health messages among

Pakistani immigrants. More research is needed to understand family influences in food habits and how healthy eating is managed in everyday food choice.

Table of Contents

Clarification of terms

ACCULTURATION: Acculturation comprehends those phenomena which result when groups of individuals having different cultures come into continuous first-hand contact, with subsequent changes in the original culture patterns of either or both groups(1).

ETHNIC GROUP: (also called a people or an ethnicity) A group of human beings whose members identify with each other, usually on the basis of a presumed common genealogy or ancestry, and by common cultural, linguistic, religious, behavioral or biological traits (2).

ETHNIC MINORITY: A group that has different national or cultural traditions from the majority of the population.

IMMIGRANTS: Immigrants are defined as people who are born abroad or have two foreign-born parents (as defined by Statistics Norway) (3).

Abbreviations

BMI	Body mass index, kg/m^2
CI	Confidence interval
CVD	Cardiovascular disease
DE-PLAN	Diabetes in Europe - Prevetion using Lifestyle, Physical Activity and Nutritional Intervention
FFQ	Food frequency questionnaire
HO	Health oriented
IGT	Impaired glucose tolerance
IGTT	Impaired glucose tolerance test
InnvaDiab	Innvandrere med diabetes, immigrants with diabetes
MetS	Metabolic syndrome
MRO	Managing relationships oriented
OR	Odds ratio
PUFA	Polyunsaturated fatty acids
SDB	Social desirability bias
SES	Socio-economic status
SPSS	Statistical Product and Service Solutions
TTM	The Trans-Theoretical Model
T2D	Type 2 diabetes

1. Introduction

1.1 The master thesis as part of the lifestyle intervention project *InnvaDiab*

The master thesis will be linked to and based upon the lifestyle intervention project *InnvaDiab.* The main aim of the intervention is to prevent type 2 diabetes (T2D) and metabolic syndrome (MetS) among Pakistani immigrant women by influencing established risk factors (e.g. obesity, dietary factors and physical inactivity). In the intervention, women receive culturally adapted dietary education and counselling regarding diet and physical activity. The PhD student Benedikte Bjørge is in charge of evaluating that part of the intervention that is related to diet, by measuring nutrition-related biochemical and anthropometrical parameters, changes in diet, and changes in knowledge and attitudes related to food and health. The project will also evaluate the intervention process in order to identify the most effective methods of intervention in regard to diet among the women.

The *InnvaDiab* includes Pakistani immigrants for several reasons. Firstly, people from Pakistan constitute the second largest non-western minority group in Norway (8). Secondly, the Pakistani immigrants have a very high prevalence rate of type 2 diabetes. Tackling social inequality in health and the promotion of healthy eating is an important feature of Norwegian health policies (4). In addition, previous research has provided thorough background information for working with this study population, which has proven essential for success in culturally related research. Women are chosen as the target group in the present study, mainly because they have a higher prevalence of T2D and obesity compared to men (Pakistani). They also influence the food pattern of the whole family by being in charge of preparation of meals.

The current study will use baseline data collected through InnvaDiab, and the main objective is to provide information on these women’s perceptions. This information includes knowledge and attitudes of healthy eating, the women’s focus in every day

food choice, motivation for change and the relationship between these parameters and food habits, with a focus on fruit and vegetables.

1.2 Background

1.2.1 The Metabolic Syndrome, Type 2 Diabetes and Ethnicity

The prevalence of T2D is rising, both in the industrialised and developing parts of the world. The World Health Organisation (WHO) has estimated that the global prevalence (for all age groups) will rise from 2.8 % in 2000 to 4.4 % in 2030, more than doubling the number of persons affected from 171 million to 366 million (5). The rapid increase of diabetes prevalence has been associated with environmental changes that promote obesity. Obesity and insulin resistance are the central contributing factors to the metabolic syndrome (MetS). MetS encompasses a constellation of metabolic abnormalities that are thought to increase the risk of developing diabetes and cardiovascular disease (CVD). The underlying pathophysiology is still a point of contention, leading to inconsistencies in the manner in which MetS is defined. Irrespective of the definition used, MetS predicts increasing CVD and T2D risk (6).

In Norway and across the Western world there is a higher prevalence of T2D among groups of immigrants, particularly those originating from the Indian Subcontinent[1], compared to the native population (7). Asian Indians migrating to the UK or other "westernized" countries have about a four times higher prevalence of diabetes compared to those living in India (8). Studies conducted among Asian-Indian migrants living in the USA have reported an overall prevalence of T2D of 18 %, which is much higher than in Whites (4.8 %), Blacks (8.2%) and Hispanics (9.3 %) (9). This is also the case among South Asian immigrants in Norway, where the prevalence of known T2D is assessed to be ~ 28% and 14% in women and men,

[1] The Indian Subcontinent is also referred to as South Asia which includes eight countries: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

respectively, compared with ~ 3% and 6% in Norwegian women and men aged 30-59 years (10). Furthermore, the prevalence of gestational diabetes is seven times higher among women from South Asia or North Africa, compared to women from Norway (31.9/1 000 versus 4.5/1 000) (11).

A nation-wide study from India shows that the prevalence of self-reported diabetes is higher in urban areas (7.3 %), intermediate in peri-urban (3.2 %) and lowest in rural areas (3.1 %). Urban residents with abdominal obesity and sedentary activity had the highest prevalence of self-reported diabetes (11.3 %), while rural residents without abdominal obesity performing vigorous activity had the lowest prevalence (0.7 %) (12). These observations suggest that the life-style changes associated with the process of urbanization/westernization may largely explain the progressive increase in the prevalence of T2D. Furthermore, due to socio-economic transitions occurring in the rural areas, the difference in disease prevalence between rural and urban areas is now rapidly changing (13). It should be noted that comparisons between prevalence of disease should be done with caution since the populations may not be comparable with respect to age, and not all of these studies were age-adjusted.

Studies conducted in various ethnic groups have, however, pointed out differences in susceptibility to T2D within the same environmental pressure. In comparison with the Europeans, the South Asians exhibit a higher prevalence of insulin resistance at lower degrees of overweight and obesity (14). The reasons for these pronounced ethnic differences are believed to be a combination of genetics and metabolic susceptibility, intrauterine programming, and the rapid change in diet and lifestyle (15). Pathogenesis of T2D involves both insufficient insulin secretion and insulin resistance. When comparing these disease mechanisms in different ethnic groups i.e. Afro-Caribbean, Caucasians and Asian Indians, the Asian Indians seem to have insulin resistance as the predominant mechanism leading to diabetes (16). The insulin resistance syndrome is also related to a more marked central fat distribution, and studies suggest that Asian Indians are at an increased risk for any level of obesity and central fat distribution when compared to persons of European descent (17). In recognition of this, the WHO has recommended lower levels of BMI as desirable in South Asians. Available data does not necessarily indicate a clear BMI cut-off point

for all Asians regarding overweight and obesity. However, trigger points for public health action were identified at BMI 23 or higher, representing an increased risk for T2D and CVD, and BMI 27.5 or higher representing high risk (18).

To explain these metabolic susceptibilities, the *thrifty phenotype hypothesis* (subsequently generalized as *fetal origins*) has been put forward (19). This hypothesis proposes that the epidemiological associations between poor fetal and infant growth and the subsequent development of T2D and MetS result from the effects of poor nutrition in early life, which produces permanent changes in glucose-insulin metabolism. This is based on the observation of an inverse relationship between birth weight and risk of T2D and MetS in elderly populations. These changes include reduced capacity for insulin secretion and insulin resistance which, combined with effects of obesity, ageing and physical inactivity, are the most important factors in determining T2D. Since the hypothesis was proposed, many studies world-wide have confirmed the initial epidemiological evidence, although the strength of the relationships has varied from one study to another. The relationship with insulin resistance is clear at all ages studied. Less clear is the relationship with insulin secretion. the relative contribution of genes and environment to these relationships remains a matter of debate (20).

1.2.2 Prevention of Type 2 Diabetes and the Metabolic Syndrome

Evaluations of clinical trials and cohort studies in low, middle and high income countries have undisputedly proven that T2D can be efficiently prevented by lifestyle modification in high-risk individuals (21-23). These studies have provided convincing evidence for a decreased risk of diabetes in adults who are physically active and maintain a normal weight status in the lower BMI range (BMI 21–23) throughout adulthood. Furthermore, it is recommended to maintain regular physical activity throughout adulthood and prevent abdominal obesity. Disease risk is reduced in overweight adults with impaired glucose tolerance (IGT) who lose weight voluntarily. It is probable that a high intake of saturated fats also contributes to an

increased risk, while non-starch polysaccharides (NSP) [2] are likely to be associated with a decreased risk. It is therefore recommended that saturated fat intake be less than 7% of the total energy intake (25). There is strong evidence to suggest that eating a variety of whole grain foods and legumes is beneficial in the prevention and management of diabetes (26). A high-fibre diet/ high-NSP diet has an obvious potential to support weight reduction and to improve disturbances of carbohydrate and fat metabolism. At the present state of knowledge, insoluble dietary fibres as found in whole grain cereal products are considered to be especially effective in the prevention of type 2 diabetes mellitus. A high intake of fruits and vegetables as well as legumes also exerts health-promoting properties. (27). Furthermore, conventional South Asian vegetable meals, usually eaten in rural areas of Pakistan, are shown to have significant effects on the blood glucose responses of normal and subjects with T2D. Specifically, the vegetables *sagh* (Indian mustard/mustard greens, *Brassica juncea)*, *ghobi* (cauliflower, *Brassica oleracae)* and *methi* (fenugreek, *Trigonella foenum graecum*) have shown to be valuable in lowering blood glucose (28). Also *karella* (bitter gourd, *Momordica charantia*) is reported to have hypoglycaemic effects (29). Therefore, conventional South Asian vegetable meals may be useful in planning diets for people with insulin resistance or diabetes (28).

Although there is no consensus on the optimal diet for treatment of the metabolic syndrome, it is suggested that focus on weight reduction should be combined with a reduced intake of saturated fat and sugar and an increased intake of vegetables, legumes, fruit and low glycemic index starchy foods (30). This is more in accordance with the traditional Pakistani diet than with the Norwegian diet, which needs an increase in intake of fruit and vegetables and a reduced intake of saturated fat and sugar, according to the Norwegian Directorate of Health (31). Hence, adoption of

2 Non-starch polysaccharides (NSP) from plant cell walls are characteristic of the largely unrefined plant foods that provide the evidence base for the definition and measurement of dietary fibre as 'intrinsic plant cell-wall polysaccharides'. NSP can physiologically be used as a marker for minimally refined plant foods that are rich in micronutrients and shown to be beneficial to health (24).

Norwegian food habits might have negative nutrition and health implications for the Pakistani population due to their high-risk profile (32).

As previously described, increasing fruit and vegetable consumption is an important health behaviour, and in Norway promotion initiatives are well established through the “5-a-Day” message. The Norwegian Nutrition Council published in 1996 the recommendations of eating five daily portions of fruit and vegetables, with two of them being fruits and three vegetables. This corresponds to 150 grams per portion, in total 750 grams (33). Studies indicate that the Norwegian population is not meeting the recommended levels of fruit and vegetable consumption, the average intake among adults being only about half the recommended amount, aproximately 400 grams, compared to 750 grams (34).

To increase fruit and vegetable intake, understanding what factors determine intake in specific target groups is essential. Although interventions are shown to increase intakes, there is still a need to better understand the factors influencing fruit and vegetable intake, including economic, social, and environmental factors that influence food availability and the ability of an individual to make healthy choices, as well as barriers to change (35).

1.2.3 The Pakistani immigrants in Norway

Demographic and socio-economic data

In 2006 there were 387 000 persons with immigrant background living in Norway (36). This corresponds to 8.3 % of the population as a whole, while in Oslo the proportion is 23 %. Immigrants with a Pakistani background constitute the largest single group, with 27700 inhabitants (at the beginning of 2006) who were either born in Pakistan or whose parents were (37). Eighty five percent of the Norwegian-Pakistani population lives in the Oslo/Akershus area. Most families came as guest workers during the 1970s, and a rather large proportion (30%) have lived in Norway for more than 25 years. Following tougher immigration laws enforced in 1976, the immigration wave from Asia came to a halt. The main Pakistani immigration into

Norway nowadays is mainly family reunification, and the majority of these are women.

Pakistan is a predominantly Muslim country: Ninety-seven per cent of the 160 million people are Muslims. The population is made up of different ethnic groups, such as Punjabis (45 % of the population), Pashtuns (15 %), Sindhis (14 %), Seraikis (11 %), Muhajirs (7.6 %), Balochis (3.6 %) and others (4.7 %). The Pakistanis in Norway have emigrated from the Punjab province in the state of Gujrat and have Punjabi ethnicity . Primary mother tongue language usage largely corresponds to ethnic groups. Despite being a native language of a relatively small minority, Urdu is the national language and lingua franca of Pakistan, while English is the official language used by the educated urban elite, and most universities. Punjabi is spoken by over 60 million people, but has no official recognition in the country (38).

In Norway, unemployment in the non-western immigrant group is three to five times higher than in the general population. However, the proportion of Pakistani men who have employment (60 %) is larger than the mean in the immigrant population. Comparing Pakistani women with the rest of the Norwegian population, a very low proportion is working (28%). The low employment rate of the women may be partly related to the fact that Pakistani women have a mean of 3.4 children, while the mean for all women in Norway is two children. Fifty per cent of the Pakistani women have four or more children. Pakistanis live in large households: 60% live in households with five or more persons, compared to 18% in the general population.

There is also a gender difference in command of the Norwegian language among the Pakistani immigrants, with men scoring considerably higher than women in reading skills. In the non-western immigrant group as a whole, literacy surveys show that reading skills (Norwegian language) is poor, i.e. that only one third have skills at the recommended level. However, there are larger differences within each of the immigrant groups than within the ethnic Norwegian population (39).

Health status

Kumar et al. (40) have recently published data on the immigrant population in Oslo. The reported prevalence of obesity (BMI>30kg/m^2) among Pakistani women (39.8%)

was four times higher than Norwegian women (11.6%). The prevalence of obesity among Pakistani men was 22.0%. Central obesity was most frequent among the Pakistanis and Sri-Lankans. The mean BMI of Pakistani women was considerably higher (29.3kg/m^2) than in a study of women in Pakistan (21.9 kg/m^2) (41).

Another study from Oslo (10), a population-based cross-sectional survey of 30- to 67-year-olds in an area with low socio-economic status (SES) and with different ethnic backgrounds (i.e. Westerners and South-Asians), showed that ethnicity and gender were strong determinants of diabetes. Women had the highest prevalence of T2D with 27.5% for South Asian women compared to 2.9% for Western women. Among the South Asian men, 14.3% had T2D compared to 5.9% for Western men. Ethnic differences in the OR for diabetes persisted after adjustment for age, adiposity, physical activity and education. These differences were still present for women after additional adjustment for body height and fertility. The different impact of gender in the two ethnic groups gives a strong indication of the importance of environmental influences, even when populations with high vs. low susceptibility for diabetes are compared. Ethnic differences in gender roles, job participation and societal norms about obesity and physical fitness may be of importance.

A third study (42) found a large diversity of self-rated health[3], prevalence of diabetes and distress among the ethnic Pakistanis and Norwegians. The Pakistanis reported a significantly higher prevalence of poor self-rated health, 54.7% as opposed to 22.1% in Norwegians, 14% vs. 2.6% in diabetes, and 22.0% vs. 9.9% in psychological distress. SES may partly explain the observed inequalities in health. Uncontrollable variables such as genetics, lifestyle factors and psychosocial factors related to migration such as social support, community participation, discrimination, and integration may also have contributed to the observed phenomenon.

3 Self-rated health is an indicator of overall health status and is a subjective appraisal of health and shown to be a powerful predictor of survival, functional decline, future morbidity, and subsequent health service utilization. It has been widely used as a health outcome measure in studies investigating socio-economic inequalities in health (42).

1.2.4 Changes in food habits - the influence of immigration and acculturation

Numerous changes in the socio-cultural environment may occur with immigration, which in turn may lead to shifts in SES, engagement in income generating work, access to health care and life style, including diet and physical activity, and ultimately health (43). Changes in the dietary habits of migrant populations are related to the process of acculturation**,** i.e. a racial, ethnic, or immigrant group adopts cultural patterns of the dominant/host group; adopting dietary practices is dietary acculturation. This does not appear to be a simple process in which a person moves linearly from one end of the acculturation continuum (traditional) to the other (acculturated), but is rather a multidimensional, dynamic and complex process. Available research indicates that as part of the acculturation process, immigrants may find new ways to use traditional foods, exclude other foods and/or consume "new" foods (44). The type and extent of changes in immigrants' eating patterns are likely to depend on several socio-demographic factors, such as length of residence in the new country, ability to speak and read the host language, education level, generation, age, and gender (44;45). Dietary acculturation can result in healthy and unhealthy dietary changes. Research, mainly from the US, Canada and Great Britain, indicate that changes towards the "western" diet may result in an increase in foods rich in sugar and fat, such as more "convenience foods", meat products, soft drinks or alcohol (46-48). A review by Misra & Ganda (49) of the evidence regarding migration and its impact on disease risk suggests a critical role of environmental factors in conferring an increased risk of obesity. The important contributory factors to this phenomenon were urbanization, mechanization, and changes in nutrition and lifestyle behaviours.

In the following section, the traditional Pakistani diet will be described in brief, followed by data on changes in food habits after immigration to Norway.

The Traditional Pakistani Diet

The majority of the Pakistanis in Norway have a background from the rural areas and villages (50). The lifestyle contrasts between rural and urban areas in Pakistan are reflected in the dietary habits.

The traditional diet consists of 2-3 main courses per day and the food is typically prepared with a lot of different spices. Vegetarian dishes are common, however not to the same extent as in India. The first meal usually consists of *chapatti*, a flat unleavened bread made of whole wheat flour, with fried eggs and salad. For some, *lassi*, a cold yoghurt drink which can be salted or sweetened, is the breakfast. In the city, it is more common to eat white bread with jam and *chai* (tea made with hot milk, cardamom and/or other spices and sweeteners, such as sugar), or *kababs/kebabs* (grilled meat) and pommes frites with sweet carbonated beverages at breakfast. The second meal consists of *salen*, dishes of vegetables, meats, fish or lentils, depending on taste and economy, with fat and garlic and blends of spices called *masala* (a mix of pepper, cardamom, coriander, cumin, clove and cinnamon). Salen is usually eaten with boiled basmati rice or chapatti. Dinner is the main course of the day and usually consists of salen and boiled rice or chapatti. Fruit and a cup of chai accompany dinner. *Mithai* is a general name for different sweets, such as *barfi, jalebi* and *halwa*. These are made of milk, sugar and fats and can have added nuts or coconut. Snack meals consist of fruit, dates, nuts, sugarcane and chai or lassi.

Other types of bread eaten are *paratha*, which is a chapatti made with additional fat, and *naan*-bread, which is leavened bread made of white flour and fat. Rice can also be a dish called *pulao*, which is rice boiled in water with added fats and spices. Rice can also be used as a dessert, cooked in milk and sugar into a dish called zarda.

Vegetables are traditionally used in large amounts in *salen* and in salads. Onions, tomatoes, cauliflower, spinach, squash, carrots, aubergine, okra, pumpkin, potatoes, cucumbers, lettuce and radish are the most commonly used vegetables. Lentils and beans are often used, especially in the countryside, in dishes called *dahl*. Lentils can also be eaten as a snack if they are fried and spiced. Fruit is eaten both as snacks and as desserts. Common fruits are mango, grapes, bananas, apples, citrus, guava, papaya and dates. Mutton, beef, chicken and offal are commonly used in salens or in kababs. Fish is mainly eaten by people living nearby the coast. Eggs are eaten fried or boiled in salens.

Both salens and rice dishes are made using different vegetable oils and ghee. Ghee is clarified butter and has an important role in Pakistani food culture. Traditionally, the amount of fat in cooking has been a sign of the family's economic status. The concept of *glossy curries* refers to salen rich in fat, offered at celebrations and feasts and used by wealthy families who can afford using more ghee/oil in the food. However, in rural population in Pakistan the majority will use fat sparingly for everyday cooking (51).

Changes in food habits after immigration to Norway

In Norway, the Oslo Health Study has provided data on the immigrant population, and the results support international literature regarding "westernization" or "urbanization" of the diet (32;43;51). The intake frequency of foods rich in fat and sugar was high and the consumption of boiled potatoes, milk (mostly full fat), oil and fruit increased after coming to Norway. The intake of fruit and vegetables was lower than recommended, and all immigration groups reported decreasing their intake of beans and lentils. Young respondents had a significant higher intake of burgers, cakes, chocolate and coca cola. Those who had lived in Norway for a longer time consumed significantly less chicken, burgers, rice and full fat milk compared to those living for a shorter time.

A dietary survey using repeated 24 hour dietary recall among Pakistani immigrant women in Oslo (51) compared the finding with results from the general Norwegian population in Norkost 1997 (52). The Pakistani women had a lower intake of fruit and berries, compared to the Norwegian women. Also, the intake of potatoes was lower, however, the total intake of other types of vegetables was higher. The percentage of energy intake from fat was higher (40% vs. 31%), while intake of fibre was lower (17grams vs. 21 grams).

1.2.5 Perceptions of healthy eating

The following chapters will describe in more detail some of the factors that influence healthy eating, such as perceptions of healthy eating, belief systems regarding relations between food and health, and the role of family and others. I will also refer

to empirical findings on these issues, especially among Pakistani immigrants in Norway.

“Perceptions of healthy eating” can be defined as meanings, understandings, views, attitudes, beliefs and knowledge about healthy eating and healthy foods. Perception of healthy eating is essential to asses how current health promotion messages are interpreted and put into practice in daily life in order to develop successful healthy eating messages. In this regard, there are many gaps in knowledge identified: in the influence of the perceptions of healthy eating on food behaviour; the need for research on perceptions themselves; and in variations in perceptions by individual or group characteristics, such as gender, age, SES, cultural heritage and geographic area of residence. Indeed, while the link between perceptions and behaviour can be inferred, it is not clearly supported in the literature (53).

Conceptualization of healthy eating is an important factor in the food choice process of people in the Western world (54;55), however these perceptions vary between groups (56;57) and between individuals within groups (57;58). This variation, like other variations in food choices, is the result of a dynamic process influenced by an integration of biological, psychological, social and cultural factors (59) and is shaped by life-course experiences (54;60). The complexity of the concept of “healthy eating” has increased with the evolution of nutritional science over the last century (61) i.e. the increasing knowledge about the relationship between diet and chronic diseases, such as cancer, diabetes and coronary heart disease, and the dietary recommendations based on this knowledge. This has influenced definitions of ”healthy” and ”unhealthy” diets among the population, and many elements of foods must now be taken into consideration to determine their healthiness, e.g., type of fat, how to combine foods into healthy food patterns and ways of eating. Accordingly, *health* has become a central aspect of the food culture in western societies as well as implications for how food is categorized and perceived by lay people (57).

Attempts to summarize the literature on the perceptions of healthy eating reveal that there is a certain level of agreement amongst the public about the meanings of ‘healthy’ and ‘unhealthy’ eating, although differences appear to exist in the way they

are discussed by people belonging to different demographic groups, such as social class and age. Some of these meanings are more or less in line with the dietary guidelines (such as the consumption of fruit and vegetables), whereas others (such as the idea of a 'balanced diet') are more open to individual interpretation, some of which may not correspond with the views of nutritionists (53;62;63). Perceptions of healthy eating may include aspects of health that may at first not seem part of health, such as feelings of personal well being and digestibility of specific foods (58).

Most of the studies on perceptions of healthy eating are from western countries, and the knowledge of socio-cultural differences in perceptions is limited. One exception a health and lifestyle survey of England (64) which looked at health and diet in four immigrant groups: Afro-Caribbean, Indian, Pakistani and Bangladeshi. They found that about half in each ethnic group perceived their own traditional diets to be healthier than Western diets (most foods eaten by people in Great Britain). This contrasts the findings in a study from Norway, exploring the experience of dietary advice among Pakistani-born persons with type 2 diabetes in Oslo. The participants told that the focus on bread based meals and the advice to avoid some of their traditional food-items, contributed to the impression that Pakistani food was inferior (65). Similarly, British South-Asians frequently also referred to the un-healthiness of the South-Asian "traditional diet" in two studies related to causes and prevention of coronary heart disease (66).

Food and health in Islamic Countries

The idea of what is "right" or "wrong", "healthy" or "unhealthy" to eat is however not unique to western countries. In most societies there are specific perceptions, ideas and belief systems of how certain types of food may prevent or cure disease, and in which ways different foods influence the psychological and physiological state of the human body (67). In the Muslim world, both religion and different medical systems give recommendations regarding food and health.

One such system is the Unani Tibb medical system (*Unani* means Greek and *Tibb*, from the Arabic, means medicine), commonly practiced in the Muslim population of South Asia. Unani Tibb has its origins from ancient Greek, Arabic, and Persian

medicine and presents causes, explanations, and treatments of disease based on the balance or imbalance of the four humors in the body: blood, mucus, yellow bile, and black bile. These combine with four basic qualities: heat, cold, moisture, and dryness. Diseases result from an imbalance of one or more of the four humors, the four qualities in the body and in the external environment. That the Western notion of health and illness is the only way toward medicine is foreign to the majority of traditional South Asians. In contemporary practice, the two divergent systems are thought to complement each other (68).

Unani Tibb makes use of a parallel food classification system where all foodstuffs are divided into two categories, *hot* and *cold.* This may influence a person's diet in the way that hot or cold food may be used to correct a perceived imbalance, ameliorate discomfort or treat an illness. People conceive of the hot-cold attributes of foods contextually; hence a food that is very hot for one person may be warm or neutral or even cool to another person. People generally conceive of animal, fatty and spicy food products as hot, and fruits and vegetables as cold, so that hot foods are often higher in calories, proteins and fats than cold foods, and cold foods are higher in water content than hot foods (69). These traditional ideas are still seen among a variety of ethnic backgrounds in the United Kingdom, particularly in relation to eating habits during pregnancy, postpartum and in the management of diabetes (70). It is also seen among Pakistani immigrant women in Norway (32).

Other types of parallel food classification systems in South Asian countries are *weak* and *strong; digestible* vs. *indigestible.* Greehalgh and colleagues (71) revealed that these two classification systems may be held at the same time. Strong foods were perceived as energy-giving, and included white sugar, lamb, beef, ghee, solid fat and spices. They were considered crucial to maintain and restore health. They were considered dangerous, however, for the old or the debilitated (including diabetics), for whom weak foods, such as boiled rice or cereals, were more appropriate. Raw foods and those baked or grilled were considered indigestible, as well as all vegetables that grow under the ground, and these were also considered inappropriate for the old, the very young or ill. Thus the recommendation that people with diabetes

should bake or grill their foods, rather than fry them, would not be in accordance with their food beliefs.

Religion does also have an impact on dietary habits. Muslims follow the teachings of the Koran, which also have stated food rules contained within the concepts of *halal* and *haram*. Halal means lawful, permitted and recommended by the Islamic law. Haram is the opposite, meaning unlawful, prohibited. Food in general is described as a ‘‘sign’’ from God for which believers owe gratitude. Food is referred to as ‘‘wholesome things’’ and food is a blessing to be enjoyed and shared. Pork is rigidly excluded from all diets and meats, and only eaten if the animal or fowl is killed according to Muslim custom. Most Muslims purchase their meat and chicken (“halal” meat or chicken) from special stores where proper procedure is followed to produce these items.

In the previous section I have described some different ways of viewing food, and classification groups like healthy/unhealthy, lawful/unlawful and food as medicine, i.e. hot/cold. The way that people view their food, and the way it is classified in different categories, has implications for food practices. In the following section, another influential classification system will be described: the social food i.e. the food which signals relationships, status, gender, and group identity.

