

Obesity in the eye of the beholder

*-Body size preferences among Pakistani women in Norway
with a high risk of diabetes*

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Dedications

This thesis is dedicated to my parents, my sisters, and my friends who have faith in me in every step I take even when my self-confidence is gone.

Executive summary

Background: South Asians are known to be prone to the metabolic syndrome and the adverse effects of this. There are many hypotheses and explanations for the high vulnerability to obesity, diabetes and cardiovascular disease in this group of people. Genetics and lifestyle differences play important roles in the development of non-communicable diseases. In the prevention and treatment of these conditions emphasis is put on keeping a normal weight, by healthy diet and physical activity. However, in areas with food scarcity, overweight has traditionally been associated with being in good health and of high status, and the body ideal has been large. Pakistani women in Norway have a high prevalence of obesity and diabetes. These women have impulses both from the traditional culture in their country of origin and from the Norwegian culture. To be able to give appropriate and effective advices on weight reduction, it is of importance to know their body size preferences. Little research has been done on body size preferences in South Asian and Pakistani women.

Aim: The aim of the study was to investigate which body size preferences Pakistani women in Norway have, and whether these have an impact on their weight reduction behaviour, their body mass indexes and on the intake of foods rich in fats and sugar, vegetables, fruits and legumes.

Methods: The participants (Pakistani women aged 26 to 62), living in Søndre Nordstrand, Oslo, were part of the larger randomized controlled lifestyle intervention study InnvaDiab. The majority was first generation immigrants. Demographic data was collected and measurements of height, weight and waist circumference were done by trained staff. Bilingual interviewers filled a precoded questionnaire on diet and body size preferences at the time of inclusion by the local health centre. A figure rating scale was used to investigate the body size preferences. The women's views of which body size a healthy and a rich woman should have were studied. In addition theirs believes of the body sizes preferred by other people were explored. The diet was studied by food frequency questionnaire and weight reduction behaviour was

reported by the stage in “stages of change”, which is a construct of the Transtheoretical Model.

Findings: There was found a high prevalence of people with a BMI ≥ 25 (80%) and BMI ≥ 30 (39%). The BMIs did not vary with age, number of children, years in Norway, years of education, self-reported Norwegian skills and work status. The waist circumferences were smaller for those with higher education. On average the women linked body sizes depicting normal BMI to good health and richness, and believed that Pakistani women in Norway in the age of 45 preferred a body size with a BMI of 21 to 23. Most of the participants had a higher body size than the body sizes they preferred, and reported to be trying to reduce weight but not doing so regularly. Those trying to reduce weight were less likely to eat deep-fried and sweet foods, and had a more frequent intake of fruit and berries. The intake of vegetables, fast food and sugar was not affected by the stage in weight reduction behaviour.

Conclusion: The present study gives information on a field that has not been widely explored previously in Pakistani women living in Norway. This study should be an encouragement to investigate body size preferences more thoroughly. There is a need for qualitative studies on this issue.

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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 cultural patterns of either or both groups” (Redfield *et al.* 1936).

BODY DISSATISFACTION In the field of body image which uses body size scales, defined as the discrepancy between the body size one perceive to have and the one that one wishes to have (Williamson *et al.* 1993).

“BODY DISSATISFACTION” The discrepancy between the self-perceived body size and the assumed ideal body size. Used in the present study as a substitute for body dissatisfaction.

SELF-PERCEIVED BODY SIZE The current body size the participants believe to have themselves pointed out using a figure rating scale. In the present study the Stunkard Figure Rating Scale (Stunkard *et al.* 1983) was used.

CALCULATED BODY SIZE The body size (in the Stunkard Figure Rating Scale (Stunkard *et al.* 1983)) corresponding to the participants body mass index and age based on the numbers linked to the scale by Bulik *et al.* (Bulik *et al.* 2001).

ASSUMED IDEAL BODY SIZE The body size that the women believe Pakistani women in Norway to prefer, was assumed