1.2.6 Commensality – food in a social context

Family meals of any kind have a great social significance, and in a suggestive series of papers, Murcott (72;73) described the traditional cooked dinner of South Wales. She analyzed its social significance as time-consuming, as evidence of women’s labour, and as served in accordance with the preferences of others who eat the meal. She found the family dinner to be a repetitive expression of family communality, even when members eat it at different times and places, and a token in a gift exchange between husband and wife, the skills for which are passed on from mother to daughter. It appears that the family context as it relates to commensality or sharing food with others is particularly salient to how healthy eating is conceptualized and enacted. Food choices often require negotiations and accommodation with the value

placed on managing relationships, sometimes coming in conflict with healthy eating food choice considerations (74). It is however, surprising that these features of family meals have not provoked more comparison with the food traditions of other cultures.

There are however, some exceptions. In a qualitative study among Pakistani women in Norway, it became clear that the women were very quick to hear the requests and desires from their children, and this factor was given as the predominant reason for changes of the menu after immigration to Norway (32). Children's preferences were reported to be the most important reason for the reduced consumption of traditional vegetables.

The influence of social relations on food patterns had also changed. In Pakistan, neighbours and family members frequently stopped by and sat down for an informal talk; they were not looked upon as guests. In Pakistani families in Norway, people are invited or call in advance of coming, and therefore the guests expect to be served many different dishes. These guests are honoured when serving a lot of food. Also, the composition of foods followed certain rules: when preparing food for guests, they do it the traditional way, then the curry should look glossy, which implies a high fat content (32). This is an example of how concerns about external status and reputation influence how meals are combined and what is served. Dawes (75) explored in more detail the socio-cultural perceptions and practices of dietary choices among Pakistani women in Norway through qualitative interviews. In this sample, ghee symbolized "nourishment" and "correct taste". Serving dishes rich in meat, sugar and ghee was a marker of SES, reflecting being "well off". In addition, community identity was important as food culture also reflected conformity or bonding to others from the same ethnic community when socializing, during weekends, at parties and celebrations.

In the parts above, I have described how food plays many roles and is deeply embedded in the social, religious and economic aspects of everyday life. Because of the central role of food in social relationships, dietary beliefs and practices are notoriously difficult to change even if they interfere with adequate nutrition. Perceptions of healthy eating and how this and other factors determine food choice

are essential to assess how current health promotion messages in various settings are interpreted and put into practice in daily life in order to develop successful healthy eating messages and interventions. There is clearly a gap of knowledge in this regard, because the majority of healthy eating research has drawn on Caucasian participants and has neglected to include an examination that reflects the cultural and immigration patterns in Western societies (76).

1.3 Theoretical background – food choice process and motivation to behavioural change

Perspectives on food and eating can take many forms and research may come from many different fields other than the nutrition sciences, such as sociology, anthropology, ethnology and psychology. In public nutrition, knowledge from psychology, specifically in the research area of social psychology and health behaviour, has increased our understanding of the determinants that affect food choice, which is currently at the forefront of public health.

There are many models of human behaviour in relation to dietary behaviours, several of which have been reviewed by Baranowski et al (77). Some of the key components of these models are mentioned to demonstrate that nutrition perceptions and knowledge are only one part among many likely influential factors: the perceived consequences of the behaviour; attitudes and beliefs about the behaviour; skills, such as knowing how to shop and how to cook; confidence in being able to perform the behaviour; the social and physical, internal and external environment; and a wide range of motivators, including social influences (e.g. doing as your peer group does), environmental rewards, biological needs (e.g. hunger), psychogenic needs (e.g. need for recognition) and personal and cultural values – which define what are ‘good’ and ‘bad’ consequences of behaviours.

1.3.1 The food choice process

One such model aiming at capturing the richness and complexity in dietary behaviour, is the food choice process by Furst et al. (59), shown in figure 1. It attempts to represent the ways people simplify the daunting task of making food choices by using individualized sets of rules, categories and meanings as heuristics for choosing foods and food situations. The model has three main components: (1) life course: person’s experiences, (2) influences: ideals, personal factors, resources, social framework and food context, and (3) the personal food system which includes

food-related value negotiations, i.e. the sorting and juggling of food-specific values (such as monetary considerations, convenience, health and nutrition, management of relationships .e.g. accommodation the needs of other people in their social circles) and strategies individuals use to find their way through everyday food choices. The model represents a process that may be either more deliberate or more automatic, and recognizes that food choice processes are complex, evolving, dynamic and situational. Understanding how people organize, simplify and feel comfortable with their food choices is important for developing theories about eating behaviour and communicating health messages related to food and eating.

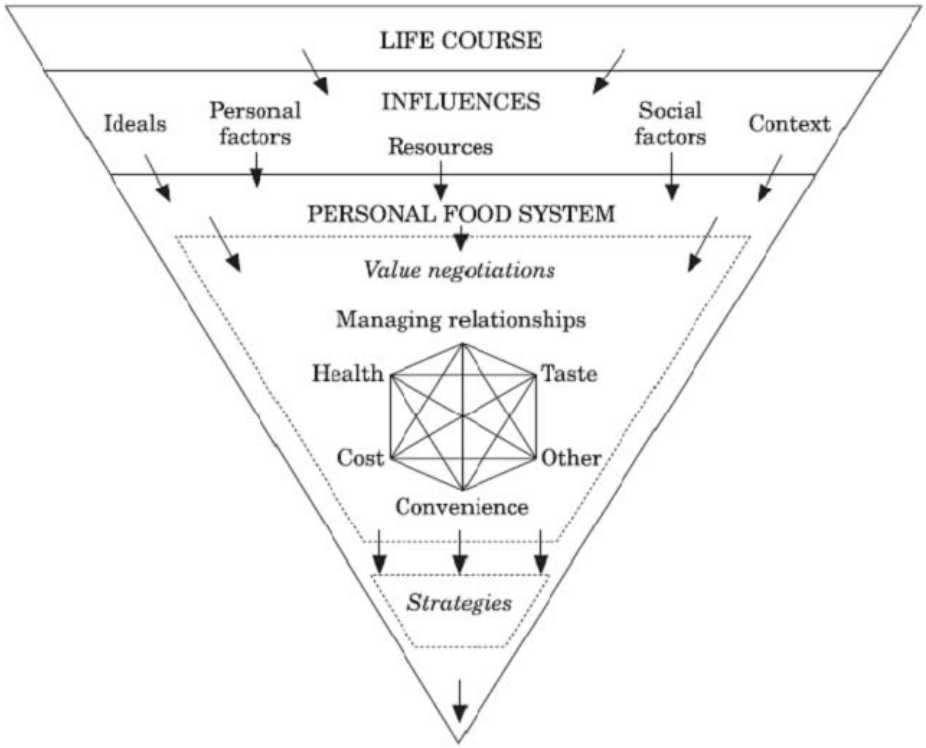


Figure 1: The food choice process model. Adapted from Furst et al. (59).

The components of the model and their interaction offer an approach to form a general idea of the food choice process and its nature. The model also recognizes that certain influences may be more salient than others for particular people in specific food choice situations. The model has also been applied on different ethnic groups (60). The present study will focus on the health aspect in the model, by exploring the perceptions of healthy eating, the role of health in everyday food choice as compared

to other values, such as personal taste or managing relationships as well as influence of social factors and context.

1.3.2 The Transtheoretical Model and Stages of Change

In spite of the abundant evidence showing the benefits of healthy eating, changing food habits is difficult. While lack of information and knowledge about foods and nutrient contents might play a part, motivation to change is likely to be much more important (78). The stages of change construct of the Trans-Theoretical Model (TTM) is a possible means for trying to address these motivational issues.

In the present study, the stages of change are used to measure intentions and motivations to change behaviour, i.e. the consumption of fruit, legumes and vegetables. This assumes that people go through a series of stages when changing their behaviours: pre-contemplation (no intention to change in the foreseeable future), contemplation (intending to change but not soon), preparation (intending to change in the next month), action (recent change of behaviour), and maintenance (maintaining change for at least 6 months). The TTM uses a six-month time frame because it assumes that this is about as far into the future as most people plan a specific behaviour change.

One of the implications of the model is that to move from one stage to another, people need different information, tailored to their specific stage of change. Applications of the model to adult fruit and vegetable consumption have shown stage of change to be a significant predictor of intake (79). This has led to tailoring methods of nutrition promotion (80) which are about twice as effective in bringing about dietary behaviour change as other approaches (81). Other purposes of using stage models are that changes in stages of change (e.g. stage transitions), can and have been used as an intermediate impact indicator in the evaluation of dietary behaviour change interventions (82). Finally, stage models are used to gain insight into the process of health behaviour change (82;83). To this researchers' knowledge there are however no other studies focusing on stages of change and dietary choice

among Pakistanis or South Asians; it has only been used in relation to physical activity (84).

A crucial requirement for tailoring nutrition messages to stage of change is that people can become unambiguously classified according to stage. It has been argued that the TTM, like other models concerned with human behaviour, is best applied to food-based goals and eating behaviours in which people engage (i.e. increase vegetable consumption), rather than to nutritional outcomes of a complex collection of eating behaviours (i.e. fat reduction) (79). The stages of change construct makes a useful distinction between people with differing motivation towards nutrition and health change. Applying the model on the current study population may contribute to the knowledge regarding motivation and its influence on food choice, with a focus on the consumption of fruits and vegetables.

1.4 Aims and research questions

Prior works in the Pakistani immigrant population have provided both quantitative data on intake of foods and nutrients and changes in food habits (43;51), as well as qualitative studies on how culturally specific beliefs and attitudes have influenced dietary habits (32;51). The main aim of this study is to provide quantitative information regarding the perceptions of healthy eating and how this relates to food choice and eating behaviour in a group of Pakistani women at risk for T2D.

I distinguish between five different approaches in studying the concept of perceptions of healthy eating: by studying *definitions* of healthy and unhealthy foods and eating situations; *knowledge* of dietary recommendations; *attitudes* towards importance of health in everyday eating; and the *motivation* to change towards healthier dietary behaviours.

The motivation for doing such research is the recognition that to successfully promote and support healthy eating, attention not only to observable behaviour, but to the underlying attitudes and beliefs which drive and influence eating behaviour is required. While it might be assumed that the information to provide "basic knowledge" of a healthy diet is available to all individuals, confusion and misconceptions exist. Individual concepts of a healthy food choice are open to a vast array of interpretations (57). Furthermore, food habits are not influenced by health considerations alone, therefore, greater understandings of different influences and their relative importance is essential whenever dietary change is being discussed. As part of an intervention project, this study will also provide information on the participants' perceptions and motivations at baseline, which is valuable in understanding the effects of the intervention.

In order to limit the scope, the current study puts focus on consumption of fruits and vegetables. This is based on knowledge from prior studies (51) recommending that

dietary information to Pakistani women should focus on increasing the use of fruit and vegetable.

The specific research aims with related research questions were the following:

1. Provide information on perceptions of healthy eating among Pakistani immigrant women

- Which foods do they consider healthy and unhealthy and what is the basis for this distinction?

- Which eating situations do they classify as unhealthy?

- What do they perceive as barriers to healthy eating?

2. Clarify the role of healthiness in every day food choice

- What is the role and importance of healthiness in the women's choice of food and how is it related to dietary behaviour?

- Is there a relationship between their considerations of foods in term of healthiness and intake of these foods?

- Are they aware of the recommendations for fruit and vegetable intake, and does this knowledge relate to intake?

3. Contribute to the understanding of the relationship between cognitive motivational readiness for dietary change and dietary behaviour.

- Are the stage classifications according to the Trans-Theoretical Model a predictor of fruit and vegetable consumption in this population group?

2. Methods

2.1 Design, recruitment and study population

The current study was based on the same population as in the InnvaDiab intervention project, and therefore the recruitment of the population for that intervention is described.

For participation in the intervention, two hundred participants were recruited continuously from spring 2006 to fall 2007 and randomly assigned to an intervention and a control group, with 100 in each. Randomization was performed externally by collaborators at the University of Bergen. Those in the intervention group received systematic dietary education and counselling in groups, totalling six sessions at their local mother-and-child health care station in Holmlia, the centre of the urban area Søndre Nordstand. The controls were offered education after the post-test.

Søndre Nordstrand was chosen as the target area, being the urban area of Oslo with both the highest percentage of people with immigrant background (41 %), and highest percentage of people with Pakistani background (12 %)(3). Furthermore, there has not been similar intervention studies conducted in this urban area previously.

It was necessary to use non-random recruitment approaches which included choosing a geographical area and through personal contact with the possible participants. A research assistant who was a community member with immigrant background was in charge of the recruitment of subjects. This included various strategies: involving the local health station and their staff, visits by the research assistant to a mosque and at other formal and informal gatherings in the community. Non-random approaches were used partly because many of the women in the target group were assumed to be unable to read or write comprehensively, hence written information/invitations would not be suitable. It was also very important to reduce participant burden and make it easy to attend the group counselling, and therefore they were selected from the mentioned urban area.

Inclusion criteria were: female; 25 years or older; having two Pakistani born parents. Exclusionary criteria were: pregnancy within the last 12 months; type 1 diabetes; have had diagnosed T2D for more than six months; myocardial infarction within the last 3 months, inability to perform the physical tests; living in the same household as another participant.

When diabetes type 2 was detected in participants they were informed immediately and referred to their General Practitioner (GP), who also received a letter with the test results, for a follow up. The GPs were encouraged to decide together with the patient about making changes in life style/diet and physical activity level to reverse the condition. If medication was initiated, the participant was excluded from the study.

The design of the current study is cross-sectional and demographic, socio-economic and anthropologic data and data from the pre-coded questionnaire from 197 eligible participants collected at baseline are used in the analyses.

2.2 Data collection

2.2.1 Baseline measurements

Participants who accepted to participate arrived at the health station, fasting at least 12 hours in advance, and after giving informed consent, baseline measurements were taken. These included anthropometric measurements, an oral glucose tolerance test (OGTT), performing a physical test and completing a pre-coded questionnaire on food frequencies and perceptions/attitudes. In addition, a repeated 48-hour dietary recall was performed. Furthermore, demographic, socio-economic, as well as clinical information was collected. All data were self-reported, except for anthropometric measures.

2.2.2 Interviewers

Collection of data was carried out by trained personnel, in total, five women. They were all Urdu- and/or Punjabi speaking in addition to Norwegian and English, with two of them carrying out most of the interviews. One of the research assistants was in

charge of scheduling the interviews and intervention participation, as well as giving reminders (by telephone) to the participants of upcoming sessions.

The Phd Student was in charge of training the staff. Training included information about the purpose of the research, familiarization with questionnaire forms and the purpose of each question, performing interviews on staff members, assisting in interviews to learn how questions were translated and asked, and performing interviews on subjects under the supervision of one of the two chief interviewers.

2.2.3 Survey instruments: The pre-coded questionnaire on attitudes and food frequencies

Participants completed the questionnaire on the first day of the data collection period. The questionnaire was tested in a pilot study with seven Pakistani women and was revised on the basis of the results and comments from that group. A test-retest was conducted on the attitude-questions in questionnaire, among South Asian immigrant women (n=16).

The questionnaire developed was based on previously conducted studies in this population in Norway by Mellin-Olsen & Wandel (32;85), by Lorentzen et al (84), the Oslo Immigrant Health study (85) and an international diabetes intervention study, DE-PLAN (86). The dietary questions from the Oslo Immigrant Health Study have been validated on Norwegian adults (87) and modified for use in the immigrant population (85), and those from the DE-PLAN have been validated on Finnish adults (88). In addition, a picture booklet was used to help participants estimate portion sizes on some of the items in the questionnaire. This was adapted from a picture booklet used in a national dietary survey among 9- and 13-y-olds (UNGKOST) and has been validated for use in this age group (89). The questions selected from these questionnaires were modified for use in the Pakistani population, according to aims of the intervention and priorities of researchers. Data from the questionnaire relevant for the current study and how they were handled and analyzes are described in the following sections.

2.2.4 Data handling and analysis

All data was manually transferred from printed forms to the computer programs “The Statistical Package for Social Sciences” (SPSS), version 15.0.1 and Microsoft Excel 2003. The data was manually rechecked and proof-read by nutritionists. Open-ended questions were coded manually.

Statistical Analyses

Proportions, means and medians were used for the descriptive statistics. Proportions were compared by frequencies and cross tables with chi-square statistics. Means were compared with t-statistics, and when data did not fulfil the assumptions of normal distributions a Mann-Whitney U test was used to compare the groups. Binary logistic regression analysis explored the associations between intake levels (two levels) of selected food groups with age, command of Norwegian language, education, engagement in income generating work, number of children and selected perceptions, including knowledge, attitudes and motivational stages. When including independent variables in the logistic regression models, the Enter method was used. Outliers in all the models were kept, and this is mentioned in the results (usually outliers between > ± 2.5 are considered clear outliers)(90). A significance level of 5 % was chosen. Effect estimates are presented as odds ratios (OR). Although no clear interpretation guidelines for the magnitude of OR exist, an OR near two is usually interpreted as meaningful (91).

Socio-economic variables

Age was self-reported. When the participants did not know their exact age, or when they said that the date on their birth certificate was incorrect, their self-reported estimate of age was used. The year when coming to Norway and if they had lived permanently in the country was also reported. Time living in Norway was calculated by subtracting current year with year of arrival to Norway. Age and time living in Norway were used as continuous variables.

Education was self-reported in number of years of formal education (excluding language courses or other courses or training) and further recoded into the following

four categorical variables: No education; 8 years or less (up to middle school); 12 years or less (higher secondary school); more than 12 years (university/college university). These groups were based on the education system in Pakistan (92). In the logistic regression analysis, education was used as a continuous variable.

Engagement in income generating work was self-reported and assessed with two questions: working (*yes/no*), and main occupational title in present or former work (open ended). Those who were not working at the present time, but reported former occupation, present occupation rehabilitation or present sick leave, were re-categorized as "working", because of interest in the number of women who were currently or formerly participating in the labour market. Work was used as a dichotomous variable in the logistic regression: *0=not working; 1=working/have been working.*

Command of Norwegian language was self-reported and measured by a five category response set: *Very good; good; average; below average;* and *poor.* These were aggregated into three categorical variables used in the analysis: *Very good/good; average;* and *below average/poor.* For use in the logistic regressions, the categories were dichotomized: *1=very good/good; 0=the rest*.

Anthropometric data

BMI (kg/m^2) was used as a continuous variable and calculated from measures of weight (using an electronic scale) and height (using a height measure attached to the wall).

The food-frequency variables

The food-frequency questions did not cover the whole diet, but were diabetes related, e.g. selected with the purpose of measuring changes in parameters important for the intervention. In the present study, intake frequency of fruits and berries (referred to as fruits in the following) and vegetables were in focus. Additionally, based on the women's responses regarding healthy and unhealthy foods, intake frequency of fish and computed indexes of foods rich in sugar and fat were used for further analysis of the relationship between perceptions and intake.

Fruits and vegetables

Intake frequency was measured with a five category response set: more than 4 portions a day; 2-3 portions a day; 1 portion a day; 4-6 portions a week; 1-3 portions a week; less than one portion a week. When comparing intake, these response groups were aggregated into a dichotomous variable of two levels: one portion a day or more (1=≥ 1); less than one portion a day (0=<1); The cut-off was initially set at 2-3 portions a day, based on the recommendation of eating 3 portions a day. However, very few (7%) reported eating this quantity, and therefore the next intake level was chosen as a cut-off in order to be able to detect any differences between groups. The same cut-off (≥ 1 portion a day) was set for fruit intake because only 14 % ate 2-3 portions a day. Intake of legumes was excluded from the analyses due to lack of variation in the responses, which eliminated the possibility of ranking the subjects.

Fish

Frequency of intake was measured by weekly frequency of using fat fish and lean fish for dinner. For use in the logistic regression analysis, the frequencies were aggregated into a dichotomous variable: *1=eat fish once a week or more; 0=eat fish less than once week or not at all*. This cut-off was chosen partly because only 14 % had an intake of twice a week, as is recommended, and setting the cut-off at once a week made it more likely that this distinguished between those who ate fish regularly and those who did not.

Fat Index and Sugar Index

Two indexes were computed based on intake frequency/selection of foods contributing substantially to fat and sugar. For the fat index five groups that in an earlier 24 hour recall study (51) were shown to contribute most to fat, were chosen: cooking fat, milk, snacks. In addition, fast food was also included. The responses were aggregated into two groups, a high score (=2) and low score (=1): Cooking fat (amount of fat used in *salen* per person), above the 70 percentile = 2, below the 70 percentile = 1; milk products, exclusively choosing high fat milk for *chai* = 2, choosing milk with lower fat or no milk/*chai* at all = 1; fried snacks (such as samosa, pakora, potato crisps, pommes frites),1-3 times a week = 2, less frequently =1; fast

food (such as hamburger and pizza) 1-3 times a week = 2, less frequently = 1 (see appendix 1 questions 2cA & 2cB, 6a, 6b and 19a).

For the sugar score, the same procedure was followed. Four food groups were included: drinks rich in sugar (e.g. soft drinks, sweetened drinks and ice tea), 1-6 glasses a week or more versus less frequently; sweet bakery products, ice-cream or chocolate (such as doughnut, cake, rolls), one portion a day or less frequently; sweet desserts (such as *mitai* and *halwa*), 1-2 times a week versus less frequently; sugar, honey and sweets, 1-3 portions a week versus less frequently (see appendix 1, questions 4ae, 15, 16 and 21a.)

The sum of each food group (rich in sugar and rich in fat) was then added to compute a total score (variation of score 4-8). For the logistic analysis the proportion with a high score (7-8) were coded =1 and the others = 0.

When computing the index of intake of high fat foods, it was necessary to manually impute values (median) for amount of oil/fat used in *salen* to twelve non item responses. Additionally, information was obtained regarding their answers on cooking methods in order to evaluate if the imputations would be realistic (see appendix 1, question 22).

Definition of healthy and unhealthy food

Regarding the definitions of healthy foods, the respondents were asked “If you were to choose food that is good for you, healthy food, what do you choose? This was an open ended question and respondents could mention as many items as they wanted. The interviewers registered the answers into 14 pre-coded response categories: *Heavy and filling food, a lot of vegetables, meat, fish, proteins, oil/fat, lean food, carbohydrates: rice/bakery/wheat products, sugar, it depends (i.e. Ayurveda, cold/hot), water, other I, other II, don’t know*. If they mentioned something else, this was noted down for coding later on. Recoding resulted in the following additional categories: *salad, chicken, dahl/lentils/chickpeas, fruit, vitamins, milk, less spice, less salt* and *other*. The ones who had answered *roti* were added to the carbohydrate category. In addition they were asked which one they considered most important.

The question about what they considered unhealthy was answered in the exact same way with these response categories: *Saturated fat/fat from animals (butter etc.), sugar, white and fine flour, polished rice, rice in general, too much oil, other I, other II, don't know*. Recoding resulted in the following categories: soft drinks, fast food/junk food, fried/deep-fried food, meat, potatoes/pasta, salt, sweets/chocolate/cake, and other.

Foods which were most frequently mentioned as either healthy (e.g. *vegetables/fish/salad/chicken/meat*) or unhealthy (e.g. *a lot of sugar/too much oil/saturated fats/white, fine flour/fat in general*) were explored further as dependant variables in bivariate and multivariate analysis. Those who mentioned the food/nutrient (=1) were tested against those who did not mention the food/nutrient (=0). The independent variables included demographic and socioeconomic factors and command of Norwegian.

Unhealthy eating situations

The responses to the open-ended question regarding *when* they eat unhealthy were coded and categorized into main groups.

Influences on food choice

When assessing the role of healthiness in their food choice they were asked to consider the importance of 12 food factors: "When planning and cooking dinner (for *yourself*, which *you* will eat), how important is it: A) that the children like the food, B) that the husband likes the food, C) that you like the food, D) that others in the house like the food, E) that the food is easy to cook, F) that the food is homemade, G) that there is a lot of vegetables, H) that the food has little fat, I) that the food looks nice, J) that the food is Pakistani, K) that the food is healthy, balanced, L) that the food is not (too) expensive, M) other I and N) other II". The answers were given on a five-point Likert scale, ranging from *very important, important, a little important, barely important* and not *important at all*. Responses were given a score to allow comparison of the importance (very important=1; not important at all=5), and further aggregated into two groups for use in regression analysis: very important/important = 1, the rest = 0.

The women were also given a follow-up question, e.g. to select the factor that they considered most important (from A to N, see the former paragraph). In addition, many women selected both A and B, which was included as a separate response. Two groups were aggregated from these responses and used as two dichotomous variables: "Managing relationships oriented" selecting A/B/A+B/D=1, the rest=0; "health oriented" selecting G/H/K=1, the rest=0.

Knowledge about healthy eating - the 5-a-Day message

The subjects were asked "Do you know how many portions of fruit and vegetables you need every day?" The answers were given in numbers, or the interviewers noted "no" when that was the answer. For use in statistical analyses, the responses were aggregated into a dichotomous variable: 1=*aware of the message* (those who reply five); 0=*unaware of the message* (those who reply other than five or "no").

Barriers to healthy eating

Assessment of barriers to healthy eating concerned vegetable intake only. They were asked if they ate more vegetables in Pakistan (*yes/no*) and if *yes*, to give reasons for eating less in Norway (open-ended). The reasons were coded into major groups. The three last questions assessed whether they would eat more vegetables if they were cheaper, tasted better or were grown in Norway (*yes/no*).

Stages of Change

Questions designed to capture cognitive-motivational readiness for dietary behavioural change were adapted from Lorentzen et al (93). The stages regarding motivation/intention to increase consumption of *fruits and berries* and *vegetables* (in the following referred to as fruits and vegetables, F/V) were assessed using five categories labelled as follows: (1) "I am currently not eating more F/V, and I do not intend to eat more in the next 6 months" (pre-contemplation); (2) "I am currently not eating more F/V, but I am thinking about eating more in the next 6 months" (contemplation); (3) "I am currently trying to eat more F/V, but not regularly" (preparation); (4) "I am currently eating more F/V, and I have begun doing so within the last 6 months" (action); and (5) "I am currently eating a lot F/V, and have done so

for more than 6 months" (maintenance). Reduction of fat and sugar was measure in the same manner (see appendix 1.) For bivariate and multivariate analysis, the stages were aggregated into three groups: pre-contemplation and contemplation; preparation; and action and maintenance.

2.2.5 Allocation of tasks

The master student has been involved with various parts of the data handling: transferring data from questionnaires to SPSS, quality control checks of data files, data analyses and visiting the intervention site (Holmlia health station) to get an overview of the data collection process.

2.2.6 Ethics

The study is conducted in full accordance with the ethical principles as per the World Medical Association Declaration of Helsinki. The Norwegian Data Inspectorate approved the study and it has been cleared by the Regional Committee for Medical Research Ethics.

3. Results

3.1 Profile of the participants

Table 1 shows the demographic profile of the participants. The prevalence of overweight and obesity in this group was 40.6% and 39.1%, respectively. Four out of five (79.7 %) had BMI 25 or higher. When applying the criteria which have been suggested for the South Asian population regarding risk of type 2 diabetes and cardiovascular disease (18), 94.9% had increased risk (BMI $\geq$ 23 kg/m^2) and 60.9% had a high risk (BMI $\geq$ 27.5).

Table 1: Baseline characteristics of participants.

	n (%)	Mean (95% CI)	Median (95% CI)	Range
Age (n=197)		41.2 (40.0, 42.3)		25.3-62.4
BMI (kg/m^2) (n=197)		29.6 (28.8, 30.4)	28.7 (27.8, 29.3)	19.2-52.4
- normal weight (BMI 18.5-24.9)	40 (20.3)			
- overweight (BMI 25-29.9)	80 (40.6)			
- obese class I (BMI 30- 34.9)	52 (26.4)			
- obese class II (BMI 35-39.9)	15 (7.6)			
- obese class III (BMI $\geq$ 40)	10 (5.1)			
Age at immigration (n=188)		22.6 (21.6, 23.6)	22.4 (21.3, 23.1)	1-45.2
Years living in Norway (n=188)		18.5 (17.3, 19.6)		0-35
Permanently in Norway (n=190)	164(86.3)			
Not lived permanently in Norway	26 (13.7)			
Formal education (n=191)				
- No formal education	21 (11.0)			
- Middle school or less ($\leq$ 8 years)	50 (26.3)			
- Higher secondary ($\leq$ 12 years)	92 (48.2)			
- University or College University	28 (14.7)			
- Years of education (n=191)		9.0 (8.4, 9.7)	10.0 (10.0, 10.10)	0-19
Work status (n=194)				
- Working/have worked	65 (33.5)			
- Housewife/have not worked	129 (66.5)			
Number of children (n= 195)		3.5 (3.3, 3.7)	4.0 (3.0, 4.0)	0-8
- No children (n=195)	9 (4.6)			
Number of people in the household (n=188)		6.5(6.2, 6.7)	7.0 (6.0, 7.0)	1-13

The ages at which the women came to Norway varied substantially, from 1 to 45 years, however the majority came in the beginning of their twenties: Fifty per cent of the women came at ages between 21 and 23 and mean time of living in Norway was 18.5 years. Two women had stayed in Norway less than one year while the maximum time of residence was 35 years. The large majority had lived in Norway permanently after arrival (vacations or visits home are accepted). Almost all of the women were married and had children, only ten were divorced and four widowed. They had many children; the median number was four children and only nine women were without children. All women were born in Pakistan, e.g. they are considered first generation immigrants, except for one woman who was born in Norway.

3.2 Perceptions of healthy eating

3.2.1 Which foods do they consider healthy and unhealthy

Healthy foods

In order to measure the participants' perceptions of healthy eating, they were asked to list what they emphasize if they were to choose healthy food. This was an open-ended question, but the interviewers registered the answers by marking the corresponding pre-coded response (see appendix 1). Each person listed from one to five items (n=183, mean 2.7.) Six participants answered that they did not know what to emphasize. Figure 2 shows that the most frequent item mentioned is *a lot of vegetables*, followed by *fish* and *salad*. Even though the women distinguished between *salad* and *a lot of vegetables*, these were mentioned together, i.e. all who mentioned *salad,* except for two, mentioned *a lot of vegetables* in addition. Some mentioned carbohydrate rich foods, such as *rice* and *roti*. Other components of healthy eating (not shown, mentioned by 3 % or less) were *proteins, water, lean food, less salt, less spice, boiled/less fried, milk and vitamins.*

Looking at different combinations of foods, almost half of the sample (48 %) mentioned both *vegetables* and *fish.* On the contrary, some food groups were seldom mentioned together: Only one mentioned *chicken* and *meat,* and only seven of those who said meat (n=27) also said that *fish* was healthy. However, half (e.g. 16 women)

of those who included *chicken* (n=31) in a healthy diet, also included fish. This indicates that fish and chicken were perceived as more similar in terms of healthiness than chicken and meat or fish and meat.

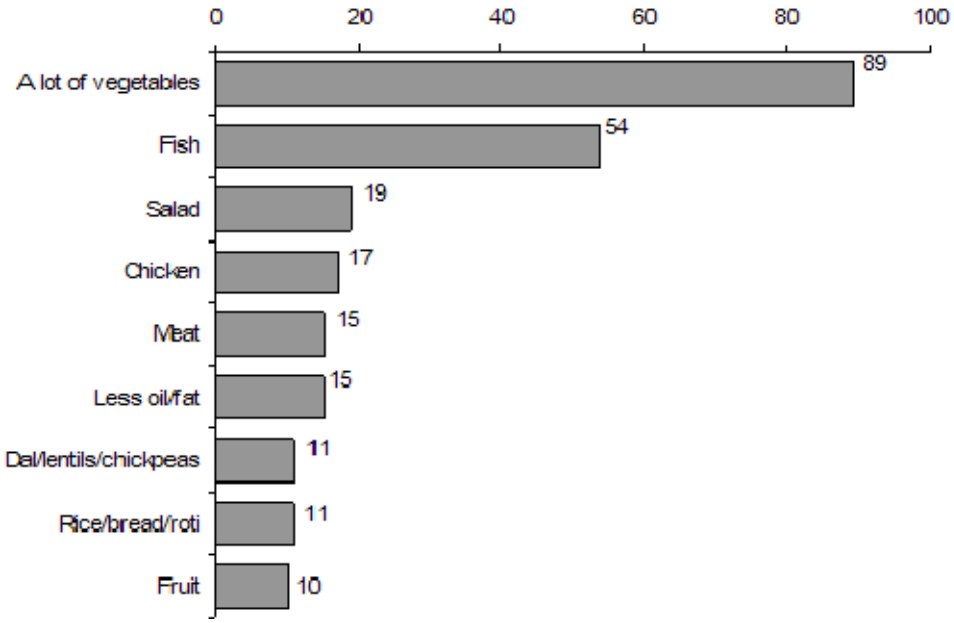


Figure 2: Foods and nutrients considered healthy, percentage of respondents mentioning each category (n=183).

When asked to select only one item which they emphasized the most when choosing healthy food, more than 65 % of the respondents said *a lot of vegetables*, followed by *fish* (8 %).

Among those who mentioned *fish*, a larger proportion were working/had worked previously (39 %), as compared to those who did not mention fish (29 %) (x^2=3.86, p=0.049). In the multivariate regression analysis (not shown), when controlling for the other variables (e.g. age, command of Norwegian language, formal education, time living in Norway and number of children), the importance of work was borderline significant (OR=2.033, 95 % CI=0.966, 4.152, p=0.051). No such relationships were detected when comparing those who mentioned *vegetable, fruits, chicken* or *meat*, compared to those who did not.

Unhealthy foods

On the open-ended question about what they considered unhealthy ("What do you think you should eat less of, what is unhealthy?"), the respondents listed from zero to seven items (n=191). They used both foods and nutrients in their descriptions, with a median of three items. *Sugar* and *too much oil* were by far the most mentioned. *Fat in general* was perceived as unhealthy by almost one quarter. When adding up the different types of fat (*too much oil, saturated fats from animal, butter* and *fat in general*), fat was the most frequently mentioned unhealthy item (82 %). All of those who mentioned *soft drinks* also mentioned *sugar*, except for one woman. Other items mentioned (by less than 5 %) were *potatoes/pasta*, *salt* and *sweets (chocolate, cake, ice-cream)*. Five respondents said they did not know of anything that is unhealthy.

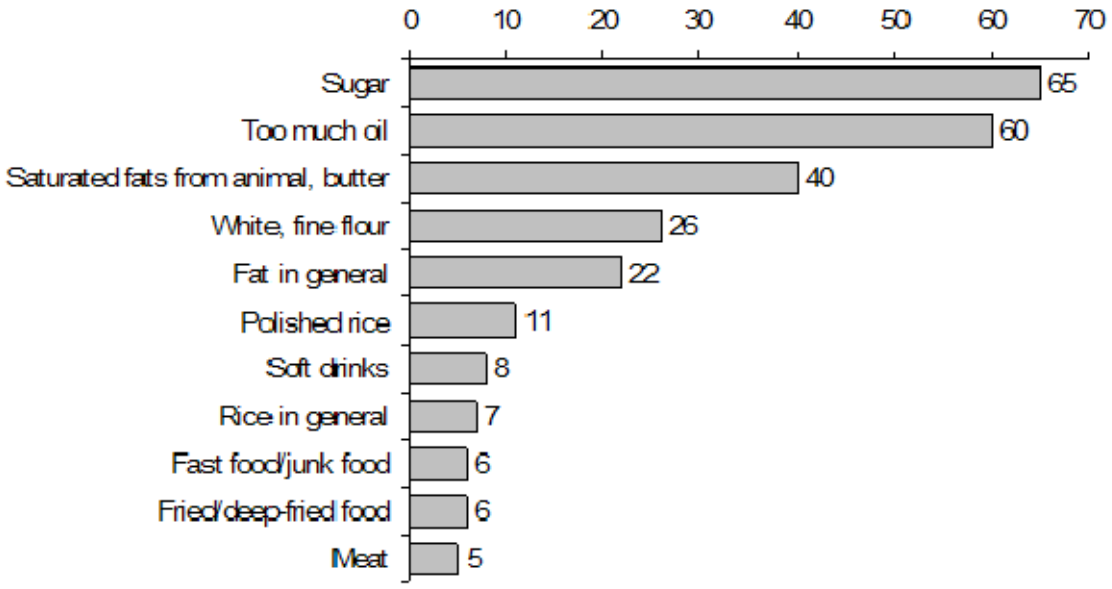


Figure 3: Categories of unhealthy foods nutrients and percentages of respondents mentioning each category (n=191).

No differences were found between those who mentioned *sugar, too much oil, saturated fats from animal, white fine flour* or *fat in general* and those who did not regarding demographic and socio-economic variables and command of Norwegian.

Unhealthy eating situations

Another way of exploring perceptions of unhealthy eating was by asking about *when* they ate unhealthy. This was an open-ended question and the answers resulted in the following main groups: *Visits/when with friends* (76%), *parties/feasts/celebrations* (58%) and *weekends* (10%) (n=185). In total, 89 % perceived social situations (e.g. *Visits/when with friends* and/or *parties/feasts/celebrations*) as unhealthy eating situations. Other reasons mentioned (by less than 5 %) were *when eating with the children*, *emotions* (e.g. when depressed/sad or angry), *eating out/travelling*, *when being in a hurry* and *Ramadan.* In addition, a small proportion reported with either *never*, *sometimes*, *often* or counted number of times per week, from once a week to every day.

3.2.2 Self-perceived barriers to healthy eating

Knowledge from a prior study (32), e.g. that intake of vegetables reduced after immigration to Norway, was the reasoning behind questions exploring barriers to healthy eating especially related to vegetable intake: if they ate more vegetables in Pakistan (*yes/no)*, reasons for this (open-ended), and suggestions of what would make them eat more (*yes/no*). The large majority (80 %) said that they used to eat more vegetables when living in Pakistan (n=158). Table 2 shows the percentage of participants who mentioned each reason when asked to list why they ate more vegetables in Pakistan. The most important reason is because *of the children*, i.e. that they do not like vegetables, while the least important reason is *because of little availability in Norway*. More than two thirds say they would eat more vegetables if they were not imported but grown in Norway, and if they tasted better. Freshness and taste are overall more important when considering eating vegetables than availability and price.

Table 2: Reasons for reduced intake of vegetables after immigration to Norway.

	Percentages of responses
Why do you eat less vegetables in Norway? (n=114)	
- Children do not like vegetables	47
- More fresh in Pakistan	27
- Husband do not like/eat vegetables	15
- Taste better in Pakistan	15
- Less availability and variety in Norway	11
Would you eat more if	Percentage answering "yes"
- they were grown in Norway, not imported? (n=145)	77
- they tasted better? (n=161)	71
- they were cheaper? (n=156)	12

3.2.3 Awareness of the 5-a-Day recommendation

One question assessed specific nutrition knowledge regarding official recommendations. Figure 4 shows that awareness of the recommendation of eating five portions of fruits and vegetables a day was varying, with only 26 % answering the correct number and nearly an equal proportion saying they did not know. The rest suggested less or more than five portions.

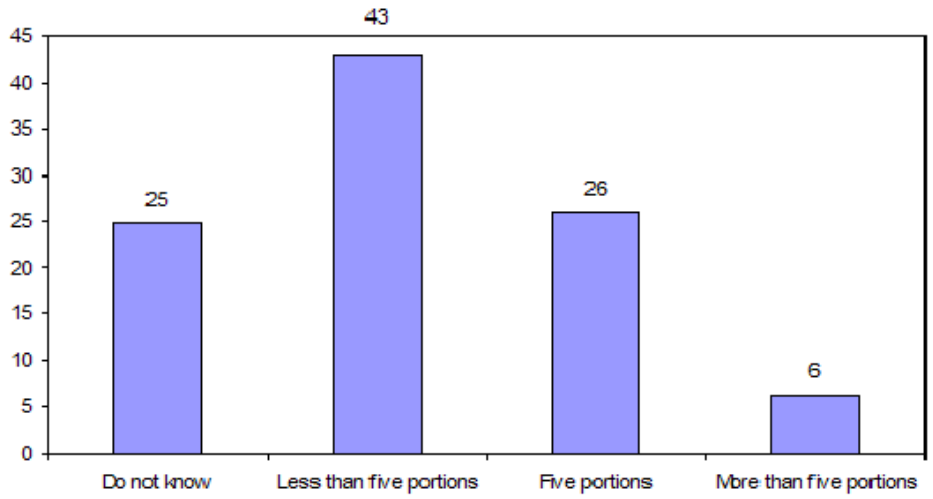


Figure 4: Proportions of respondents and answers to the question "Do you know how many portions of vegetables and fruits you should eat every day?" (n=189).

Multivariate logistic regression showed that time living in Norway and formal education was significantly related to awareness of the 5-a-Day message. In addition, younger age was related to being aware of the message, however borderline significant (see table 3.)

Table 3: Awareness of the 5 a day message, related to demographic, socio-economic factors and literacy, from logistic regression (n=171).

	Crude OR	95 % CI		Crude p-value	Adjusted OR	95 % CI		Adjusted p-value
Age	0,976	0,936	1,017	0,240	0,933	0,869	1,002	0,055
Time Living in	1,034	0,989	1,080	0,141	1,097	1,018	1,181	0,015
Norwegian (Ref: below average/poor)	2,790	1,329	5,855	0,007	1,293	0,492	3,396	0,602
Formal education	1,140	1,036	1,254	0,007	1,137	1,007	1,283	0,038
Work (Ref: no work)	2,305	1,174	4,523	0,015	1,458	0,642	3,311	0,367
Number of children	0,959	0,773	1,191	0,707	1,142	0,847	1,538	0,384

3.3 The role of healthiness in every day food choice

3.3.1 Considerations when planning and cooking dinner

In order to get information about the importance of health in every day food choice compared to other factors, the participants were asked to rate the importance of 12 different food-related values when planning and cooking dinner for themselves on a five-point Likert scale (very important, important, a little important, barely important, not important). Responses were further aggregated into two categories; very important/important and less/not important. Figure 5 shows the percentage of responses of very important/important (n ranges from 185-189, due to missing cases). The three most important factors were: *that the children like the food; that the food is healthy, balanced;* and *that it has little fat*. The least important factors were: *cost; that the food is quick to cook;* and *that it is Pakistani food*. That *the woman herself likes the food* was subordinated to the preferences of children and husband.

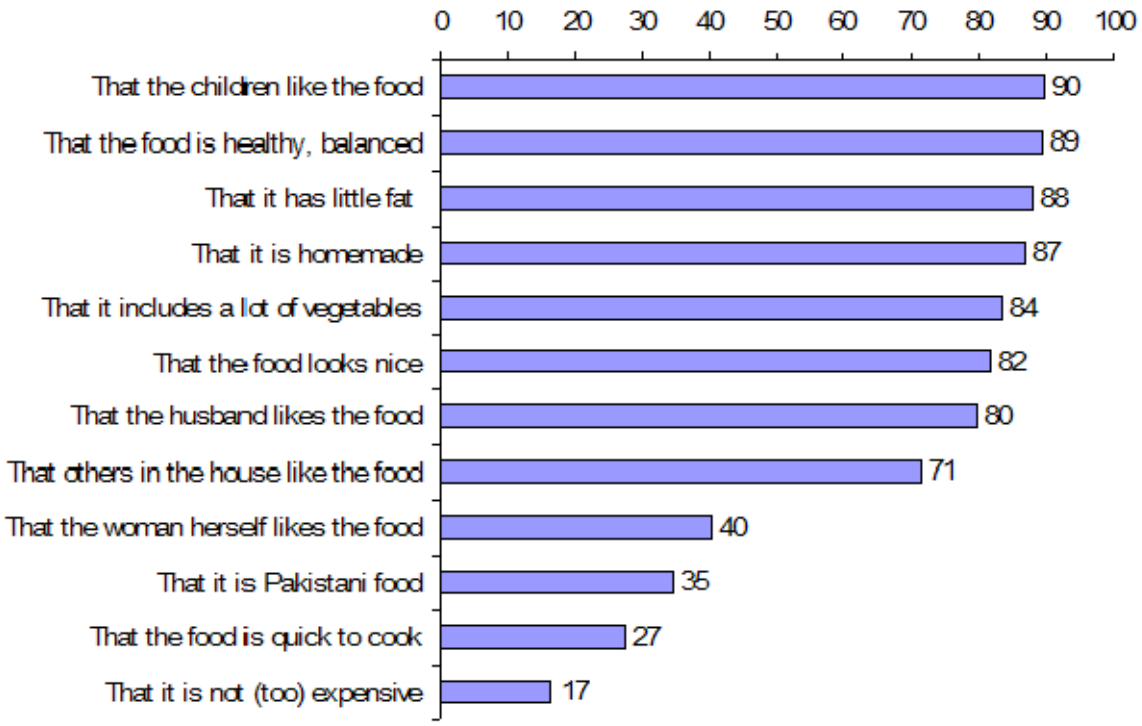


Figure 5: Factors considered very important/important (percentages of responses) when planning and cooking dinner (n=185-189).

In figure 6, the food choice process model is used in order to relate the different factors to each other. It shows that *health* and *managing relationship* were clearly more important than women's preference, convenience and cost. In this model the mean of the three factors, *that the children like the food, that the husband likes the food, that others in the house like the food*, represents *managing relationships.* The mean of *that the food is healthy, balanced, that it has little fat* and *that it includes a lot of vegetables* represents *health.*

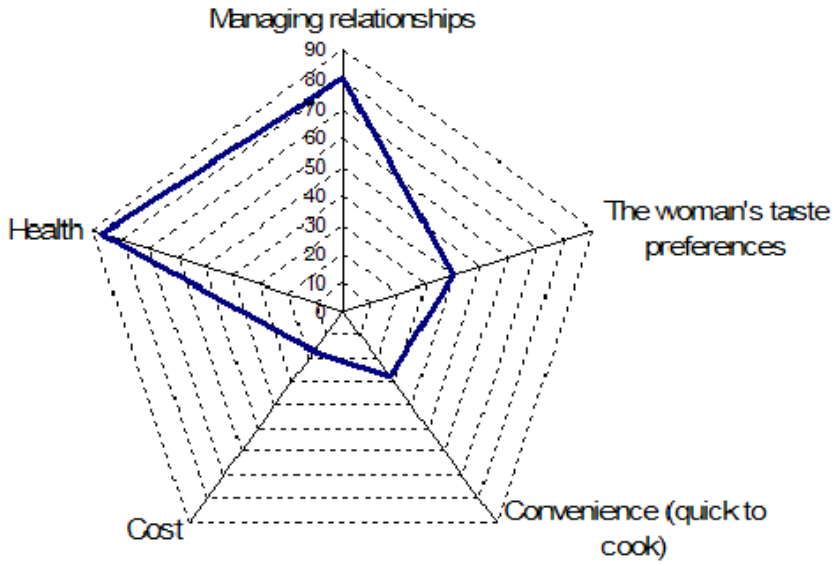


Figure 6: Importance of different factors, grouped into food values according to *the food choice process* model.

After evaluating the factors, the women were asked to select the *most* important one. Children's preferences was the factor selected by most women (34 %), second came healthy and balanced food (24 %), thereafter preferences of both children and husband (14%) and preferences of husband (7 %) (n=191). The remaining factors, mentioned by less than 5 %, are not shown.

In order to assess the characteristics of those most oriented towards the preferences of family members and those most oriented towards health aspects in food choice, two groups were aggregated: "Health oriented" (HO)(e.g. perceive *healthy food* or *a lot of vegetables* or *little fat* as most important, n=58) and "Managing relationships oriented" (MRO) (perceive *preferences of children* and/or *husband* or *others in the household* as most important, n=108). Multivariate logistic regression (table 4) showed that higher education (in number of years) and fewer children significantly increased the OR of being health oriented, while shorter time living in Norway, lower education and more children increased the OR of being MRO.

Table 4: Socio-economic and demographic variables and literacy as predictors of being either "health oriented" (HO) or "managing relationship oriented" (MRO) (n=173).

	Predictors of HO				Predictors of MRO			
	Adjusted OR	95% CI		Adjusted p-value	Adjusted OR	95% CI		Adjusted p-value
Age	1,050	0,985	1,119	0,136	1,011	0,948	1,079	0,740
Time living in Norway	1,017	0,950	1,089	0,624	0,929	0,864	0,998	0,044
Formal education	1,137	1,022	1,265	0,018	0,882	0,797	0,975	0,014
Number of children	0,720	0,552	0,938	0,015	1,569	1,198	2,055	0,001
Work (ref: no work)	0,934	0,428	2,036	0,863	0,677	0,320	1,433	0,308
Norwegian (ref: average/poor)	1,729	0,707	4,233	0,230	0,594	0,241	1,464	0,258

3.4 The relationship between perceptions of healthy eating, motivation and food choice

3.4.1 Selection of variables in the models

In this section, relationships between perceptions and dietary intake have been explored in more detail. Differences in attitudes regarding emphasise on food choice and motivation/intention to change dietary habits (stages of change) are related to two levels (high/low) of intake frequency of selected food intake.

Finally, intake frequency of high/low levels of vegetables and high/low levels of fish as dependent variables and demographic, socio-economic variables and perceptions as independent variables were explored in logistic regression models.

3.4.2 Dietary intake

Table 5 shows the dietary intake of fruits, vegetables and frequency of fish intake. Only 7% and 14 % had an intake within the recommended amount of up to 2-3 portions daily of vegetables and 2-3 portions of fruits, respectively. Frequency of fish intake included both fat and lean fish. Table 6 shows reported intake/intake frequency of food types high in sugar and fat, and choice of high fat milk.

Table 5: Reported frequency of intake of fruits, vegetables (n=197) and fish (n=195), percentages of respondents.

	Frequency	Vegetables	Fruits
1	> 4 portions/day	0	1
2	2-3 portions/day	7	14
3	1 portion/day	34	36
4	4-6	18	11
5	1-3	33	26
6	< 1 portion/week	8	12

Frequency	Fish
≥ 3 times/week	0
≥ 2 times/week	14
≥ 1 time/week	45
< 1 time/week	28
Seldom/never	13

Table 6: Reported intake/frequency of intake/choice of food types high in fat and sugar.

High fat foods		High sugar foods	
Cooking fat in *salen* per portion (n=196)		Sugar, honey and sweets. (n=196) (%)	
- mean, gram (95 % CI)	26.3 (23.7, 28.9)	- 1-3 portions a week	25
- median, (95 % CI)	21.4 (21.3, 25.0)	- Seldom or never	75
Fast food; pizza, hamburger. (n=196) (%)		Sweet bakery foods, cakes, ice-cream (n=196)	
- 1-3 portions a week	41	- 1 portion a day or more	30
- Seldom or never	59	- Less than one portion a	70
Deep-fried snacks/food (n=197)		Sweet desserts; *mitai, halwa* (n=195)	
- 1-3 portions a week	27	- 1-2 times a week	43
- Seldom or never	73	- Seldom or never	57
Type of milk in *chai* (n=195)		Soft drinks/sweetened drinks/ice tea (n=196)	
- Only full fat milk	74	- 1-6 glasses a week	66
- Fat reduced/no milk	26	- Seldom or never	34

3.4.3 Relationships between perceptions and intake

Perceptions of foods as part of a healthy diet related to intake frequency

Comparing those who mentioned fish as part of a healthy diet with the rest, there was a significant difference in frequency of fish intake. Chi square analysis showed that among those who perceived fish as healthy, 70 % eat fish once a week or more, compared to 48 % among those who did not mention fish ($p<0.01$). No such relationship was found for the most frequently mentioned healthy and unhealthy items (e.g. *vegetables/fish/salad/chicken/meat* and *a lot of sugar/too much oil/saturated fats/white, fine flour/fat in general.*)

Awareness of the 5-a-Day message and food intake

Chi-Square analysis showed that among those aware of 5-a-Day message, a higher proportion had a daily intake of fruits (63 %) and vegetables (59 %) of one portion a day, compared to those not aware (47 % and 34 %). The relationship is significant for vegetables ($p<0.01$), but not for fruits ($p=0.052$).

"Health oriented"(HO) and "managaing relationship oriented"(MRO) attitudes related to food intake

Figure 7 shows that intake of vegetables, fruits and high fat foods were significantly related to orientation towards primarily health aspects or primarily family preferences. The HO had a significantly higher intake of fruits (p=0.010) and lower intake of high fat foods (p=0.014), compared to the rest of the sample. They also had a higher intake of vegetables (p=0.139). The MRO had a significantly lower intake of fruits (p=0.025) and vegetables (p=0.005), and a higher intake of high fat foods (p=0.001). No differences were found regarding intake of high sugar foods and fish.

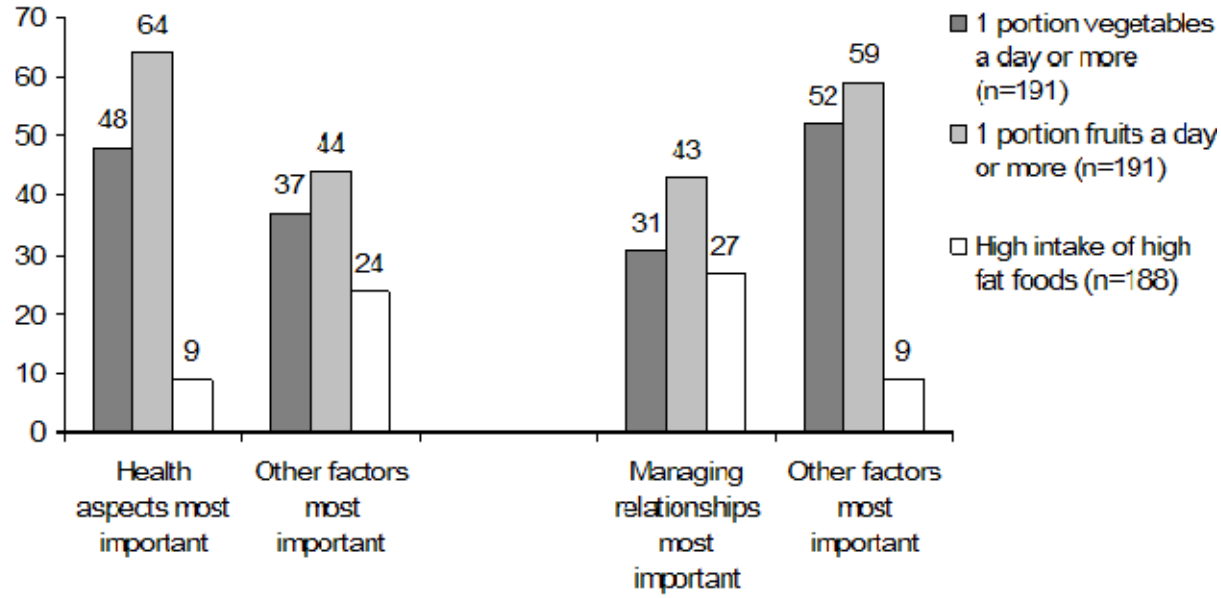


Figure 7: Proportions with a high intake frequency of fruits, vegetables and high fat foods within two groups: HO compared to the rest of the sample; MRO compared to the rest of the sample.

Stages of Change and food intake

Figure 8 shows the relationship between stages of change distribution regarding motivation and intention to increase intake of fruits and vegetables. When comparing the pre-action stages (pre-contemplation, contemplation and preparation) with the action stages (action and maintenance), about half of the respondents were in the action stages (51% for fruits and 49% for vegetables). Stages of change for fruits and vegetables were regressed on socio-economic and demographic variables and

command of Norwegian. Years of formal education showed a positive and significant relationship with being in the action stages for increasing vegetable intake (OR=1.115, 95 % CI = 1.025, 1.214, p=0.012).

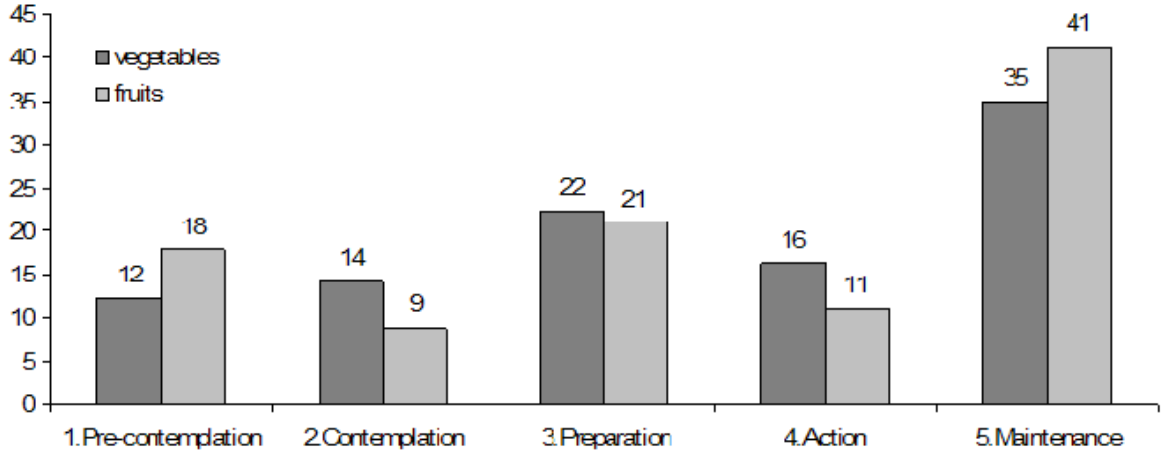


Figure 8: Distribution of participants (proportions) regarding motivation and intention to eat more fruits and vegetables (n=197).

Figure 9 shows the distribution of participants across stages of change for reducing fat and sugar consumption. Regarding motivation to reduce fat intake, there were fewer (42 %) in the action stages (action and maintenance) than in the pre-action stages (58 %). This differed for motivation to reduce sugar intake: almost two thirds (65 %) were categorized in the action stages, while only one third (35 %) was categorized in the pre-action stages. In logistic regression years formal education showed a positive and significant relationship with being in the action stages for fat reduction, when controlled for age, time living in Norway, command of Norwegian, work and number of children (OR=1.098, 95 % CI = 1.006, 1.198, p=0.037).

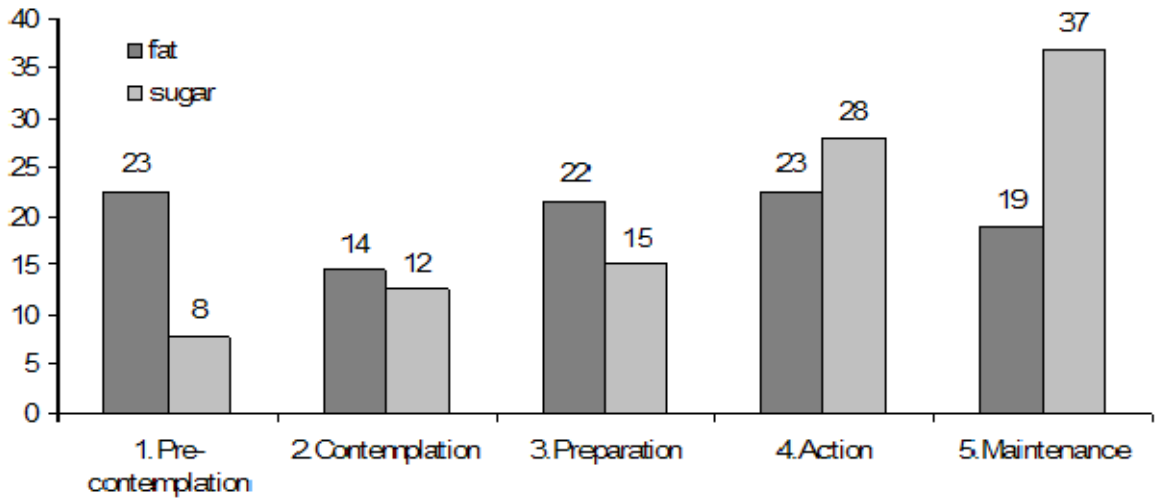


Figure 9: Stages of change distribution (percentages) regarding motivation to reduce intake of fat (n=195) and sugar (n=193).

Table 7 shows that there was a linear and significant relationship between stages of change distribution and reported intake of fruits and vegetables when analyzed with Chi-square. Among women in the action and maintenance stages larger proportions had a higher frequency of consumption than in the other stages. The difference is most profound for fruit consumption with 82 % eating fruits daily compared to only 12 % in pre-contemplation/contemplation stages.

Table 7: Stages of change distribution related to intake of fruits and vegetables.

	Pre-contemplation and contemplation (%)	Preparation (%)	Action and maintenance (%)
Vegetables (n=195)			
1-3 portions a week	60	55	26
4-6 portions a week	14	14	22
1 portion a day	24	30	42
2-4 portions a day	2	2	10
$x2 = 22.82$, $p < 0.01$			
Fruits (n=189)			
1-3 portions a week	85	51	9
4-6 portions a week	4	21	9
1 portion a day	12	23	54
2-4 portions a day	0	5	28
$x2 = 97,91$, $p < 0.01$			

For foods rich in fat and sugar the relationships are inverted e.g. in the action/ maintenance stages, significantly lower proportions have a high intake of these foods (table 8.)

Table 8: Stages of change distribution related to intake of high fat foods and high sugar foods.

	Pre-contemplation and contemplation (%)	Preparation (%)	Action and maintenance (%)
Fat index (n=192)			
Low level high fat foods	79	64	91
High level of high fat foods	21	36	9
x2 = 12.73, p<0.01			
Sugar Index (n=191)			
Low level of high sugar foods	53	66	90
High level of high sugar foods	47	34	10
x2 = 26.9, p<0.01			

3.4.4 Predictors of intake frequency of vegetable and fish

Predictors of vegetable intake

Awareness of the 5-a-day message and Stages of change for motivation to increase vegetable intake were found to be significantly related to intake in the bivariate analyses, and were therefore included in the logistic regression model as predictors of vegetable intake (1 portion a day or more/ less than one portion a day), shown in table 9. In the first model demographic and socio-economic variables were included. In the second model, message awareness was included, and continued being significant, together with command of Norwegian. In the final model only command of Norwegian and Stages of change variables remained significant predictors of vegetables intake.

Table 9 : Predictors of vegetable intake (1 portion or more daily) with logistic regression (n=170), in three models.

Predictors of vegetable intake, 1 portion a day or	Model 1: Demographic and socio-economic variables				Model 2: + message awareness and formal				Model 3: + Stages of Change for increasing vegetable intake			
	OR	95 % CI		p-value	OR	95 % CI		p-value	OR	95 % CI		p-value
Age	0,987	0,933	1,044	0,640	0,997	0,941	1,056	0,918	0,984	0,926	1,045	0,595
Time living in Norway	1,033	0,973	1,096	0,285	1,019	0,960	1,083	0,531	1,025	0,963	1,091	0,434
Number of Children	1,102	0,874	1,391	0,411	1,066	0,839	1,355	0,603	1,094	0,853	1,402	0,480
Norwegian (ref:	3,160	1,330	7,511	0,009	2,679	1,092	6,572	0,031	2,828	1,107	7,225	0,030
Work (ref: no work)	0,480	0,228	1,009	0,053	0,490	0,227	1,055	0,068	0,590	0,265	1,312	0,196
Formal education	1,031	0,948	1,122	0,473	1,028	0,942	1,123	0,531	1,002	0,913	1,099	0,968
Awareness of the 5-a-day Message (ref: not aware)					2,194	1,004	4,795	0,049	1,936	0,855	4,386	0,113
Stages of change (ref: pre-contemplation,												0,003
- Preparation									1,699	0,617	4,680	0,305
- Action and maintenance									4,157	1,736	9,957	0,001

Predictors of fish intake

Table 10 shows that perceiving fish as part of a healthy diet significantly increased the OR for eating fish for dinner at least once a week with 2.8 times (95 % CI = 1.463, 5.305, p<0.002), compared to those who do not mention fish when controlled for other variables. The model had one outlier (-2.69).

Table 10: Predictors of frequency of fish intake (fish for dinner once a week or more), including perceiving fish as part of a healthy diet, demographic and socio-economic variables and (n=176).

Weekly fish intake	Crude OR	95 % CI		Crude p-value	Adjusted OR	95 % CI		Adjusted p-value
Mention fish as healthy (ref: do not mention fish)	2,498	1,381	4,516	0,002	2,715	1,429	5,157	0,002
Formal education	1,038	0,971	1,110	0,274	1,057	0,974	1,148	0,186
Time living in Norway	1,034	0,996	1,074	0,083	1,013	0,956	1,073	0,658
Age	1,020	0,984	1,057	0,286	1,016	0,962	1,073	0,574
Command of Norwegian (ref: average/poor)	1,439	0,713	2,904	0,310	1,777	0,723	4,370	0,210
Number of children	1,155	0,953	1,401	0,143	1,153	0,912	1,459	0,235

4. Discussion

4.1 Discussion of methods

4.1.1 Design and selection of participants

Sampling methods

The ideal method of sampling is *probability sampling*, where the probability of selecting any subject in the sampling population is known and random selection is possible. However, from a practical perspective, probability sampling can be difficult or expensive to implement. Experience from prior studies on this population shows that there are additional challenges in recruiting South Asians in medical research because they may have different health beliefs and behaviours and there may be several barriers, such as language, illiteracy or varying reading and writing skills, and the experience that this group does not respond easily to written information. Time pressure or family obligations, including having small children, are other factors that may make participation difficult. Therefore, non-probability sampling through multi-recruitment strategies was used. Hussain-Gambles et al (94) have recommended several effective strategies for South Asian recruitment to clinical trials. These recommendations are applicable to the current intervention study as well, and have to a large extent been followed: Using multi-recruitment strategies; defining the demographic and social profiles of the population to be included; using focus groups to identify any potential barriers; consulting representative community members to provide assistance in the study; ensuring that eligibility criteria be set as wide as possible. In addition, the area targeted had high ethnic minority populations in order to increase recruitment. The sampling of women continued until there were 200 participants, and only ten women chose to not participate.

Using non-probability sampling methods, however, introduces the possibilities of selection bias, such as recruiting more motivated women or women interested in nutrition. On the other hand, the researchers experienced that some of the women were recruited based on interest in getting to know their health status through blood

analysis. The external validity of the findings in the current study is therefore limited. However, it is likely to be relevant to intervention studies in similar populations.

Furthermore, comparing the demographic data in this sample with Statistics Norway's (SN) (3) data on the Pakistani immigrant population as a whole highlights common features; the mean number of children is 3.5 (SN: 3.4) and the mean number of people in the household is 6.5 persons, including the woman herself (SN: 60 % live in households of five or more persons). Only one third is or has been engaged in income generating work (SN: 28% of Pakistani women are working). Therefore there are reasons to believe that the sample of the current study resembles a representative sample.

Sample size and item non-response

Collecting data from large enough samples of ethnic minorities has long posed a challenge, partly because of the small overall population size. In this study, the total sample size was 197 were women. For descriptive statistics, e.g., mean, frequencies, nearly any sample size will suffice. On the other hand, a "good size" sample, e.g. 200-500 is needed for multiple regression. For multiple logistic regression a the rule of thumb is that the smaller of the classes of the dependent variable should have at least 10 events per parameter in the model (95), for which the current sample size was sufficient. However, the sample size needed is also dependent on the variability of the data; the more heterogeneous, the larger sample size is required to obtain a given level of precision. Large confidence intervals are therefore clues of an inadequate sample size (95). In some of the logistic regression analyses, the total number included was reduced due to missing values/non-item response, which could explain the vide confidence intervals for some of the ORs.

Item non-response refers to the fact that due to fatigue, sensitivity, lack of knowledge, or other factors, respondents leave items blank on questionnaires or decline to give any response during interviews. In the current data there were missing answers on several questions, mostly since the participants did not feel that they could know the answer. A high number of "don't knows" has been seen in previous studies among South Asians (96).

The fact that the participants had taken the OGTT before completion of the questionnaire may have contributed to missing data or bias. The large dose of glucose can cause nausea or discomfort which may have further influenced concentration, cognitive performance and motivation to answer the questionnaire and hence reduced the quality of the data.

There is no simple rule for whether to leave data as they are, to drop cases with missing values or to impute values to replace missing values. When the number of cases with missing data is small (ex. <5% in larger samples), it is common simply to drop these cases from analysis. Even when there are larger numbers of cases with missing data, the researcher may opt for dropping cases rather than imputing values when the purpose is multivariate analysis, since an imputation can distort coefficients of association and bias the results in ways that are difficult to predict (97). In this study missing data were dropped, except for when computing the Fat Index, as it was considered necessary to replace the blanks (see next section). To assess bias due to cases with missing values, those with missing data were compared as a group to those without missing data on the independent and dependent variables analyzed. No differences were found; therefore, dropping the cases should not have biased the analysis. One should however recognize that there still could be bias due to unmeasured factors.

Handling of missing values

When computing the index of intake of high fat foods, it was necessary to manually impute values for amount of oil/fat used in *salen* for 12 cases. The reasons for non-item response could be that they could not estimate the amount, because they add oil/fat during the time of cooking, or they use different amounts every time. Information from a question on cooking methods however showed that all women with missing answers did cook *salen*; using methods like “frying in butter or oil, followed by boiling as a stew” (typical when cooking *salen*) most frequently. Only one case was left as missing, because no data on cooking methods was available. In addition, those who reported use of butter or margarine were also included in the index, because the amount of fat was of interest.

Imputation at the centre of the value (median) underestimates the variance, however, it was applied to only eight cases (4%). For those who reported using “little” or “a lot” the 25- and 75 percentiles were imputed. This was based on the assumption of what would be closest to “a little” or a “lot of oil” would be relative within the ranges of oil used in the sample as a whole. Moreover, commonly in handling of other dietary data, such as 24 hour recall, standard “mean portions” or values are often used when portion size, amount or type of food is lacking or unspecific.

Open-ended questions

Some of the questions in this study were open-ended (what is healthy/unhealthy and reasons for eating less vegetables in Norway), which is not very common in quantitative nutrition research. One reason is that open-ended questions are more difficult and time-consuming to code and analyze than those from closed-ended questions. An advantage, on the other hand, is that they can yield useful information, especially when researchers need to explore complex issues that do not have a finite or predetermined set of responses. This was the reason for using open-ended questions regarding healthy/unhealthy foods. However, the pre-coded response categories could have given some loss of detail, since the exact words or wording was not recorded. However, this was done in order to simplify the analysis of quantifying the different food categories. It was stressed to the interviewers that response categories should not be read out loud to the respondents, to not limit the range of responses, and that unexpected responses should be noted, since it the purpose of these questions to let the women give their own responses.

4.1.2 Internal validity and reliability

Internal validity refers to how inferences or conclusions drawn pertain to the study sample. Factors violating internal validity are *confounding and information bias.* Confounding factors are factors associated with the independent/predictor variables and causally related to the dependent variables/outcome. Factors not measured in the current study may be relevant and influence attitudes and dietary habits, such as income and other material resources, presence of other diseases both in the participants and their family. For example, women with husbands or other in the household with T2D or CVD may have more knowledge regarding nutrition. In that case the relationships detected could be more or less influenced by other factors.

Information bias is defined as errors in measuring any study variable. All data in the current study, except for anthropometric measures, are self-reported data. This in particular introduces the possibility of information bias related to dietary intake variables, demographic and socio-economic variables and psychometric variables. Bias in terms of random errors, such as misclassification of subjects, may reduce the possibility of detecting relationships. Systematic errors, such as selective under- or over-reporting of foods, and acquiescence bias, may distort relationships and findings. Sources and effects of information bias are discussed in the following sections.

Social desirability bias and acquiescence

Self-reports are sensitive to respondent's memory biases and potential for social desirability bias (SDB) (98). Respondents may answer a questionnaire to obtain social approval or avoid social disapproval, e.g. SDB, and to protect particular identities or personalities. SDB effects are complex and have the potential to attenuate, inflate, or moderate variable relationships depending on the measures being used. For example, when asking about what is important to the women when cooking, the response items reflect various values (such as family and health). Values are a conception of what is desirable within a culture and respondents are motivated to bias

their responses to the degree that the value is strongly prescribed within the social system (98).

Acquiescence is another category of response bias referring to a tendency to agree with all the questions or to indicate a positive connotation. Acquiescence seems to increase when people are interviewed face to face, rather than anonymously filling a questionnaire. Differences in acquiescence bias are, furthermore, found to be related to culture (2) and impose additional challenges in interpreting the findings. We can not make any conclusions regarding impact of acquiescence on this and other questions in the current study, only recognize that it has the potential to influence the results.

Factors related to translation of questionnaires

The face-to-face interview method was chosen in this study because it was the researchers' experience that many in this immigrant population do not read well, and many are not familiar with the format and system of questionnaires, so self-administered questionnaires would have been of poor quality. The questionnaire was printed in a Norwegian version only. This is because it was expected that most of the participants would speak Punjabi and not Urdu. Furthermore, Punjabi is predominantly a spoken language. There is not a single script for the Punjabi language, rather there are several different scripts used for writing the language, depending on the region as well as the religion of the speaker.

During the interview questions were translated to Punjabi, Urdu or English or asked in Norwegian according to the respondents' preference. Back-translation was also done during the interview. The logic of questionnaire-based research requires that all respondents be confronted with the same question, so any differences between people in their responses are due to real differences between the people. At the same time, cultural perceptions are moderating the meanings being assigned to many questions by respondents. It would thus appear that shared stimuli or question wording alone is not sufficient to ensure reliable measurement, as the meanings assigned to specific stimuli may consistently vary across cultures. So, even if the questions had all been translated to Punjabi or Urdu and read out to the respondents, there would still be

differences in how questions were interpreted. However, after conducting the study the researchers would recommend translating the questionnaire into Punjabi using the Latin alphabet in order to increase reliability.

This inherent difference in understanding also applies to the researchers, including the master student. Some of the researchers have a cultural background different from the study population which may have influenced how questions were constructed and how answers were analyzed and interpreted. In addition the particular aim of the study and relating food and eating with health and diabetes form the researchers' perspective.

In order to reduce possible bias due to different understandings and perspectives translations of the questionnaires were discussed between the interviewers. In addition, the researchers analyzing the data asked the interviewers about their exact translations on some questions. In particular, this was relevant for the questions regarding healthy and unhealthy food.

Socio-economic measures

Socio-economic status is a common parameter in nutrition and health research, and different indicators of social position have been used, most commonly work, formal education and income. These measure different aspects of social position, but are interrelated and overlap each other. Education is the most easily measured indicator, widely used and reported to be the strongest and most consistent indicator in assessing socio-economic differentials (99). Some recommend that income be included in the socio-economic variable (100). However, asking for income or welfare benefit information was considered too complicated to include in the questionnaire, partly because of large and multi-generational households with several people contributing to total income and the households possibly supporting relatives in Pakistan. Asking of income might involve the husbands, however, the researchers wanted to make the study independent of husbands.

Therefore, as a measure of socio-economic status only self-reported formal education (in years) and engagement in income generating work was used. The latter variable

was used, adding those who had been working earlier, and the variable was dichotomised (working/have been working; are/have not been working), because of main interest in participation in the labour market. The assessment of engagement in income generating work may, in this group, therefore be perceived as a variable that tells more about contact with the host population than social status. However, it was possible that some had reported work in Pakistan.

Factors influencing dietary acculturation

In research on dietary change in immigrant groups the concept of dietary acculturation has been widely used. However, there are many views of how this concept should be defined and measured. For the purpose of this study, the definition by Satia-Abouta et al. is useful: “The process by which immigrants adopt the dietary practices of the host country” (44).

In the literature there are three major approaches to assessing dietary acculturation: single-item measures of general acculturation, acculturation scales and food-based assessment. Command of language and length of residence in the host country are examples of the first measure, which are commonly used for assessing general acculturation in many studies. However, these measures are non-specific and therefore may misclassify a respondent’s level of acculturation (44). Therefore in the current study, command of Norwegian and time living in Norway should be viewed as factors having influence on dietary acculturation, not measures of acculturation per se.

Furthermore, self-assessment of command of Norwegian (like all self-reported data) suffer from measurement error and problems of misclassification (101). Dichotomising the originally 5 point ordinal scale of language proficiency may result in loss of information. However, using three (aggregated) categories showed no difference between lowest and middle categories in the logistic regression analyses. Also years of residence in Norway may be burdened with some inaccuracy. Some women had lived part time in Pakistan after arriving to Norway the first time, and some may have attended schools in Pakistan during this time. However, the large majority (86.3%) reported living permanently in Norway.

Reliability

Reliability is the extent to which the measurements of a test remain consistent over repeated tests of the same subject under identical conditions. It can also be interpreted as the lack of random error in measurement. Test-retest reliability for the attitude questions in the pre-coded questionnaire was assessed in South Asian women (n=16). Inter-rater reliability was also assessed by comparing 48 hour dietary recalls between the different interviewers. No systematic differences were found in terms of energy or nutrient intake, which suggest that inter-rater reliability for the FFQ-part would be adequate. FFQ is however a more interviewer driven method than dietary recall, so inter-rater reliability should be assessed for this instrument as well.

4.1.3 Food frequency questions and methodological issues

The food frequency questions in the pre-coded questionnaire were based on the dietary questions from the Oslo Immigrant Health Study, which have been validated on Norwegian adults (87) and modified for use in the immigrant population (85), and the questions from the DE-PLAN have been validated on Finnish adults (88). They were further adapted for the intervention study InnvaDiab. It might be questioned whether validation on other populations is sufficient, since special modifications are needed in dietary assessments when the study population have food habits or cooking practices that are not native to the study population. Not only may food selection vary, but also portion sizes and compositon of meals. In future studies, validation of the food frequency questions used here might be necessary to assess the validity of the modifications that were made.

There are several concerns regarding measurement errors associated with food frequency questionnares (FFQ), and it has been argued that food intake data in general are likely to be measured more poorly than most other variables. Relying on self-assessment and recall, the unreliability of memory remains the central inherent problem. Other factors related to the subjects may affect the accuracy with which dietary intake is measured e.g. formal education, age, cultural background, health status, knowledge and attitudes. In quantitative terms the overall measurement error can be divided into systematic and random error. Systematic errors are often referred

to as scaling bias; when measured intake overestimates or underestimates the true intake, either on average, proportional or non-proportional (some foods are over- or underestimated more than other). The errors are considered to be random (102).

The structure of the FFQ also influences the results. A review on instruments measuring intake of fruits and vegetables suggested a greater validity for survey instruments with a moderate number of fruit and vegetable items and/or which included questions on portion sizes and consumption of mixed vegetable dishes (103). It is recognized that underestimation by exclusion of composite dishes/foods seems to affect intake of vegetables more than of fruits. It has also been shown that questionnaires with a short list of items tend to underestimate consumption both compared to reference methods and to detailed questionnaires (103).

The intake of total fruits and vegetables in this study was measured by asking for the total amount in terms of portions and frequency, which may be too few items. On the other hand, standard potions size was described to the participants by using reference volumes of household measure, such as “a small bowl” and “half *katori* (cup)”, which would increase validity. When assessing use of cooking fat in *salen* portion models, a picture booklet was used to help participants estimate intake. Uncertainty remains, however, over the measurements of vegetables in particular; whether everyone included what they used in composite dishes and whether they managed to conceptualize the total intake with accuracy.

Regarding the *frequency* of consumption, the measurement error is likely to be less substantial. It has also been shown that by comparing high and low levels of consumption, it was found that frequency of intake had much more impact on classification of intake level than serving size (104). In the current study, it was not an aim to measure the quantitative intake of the selected foods on an individual level, rather data on frequency of intake was used which is considered sufficient to rank the individuals and compare levels of intake frequency.

In individual dietary research, under-reporting in particular is a well -known source of systematic error (105). While in the past it was thought that obese persons and women were the most systematic under-reporters, it has now been established that the

phenomenon is much more widespread and affects all ages and both sexes, and that other subgroups of the population besides the obese are also affected (105;106). Under-reporting is mostly associated with retrospective methods, such as the FFQ. Memory may not only be quantitatively imperfect but also selective, with people tending to report lesser consumption of foods to which social stigmas are attached, e.g. SDB is particularly related to high-fat or high- sugar foods. As a consequence, the systematic errors associated with under-reporting are usually compounded by a non-proportional scaling bias of various nutrients (106;107). The possibility of over-reporting of foods perceived as healthy or socially desired is also present. The fact that the women participated in an intervention especially focusing on diabetes and that the majority was overweight can have influenced the results. It should be noted that additional analysis showed that the intake of foods rich in fat was positively associated with increasing BMI, and therefore possible systematic under-reporting of high-fat foods is less likely to be related to the degree of overweight/obesity.

Furthermore, since SDB is assumed to reflect cultural values, there may be differences between ethnic groups, however, we had no possibility of making such comparisons in this study. Others that have examined this issue (108) observed no relationship between SDB and self-reported intake of fruits and vegetables in a multi-ethnic group of women (i.e. Black, White, Hispanic and Asian American). There was no association of SDB with self-reported fruit and vegetable intake. The effect of SDB on FFQ reports of macronutrient intake appeared to differ by formal education, but not by ethnicity or race.

In summary, constant scaling errors may cause bias in effect sizes for quantitative differences in intake, but they do not affect OR estimates for categories of subjects ranked according to intake level. However, if the bias is systematically different for different subgroups of the sample (e.g. non-proportional scaling) then the effect estimates are affected, resulting in either overestimation or underestimation of effects. On the other hand, the random error leads to underestimation of measures of association. To assess the magnitude of over-reporting/under-reporting, scaling bias and random error validation of the current instrument is necessary. Without data from

a validation study there are no other objective criteria for evaluating the validity of the dietary questions used in this population.

4.1.4 Measuring perceptions; attitudes and beliefs

"Perceptions of healthy eating" is here used as an overall definition, covering knowledge, attitudes and beliefs about healthy eating, eating for health and healthy foods. These are different concepts, however, measured in different ways, and have different limitations which are important to have in mind when interpreting the results.

Attitudes and beliefs

In the current study, 12 factors in food choice were included in the questionnaire, including three factors related to health aspects (e.g. that the food is healthy/balanced, has a lot of vegetables and has little fat). The importance of factors was measured on a 5 point Likert scale in order to measure attitudes towards healthy eating.

Likert scales may be subject to distortion from several causes. Respondents may avoid using extreme response categories (central tendency bias), and as explained earlier, agree with statements as presented (acquiescence bias), or SDB. The fact that over 80 % said that seven out of eleven factors were very important/important and the very low variability in responses (skewed towards the positive end), may indicate the presence of acquiescence bias and/or SDB.

There is extensive literature on attitudes which shows that agreeing upon a "universal" definition is difficult, as is developing and evaluating attitude-measuring instruments (109;110). Moreover, attitudes are related to concepts such as beliefs and values - often used synonymously. For the purpose of this study, the definition by Bohner & Wanke (109) is used; attitude is a summary evaluation of an object of thought. Attitude refers to a feeling of favourableness or unfavorableness toward something (110). Using these definitions, it is operationally possible to distinguish between attitude and belief, with both concepts on a continuum labelled with "affect" on one end and "facts" on the other. Along this continuum, attitudes would be placed toward the affect side, while the belief concept would lie much closer to the fact or

cognition side. In other words, when measuring attitudes, the attitude items should not be formulated so that they can be measured by a "correct-incorrect" count, but rather items must be stated so that they evoke an affective or evaluative response (110).

This distinction between attitudes and beliefs has relevance for the questions on important factors when choosing dinner: Questions like "Is it important that the food contains a lot of vegetables?" or "that it contains little fat?" may be evaluated by a correct-incorrect account, and therefore one can not distinguish between the respondents beliefs and attitudes. Furthermore, in this study, the food choice process model was used to view the different factors/attitudes together. This model is referring to different food *value* that people negotiate between. However, values are often equated with attitudes, and although believed to be more enduring, general and less specific than attitudes (110), the model was viewed as applicable.

Another important consideration when constructing attitude measurements is the number of items used. Sims (110) has maintained that attitudes must be measured on the basis of multiple measures or multiple items, not as single item scores. The latter will detract from the reliability of the scale and, hence, will detract from the usefulness of the item as a predictor if one is to study the relationships between attitudes and behaviour.

The reason for measuring attitudes in dietary research is partly because attitudes are frequently conceptualized as "pre-dispositions to action" or determinants of how a person will behave. The methodological challenges in measuring attitudes, as described, are important to consider. However, research on dietary behaviours in general has been limited by a lack of attention to the psychometric properties of measurement instruments, particularly within and across ethnic groups. Most often works on attitudes, beliefs and perceptions related to food and health among minority South Asian groups have used qualitative methods (32;71;111-113). Therefore, there is little data available on the methodological issues of psychometric assessments relevant for the current study.

Due to the fact that the questionnaire used in the current study needed to cover both psychometric and dietary variables, it was considered necessary to structure a shorter measurement tool to reduce the burden on the respondent. This made it possible to compare variables of perceptions and diet across groups in terms of socio-economic and demographic characteristics.

4.1.5 Dietary research in a migrant population

The current work is part of an intervention study among Pakistani women only, with no comparable groups of differing ethnicity, and is therefore not a cross-cultural study. That would require comparison with another cultural/ethnic group with similar socioeconomic status, living in the same geographic area. The immigrants do, however, live in a "cross-cultural" context, and therefore the results are referenced against international literature where available, in addition to studies on South Asian immigrant populations in Norway and other Western countries. Furthermore, the descriptive study of one ethnic group can provide, if current, useful information to health practitioners in the field working with particular cultural subgroups. In addition, the results from baseline can be valuable in analyses of the post-test results of the intervention.

The study of food and diet is a complex field, because it affects and relates to most aspects of our way of life and who we are. The reality therefore may be best described by using many different approaches. This study is not describing the whole picture regarding perceptions on healthy eating or influences on food choice, but builds on previous research, and the most relevant is the qualitative study by Mellin-Olsen & Wandel (32;110) who have explored Pakistani women's perceptions of dietary changes after coming to Norway. The current study is providing quantitative data on many of the same issues discussed by the former researchers.

4.2 Discussion of results

4.2.1 The different approaches to analyzing perceptions of healthy eating

Perceptions of healthy eating were explored through four approaches: 1) perceptions of healthy and unhealthy foods, 2) awareness of recommendations of fruit and vegetable consumption, 3) attitudes towards important factors in food choice and 4) stages of change for motivation/intention to change dietary behaviours. These approaches/perceptions were further analyzed in three steps: first, the perceptions were analysed on participants' background variables (demographic/socio-economic), next in relation to food intake, and finally perception of fish as part of a healthy diet and awareness of the 5-a-Day message were used as predictors of dietary intake, controlled for background variables.

4.2.2 Perceptions of healthy eating

Translation of "healthy"

As there is no word for "healthy" in Punjabi or Urdu, the interviewers used the translation: "If you were to choose food that is good *for your body*, what would you especially emphasize." Similarly, "unhealthy" was translated as "not good for the body." It is important to consider the wording of the questions because in many other studies people have usually been asked to describe healthy eating in their own words (114), not just healthy foods, and therefore many may have found a broader array of definitions.

Healthy and unhealthy food choices

When describing healthy foods, the women used both food groups (i.e. vegetables and fish) and specific foods, (i.e. *roti*, chicken and salad). When describing unhealthy eating, nutrients were more frequently used, such as sugar and fat. This difference in the use of foods versus nutrients may be due to question wording, leading the

respondent to think of specific foods only; “If you were to choose *food* that is good for your body.” The question regarding unhealthy eating did not include *food*: “What do you think you should not eat much of, which is not good for your body/for your health?” The different use of terms could also reflect how dietary recommendations most often are worded: for example, increase intake of vegetables and fruits and reduce intake of sugar and fat, including saturated fat (115).

In the review of the literature, fundamental elements of the perceptions of healthy eating were found to be: vegetables and fruits; meat; low levels of fat, salt and sugar; quality aspects, such as fresh, unprocessed and homemade foods; concepts of balance, variety and moderation. Vegetables and fruits were most often mentioned by participants as healthy foods, as part of a healthy diet or as most important for healthy eating (53). In a population study from Norway, it was found that vegetables, potatoes, fruits and fish had a strong position in the notion of a healthy diet (116).

The Pakistani women’s definitions of a healthy food choice were broadly in line with current recommendations and earlier findings; vegetables and fish were mentioned most frequently as healthy, and sugar and fat were the dominating unhealthy items. Some exceptions were however found. For example, that fruits are important in a healthy diet, as compared to vegetables, was mentioned by far less women. In contrast, a good number of studies have found that both fruits and vegetables were most often mentioned by participants as healthy (53). This discrepancy could be due to the fact that fruits are not recommended in great amounts for people with diabetes. Given the high prevalence of diabetes in the Pakistani population, it is reasonable to assume that many of the women would know people with diabetes and may therefore have knowledge of dietary advice for people with diabetes; moderate the intake of sweet foods. That the women mention sugar most frequently as unhealthy may also be related to diabetes. In Punjabi, the words “sugar” or “sugar di bimari” (translated as the illness of sugar) are commonly used for diabetes. Rankin and Bhopal (96) studied the understanding of heart disease and diabetes in a South Asian community in the UK, and found that many respondents related diabetes directly to the amount of sugar eaten. The authors suggested that this misperception could result from a lack of knowledge, but could partly be explained in terms of semantics, using “sugar” for

diabetes. In the current study, the fact that they participated in a diabetes prevention project setting may also have influenced their answers.

Quite few women mentioned beans and lentils as healthy. In terms of T2D or IGT, beans and lentils are highly recommended because they have a lower influence on blood glucose than any other carbohydrate-rich food. This effect relates to their high soluble fibre content and naturally occurring starch blockers (inhibitors of digestive enzymes responsible for hydrolysis of starch) (117). The traditional Pakistani diet contains various legume dishes, such as *dhal*, and therefore a recommendation of increasing the use of legumes is in line with traditional food practices and may be a more natural and easy way of making dietary changes. However, there may be several barriers to using legumes, most importantly the children's dislike of both traditional vegetables and *dhal* (32). Dawes conducted a qualitative study on socio-cultural perceptions and practices of dietary choices among Pakistani women in Oslo (75). She found that some adults seemed to link lentils to lower socio-economic status and perceptions of poor nourishment as opposed to food of animal origin. It should be noted that in Dawes' study, the sample consisted of only 12 women age 42-70 and sampled from a particular geographical area in Oslo. Therefore, the narratives and perceptions found may not be applied to the Pakistani immigrant population as a whole or to the sample of the current study, but it illustrates that foods considered healthy in a biomedical perspective could have other, and even contradictory, meanings to people that make them less "palatable".

In addition to sugar, fat was perceived as unhealthy by the greater majority. An interesting finding is that *too much oil* was mentioned by the majority of the respondents. In the former qualitative study by Mellin-Olsen & Wandel (32), the Pakistani women told about changes in fat intake that had proceeded through three different stages after migration. The first stage was immediately after arrival into Norway when they increased their use of butter and margarine since they are culturally favoured and accessible at a relative low price. Next, as a response to nutritional information in Norway, almost all of them changed to oil instead. Now, because of the high obesity prevalence, the nutrition message is to reduce the intake of oil. Some, therefore, begun to cut down on the amount of oil in *salen*. However,

many used generous amounts of oil for cooking, and refer to the nutrition advice that oil is better for health than butter. This advice had made some believe that oil contains fewer calories than butter. In the present study however, 62% of the respondents perceived too much oil as unhealthy, indicating that the message to reduce oil consumption is widespread in this group. No difference in use of oil was detected when comparing those who mentioned "too much oil" to those who did not. This could be due to that "too much" itself is a relative concept. In the qualitative study by Dawes (75), her sample of women used traditional cooking methods e.g. foods were prepared as curries or fried with generous amounts of oil, and this was done to provide digestibility and nourishment.

Other aspects used to categorize food?

Quality aspects, such as fresh and unprocessed or homemade food, and balance and variety, which have been a common finding when people are asked to describe healthy eating (53;116), were not mentioned explicitly in this sample. However, the perception that "too much oil" is unhealthy refers to some notion of balance or moderation of that nutrient. Hot-cold attributes to foods, digestible/indigestible or strong/weak classifications were not mentioned at all, but these attributes have been reported in the qualitative studies on this population in Norway (32;75). Also, a number of studies from the UK have shown the persistence of traditional ideas such as the "heating" or "cooling" effects on the body, and that the key to wise eating is choosing foods that will keep the body "balanced" (71;118).

An explanation for different findings is probably related to the wording of the question; as already mentioned, were asked to mention what *foods* they would choose. These other food qualities may still be important in the women's thinking of what is the "right" food for the body or for health, but might remain as more subtle thoughts or parallel to the "healthy/unhealthy" categories. In a qualitative study by Ristovski-Slijepcevic et al. (113), such ideas were studied, e.g. how people make sense of different healthy eating discourses among three different ethnic groups in Canada: African, Punjabi and Canadian Europeans. They concluded that mainstream perceptions of conceptualizations of healthy eating (based on official nutritional

guidelines, i.e. “experts’ advice”) were often combined with cultural/traditional perceptions (which incorporated accounts of cultural/traditional foods considered to be healthy), providing illustrations that different accounts of healthy eating can co-exist, even if they seem contradictory.

Meat and charbohydrate rich foods - inconsistent perceptions?

Meat was perceived as healthy by 15 % and unhealthy by 5 %, which suggest that the role of meat in healthy eating is not clear. This is also supported by other studies. In an earlier study the perceptions of healthy eating included avoiding or limiting meat consumption (114), and in a more recent study from the UK by Lake et al. (119), some considered meat necessary for a healthy diet, while others perceived reducing meat as part of a healthy diet. Perceptions of meat have also been related to differences in social class, i.e. that people with lower SES more frequently mentioned meat as healthy (120). In this study no such differences were detected.

Healthy or not, meat is considered a prestigious food and other studies on the Pakistani immigrant population report an increase in intake after immigration (32;43). In the current study, some women’s answers of why they had reduced vegetable intake in Norway gave indications of increased meat consumption at the expense of vegetables; they mentioned either that meat was more affordable or available in Norway, as well as family member’s higher preference for meat. However, Mellin-Olsen & Wandel (32) revealed that many Pakistani immigrants in their sample were aware of the effect of fatty meats on CVD, and said that this information had made them reduce the intake of mutton or meat in general compared to what they initially ate in Norway. Dawes (75) also found in her sample that the women had included chicken and fish in their diet, due to failing health, dietary recommendations and children’s preferences. At the same time the women used the words equivalent to “strength giving” or “health promoting” in Urdu when describing meat, and they said that men required nourishing food, partly because of long working hours. In addition the women linked meat to old traditions related to Islam, giving meat a religious dimension (75). Meat has also been characterised as a typical “hot” food, suitable in the cold Norwegian climate (32). In summary, these findings may indicate that the

role of meat can be interpreted in various ways; the meat's symbolic meanings, "hot" attributes and nourishing value may accentuate its use, while some may question the role of meat in a healthy diet due to considerations of fat content. This could explain the inconsistent findings in the current study. The inconsistent perceptions of meat, mentioned as healthy by some and unhealthy by others, may be attributable to the term itself, which can encompass many varieties of meat cuts and products.

Chicken on the other hand seemed to be perceived as more "similar" with fish in terms of healthiness, since fish and chicken more frequently were mentioned by the same individuals. In contrast only one woman mentioned both meat and fish.

Rice was also perceived as both healthy (11%) and unhealthy (17%). Just as meat is a prestigious food, rice has a special significance for Muslims. One explanation for this is because rice is not grown in Punjab and so has to be imported, adding to its cost which may explain its status (111). When rice was mentioned as healthy, most women said *boiled* rice, distinguishing it from fried. That *rice in general* is perceived as unhealthy, in addition to a small proportion mentioning *potatoes* or *pasta*, could indicate that some related foods they considered unhealthy/"not good for the body" to diabetes. In such a perspective, carbohydrate rich foods may be categorized as unhealthy in terms of unwanted effects on blood sugar. However, alternative explanations are possible for perceiving potatoes and pasta as unhealthy. For example, it was reported that Western foods, such as pasta, were viewed as less healthy and "too heavy" to digest among South Asian immigrants in Canada (113). In another study, South Asian Bangladeshi immigrants viewed any vegetable that grew under the ground as indigestible (71). Such reports reflect that perceptions of healthy eating may include meanings and food attributes that were not captured by asking about "food that is good for the body." Further studies should seek to explore a wider array of healthy eating definitions.

That the women in this study, in line with many other studies, refer to recommendations when describing healthy eating shows that information has an impact on people's definitions and perceptions of food. However, this knowledge or awareness is not necessarily the same as understanding and integrating them into

every day food choice and practice. Indeed, a wide range of qualitative studies on food habits have pointed at the recurrent and contrasting ways that people talk about food; they use more personal descriptions when referring to good or tasty food, while when talking about health, more abstract and scientific and less personal descriptions are used (121). In the following section, I will discuss the findings regarding the influence of perceptions of healthy eating on food choice.

4.2.3 The relationship between perceptions and dietary habits

Awareness of the 5-a-day message and consumption of vegetables

Almost all the women (89 %) perceived *a lot of vegetables* as part of a healthy diet. No differences were detected in vegetable intake between those who mentioned vegetables or those who did not, which could be due to the low number of women in the latter group (e.g. extreme split of the variable).

Awareness of the recommendation to eat five portions of fruits and vegetables a day was on the hand related to consumption of vegetables. Consumer surveys in the Norwegian population from 2004 showed that most people know that one should eat more fruit and vegetables (96%) (122). On the contrary, in this sample only 24% of the respondents were aware of the 5-a-Day message. Bivariate analyses showed that command of Norwegian, formal education and being or having been engaged in income generating work significantly predicted message awareness. However, in the multivariate analysis, formal education seemed to explain the effect of command of Norwegian and work on message awareness. In addition, time living in Norway was a significant predictor of awareness. The fact that the socio-economic variables (formal education and work) and factors related to dietary acculturation (command of Norwegian and time living in Norway) are likely to be related to each other, it reasonable to assume that they all may contribute to becoming aware of health messages.

The next step in the analysis was assessing whether this awareness or knowledge had any influence on intake. The multivariate analysis showed that awareness of recommended intake was predictive of daily vegetable intake, in addition to

command of Norwegian language, controlling for socio-economic and demographic variables. It should be noted that the wide CI (1.10, 7.20) for command of Norwegian leaves the OR estimate (2.83) with inaccuracy, e.g. the true OR ranges from being not meaningful to substantial. This could be due the reduced number of cases in the analysis because of missing values (n=170).

However, the relationships detected seem to point in the same “direction”, e.g. that indicators of higher SES and factors related to dietary acculturation positively influence the OR for being aware of official health messages. Furthermore, awareness and command of Norwegian increase the OR for having a higher level of vegetable consumption. These factors may be related: It is recognized that educational level at the time of immigration has implications for working possibilities, use of media and ability to learn a new language (50). Also engagement in income generating work may increase both contact with the host population, and aid in language learning. Moreover, better command of the language increases the possibility of becoming aware of the nutrition campaigns from the Norwegian health authorities. They have usually been given in channels commonly used by ethnic Norwegians and are based on Norwegian food patterns. Hence these campaigns may have been of little relevance to many immigrants. An additional possibility is that those with good command of Norwegian may be different from the rest with respect to factors of cultural, demographic and social origin that influence food habits, which we have not been able to measure or control for, which could explain the relationship with vegetable intake.

When including the stages of change for increasing vegetable intake as predictor in the regression model (the final model), message awareness’ effect on intake seemed to be explained by being in the action stages, e.g. that those aware of the message already had changed their intake. This is supported by findings in a US study, on stages of change for fruit and vegetable consumption, in which a much higher percentage of participants in the action/maintenance stages knew the 5-a-Day recommendation compared to those in earlier stages (123). These results are also supportive of the assumption that increasing awareness of a health message is a first

and important step in dietary change to improve health (124). Worsley (81) reported that recent literature shows that the evidence for the influence of nutrition knowledge on food behaviours is mixed. Still, he argues that nutrition knowledge is a necessary but not sufficient factor for changes in food behaviours and that nutrition knowledge may play a small but pivotal role in the adoption of healthier food habits. Other research has shown that awareness and knowledge of dietary recommendations are significant predictors of dietary change (125). The impact of awareness of the national 5-a-day programme has been studied in the US population, and demonstrated a significant increase in awareness of between 1991 (2 %) and 1997 (18 %)(126). Message awareness was associated with significantly higher combined fruit and vegetable intakes in both baseline and follow-up studies. In a more recent study from New Zealand (127) with a multi-ethnic sample, they found that awareness of the "5+a day" message was associated with a non significant trend towards greater fruit and vegetable intakes in respondents who were aware of the campaign or recognised the campaign logo. They argue that the lack of statistical significance may have been due to the small number of respondents who were not aware of the 5+ a day message (12%).

Perceptions of fish as part of a healthy diet

It was only for fish that a relationship was detected between foods the women focused on in a healthy diet and intake of such foods. The OR for eating fish was 2.7 times higher for those who perceived fish as part of a healthy diet, compared to those who did not mention fish, after controlling for demographic and socio-economic factors and command of Norwegian. This supports findings in qualitative work; Pakistani women reported eating more fish in Norway; some reported doing so for health reasons, others because of increased accessibility and that it "suits" the Norwegian climate; according to Unani Tibb, fish is a hot food and therefore suitable in cold climates (32). Another important reason for adopting fish dishes was because the children asked for them. However, Dawes (75) argues that in her sample fish intake on the individual level did not give many health benefits, since it was prepared as a curry with a lot of oil, fried or consumed as fish fingers.

Quantitative dietary research among Pakistani immigrants has revealed that many have increased their intake of fish in Norway (51). Still, the mean daily intake was reported as being lower than among Norwegian women (13 grams/day versus 58 grams/day, which corresponds to about two fish meals a week). The most common type of fish products eaten were deep-fried breaded fish products, followed by lean fish, shellfish and fish spread (tinned mackerel) (51). Also, Mellin-Olsen & Wandel (32) reported that fish fingers were especially popular both by children and adults, for dinner, breakfast, lunch, after school or as a snack. No concern was expressed about the fat content.

The frequency of fish consumption reported in this study was relatively low, with 41 % consuming fish less than once a week or not at all, and only 14 % using fish for dinner twice a week as recommended. Types of processed fish, such as deep-fried, breaded or other fish products, were not systematically registered, and this may have lead to underestimation of total fish intake (excluding fish used as spread). It can not be ruled out that processed fish was reported as either lean or fat fish, and therefore it was not possible to assess if the perception of fish as healthy was different for unprocessed and processed fish. This is an important distinction in terms of fat quality of increased fish intake; substituting the intake of fatty meat with a mixture of seafood might improve the quality of the fat consumed. However, not all seafood products, notably processed fish products (fish cakes, puddings), contain polyunsaturated fatty acids, and some (fish fingers, breaded products) may have a high fat content, of which a considerable proportion is saturated fats.

That perceptions of fish was strongly related to intake in the current data imply that dietary change towards a healthier diet, in particular the fat quality, can be achieved by promoting increased use of unprocessed fish. This was particularly stressed in the interventions' counselling sessions. Studies in South Asian populations have shown that low dietary intakes and tissue levels of long-chain (LC) n-3 PUFA in South Asians have been linked to high-risk abnormalities in the MetS. Conversely, increasing the dietary intake of LC n-3 PUFA in South Asians has proved an effective strategy for correcting such abnormalities as dyslipidemia in the MetS (128).

No relationships were found when comparing what the women mentioned as unhealthy (e.g. sugar and fats) with intake of foods high in sugar and fat. As mentioned earlier, this may be related to the fact that these foods are not "socially desirable" and more susceptible to under-reporting compared to other foods. The failure to detect any relationship may be due to methodological challenges; sugar and fats are nutrients, while the FFQ measures intake frequency of foods and dishes. For example, times per week that fish is consumed may be easier to remember and conceptualize than intake of snacks in between meals. Hence, a better analysis of the relationship between perceptions and intake would be achieved by using dietary methods (such as 24-hour dietary recalls) which cover the whole diet, allowing the possibility of estimation of nutrient intake.

Years of residence and command of Norwegian – influences on diet?

Years of residence in Norway was one of the predictors for awareness of the 5-a-Day message. Message awareness, together with command of Norwegian, was predictive for higher vegetable intake. Also engagement in income generating work increased the OR for mentioning fish as a healthy food. Could these findings be related to dietary acculturation?

Several studies have shown that longer residence in the country, high education and income, employment outside the home and fluency in the host language result in increased exposure to mainstream culture and, consequently, acculturation. Exposure to host culture (through television, books, friendships) lead to changes in diet- and disease-related knowledge, attitudes, and beliefs; values ascribed to traditional eating patterns; and/or taste preferences (44). However, whether dietary acculturation results in healthy or unhealthy dietary changes remains a matter of debate. From a recent systematic review of studies assessing dietary habits and post migration changes of ethnic groups in Europe it was suggested that the dietary habits of some ethnic groups are likely to become less healthy overall (129). The review also identified several limitations, such as reliability in intake data due to lack of food composition data on "ethnic foods", and the intake data obtained from dietary assessment methods that were not critically assessed for their suitability in minority groups. The data are

therefore not conclusive. An additional issue is the differences that occur between first and second generation immigrants. For example, Anderson et al. (46) found that South Asian immigrants change from a “traditional” diet in the country of origin (low to moderate in fat and high in fruits and vegetables) to atherogenic diets (particularly diet high in saturated fats) after residence in the UK, but that diet composition improves in the subsequent generations to become more similar to the general population and less atherogenic. In a study among Pakistani immigrants in Norway by Wandel et al. (43) it was reported that good command of Norwegian and educational achievement had beneficial effects on the choice of foods rich in fats and sugar after immigration. On the other hand, those who scored high on the index of integration into the Norwegian society were more likely to consume foods rich in sugar.

In order to asses how time in Norway, command of Norwegian and socio-economic factors influence changes in food habits after immigration, directly and indirectly, longitudinal studies are needed. Cross-sectional data do not allow for any firm conclusions on this matter, however, one could speculate whether changes in perceptions and food habits go through different stages, as was described for changes in fat consumption among Pakistani immigrants in Norway; a time after immigration they changed type of fats, from saturated fats/*ghee* to soft margarine or oils, due to health information and concerns of CVD (32). A larger proportion of women in this study perceived *too much oil* as unhealthy as compared to *saturated fat*, and it could be the case that concern has now shifted from *type of fat* to the *amount* of oil used, since many already had changed to oil.

4.2.4 Important factors in food choice

In section the more general attitudes towards the importance of health and other factors in every day food choice are discussed. The questionnaire items assessing attitudes were chosen based on what Pakistani immigrant women had reported as important concerns in previous qualitative research (43), such as health aspects, children's preferences and social relations, which is in accordance with the results of the current study.

Applying the different factors influencing food choice to the *food process model* by Furst et al. (59), it was clear that health aspects and managing relationships were the most important in everyday meals through the high ranking of children's and husbands' preferences. In contrast, the women's own taste preferences were ranked low. This could indicate that the women's preferences in terms of health considerations were perceived as secondary to the preferences of other family members, for example by complying with children's dislikes of vegetables, in spite of perceiving a lot of vegetables and healthy food as important. That the food should be easy to cook (as an indicator of valuing convenience) was perceived as important by rather few, which also supports findings from earlier qualitative work where it was pointed out that the women put a great effort in cooking (43;75;113).

The underlying assumption when measuring factors that influence food choice is that all the factors matter at least somewhat and that people differ in how much importance they assign to each. If an individual regards several aspects as important, he or she will probably experience a conflict between two or more aspects on some foods. How decision makers solve these trade-offs has not yet been well explored in the food literature (60). The major factors in the food choice process model, health and managing relationships, could reflect conflicting values, as described, between choosing healthy foods versus choosing foods in line with family members' preferences. However, differences in the study population appeared when they were asked to select the most important factor. Then it was revealed that twice as many (55

%) found it most important to consider the preferences of children and/or husband as compared to making healthy food (24 %).

When aggregating the responses, two major “attitude-groups” were identified which were different both in demographic and socio-economic terms, with regard to food intakes. Being “health oriented” was related to higher education and fewer children as well as eating more fruits and vegetables and less high fat foods. In contrast, being “managing relationship oriented” was predicted by lower formal education, more children and shorter time living in Norway. These women reported eating less vegetables, fruits and more high fat foods. That fish intake was not influenced in the same way, may be explained by the finding in an earlier study among Pakistani immigrant women in Norway: the children ask explicitly for fish (32). In that case health considerations and preferences were converging.

One can not exclude that answers were coloured by social desirability. Most likely they want to present themselves as capable and competent mothers and as concerned about health and it might be that they present attitudes and behaviour they aspire to rather than actual behaviour. However, an understanding of the women’s ideals is also valuable in gaining insight into their considerations regarding food choice.

Education, attitudes to health and dietary patterns

An interesting finding in this study is that formal education was significantly related to attitudes towards importance of choosing healthy food, which was further reflected in the food habits. It is a possibility that this relationship is affected by SDB, for example, by more frequent over-reporting of fruits and vegetables and underreporting of high fat foods among those who were “health oriented”. However, the linkage between education, attitudes and dietary habits is supported by findings in a nation-wide study among Norwegian women (130). Years of education was significantly and negatively related to percentage of energy from fat, and positively related to intake of fruits and vegetables. Furthermore, the perception of diet's importance to health was one of the strongest predictors of a healthy diet. A relationship between educational level and dietary habits was also found in another Norwegian dietary survey.

A systematic review on disparities in food habits, also found that higher SES (both educational level and occupational status were used as indicators) was associated with a greater consumption of both fruit and vegetables. The authors argue that although over-reporting of intake by those with highest SES could not be included, it is unlikely that this potential bias could fully explain the differences found (131). The effect of education on dietary habits has however been found to vary between ethnic groups. In a recent cross-cultural study, education was positively associated with diet quality in ethnic Dutch, but not consistently so in Surinamese South Asians immigrants, and suggested that education level among migrant groups may have different associations with diet than in the host population (132).

Formal education, as an indicator of SES, has been related to differences in both attitudes and food intake, similarly to the current study. For example, a cross-national study of women in Germany, the Netherlands and Belgium examined whether class (measured by formal education) influenced considerations of health aspects and preferences of their family members in choice of food (133). They found that higher class mothers more often took health into account in their choice of food, while lower class mothers more often considered the preferences of their family, and they more often agreed that they could please their family by serving tasty food. Analysis of data on the mothers' eating habits indicated that mothers who often took health into account and/or less often the preferences of their children had healthier food consumption patterns themselves: they consumed less fat and more fibre. This study was conducted in a different ethnic group, and the effect of formal education may be different among the Pakistani women regarding socio-economic position or class, plus the range of educational level was greater in the current group. Still the findings demonstrate similar relationships between formal education, attitude and food choice in both study populations.

Socio-economic status or position in general has also been shown to have a major influence on dietary attitudes (134-137). However, the conceptualisation and measurement of SES in health research more broadly have been extensively discussed and critically examined, partly because different indicators of SES have

been used; education, occupation and household income reflect different underlying social processes and hence they are not interchangeable, and do not serve as adequate proxies for one another (138).

Educational level alone, or combined with occupational status, are the most used indicator indicators of SES in dietary research (139). Education expresses not only the individual's attainment and years of schooling, but it might also reflect occupation and income. Even more important when it comes to healthy dietary practice, formal education may be related to capacity and habit of seeking and attaining information about food and health. It has also been shown that formal education is related to perceptions of control, i.e. people with higher education tend to have a higher internal locus of control[4], believe more strongly that personal health-related behaviours influence health, and that they are capable achieving goals (141). These perceptions of control may also influence how one perceives information about food and health. Education therefore could be related to both structural factors (economy, work) and psychosocial factors that further influence attitudes and behaviour, and to the understanding of the relationships shown in this and several other studies.

Distinguishing between "health oriented" and "managing relationship oriented" may however polarize the women's true attitudes, since the large majority considered both factors important or very important. On the other hand, the findings reflect that within the study population there may be different subgroups in terms of educational level, with differing attitudes and food habits. It was however not analyzed at which educational level(s) differences become significant, i.e. whether it is any formal schooling at all that is important, or that differences appear at higher levels of

4 The locus of control can either be internal (meaning you believe that you control yourself and your life) or external (meaning you believe that your environment, some higher power or other people control your decisions and your life). It was developed by Rotter (140) as an important aspect of personality.

education. Such information would be important in terms of designing dietary interventions .

Family meals – not only health considerations

That greater number of children was associated with being oriented towards "managing relationships" in food choice suggests that children have a strong influence on what is served on a family's table. Living in the same household does not necessarily mean that exactly the same food is consumed by everyone. For example, the women may be making separate dishes to husband and/or children. However, the differences in dietary intake between the women who placed greatest importance on managing relationships versus those who did not, reflects that the consideration for others' preferences influenced the women's dietary patterns. This was further supported by the finding that the most frequently mentioned reason for eating less vegetables in Norway as compared to Pakistan, was that children did not like vegetables.

Others are viewing the relationship between who is influencing whom the other way around: Children adopt the parents' preferences and likings, i.e. that children like what they know, and eat what they like (142). Most likely, family influences on health behaviours are multi-directional, argued by Sallis & Nader (143). As this study is cross-sectional it is not possible to conclude on any causal relationships. However, the women seem to perceive children's requests as most important. This was also reported by Mellin-Olsen & Wandel (32). They argue that the children, to a larger extent than their mothers, got familiar with Norwegian food in the kindergarten, at school and through friends, and asked for this food at home. Another factor was the loss of the extended family, meaning that there were fewer adults present at the meals. Hence, the preferences of the children increased in dominance. The women did not give any thought to the possible health implications related to this change.

When turning to studies in Norway, a population study explored influence of life face and socio-economic factors on the dietary intake for fruits and vegetables found that the presence of children in the household had a negative effect on intake of fruits and potatoes (144). Another study, on opinions of a healthy diet in different stages of life, found that those who had small children in their households responded more often

than others that they failed to buy the foods they considered to be healthy(116). Moreover, women tended to choose more often according to their partners' preferences than men, and this was particularly so in households with small children.

A wide range of qualitative work on food habits recurrently find that family meals play a central role in every day life, and that eating is not just for health, but concerns practical issues and social relations (121). For those who are responsible for the food in the family, most often the women, the social meaning of the meal implies that the wish to gather the family for a harmonious meal where social relations are maintained governs what food is served. This means that decisions regarding food choice and meal planning are focused on how family members' preferences can be met (121). Qualitative research on dietary habits in Norway has also showed that children have a great influence in shaping the food habits: The children chose spaghetti, sausages and pizza instead of fish and vegetables, and the women perceived children's preferences as an important reason for serving this food relatively often (145). Such thoughts has also been described in a recent qualitative study of Norwegian dinner habits by Bugge (146). Through interviews with mothers of young children, it was shown that children occupied the principal position in the every life of food and eating, in the sense that the parents listen to the children's wishes. For example, this influenced the views and consumption of fish. From a medial perspective fish is good choice for dinner, however, in the women's everyday life fish was a challenging food, and could become a "bad" choice if children's disapproval caused conflicts and arguments at the table (146).

A limitation of the current study is that children's age was not included in the analyses. It is possible that small children have different influences on eating patterns than adolescents, by factors such as preferences, nutrition knowledge (i.e. through school), and influences from peers. Further research should take account of family structure in order to better understand the role of children in family eating habits among Pakistani immigrants.

Hospitality meals – barriers to healthy eating?

It has been argued that an important issue that needs further attention is whether social pressure acts as a major barrier to healthy eating in everyday life (32). In this study it was revealed that a large majority (89%) reported eating unhealthy mainly in social situations (e.g. *visits/when with friends* and/or *parties/feasts/celebrations*) while few women reported eating unhealthy frequently without a particular reason or occasion. This confirms findings from other studies, i.e. that hospitality is of great importance (32;75), and that social gatherings were found to decide the snacking patterns more than individual desire of the housewives (43). Studies among different immigrant populations have shown that social factors, including family, friends, co-workers and social events have an important influence on food intake; social factors seem to make it more difficult to make healthy choices (60;147).

In a cross-cultural study from the UK, Bush et al. (111) showed that traditional family hospitality meals played a more important part in the life of migrant South Asians (Punjabi) and Italians than they did in the majority culture. In addition, British-born South Asians maintain this pattern more than British-born Italians. The South Asians also spent longer hours in cooking and showed more concern with reputation, status and rules of respect for guests. Also, a greater salience of meat in the hospitality meals of Punjabi migrants was found. Choosing foods/dishes based on novelty or health considerations was, however, only mentioned by the Italians and British, and these were usually stated as individual preferences, only rarely were such preferences elevated to a family or group preference. In general, health did not emerge as a major consideration in the choice of any hospitality meal in any of the ethnic groups.

To what extent these meals have an impact on overall dietary intake is highly dependent on frequency of hospitality and meal composition. However, the data from the current study seem to reflect that social meals, e.g. eating with friends, receiving guests or being a guest, was by most women perceived as unhealthy eating occasions. Making reference to the food choice process model (59), it is clear that the health aspect is only one among several values that a meal could represent, and particularly the social meals seem to be occasions or situations where the health value is relaxed.

However, whether this was perceived as barrier to overall healthy eating cannot be concluded from this data.

It has been reported that people may ignore or not mention their dietary restrictions, because it is considered very impolite to refuse or because a chronic illness can be perceived to be shameful (147). Dawes (75) on the other hand, reported that some women in her sample had developed coping strategies related to intake of festive snacks/meals. For example, by using artificial sweeteners in preparation of traditional sweet dishes and offering sweeteners for tea to guests. Some also served dishes with *karella* (bitter gourd), perceived to have curative effects in diabetes in South Asian countries, in order accommodate the needs of guests with diabetes. And when being a guest, the women chose to serve themselves smaller portions, rather than refrain from eating anything.

The aforementioned research on family and hospitality meals demonstrate an important issue relevant in every study of eating habits; instead of perceiving food choices as a free, independent and individual, they are formed by conventionalities, social norms and rules. In other words, social relationships and identities often make apparent rationale of the habit in question, and this is so, independently of nutritional or dietary consequences (148). For example, emphasis on animal protein and certain cooking techniques may be medically unwarranted. Such habits, however, makes very “good” sense socially (148). Accordingly, the results indicate that focusing on the women’s own preferences or concerns with personal diet and health may not be perceived as helpful or even relevant, and does not “make sense” in their roles as mothers or caretakers. More research should be done to achieve greater knowledge on how people balance conflicting food values and which strategies they employ to “solve” such conflicts in everyday life. This could give important information on which strategies people find more applicable and acceptable than others when improving health through diet change is needed.

It should be taken into consideration that the relationships between attitude and dietary intake were found for some of the selected dietary variables. How attitudes

are related to the composition of the whole diet, in terms of eating habits, food choice/meal composition and nutritional value remains however to be studied.

4.2.5 Motivations and intentions to change dietary habits

Stages of change distributions

Trans-Theoretical Model (TTM) includes three dimension of which stages of change is one. The others are a series of independent variables, the Processes of Change (e.g. strategies which individuals are assumed to employ when moving through the stages), and a series of outcome measures (e.g. different types cognitions that are assumed to change). The stages of change is the part of the TTM that have been most frequently applied in dietary research (149), and was used in this study to describe the participants motivation/intention do make dietary changes. The stage-of-change algorithm used was adapted from Lorentzen et al. (84).

The distribution of the Pakistani women across stages showed that half of the participants were in the action stages (action and maintenance) for increasing fruit and vegetable consumption. For motivation/intention to reduce fat less than half (42%) was in the action stage, as compared to the majority (65%) for motivation/intention to reduce sugar intake. This could reflect a greater concern with sugar content of the diet than fat, and that many already had made dietary changes.

For analysis purposes some of the stages were aggregated into three main groups. In the algorithm for stage classifications, the action and maintenance stages have a strict time frame, in that people are described as being in action if they have changed their behaviour for a period of 6 months (see appendix 1). However, it has been shown that people who were actively making a change (actors) or maintaining change (maintainers) had done so for a range of different periods of time, with no specific cut-off point being evident (150). It was therefore considered reasonable to group the actors and the maintainers. Grouping the pre-contemplators and contemplators was based on the assumption that these groups would be more similar in terms of dietary behaviour, which was the comparing variable across the stages. Still, they are

assumed to be “qualitatively” or motivationally different since only contemplators are considering doing something about their behaviours.

Stages of change and relationship with dietary intake

It was shown that those in the action/maintenance stages had a higher intake frequency of fruits and vegetables and a lower for high fat and high sugar foods compared to the pre-action stages, which supports results from previous research (123;151;152). However, an important point to recognize is that there is no consensus for the staging algorithms used with each dietary behaviour, which makes comparison across studies difficult (149).

Little difference was observed among the pre-action stages, except for fruit intake; 82% of women in the action/maintenance stages reported eating fruits daily, compared to 28% in the preparation stage and only 12 % in the pre-contemplation/contemplation stages. On the contrary, only 52% in the action stages ate vegetables daily. One reason for this may be the low proportion aware of the recommended quantity. Another reason may be that it is more difficult to assess overall vegetable intake, since vegetables often are eaten in combination with other foods at main meals and in composite dishes. Fruits on the other hand are often eaten separately, i.e. between meals or as dessert, and portions in terms of whole fruits are more easily conceptualised.

In the literature, the term “misclassification” is used to describe those who are categorized in action/maintenance and simultaneously consume less than a specific dietary goal, e.g. the recommended level of intake. More realistic stage categorisation has been shown for the most specific dietary behaviours (150). Still, applying the TTM and stages of change on dietary behaviours may cause problems, because the model was originally developed for addictive behaviours such as smoking, which differ considerably in nature. This gives rise to specific problems associated with stage categorization, due to discrepancies between a person’s perceived and actual dietary behaviour. Other studies have reported on considerable proportions among the maintainers who are consuming more fat (153) or fewer servings of fruits and

vegetables (154) than recommended. It has therefore been argued that one could question applying the stages of change model based on subjective, self-rated intake to dietary behaviour.

In order to overcome such problems Brug et al. (153) suggested that people in the action stages who do not meet the recommendations (based on their reported intake) should be re-classified into the preparation stage. On the other hand, Povey et al. (150) argue that re-classification does not appear to resolve the problem, and question whether it is plausible to combine people who believe they are eating enough vegetables with those who do not into a single psychologically meaningful stage. For intervention purposes it is likely to be more important to group people in terms of self-perceived motivation to change.

Stages of change related to formal education

An interesting finding in this study was that women in the action stages for fat and vegetable consumption had a higher level of formal education, e.g. education could be a stage-related factor. This is in accordance with the finding that higher education was related to being “health oriented” in food choice and being aware of the 5-a-day message. This again suggests that educational level is important in explaining motivational stage, attitudes, knowledge and dietary behaviours within this sample. This is also supported by a resent scoping review on socio-economic distribution of stages of change (155). The authors concluded that there was substantial published evidence that people with higher SES tended to be in more advanced stages of change than people with lower SES.

Further research is needed among Pakistani immigrant women to provide insight into the reasons why dietary behaviours of those in the pre-action stages differ from the action stages in order to suggest strategies for interventions. Comparison between baseline and post-test stage classifications could further enhance the understanding classification of participants. When considering the large proportions already in the action stages for vegetable intake, while simultaneously many of these reported a rather low frequency of intake, it is possible that in the post-test some will be categorized into lower stages, which could imply an increase awareness of dietary

recommendations during the intervention. The stages of change may also help to understand results of the intervention, e.g. whether the information given matched most of the respondents' stages or only a small group, and whether those who received information matching their stage benefited more from the intervention. It could also aid in explanation of possible drop-outs. If participants find that there is the intervention program is not fitting their needs and readiness to change, then drop out could be more likely.

In conclusion, the current study gives support to using the stages of changes to describe motivation and intention to change dietary habits among Pakistani immigrant women. In addition, the adoption of a diet with increased fruit and vegetable intake and reduced fat consumption appears to be mediated by educational level. Such variation may be directly useful for tailoring interventions to different groups to enhance their effectiveness.

4.2.6 Conclusions and implications for further studies

In the present study, several approaches have been used to increase the understanding of Pakistani immigrant women's perceptions of healthy eating, and this has been linked to both consumption of selected foods and to participant characteristics, such as socio-economic and demographic variables. The findings can be summarized in the following points:

- Most of the women perceived vegetables and fish as healthy foods and sugar and fat as unhealthy. Meat and carbohydrate rich foods were by some perceived as both healthy and by others as unhealthy.

- Social situations were by most women perceived as "unhealthy eating situations", and the main barrier to vegetable consumption was children's low preferences for vegetables.

- The majority reported that making food in accordance with children and husband's preferences was most important when planning and cooking dinner meals. These women reported a lower intake frequency of fruits and vegetables and a higher intake of high fat foods.

- Those who perceived health aspects as most important when cooking dinner meals, e.g. "health oriented", had a higher intake frequency of fruits and vegetables and a lower intake frequency of high fat foods.

- Three quarters of the sample were unaware of the dietary recommendations of eating 5 portions of vegetables a day.

- Time living in Norway and command of Norwegian language were predictors of awareness of the 5-a-Day message.

- Stages of change distributions were predictive of dietary patterns: intake frequency of fruits and vegetables was higher and intake frequency of high fat foods and high sugar foods was lower in the action stages.

- Being in the action stages and command of Norwegian predicted a higher intake frequency of vegetables when controlling for socio-economic and demographic variables. Perceiving fish as part of a healthy diet was predictive of a higher frequency of choosing fish for dinner.

- Higher levels of formal education was related to being "health oriented", being aware of the 5-a-Day message, and being in the action stages.

This study gives support to the assumption that perceptions of healthy eating are related to food choice and intake by demonstrating a relationship between attitudes, knowledge/awareness of recommendations and intake, and perceptions of what constitutes a healthy diet and intake of this food. The results also show that socio-economic factors and aspects related to dietary acculturation, such as work and command of Norwegian language, were linked to perceptions and intake in a beneficial way regarding consumption of vegetables and fish.

There are however some limitations. The study did not look at the whole diet, and therefore it is not possible to make any assumptions regarding the quality of diet and differences in eating patterns as a whole. The necessity of a questionnaire that covered both intake of several foods, and attitudes and knowledge, made it impossible to include multiple-item indicators when measuring attitudes towards important factors in food choice. It was also the researchers' experience that the ability to answer multi-item questions in this group could vary. The use of single items may have influenced the results since most psychosocial measures are complex. Also, the possibility of SDB and acquiescence bias may distort or misrepresent attitudes of the women. As attitudes towards diet and lifestyle behaviours were measured cross-sectionally, this fails to resolve the issue of temporal patterning of attitudes and behaviour, i.e. do attitudes cause the behaviour, or does the behaviour produce the attitudes?

In conclusion, and in spite of the shortcomings, the study managed to show accordance between attitudes and measures of dietary behaviour within the same respondents. Even though a cross-sectional survey such as this does not allow any causal conclusions to be drawn, comparison of these data with previous studies and with theoretical models, such as the Food Choice Model, suggests that the direction of this intricate relationship follows that dietary attitudes most likely exert their influence on dietary behaviour.

Results suggest a need for increased conventional nutrition information in order to achieve a better understanding of the relationship between diet and health, such as the benefits of an increased intake of vegetables, legumes and fish as recommended in earlier studies on this population group. That conventional nutrition information is required does not mean that people's perceptions, knowledge and attitudes are all "wrong" and need correcting. Instead, this argues for a better understanding of women's reasoning behind food and health choices, in order to give advice that is relevant in their everyday life.

It was revealed that the women place great importance to the preferences of family, and that the social context in many ways is an important determining factor. In terms of counselling, high priority should be given regarding how to manage family relationships, while simultaneously composing a diet that is beneficial for health and contributes to better regulation of blood glucose and weight reduction. For example, this could be done by discussing with the women how to find ways of changing the diet in a way that is acceptable to children, husband and other family members. In addition, culturally sensitive advice on cooking methods which preserve traditional taste is important. That the majority report children's preferences as the major barrier to vegetable consumption aspects of their diet warrants further investigation.

An important issue clearly highlighted by this study was the within-group differences in perceptions, dietary behaviours relating socio-economic and demographic variables, and the consequent danger of stereotyping e.g. assuming that everyone from a particular ethnic group is "all the same". Particularly, the degree of formal education seemed to be important in explaining the differences regarding attitudes to

importance of health in food choice and in stages of change distribution. This argues again for more research on how people understand healthy eating and manage food choices, and how this differs in different groups. Accordingly, interventions may need to be tailored to the needs of these groups.

In addition to focus on individual characteristics and behaviours in explaining disparities of diet and health between diverse groups, it is important to include factors beyond individual behaviours that are at work on people's eating habits. Such factors share a part in the explanation of why some groups of the population become more vulnerable to the so called "life style" health problems than others.

5. References

Reference List

1. Redfield R, Linton R, Herskovits M. Memorandum on the study of acculturation. American Anthropologist 1936;38:149-52.

2. Smith PB. Acquiescent response bias as an aspect of cultural communication style. Journal of Cross-Cultural Psychology 2004;35:50-61.

3. Immigration and Immigrants 2006. Mathisen, B. 2007. Oslo-Kongsvinger, Statistics Norway.
   Ref Type: Report

4. Næss Ø, Rognerud M, and Strand BH. Sosial ulikhet i helse. En faktarapport. 2007. Folkehelseinstituttet.
   Ref Type: Report

5. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes Care 2004;27:1047-53.

6. Batsis JA, Nieto-Martinez RE, Lopez-Jimenez F. Metabolic syndrome: from global epidemiology to individualized medicine. Clin Pharmacol Ther 2007;82:509-24.

7. Bhopal R, Unwin N, White M et al. Heterogeneity of coronary heart disease risk factors in Indian, Pakistani, Bangladeshi, and European origin populations; cross sectional study (vol 319, pg 215, 1999). British Medical Journal 1999;319:546.

8. Abate N, Chandalia M. Ethnicity, type 2 diabetes & migrant Asian Indians. Indian J Med Res 2007;125:251-8.

9. Venkataraman R, Nanda NC, Baweja G, Parikh N, Bhatia V. Prevalence of diabetes mellitus and related conditions in Asian Indians living in the United States. Am J Cardiol 2004;94:977-80.

10. Jenum AK, Holme I, Graff-Iversen S, Birkeland KI. Ethnicity and sex are strong determinants of diabetes in an urban Western society: implications for prevention. Diabetologia 2005;48:435-9.

11. Ahlberg NL, Vangen S. Svangerskap og fødsel i et flerkulturelt Norge. Tidsskr Nor Lægeforen 2005;125:586-8.

12. Mohan V, Mathur P, Deepa R et al. Urban rural differences in prevalence of self-reported diabetes in India-The WHO-ICMR Indian NCD risk factor surveillance. Diabetes Res Clin Pract 2008.

13. Ramachandran A. Epidemiology of diabetes in India--three decades of research. J Assoc Physicians India 2005;53:34-8.

14. Abate N, Chandalia M. Ethnicity and type 2 diabetes - Focus on Asian Indians. Journal of Diabetes and Its Complications 2001;15:320-7.

15. Yajnik CS. Early life origins of insulin resistance and type 2 diabetes in India and other Asian countries. J Nutr 2004;134:205-10.

16. UK Prospective Diabetes Study. XII: Differences between Asian, Afro-Caribbean and white Caucasian type 2 diabetic patients at diagnosis of diabetes. UK Prospective Diabetes Study Group. Diabet Med 1994;11:670-7.

17. Raji A, Seely EW, Arky RA, Simonson DC. Body fat distribution and insulin resistance in healthy Asian Indians and Caucasians. Journal of Clinical Endocrinology and Metabolism 2001;86:5366-71.

18. Barba C, Cavalli-Sforza T, Cutter J et al. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet 2004;363:157-63.

19. Barker DJP. Fetal Origins of Coronary Heart-Disease. British Medical Journal 1995;311:171-4.

20. Hales CN, Barker DJP. The Thrifty Phenotype Hypothesis. British Medical Bulletin 2001;5-20.

21. Tuomilehto J, Lindstrom J, Eriksson JG et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. New England Journal of Medicine 2001;344:1343-50.

22. Pan XR, Li GW, Hu YH et al. Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance - The Da Qing IGT and diabetes study. Diabetes Care 1997;20:537-44.

23. Knowler WC, Barrett-Connor E, Fowler SE et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. New England Journal of Medicine 2002;346:393-403.

24. Englyst KN, Liu S, Englyst HN. Nutritional characterization and measurement of dietary carbohydrates. European Journal of Clinical Nutrition 2007;61:S19-S39.

25. Steyn NP, Mann J, Bennett PH et al. Diet, nutrition and the prevention of type 2 diabetes. Public Health Nutr 2004;7:147-65.

26. Venn BJ, Mann JI. Cereal grains, legumes and diabetes. Eur J Clin Nutr 2004;58:1443-61.

27. Kaline K, Bornstein SR, Bergmann A, Hauner H, Schwarz PE. The importance and effect of dietary fiber in diabetes prevention with particular consideration of whole grain products. Horm Metab Res 2007;39:687-93.

28. Akhtar M, Almas K, Kausar T, Wolever TMS. Blood glucose responses to traditional South Asian vegetable dishes in normal and diabetic human subjects. Nutrition Research 2002;22:989-96.

29. Krawinkel MB, Keding GB. Bitter gourd (Momordica charantia): A dietary approach to hyperglycemia. Nutrition Reviews 2006;64:331-7.

30. Riccardi G, Rivellese AA. Dietary treatment of the metabolic syndrome - the optimal diet. British Journal of Nutrition 2000;83:S143-S148.

31. Utviklingen i norsk kosthold 2006. 2006. Oslo, Helsedirektoratet. 19-4-2008.
Ref Type: Report

32. Mellin-Olsen T, Wandel M. Changes in food habits among Pakistani immigrant women in Oslo, Norway. Ethn Health 2005;10:311-39.

33. Helsedirektoratet. Kostholdsråd, fem om dagen. 2005. 19-4-2008.
Ref Type: Internet Communication

34. Johansson L, Andersen LF. Who eats 5 a day? Intake of fruits and vegetables among Norwegians in relation to gender and lifestyle. Journal of the American Dietetic Association 1998;98:689-91.

35. Pomerleau J, Lock K, Knai C, Mckee M. Interventions designed to increase adult fruit and vegetable intake can be effective: A systematic review of the literature. Journal of Nutrition 2005;135:2486-95.

36. Forgaard, T. S. Dzamarija M. T. Innvandring og innvandrere 2006, Innvandrerbefolkningen. 2006. Statistisk Sentralbyrå.
Ref Type: Report

37. Henriksen K. Fakta om 18 innvandrergrupper i Norge. 2007. Statistisk sentralbyrå, Statisics Norway. 3-4-2008.
Ref Type: Report

38. Statistics Division , Ministry of Economic Affairs and Statistics Government of Pakistan. Population Census Organization. 2008. 12-5-0008.
Ref Type: Internet Communication

39. Gabrielsen B, Lagerstrøm BO. Mange Innvandrere er dårlige til å lese norsk. Samfunnsspeilet 2005;9:2-10.

40. Kumar BN, Meyer HE, Wandel M, Dalen I, Holmboe-Ottesen G. Ethnic differences in obesity among immigrants from developing countries, in Oslo, Norway. International Journal of Obesity 2006;30:684-90.

41. Jafar TH, Levey AS, White FM et al. Ethnic differences and determinants of diabetes and central obesity among South Asians of Pakistan. Diabetic Medicine 2004;21:716-23.

42. Syed HR, Dalgard OS, Hussain A, Dalen I, Claussen B, Ahlberg NL. Inequalities in health: a comparative study between ethnic Norwegians and Pakistanis in Oslo, Norway. Int J Equity Health 2006;5:7.

43. Wandel M, Raberg M, Kumar B, Holmboe-Ottesen G. Changes in food habits after migration among South Asians settled in Oslo: The effect of demographic, socio-economic and integration factors. Appetite 2007.

44. Satia-Abouta J, Patterson RE, Neuhouser ML, Elder J. Dietary acculturation: Applications to nutrition research and dietetics. Journal of the American Dietetic Association 2002;102:1105-18.

45. TILLOTSO.JL, Kato H, Nichaman MZ et al. Epidemiology of Coronary Heart-Disease and Stroke in Japanese Men Living in Japan, Hawaii, and California - Methodology for Comparison of Diet. American Journal of Clinical Nutrition 1973;26:177-84.

46. Anderson AS, Bush H, Lean M, Bradby H, Williams R, Lea E. Evolution of atherogenic diets in South Asian and Italian women after migration to a higher risk region. Journal of Human Nutrition and Dietetics 2005;18:33-43.

47. Neuhouser ML, Thompson B, Solomon CC. Higher fat intake and lower fruit and vegetables intakes are associated with greater acculturation among Mexicans living in Washington state. Journal of the American Dietetic Association 2004;104:51-7.

48. Varghese S, Moore-Orr R. Dietary acculturation and health-related issues of Indian immigrant families in Newfoundland. Canadian Journal of Dietetic Practice and Research 2002;63:72-9.

49. Misra A, Ganda OP. Migration and its impact on adiposity and type 2 diabetes. Nutrition 2007;23:696-708.

50. Blom, S. and Henriksen, S. Levekår blant innvandrere i Norge 2005/2006. 2008. Oslo-Kongsvinger, Statistisk sentralbyrå • Statistics Norway.
Ref Type: Report

51. Holmboe-Ottesen G, Råberg MK, Natland ST, Kumar B, Wandel M. Dietary Patterns Among South Asian Immigrants in Oslo - Implications for preventive measures. Public Health Nutrition 2006;9:66.

52. Johansson, L and Solvoll, K. Norkost 1997. Landsomfattende kostholdsundersøkelse blant menn og kvinner i alderen 16-79 år. 2. 1999. Statens råd for ernæring og fysisk aktivitet, Institutt for ernæringsforskning, Universitetet i Oslo.
Ref Type: Report

53. Paquette MC. Perceptions of healthy eating - State of knowledge and research gaps. Canadian Journal of Public Health-Revue Canadienne de Sante Publique 2005;96:S15-S19.

54. Bisogni CA, Connors M, Devine CM, Sobal JY. Who we are and how we eat: A qualitative study of identities in food choice. Journal of Nutrition Education and Behavior 2002;34:128-39.

55. Kearney JM, Gibney MJ, Livingstone BE, Robson PJ, Kiely M, Harrington K. Attitudes towards and beliefs about nutrition and health among a random sample of adults in the Republic of Ireland and Northern Ireland. Public Health Nutr 2001;4:1117-26.

56. Martinez-Gonzalez MA, Holgado B, Gibney M, Kearney J, Martinez JA. Definitions of healthy eating in Spain as compared to other European Member States. Eur J Epidemiol 2000;16:557-64.

57. Povey R, Conner M, Sparks P, James R, Shepherd R. Interpretations of healthy and unhealthy eating, and implications for dietary change. Health Education Research 1998;13:171-83.

58. Falk LW, Sobal J, Bisogni CA, Connors M, Devine CM. Managing healthy eating: Definitions, classifications, and strategies. Health Education & Behavior 2001;28:425-39.

59. Furst T, Connors M, Bisogni CA, Sobal J, Falk LW. Food choice: A conceptual model of the process. Appetite 1996;26:247-65.

60. Connors M, Bisogni CA, Sobal J, Devine CM. Managing values in personal food systems. Appetite 2001;36:189-200.

61. Lupton D. Food, the body and the Self. London, England: Sage, 1996.

62. Wandel M, Roos G. Work, food and physical activity. A qualitative study of coping strategies among men in three occupations. Appetite 2005;44:93-102.

63. Caplan P. Food, Health and Identity. London and New York: Routledge, 1997.

64. Rudat, K. Black and Minority Ethnic Groups in England: health and Lifestyles. 1994. London, England, Health Education Authority.
Ref Type: Report

65. Fagerli RA, Lien ME, Wandel M. Experience of dietary advice among Pakistani-born persons with type 2 diabetes in Oslo. Appetite 2005;45:295-304.

66. Lambert H, Sevak L. Is 'cultural difference' a useful concept? Perceptions of health and the sources of ill health among Londoners of South Asian origin. In: Kelleher D, Hillier S, eds. Researching cultural differences in health. London: Routledge 1996:124-60.

67. Wandel M. Mat og helse - Forbrukeroppfatninger og strategier. 5. 1997. SIFO.
Ref Type: Report

68. Sheehan HE, Hussain JS. Unani Tibb: History, Theory, and Contemporary Practice in South Asia. The ANNALS of the American Academy of Political and Social Science 2002;1:583.

69. Manderson L. Hot Cold Food and Medical Theories - Overview and Introduction. Social Science & Medicine 1987;25:329-30.

70. Thomas J. Nutrition intervention in ethnic minority groups. Proceedings of the Nutrition Society 2002;61:559-67.

71. Greenhalgh T, Helman C, Chowdhury AM. Health beliefs and folk models of diabetes in British Bangladeshis: a qualitative study. BMJ 1998;316:978-83.

72. Mennell S, Murcott A, Vanotterloo AH. The Sociology of Food - Eating, Diet and Culture. Current Sociology-Sociologie Contemporaine 1992;40:1-152.

73. Murcott A. On the Social Significance of the Cooked Dinner in South-Wales. Social Science Information Sur les Sciences Sociales 1982;21:677-96.

74. Connors M, Bisogni CA, Sobal J, Devine CM. Managing values in personal food systems. Appetite 2001;36:189-200.

75. Dawes, T. Socio-cultural perceptions and practices of dietary choices with focus on fat intake in middle aged Pakistani Women in Oslo - a qualitative study. 2006. Oslo, Department of General Practice and Community Medicine, Faculty of Medicine, University of Oslo.
Ref Type: Thesis/Dissertation

76. Sobal J. Cultural comparison research designs in food, eating, and nutrition. Food Quality and Preference 1998;9:385-92.

77. Baranowski T, Cullen KW, Baranowski J. Psychosocial correlates of dietary intake: Advancing dietary intervention. Annual Review of Nutrition 1999;19:17-40.

78. Shepherd R. Influences on food choice and dietary behavior. Diet Diversification and Health Promotion 2005;57:36-43.

79. Ling AMC, Horwath C. Defining and measuring stages of change for dietary behaviors: Readiness to meet fruit, vegetable, and grain guidelines among Chinese Singaporeans. Journal of the American Dietetic Association 2000;100:898-904.

80. Brinberg D, Axelson ML, Price S. Changing food knowledge, food choice, and dietary fiber consumption by using tailored messages. Appetite 2000;35:35-43.

81. Worsley A. Nutrition knowledge and food consumption: can nutrition knowledge change food behaviour? Asia Pacific Journal of Clinical Nutrition 2002;11:S579-S585.

82. Brug J, Van Assema P. Differences in use and impact of computer-tailored dietary fat-feedback according to stage of change and education. Appetite 2000;34:285-93.

83. Velicer WF, Norman GJ, Fava JL, Prochaska JO. Testing 40 predictions from the transtheoretical model. Addictive Behaviors 1999;24:455-69.

84. Lorentzen C, Ommundsen Y, Jenum AK, Holme I. The "Romsas in Motion" community intervention: program exposure and psychosocial mediated relationships to change in stages of change in physical activity. International Journal of Behavioral Nutrition and Physical Activity 2007;4.

85. Kumar, B. and Meyer, H. E. The Oslo Immigrant Health Study - methods. 2003. Folkehelseinstituttet. 28-4-2008.
Ref Type: Internet Communication

86. Schwarz PE, Lindstrom J, Kissimova-Scarbeck K et al. The European Perspective of Type 2 Diabetes Prevention: Diabetes in Europe - Prevention Using Lifestyle, Physical Activity and Nutritional Intervention (DE-PLAN) Project. Exp Clin Endocrinol Diabetes 2008;116:167-72.

87. Mosdøl, A. Dietary assessment - the weakest link? A dissertation exploring the limitations to questionnaire based methods of dietary assessment. 2004. University of Oslo, Faculty of Medicine.
Ref Type: Thesis/Dissertation

88. Lindstrom J, Tuomilehto J. The diabetes risk score - A practical tool to predict type 2 diabetes risk. Diabetes Care 2003;26:725-31.

89. Lillegaard ITL, Overby NC, Andersen LF. Can children and adolescents use photographs of food to estimate portion sizes? European Journal of Clinical Nutrition 2005;59:611-7.

90. Pallant J. SPSS survival manual. New York: McGraw-Hill, 2007.

91. Kraemer HC. Reconsidering the odds ratio as a measure of 2 x 2 association in a population. Statistics in Medicine 2004;23:257-70.

92. Blood P. Pakistan, a Country Study. Washington: GPO for the Library of Congress . 1994. 11-4-2008.
Ref Type: Internet Communication

93. Lorentzen C, Ommundsen Y, Jenum AK, Holme I. The "Romsas in Motion" community intervention: program exposure and psychosocial mediated relationships to change in stages of change in physical activity. International Journal of Behavioral Nutrition and Physical Activity 2007;4.

94. Hussain-Gambles M, Leese B, Atkin K, Brown J, Mason S, Tovey P. Involving South Asian patients in clinical trials. Health Technology Assessment 2004;8:1-+.

95. Katz MH. Multivariable analysis - a Practical Guide for Clinicians. Cambridge, United Kingdom: Cambridge University Press, 2002.

96. Rankin J, Bhopal R. Understanding of heart disease and diabetes in a South Asian community: cross-sectional study testing the 'snowball' sample method. Public Health 2001;115:253-60.

97. Ludbrook J. Outlying observations and missing values: How should they be handled? Clinical and Experimental Pharmacology and Physiology 2008;35:670-8.

98. Fisher RJ, Katz JE. Social-desirability bias and the validity of self-reported values. Psychology & Marketing 2000;17:105-20.

99. Liberatos P, Link BG, Kelsey JL. The Measurement of Social-Class in Epidemiology. Epidemiologic Reviews 1988;10:87-121.

100. Kunst AE and Mackenbach JP. Measuring Socio-economic Inequalities in Health. 1994. Copenhagen, World Health Organization.
Ref Type: Report

101. de Coulon A, Wolf F. Language proficiency of immigrants and misclassification. Applied Economics Letters 2007;14:857-61.

102. Agudo A. Measuring intake of fruit and vegetables. Joint FAO/WHO Workshop on Fruit and Vegetables for Health, September 2004, Kobe, Japan.

2005. WHO.
Ref Type: Conference Proceeding

103. Wolfe WS, Frongillo EA, Cassano PA. Evaluating brief measures of fruit and vegetable consumption frequency and variety: Cognition, interpretation, and other measurement issues. Journal of the American Dietetic Association 2001;101:311-8.

104. Ashfield-Watt PAL, Welch AA, Day NE, Binham SA. Is 'five-a-day' an effective way of increasing fruit and vegetable intakes? Public Health Nutrition 2004;7:257-61.

105. Beaton GH, Burema J, Ritenbaugh C. Errors in the interpretation of dietary assessments. American Journal of Clinical Nutrition 1997;65:S1100-S1107.

106. Ashfield-Watt PAL. Fruits and vegetables, 5+ a day: are we getting the message across? Asia Pac J Clin Nutr 2006;15:245-52.

107. Kaaks R, Riboli E. Validation and calibration of dietary intake measurements in the EPIC project: Methodological considerations. International Journal of Epidemiology 1997;26:S15-S25.

108. Hebert JR, Peterson KE, Hurley TG et al. The effect of social desirability trait on self-reported dietary measures among multi-ethnic female health center employees. Annals of Epidemiology 2001;11:417-27.

109. Bohner G, Wanke M. Attitude and Attitude Change. Psychology Press, 2002.

110. Sims LS. Toward an understanding of attitude assessment in nutrition research. J Am Diet Assoc 1981;78:460-6.

111. Bush H, Williams R, Bradby H, Anderson A, Lean M. Family hospitality and ethnic tradition among South Asian, Italian and general population women in the West of Scotland. Sociology of Health & Illness 1998;20:351-80.

112. Farooqi A, Nagra D, Edgar T, Khunti K. Attitudes to lifestyle risk factors for coronary heart disease amongst South Asians in Leicester: a focus group study. Family Practice 2000;17:293-7.

113. Ristovski-Slijepcevic S, Chapman GE, Beagan BL. Engaging with healthy eating discourse(s): ways of knowing about food and health in three ethnocultural groups in Canada. Appetite 2008;50:167-78.

114. Margetts BM, Martinez JA, Saba A, Holm L, Kearney M, Moles A. Definitions of 'healthy' eating: a pan-EU survey of consumer attitudes to food, nutrition and health. Eur J Clin Nutr 1997;51 Suppl 2:S23-S29.

115. Helsedirektoratet. Tema: Ernæring. 2008. 20-5-0008.
Ref Type: Internet Communication

116. Wandel M, Fagerli RAA. Norwegians' opinions of a healthy diet in different stages of life. Journal of Nutrition Education 1999;31:339-46.

117. Anderson JW. Diabetes Mellitus: Medical Nutrition Therapy. In: Shils ME, Shike M, Ross AC, Caballero B, Cousins RJ, eds. Modern Nutrition in Health and Disease. Baltimore: Lippincott Williams & Wilkins 2006.

118. Thomas J. Nutrition intervention in ethnic minority groups. Proceedings of the Nutrition Society 2002;61:559-67.

119. Lake AA, Hyland RM, Rugg-Gunn AJ, Wood CE, Mathers JC, Adamson AJ. Healthy eating: perceptions and practice (the ASH30 study). Appetite 2007;48:176-82.

120. Calnan M. Food and health: a comparison of beliefs and practices in middle-class and working-class households. In: Cunningham-Burley S, McKeganey NP, eds. Readings in Medical Sociology. London: Routledge 1990:9-36.

121. Holm L. Sund ernæring og hverdagens vaner. In: Holm L, ed. Mad, mennesker og måltider - samfunnsvidenskabelige perpektiver. København: Munksgaard Danmark 2003.

122. Undersøkelse om holdning til kostholdsråd fra helsemyndighetene, Holdning til de enkelte kostholdsråd, samt holdning til foreldrebetaling av frukt- og grøntordningen i skolen.MMI Univero. 2004. Oslo, Sosial- og helsedirektoratet.
Ref Type: Report

123. Campbell MK, Reynolds KD, Havas S et al. Stages of change for increasing fruit and vegetable consumption among adults and young adults participating in the National 5-a-Day for Better Health community studies. Health Education & Behavior 1999;26:513-34.

124. Prochaska JO, Velicer WF. The transtheoretical model of health behavior change. American Journal of Health Promotion 1997;12:38-48.

125. Wardle J, Parmenter K, Waller J. Nutrition knowledge and food intake. Appetite 2000;34:269-75.

126. Stables GJ, Subar AF, Patterson BH et al. Changes in vegetable and fruit consumption and awareness among US adults: results of the 1991 and 1997 5 A Day for Better Health Program surveys. J Am Diet Assoc 2002;102:809-17.

127. Ashfield-Watt PAL. Fruits and vegetables, 5+a day: are we getting the message across? Asia Pacific Journal of Clinical Nutrition 2006;15:245-52.

128. Lovegrove JA. Symposium on 'nutrition interventions in high-risk groups' - CVD risk in South Asians: the importance of defining adiposity and influence

of dietary polyunsaturated fat. Proceedings of the Nutrition Society 2007;66:286-98.

129. Gilbert PA, Khokhar S. Changing dietary habits of ethnic groups in Europe and implications for health. Nutrition Reviews 2008;66:203-15.

130. Hjartaker A, Lund E. Relationship between dietary habits, age, lifestyle, and socio-economic status among adult Norwegian women. The Norwegian Women and Cancer Study. European Journal of Clinical Nutrition 1998;52:565-72.

131. de Irala-Estevez J, Groth M, Johansson L, Oltersdorf U, Prattala R, Martinez-Gonzalez M. A systematic review of socio-economic differences in food habits in Europe: consumption of fruit and vegetables. European Journal of Clinical Nutrition 2000;54:706-14.

132. Nicolaou M, Van Dam RM, Stronks K. Acculturation and education level in relation to quality of the diet: a study of Surinamese South Asian and Afro-Caribbean residents of the Netherlands. Journal of Human Nutrition and Dietetics 2006;19:383-93.

133. Hupkens CLH, Knibbe RA, van Otterloo AH, Drop MJ. Class differences in the food rules mothers impose on their children: A cross-national study. Social Science & Medicine 1998;47:1331-9.

134. Buttriss JL. Food and nutrition: Attitudes, beliefs, and knowledge in the United Kingdom. American Journal of Clinical Nutrition 1997;65:S1985-S1995.

135. Charles N, Kerr M. Women, Food and Families. Manchester, UK: Manchester University Press, 1988.

136. Coveney J. A qualitative study exploring socio-economic differences in parental lay knowledge of food and health: implications for public health nutrition. Public Health Nutrition 2005;8:290-7.

137. Hearty AP, McCarthy SN, Kearney JM, Gibney MJ. Relationship between attitudes towards healthy eating and dietary behaviour, lifestyle and demographic factors in a representative sample of Irish adults. Appetite 2007;48:1-11.

138. Turrell G, Hewitt B, Patterson C, Oldenburg B. Measuring socio-economic position in dietary research: is choice of socio-economic indicator important? Public Health Nutrition 2003;6:191-200.

139. Holmboe-Ottesen G, Wandel M, Mosdøl A. Sosiale ulikheter og kosthold. Tidsskr Nor Lægeforen 2004;124:1526-8.

140. Rotter JB. Social learning and clinical psychology. New York: Prentice-Hall, 1954.

141. Iversen, A. C. Social differences in health behaviour : the motivational role of perceived control and coping. 2005. Bergen, Research Centre for Health Promotion, Department of Education and Health Promotion, Faculty of Psychology, University of Bergen.
Ref Type: Thesis/Dissertation

142. Cooke L. The importance of exposure for healthy eating in childhood: a review. Journal of Human Nutrition and Dietetics 2007;20:294-301.

143. Sallis J, Nader P. Family determinants of health behaviours. In: Gochman D, ed. Health Behaviour: Emerging Research Perspectives. New York: Plenum Press 2008:107.

144. Wandel M. Dietary intake of fruits and vegetables in Norway: influences of life phase and socio-economic factors. Intarnational Journal of Food Sciences and Nutrition 1995;291-301.

145. Wandel, M, Bugge, A, and Ramm, JS. Change and stability in food habits. 4. 1995. Lysaker, Statens institutt for forsbruksforskning.
Ref Type: Report

146. Bugge A. Middag - en sosiologisk analyse av den norske middagspraksis. 2005. Lysaker, Statens institutt for forbruksforskning.
Ref Type: Report

147. von Hofe B TMCR. A systematic review of issues impacting on health care for culturally diverse groups using diabetes as the model. Sydney: Australian Centre for Diabetes Strategies in collaboration with Multicultural Health Unit, South Eastern Sydney Area Health Service, 2002.

148. Murcott A. Cultural Perceptions of Food and Eating - Obstacles to Change. Ecology of Food and Nutrition 1992;27:283-90.

149. Spencer L, Wharton C, Moyle S, Adams T. The transtheoretical model as applied to dietary behaviour and outcomes. Nutrition Research Reviews 2007;20:46-73.

150. Povey R, Conner M, Sparks P, James R, Shepherd R. A critical examination of the application of the Transtheoretical Model's stages of change to dietary behaviours. Health Education Research 1999;14:641-51.

151. Lea EJ, Crawford D, Worsley A. Consumers' readiness to eat a plant-based diet. European Journal of Clinical Nutrition 2006;60:342-51.

152. Van Duyn MAS, Heimendinger J, Russek-Cohen E et al. Use of the transtheoretical model of change to successfully predict fruit and vegetable consumption. Journal of Nutrition Education 1998;30:371-80.

153. Brug J, Vanassema P, Kok G, Lenderink T, Glanz K. Self-Rated Dietary-Fat Intake - Association with Objective Assessment of Fat, Psychosocial Factors, and Intention to Change. Journal of Nutrition Education 1994;26:218-23.

154. Glanz K, Patterson RE, Kristal AR et al. Stages of Change in Adopting Healthy Diets - Fat, Fiber, and Correlates of Nutrient Intake. Health Education Quarterly 1994;21:499-519.

155. Adams J, White M. Are the stages of change socioeconomically distributed? A scoping review. Am J Health Promot 2007;21:237-47.

6. List of appendices

Appendix 1.

UNIVERSITETET I OSLO
DET MEDISINSKE FAKULTET

InnvaDiab
Holmlia

Kosthold

Disse spørsmålene dreier seg om matvanene dine, hva du vanligvis pleier å spise og drikke.

1a. Lager du egen middag til barna (B) eller mannen din (M)?

☐$_1$ Ja ☐$_2$ Nei ☐$_3$ Av og til

1b. Hvis ja eller av og til, **hvor ofte?** _____

Hvis ja eller av og til: Disse spørsmålene gjelder det *du* spiser, ikke resten av familien din.

2. Hvis du tenker på en vanlig dag og hva du gjør om morgenen, ettermiddagen og kvelden. Når er det du spiser (M = måltid, MM = mellommåltid)**? Pleier du å drikke noe utenom disse tidene i tillegg** (D)**?** (Bortsett fra rent vann.) Skriv bokstavkodene inn på klokkeslettene her:

04	05	06	07	08	09	10	11	12	13	14	15

16	17	18	19	20	21	22	23	24	01	02	03

For å hjelpe hukommelsen: **Spiser du mellom måltidene (småspising, te)? Spiser du rester etter barna? Etter frokosten? Når de kommer hjem fra skolen? Etter middagen?**

3. a) Hvor mye te drikker du vanligvis i løpet av <u>en dag</u>?

Tekopper	0	1	2	3	4	5	6	7	8+
	☐	☐	☐	☐	☐	☐	☐	☐	☐

b) Hvor stor er den koppen? (Se bakerst i bildeheftet:) ☐$_1$ ☐$_2$ ☐$_3$ ☐$_4$

c) Teen du drikker, lager du den i kjele (___A) eller kopp for kopp (___B)?

A. Dersom i kjele, hvor mye melk i forhold til vann har du oppi? Sett ring rundt riktig enhet (kopp/dl)

___kopper / dl vann ___kopper / dl melk ___ ts sukker

☐$_1$H-melk
☐$_2$Lettmelk
☐$_3$Ekstralett
☐$_4$Skumma

B. Dersom kopp for kopp:

(Se bildeheftet bakerst: øverste strek =1, nest øverste 2 osv)

	Antall tekopper per dag									*Hvor stor del av koppen*			
Tilsatt	0	1	2	3	4	5	6	7	8+	1	2	3	4
H-melk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Lettmelk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Ekstra lettmelk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Skumma melk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Ingenting	☐	☐	☐	☐	☐	☐	☐	☐	☐				

d) Totalt antall kopper (skal stemme med nr. 2a og 2e): _____

	Antall tekopper per dag									*Mengde (ts/kopp el. antall/kopp)*			
Tilsatt	0	1	2	3	4	5	6	7	8+	½	1	2	3
Sukker	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Suketter	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Honning	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Annet: _____	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Ingenting	☐	☐	☐	☐	☐	☐	☐	☐	☐				

e) Totalt antall kopper (skal stemme med nr. 2a og 2d): _____

4a. Så lurer jeg på hva du drikker av andre ting. Hvor mange glass per dag eller per uke drikker du vanligvis av: (Sett kryss. Inkludert helger. ½ liter = 3 glass.)

	4 glass el. mer/dag $_1$	2-3 glass/dag$_2$	1 glass/dag$_3$	1-6 glass/uke$_4$	sjelden /aldri$_5$
a) Cola/brus/saft/iste					
b) Cola/brus/saft u/sukker					
c) Fruktjus					
d) Fruktnektar/jus tilsatt sukker					
e) H-melk, kefir, yoghurt					

b) Hvor stort er glasset? (Vis ulike størrelser i det oransje bildeheftet s. 1)
Glass □$_1$A □$_2$B □$_3$C (= større enn B) ___

5. Hvor mange ganger i uka spiser du dette som hovedrett?

a) Mager fisk □$_1$ (torsk, sei, hyse osv.) e.g. stekt fisk, ovnsbakt fisk, fiskesalen/-curry
b) Fet fisk □$_2$ (laks, ørret, makrell, sild, kveite) e.g stekt fisk, ovnsbakt fisk, fiskesalen/-curry
c) Kylling □$_3$ (e.g. grillet kylling, kyllingsalen/-curry)
d) Annet kjøtt □$_4$ (e.g. kofta, kebab, kjøttkaker, korma med kjøtt, kjøttsalen/-curry)
e) Pølseretter □$_5$
f) Vegetarretter □$_6$ (e.g. grønnsakssuppe, auberginesalen/-curry, dahl, linsesuppe, kjøttcurry uten å spise kjøttet)

6a. Hvor mange porsjoner med fastfood som pizza eller hamburger spiser du? En porsjon er f.eks. en hamburger, et pizzastykke.

□$_1$ 1 porsjon eller mer per dag
□$_2$ 4-6 porsjoner per uke
□$_3$ 1-3 porsjoner per uke
□$_4$ 1-3 porsjoner per måned
□$_5$ Mindre enn 1 porsjon per måned eller ingenting

6b. Hvor mange porsjoner med frityrstekt mat og snacks spiser du, f.eks. med ettermiddagste? En porsjon er f.eks. en samosa, 2-3 pakora, en kopp potetgull eller pommes frites, frityrstekt kebab, kylling, gulab jamun, 2 jaleebi.

□$_1$ 1 porsjon eller mer per dag
□$_2$ 4-6 porsjoner per uke
□$_3$ 1-3 porsjoner per uke
□$_4$ 1-3 porsjoner per måned
□$_5$ Mindre enn 1 porsjon per måned eller ingenting

7. Hvor mye grønnsaker spiser du? En porsjon er f.eks. en middels stor gulrot, 2 tomater, en liten salat/grønnsakschaart, grønnsakssalen/-curry som til sammen fyller en liten bolle (men som ikke nødvendigvis er hovedrett).

□$_1$ 4 porsjoner eller mer per dag
□$_2$ 2-3 porsjoner per dag
□$_3$ 1 porsjon per dag
□$_4$ 4-6 porsjoner per uke
□$_5$ 1-3 porsjoner per uke
□$_6$ Mindre enn 1 porsjon per uke

8. Bruker du dressing eller lignende?

	4 ss el. mer/dag $_1$	1-3 ss/dag $_2$	3-6 ss/uke $_3$	1-6 ss/2 uker $_4$	Sjelden /aldri $_5$
a)Oljebasert dressing (f.eks. olivenolje)					
b) Majonesbasert (f.eks. Thousand island, majonesblandinger)					
c) Jusbasert dressing (f.eks. sitronsaft)					
d) Yoghurtbasert (f.eks. kefir, rømme, yoghurt)					
e) Raita					
f) Ketchup (f.eks. til samosas)					

9. Hvor mye bønner og linser spiser du? F.eks. dahl, kikerter, erter. En porsjon er ca. en halv katori.

□$_1$ 4 porsjoner eller mer per dag
□$_2$ 2-3 porsjoner per dag
□$_3$ 1 porsjon per dag
□$_4$ 4-6 porsjoner per uke
□$_5$ 1-3 porsjoner per uke
□$_6$ Mindre enn 1 porsjon per uke

10. Hvor mye frukt spiser du? En porsjon er f.eks. et eple, 1 banan, 1 håndfull druer, 2 mandariner, 5 jordbær, eller 2 dl (=1/3 pint or 7 fluid ounces) bær eller fruktsalat/fruktchart.

□$_1$ 4 porsjoner eller mer per dag
□$_2$ 2-3 porsjoner per dag
□$_3$ 1 porsjon per dag
□$_4$ 4-6 porsjoner per uke
□$_5$ 1-3 porsjoner per uke
□$_6$ Mindre enn 1 porsjon per uke

11 a. Hvor mye melk eller flytende melkeprodukter drikker du per dag? Utenom teen (spm. 4).

__ porsjoner melkeprodukt med <1 % fett (skummet (lyserosa), ekstra lett melk (grønn), lyseblå kulturmelk, fettredusert yoghurt)

__ porsjoner melkeprodukt med 1-2 % fett (lettmelk (mørkerosa), Cultura, Biola)

__ porsjoner melkeprodukt med >3 % fett (kefir, mørkeblå kulturmelk, helmelk/H-melk, kaffefløte, fløte)

b) Hvor stort er glasset? (Vis ulike størrelser i det oransje bildeheftet s. 1)

Glass □$_1$A □$_2$B □$_3$C (= større enn B) ___ □$_4$D annet mål: _____

12. Hvor mye brød pleier du å spise en vanlig hverdag? Jeg skal spørre om flere både pakistanske/tamilske og norske brød. Legg sammen alle dagens måltider. Ved forskjell mellom hverdagene: Gjør anslag for en uke og del på 7 etterpå.

Paratha	Små (som lomper)	Store (½ stor=1liten)	**Per dag**	**Per uke**
Sammalt hvete (fin/grov)	__	__	□$_1$	□$_2$
Blanding hvete/sammalt	__	__	□$_1$	□$_2$
Annet: _____	__	__	□$_1$	□$_2$
Chapati/roti				
Sammalt hvete (fin/grov)	__ tynne __ tykke	__	□$_1$	□$_2$
Blanding hvete/sammalt	__ tynne __ tykke	__	□$_1$	□$_2$
Atta	__ tynne __ tykke	__	□$_1$	□$_2$
Annet: _____	__ tynne __ tykke	__	□$_1$	□$_2$

	Små	Store	Per dag	Per uke
Naan				
Hvitt, fint hvetemel	___	___	□1	□2
Sammalt hvete (fin/grov)	___	___	□1	□2
Blanding hvete/sammalt	___	___	□1	□2
Annet: _____	___	___	□1	□2
Dosa/Thosai, puri	___	___	□1	□2
Bhatura	___	___	□1	□2
Idli	___	___	□1	□2
Pappadum Type mel: _____	___	___	□1	□2
Norsk brød				
Hvitt, fint hvetemel (loff, baguette)	___		□1	□2
Mellomgrovt (kneipp, grove rundstykker, fint knekkebrød)	___		□1	□2
Knekkebrød (unntatt fint), veldig grovt brød fra baker	___		□1	□2

13. Hvor ofte spiser du dette?

a) __ antall ganger ris eller pasta (også puttu, stringhoppers/idyanpm) (se bakerst i bildeheftet nr. 17)
□1A □2 B □3 C □4 D □1 **per dag** □2 **per uke**

b) __ grov pasta eller upolert ris (se bakerst i bildeheftet nr. 17)
□1A □2 B □3 C □4 D □1 **per dag** □2 **per uke**

c) __ antall ganger havregrøt o.l. (se bildeheftet nr. 5 grøt) □1 **per dag** □2 **per uke**
□1A □2B □3C □4D

d) __ antall ganger cornflakes, puffa ris, andre frokostblandinger med lite fiber (se bildeheftet nr. 4)
□1A □2B □3C □4D □1 **per dag** □2 **per uke**

e) __ Desiliter/ounces havregryn, müsli, kornblanding, andre frokostblandinger med mye fiber (bilde nr. 20)
□1A □2 B □3 C □4 D □1 **per dag** □2 **per uke**

f) __ stykker middels store poteter (kokte, bakte, stekte, i curries) □1 **per dag** □2 **per uke**

14. Hvor mye nøtter og frø spiser du? En porsjon er ca. 1 ss/liten håndfull (uten skall) (15 g eller ½ ounce). F.eks. mandler, cashewnøtter, pistasjnøtter, solsikkefrø, peanøtter, hasselnøtter.

□1 2 porsjoner eller mer per dag
□2 1 porsjon per dag
□3 4-6 porsjoner per uke
□4 1-3 porsjoner per uke
□5 Mindre enn en porsjon per uke
□6 1-4 porsjoner per måned
□7 mindre enn en porsjon per måned

15. Hvor mye søte bakervarer, iskrem, pudding eller sjokolade o.l. spiser du? En porsjon er f.eks. et stykke kake eller pai, 2 rusk, en baklava, en liten smultring/doughnut, et wienerbrød, 3-4 søte kjeks, en iskrem, en bolle, et skolebrød, en sjokolade.

□1 2 porsjoner eller mer per dag
□2 1 porsjon per dag
□3 4-6 porsjoner per uke
□4 1-3 porsjoner per uke
□5 Mindre enn 1 porsjon per uke

16. Hvor mye sukker, honning eller søtsaker spiser du? En porsjon er f.eks. 2 teskjeer sukker/honning (f.eks. på fruktchart), 3 sukkerbiter, 5 sukkertøy. Ikke ta med det du har i teen.

☐1 2 porsjoner eller mer per dag
☐2 1 porsjon per dag
☐3 4-6 porsjoner per uke
☐4 1-3 porsjoner per uke
☐5 Mindre enn 1 porsjon per uke

16b. Tar du vitaminer eller tran?

Tran/omega-3 ☐1Nei ☐2 Ja, hver dag ☐3 Ja, noen ganger ☐4 Ja, om vinteren

Vitaminer ☐1Nei ☐2 Ja, hver dag ☐3 Ja, noen ganger ☐4 Ja, om vinteren

17. Hva slags fett bruker du <u>som oftest</u> hjemme hos dere? (Velg kun ett alternativ.)

☐1 For det meste matolje eller myk margarin
☐2 For det meste plantesterolmargarin (Provita)
☐3 For det meste smør, ghee eller hard margarin
☐4 Bruker ikke fett
☐5 Lager ikke mat

18. Hva slags fett bruker du… Les kolonnene bortover og kategoriene nedover, ikke brand names, kryss av det navnet de svarer. NB:"Smør" på folketale kan være egentlig margarin.

Fettype	Fettype	Norsk brød	Chapati (på)	Paratha			Frityr deep-fry	Curry/ salen	Matlaging ellers (:)
				I	Steking	På			
Smør 1	**"Hva heter det?"**								
Margarin2	Husker ikke navn								
	Brelett (rød)								
	Bremykt (gul)								
	Soft/Soya								
	Soft/Soya light								
	Soft – mini								
	Vita								
	Vita lett								
	ProVita								
	Oliven								
	Hverdag (Synnøve)								
	Stek og bak (but.kjede)								
	Melange								
	Annet: _____								
	Flytende Bremykt								
	Flytende Melange								
	Flytende Vita								
Olje 3	Solsikke/mais								
	Vegetable								
	Soya								
	Oliven								
	Kokos/palme								
	Raps								
	Annen: _____								
Ghee (nej) 4	Laget av smør S, margarin M, Palme P, kjøpt X								
Ingenting 5									

19a. Hvor mye olje bruker du når du lager salen/curry? _____

19b. Hvor mye og hvor ofte pleier du å kjøpe olje, hvor stor er kanna eller flaska?

	Olje	Margarin	Smør	Ghee*
Hvor mye				
Hvor ofte				

20. Hvor ofte pleier du å spise disse påleggsortene?

	Flere g/dag $_1$	5-7 g/uke $_2$	3-4 g/uke $_3$	1-2 g/uke $_4$	Sjelden/aldri $_5$
Ost (gul-brun-krem-smøre-, paneer)					
Lettost (gul-brun-krem-smøre-, paneer)					
Majonessalater, f.eks italiensk salat, reke-					
Kalkun, skinke, lett kjøttpålegg					
Fiskepålegg (makrell, sardiner, tunfisk)					
Syltetøy					
Lettsyltetøy					
Sjokoladepålegg (nugatti, sjokade) ha-på					

21. Hvor mye pleier du å spise snacks og desserter/søtsaker?

Desserter og søtsaker:	Flere ganger/dag $_1$	5-7 g/uk $_2$	3-4 g/uke $_3$	1-2 g/uke $_4$	1-3 g/md $_5$	Sjelden /aldri $_6$
a) …med både sukker og fett (mithai, halwa, kaker, iskrem, custard)						
b) …med mest sukker (gelé, Turkish delight)						
c) …basert på frukt (chart, tørket frukt)						
d) …basert på nøtter/med mye olje (la'du)						
e) …zarda (søt ris)						

22. Man kan lage mat på forskjellige måter, f.eks. grillet, stekt eller dampet.
Hvor mange ganger i uka eller måneden pleier du å spise mat som er blitt:

	5-7 g/uke $_1$	3-4 g/uke $_2$	1-2 g/uke $_3$	1-3 g/mnd $_4$	sjelden/aldri $_5$
a) Laget i kedai (wok)					
b) Stekt i panne med smør(S), margarin/olje O					
c) Stekt i ovn eller på grill					
d) Stekt først og så kokt i gryterett					
e) Kokt eller dampet (gryteretter, supper)					
f) Frityrstekt					

23. a) Har du redusert mengden fett i maten/kostholdet ditt i løpet av <u>de siste 6 månedene</u>? F.eks. skiftet fra helmelk til lett- eller skumma melk, valgt produkt med redusert fettinnhold, brukt mindre olje når du steker, brukt mindre frityrsteking eller steking generelt.

☐$_1$ Jeg har ikke, og jeg har ikke tenkt å redusere noe de neste 6 månedene.

☐$_2$ Jeg har ikke, men jeg tenker på å gjøre det i løpet av de neste 6 månedene.

☐$_3$ Jeg prøver å redusere, men det er ikke regelmessig.

☐$_4$ Jeg har redusert i løpet de siste 6 månedene.

☐$_5$ Jeg har redusert lenger enn de siste 6 månedene.

b) Har du forandret type fett du bruker i husholdningen i løpet av <u>de siste 6 mnd</u>? (mettet fett → umettet fett) F.eks. begynt å bruke olje i stedet for smør eller ghee, spist mer fisk, begynt å bruke oljebasert dressing i stedet for rømme-/majonesbasert dressing.

☐$_1$ Jeg har ikke, og jeg har ikke tenkt å forandre noe de neste 6 månedene.

☐$_2$ Jeg har ikke, men jeg tenker på å gjøre det i løpet av de neste 6 månedene.

☐$_3$ Jeg prøver å forandre, men det er ikke regelmessig.

☐$_4$ Jeg har forandret i løpet de siste 6 månedene.

☐$_5$ Jeg har skiftet fra mettet fett til for det meste umettet fett for lenger enn 6 måneder siden.

24 a) Har du spist mer grønnsaker <u>de siste 6 mnd.</u> enn før?

□1 Jeg har ikke spist mer grønnsaker de siste 6 mnd, og jeg har ikke tenkt å spise mer de neste 6 månedene.
□2 Jeg har ikke spist mer grønnsaker de siste 6 mnd, men jeg tenker på å gjøre det i løpet av de neste 6 mnd.
□3 Jeg prøver å spise mer grønnsaker, men det er ikke regelmessig.
□4 Jeg har begynt å spise mer grønnsaker i løpet av de siste 6 månedene.
□5 Jeg spiser allerede mye grønnsaker, og har gjort det i mer enn 6 mnd.

b) Har du spist mer bønner og linser <u>de siste 6 mnd.</u> enn før?

□1 Jeg har ikke spist mer bønner og linser de siste 6 mnd, og jeg har ikke tenkt å spise mer de neste 6 mnd.
□2 Jeg har ikke spist mer bønner og linser de siste 6 mnd,men jeg tenker på å gjøre det i løpet av de neste 6mnd
□3 Jeg prøver å spise mer bønner og linser, men det er ikke regelmessig.
□4 Jeg har begynt å spise mer bønner og linser i løpet av de siste 6 månedene.
□5 Jeg spiser allerede mye bønner og linser, og har gjort det i mer enn 6 mnd.

c) Har du spist mer frukt og bær i løpet av <u>de siste 6 mnd.</u> enn før?

□1 Jeg har ikke spist mer frukt og bær de siste 6 mnd, og jeg har ikke tenkt å spise mer de neste 6 mnd.
□2 Jeg har ikke spist mer frukt og bær de siste 6 mnd, men jeg tenker på å gjøre det i løpet av de neste 6 mnd.
□3 Jeg prøver å spise mer frukt og bær, men det er ikke regelmessig.
□4 Jeg har begynt å spise mer frukt og bær i løpet av de siste 6 månedene.
□5 Jeg spiser allerede mye frukt og bær og har gjort det i mer enn 6 mnd.

d) Har du redusert mengden sukker i løpet av <u>de siste 6 mnd</u>? F.eks. mindre sukker i teen eller begynt med suketter.

□1 Jeg har ikke brukt mindre sukker, og jeg har ikke tenkt å bruke mindre de neste 6 mnd.
□2 Jeg har ikke brukt mindre sukker, men jeg tenker på å bruke mindre i løpet av de neste 6 månedene.
□3 Jeg har prøvd å redusere mengden sukker, men det er ikke regelmessig.
□4 Jeg har redusert mengden sukker i løpet av de siste 6 mnd.
□5 Kostholdet mitt inneholder allerede lite sukker og har gjort det i mer enn 6 mnd.

e) Har du redusert mengden hvitt mel (til forskjell fra grovt) i løpet av <u>de siste 6 mnd</u>? F.eks. begynt å spise upolert ris, begynt å bruke mer sammalt mel eller attamel.

□1 Jeg har ikke spist mindre hvitt mel, og jeg har ikke tenkt å spise mindre de neste 6 mnd.
□2 Jeg har ikke spist mindre hvitt mel, men jeg tenker på å gjøre det i løpet av de neste 6 månedene.
□3 Jeg har prøvd å redusere mengden hvitt mel, men det er ikke regelmessig.
□4 Jeg har redusert mengden hvitt mel i løpet av de siste 6 mnd.
□5 Kostholdet mitt inneholder allerede lite hvitt mel og har gjort det i mer enn 6 mnd.

f) Når det gjelder vekt, hvilken av disse passer best på deg:

❒1 Jeg prøver ikke å gå ned i vekt for tiden, og jeg har ingen planer om å gjøre det de neste 6 måneder.

❒2 Jeg prøver ikke å gå ned i vekt for tiden, men jeg tenker på å gjøre det de neste 6 måneder.

❒3 Jeg prøver å gå litt ned i vekt for tiden, men det er ikke regelmessig.

❒4 Jeg har prøver å gå ned i vekt for tiden, og begynte i løpet av de siste 6 måneder.

❒5 For tiden prøver jeg å gå ned i vekt, og jeg har gjort det lengre enn de siste 6 mnd.

24. Vet du, er det noen typer mat som er bra å spise for å unngå å få diabetes, som hjelper mot diabetes?
❒1 Vet ikke ❒2 Nei ❒3 Ja: _____

25. Vet du, er det noen typer mat som uheldige å spise, som øker risikoen for diabetes?
❒1 Vet ikke ❒2 Nei ❒3 Ja: _____

26. Når du skal planlegge og lage middag (til *deg selv,* som *du* spiser), hvor viktig er det:

		Veldig viktig 1	Ganske viktig 2	Litt viktig3	Bare litt viktig 4	Ikke viktig i det hele tatt 5
A	At barna liker maten					
B	At mannen liker maten					
C	At du selv liker maten					
D	At andre i huset bifaller maten					
E	At maten er rask å lage					
F	At maten er hjemmelaget					
G	At der er mange grønnsaker					
H	At maten har lite fett					
I	At maten ser fin ut					
J	At maten er pakistansk/tamilsk					
K	At maten er sunn, balansert					
L	At maten ikke er (for) dyr					
M	Annet I: _____					
N	Annet II: _____					

27. Hvilken er den viktigste for deg? ___

28. Hvis du skal velge mat som er bra for deg, sunn mat, hva legger du spesielt vekt på?
Ikke les opp alternativ, bare kryss av når noe nevnes, skriv ned andre ting på "Annet."

		Nevnes
A	Staut og kraftig mat	
B	Mye grønnsaker	
C	Kjøtt	
D	Fisk	
E	Proteiner	
F	Olje/fett	
G	Mager mat	
H	Karbohydrater/stivelse: ris/bakervarer/hvetevarer	
I	Sukker	
J	Kommer an på (e.g. Ayurveda, kald/varm)	
K	Vann	
L	Annet I: _____	
M	Annet II: _____	
N	Vet ikke noe	

29a. Hvilken er den aller viktigste for deg? ___
29b. Synes du at du gjør dette? □1 Ja □2 Nei □3 Vet ikke □4 Nei, men vil.

30. Hvor har du lært hva som er bra å spise, hva som er sunt?
□1 Mor/oppvekst
□2 Utdannelse
□3 Andre kvinner
□4 Legen
□5 Annet helsepersonell
□6 Barna
□7 Offentlig helseopplysning
□8 Annet: _____

31. Hva tror du man ikke bør spise så mye av, hva er usunt?
Ikke les opp alternativ, kryss bare av når noe her nevnes, og skriv andre ting på "Annet."

		Nevnes
A	Mettet fett/fra dyr (smør osv.)	
B	Fett generelt	
C	Sukker	
D	Hvitt, fint mel	
E	Polert ris	
F	Ris generelt	
G	For mye olje	
H	Annet I: _____	
I	Annet II: _____	
J	Vet ikke noe	

32. Synes du at du spiser sunt nok? □1 Ja □2 Nei □3 Vet ikke

33. Hvis nei eller vet ikke, hvorfor ikke?

	Viktig				Ikke viktig
a. Du synes ikke du liker det ……	1	2	3	4	5
b. Barna liker ikke den maten ……..	1	2	3	4	5
c. Mannen din liker ikke den maten ….	1	2	3	4	5
d. Barna vil ha "noe godt" å spise…….	1	2	3	4	5
e. Mannen din vil ha "noe godt" å spise	1	2	3	4	5
f. Familien din får gjester/besøk ……	1	2	3	4	5
g. Vanskelig å få tak i varene……	1	2	3	4	5
h. Ikke god nok kvalitet på varene…	1	2	3	4	5
i. Du har ikke nok tid ……	1	2	3	4	5
j. Det interesserer deg ikke/du vil ikke	1	2	3	4	5
k. Usunn/annen mat smaker bedre	1	2	3	4	5
l. Familien din liker ikke sunn mat	1	2	3	4	5
m. Du har andre vaner ……..	1	2	3	4	5
n. Du synes ikke du vet nok …….	1	2	3	4	5
o. Du er sliten ……..	1	2	3	4	5
p. Du er bekymret eller lei deg ……	1	2	3	4	5
q. Det er for dyrt/koster for mye …	1	2	3	4	5
r. Annet: _____	1	2	3	4	5
s. Annet: _____	1	2	3	4	5
t. Vet ikke ……	1	2	3	4	5

34. Når spiser du usunt? I noen spesielle situasjoner? (Hvis de står fast: f.eks. med besøk?)

35. Vet du hvor mye eller hvor mange porsjoner grønnsaker og frukt man bør spise per dag? _____

36. Hvis du skal spise eller drikke noe riktig godt, hva velger du?

37. Vet du om noe som øker risikoen for å få diabetes?
Ikke les alternativ, bare kryss av når noe nevnes, og før andre ting på "Annet."

		Nevnes
A	Lite fysisk aktivitet	☐
B	Overvekt	☐
C	Familie med diabetes (gener)	☐
D	Stress	☐
E	Spiser for mye sukker	☐
F	Spiser for mye fett	☐
G	Mat/drikke: hva _____	☐
H	Annet: _____	☐
I	Annet: _____	☐

38. Se på siste side. **Disse kvinnene er cirka 45 år gamle (de har litt mer rynker enn du ser her):**

38a. Hvem tror du er mest frisk, blir minst sliten? ____

38b. Hvem tror du er rikest eller har høyest status? ____

38c. Hvem liker de best i Pakistan, hvordan vil folk i Pakistan at 45 år gamle damer skal se ut? ___

38d. Hvordan vil pakistanere som bor i Norge at 45 år gamle pakistanske damer skal se ut? ____
38e. Tenker menn og damer likt? ☐$_1$ Ja ☐$_2$ Nei Menn:_____ Damer:_____

38f. Hvordan vil nordmenn at 45 år gamle damer skal se ut? ____

38g. Hvem av disse er du? ____

38h. Intervjuerens vurdering av personen på skalaen: _____

39a. Spiste du mer grønnsaker da du bodde i Pakistan enn du gjør nå? ☐$_1$Ja ☐$_2$Nei

39b. Hvorfor spiser du mindre her i Norge? _____

39c. Ville du ha spist mer og flere typer grønnsaker hvis de var billigere? ☐$_1$Ja ☐$_2$Nei

39d. Ville du ha spist mer og flere typer grønnsaker hvis de smakte bedre? ☐$_1$Ja ☐$_2$Nei

39e. Ville du ha spist mer og flere grønnsaker hvis de vokste her i Norge i stedet for å bli fraktet hit i kjølerom? ☐$_1$Ja ☐$_2$Nei

39f. Har du smakt upolert ris? ☐$_1$Ja ☐$_2$Nei

39g. Hvorfor spiser du polert ris og ikke upolert ris?

39h. Kjenner du noen som spiser upolert ris? ☐$_1$Ja ☐$_2$Nei

39i. Hva synes du om det?

ID: -_____

40a. Hvor mange spiser vanligvis hjemme hos dere: Hverdager I helgene

Til frokost?	_____	_____
Til lunsj?	_____	_____
Til middag?	_____	_____
Til kvelds?	_____	_____

40b. Er det andre enn familien din som spiser fast hjemme hos deg?

□$_1$ Nei □$_2$ Ja: _____

41. Hvor mange ganger i uka spiser du salen?

a) __ antall ganger kjøttsalen (uten ekstra grønnsaker) (se bakerst i bildeheftet nr. 18)
□$_1$A □$_2$ B □$_3$ C □$_4$ D □$_1$ **per dag** □$_2$ **per uke**

b) __ antall ganger grønnsakssalen (enten uten kjøtt eller plukket bort kjøttbitene) (se bakerst i bildeheftet nr. 18)
□$_1$A □$_2$ B □$_3$ C □$_4$ D □$_1$ **per dag** □$_2$ **per uke**

c) __ antall ganger kjøttsalen (uten grønnsaker utover løk og tomater) (se bakerst i bildeheftet nr. 18)
□$_1$A □$_2$ B □$_3$ C □$_4$ D □$_1$ **per dag** □$_2$ **per uke**

42.

a) Til hva slags mat bruker du olje om igjen?	Hvor ofte skifter du?	Hvor ofte spiser du dette?
_____	□2.hver □3.hver □4.-5. hver □sjeldnere	_____
_____	□2.hver □3.hver □4.-5. hver □sjeldnere	_____
_____	□2.hver □3.hver □4.-5. hver □sjeldnere	_____
_____	□2.hver □3.hver □4.-5. hver □sjeldnere	_____
_____	□2.hver □3.hver □4.-5. hver □sjeldnere	_____
_____	□2.hver □3.hver □4.-5. hver □sjeldnere	_____

b) Har du pommes frites-maskin hjemme hos deg som du bruker? □Nei □Ja

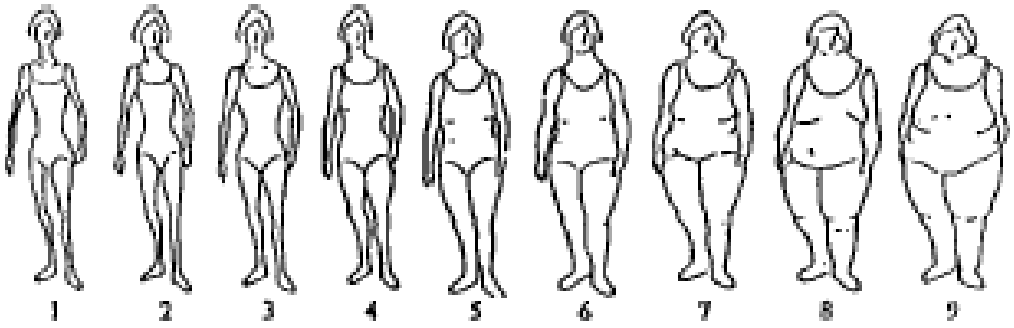
Hvor ofte bruker du den? _____

Hvordan gjør du det med oljen? _____

Takk!!!!! Vi vil gjerne snakke med deg en gang til om et par uker. En jente kommer til å ringe deg.
Er det greit at hun besøker deg hjemme hos deg eller vil du møte henne et annet sted hvor det passer deg?
□ Hjemme □ Annet sted: _____

Når ca. passer det? _____

(Jamfør med Monica om passende dag og tidspunkt (og barn).)


1
2
3
4
5
6
7
8
9

Appendix 2.

1. Demografi

a) **Hvordan kom du deg hit?**
☐1 Gående/syklende, *hvor lenge*; _____min ☐2 Motorisert kjøretøy

b) **Var du fysisk aktiv i går?** ☐1 Ja, *hvor lenge:* _____ min ☐2 Nei

c) **Hvor lenge har du samlet bodd i nåværende bydel/område i Oslo?** *Antall* _____ år
(Sett 0 hvis mindre enn et halvt år)

d) **Hvor bodde du det meste av tiden før du fylte 16 år?**
(kryss av for ett alternativ og spesifiser)
☐1 Samme bydel/område
☐2 Annen bydel/område i Oslo: *Hvilken:* _____
☐3 Annet fylke i Norge .... *Hvilket:* _____
☐4 Utenfor Norge ..... *Land:* _____

e) **Når flyttet/kom du til Norge?** *Årstall:* _____ ☐ Er født i Norge

f) **Hvor gode vil du si at dine norskkunnskaper er?** *(Sett bare ett kryss)*
☐1 Svært gode
☐2 Gode
☐3 Middels
☐4 Litt dårlig
☐5 Dårlig

g) **Hvor mange års skolegang har du totalt gjennomført?** *Antall*: _____år
(Ta med alle år du har gått på skole eller studert)

h) **Hvilken utdanning har du?**
Mindre enn 7 år, oppgi antall år: _____år
Grunnskole/"Matrick", oppgi antall år: _____år
Gymnas/"FA": oppgi antall år: _____år
Høgskole eller universitet/"BA", oppgi antall år_____år
Yrkesskole, oppgi antall år_____år

i) **Bor du ...?**

Bor du sammen m/noen? Ja 1, Nei 2

k) **Hvis JA** (sett gjerne flere kryss):
☐1 Ektefelle
☐2 Kjernefamilie. *Antall:* _____
☐3 Storfamilie. *Antall:* _____
☐4 Andre personer, 18 år og eldre. *Antal:l*_____
☐5 Personer under 18 år. *Antal:l*_____

l) **Har du født barn?**
☐1 Ja ☐2 Nei Hvis ja, *antall barn:*_____

m) **Sivil status:**
☐1 Gift
☐2 Samboer
☐3 Skilt/separert
☐4 Enke
☐5 Enslig

Appendix 3.

1. Arbeid

a) **Er du i arbeid** ❒$_1$ Ja ❒$_2$ Nei

b) **Hvilket yrke/tittel har eller hadde du?**
Yrke: _____

c) **Beskriv hovedyrket ditt;**

❒$_1$ Selvstendig, eier/medeier ❒$_2$ Ansatt ❒$_3$ Familiemedlem med fast lønnlønn
❒$_4$ Familiemedlem uten fast lønn ❒$_5$ Leder ❒$_6$ Pensjonist
❒$_7$ Husmor

d) **Hvor mange timer er du i lønnet arbeid i løpet av en uke?** Ca _____ timer

e) **Hvor mange timer har du sesongarbeid i løpet av en uke?** Ca _____timer

f) **Hvor mange timer hjelper du til i en familiebedrift/ulønnet arbeid i løpet av en uke?**
Ca _____ timer

g) **Hvor mange timer driver du med husarbeid i løpet av en uke?** Ca _____ timer

Errata

Corrections in the master thesis ”Perceptions of Healthy Eating among Pakistani Immigrant Women in Oslo – Influences on Food Choice” by Mari Helene Kårstad

Page 42, paragraph 4, line 8: The following sentence is deleted: “This was adapted from a picture booklet used in a national dietary survey among 9- and 13-y-olds (UNGKOST) and has been validated for use in this age group (89).”

It is replaced by the following sentences and references:

“This was adapted from a picture booklet, used in the Norwegian part of the European Prospective Investigation into Cancer and Nutrition (EPIC) study (Kaaks R & Riboli E, 1997), which had been adapted to be relevant for the Norwegian diet (Brustad et al. 1997).”

References:

Kaaks R & Riboli E (1997): Validation and calibration of dietary intake measurements in the EPIC Project: methodological considerations. European Prospective Investigation into Cancer and Nutrition. Int. J. Epidemiol. 26(Suppl 1), S15 – S25.

Brustad M, Skeie G, Braaten T, Slimani N and Lund E (2003): Comparison of telephone vs face-to-face interviews in the assessment of dietary intake by the 24 h recall EPIC SOFT program—the Norwegian calibration study. European Journal of Clinical Nutrition. 57, 107–113.

Page 78, paragraph 3, line 6: The following sentence is deleted: “When assessing the use of cooking fat in *salen* portion models, a picture booklet was used to help participants estimate intake.”

It is replaced by the following sentence and with reference to appendix 4:

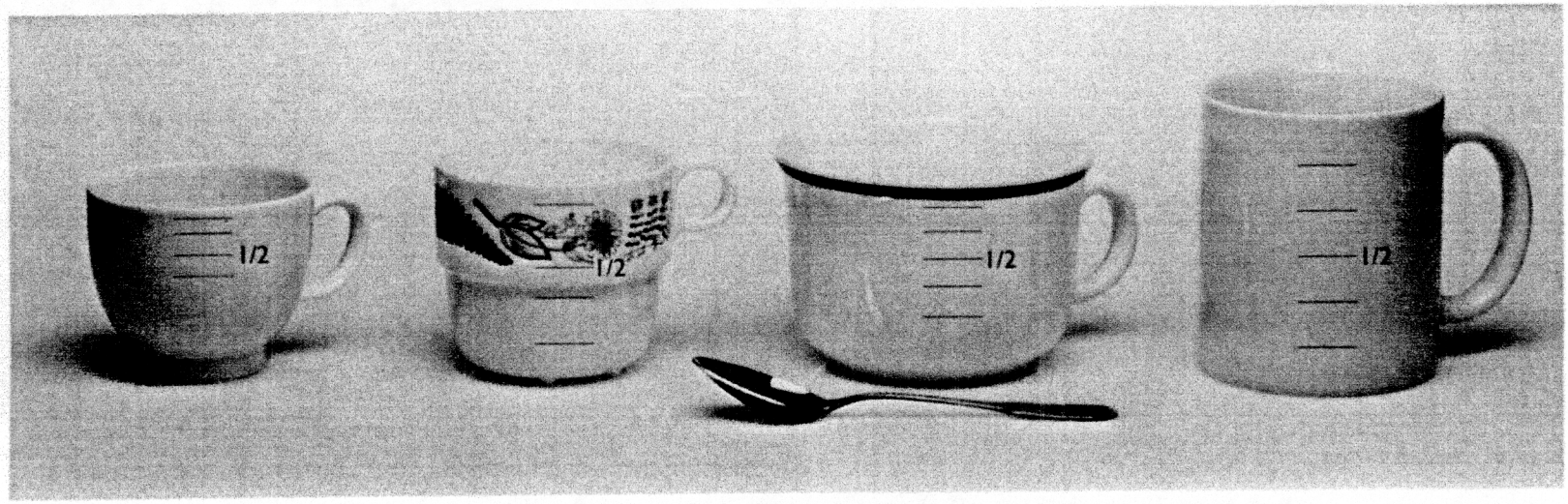
“When assessing the use of cooking fat in *salen* portion models, e.g. a picture of four cups/mugs, were used to help participants estimate intake (see appendix 4).

Page 129: The following should be added to the list of appendices: “Appendix 4: Cups and mugs”

Appendix 4 with picture of cups and mugs is attached.

Appendix 4.

16. Kopper og krus



1 2 3 4

Bildene hentet fra *Epic*. Universitetet i Tromsø.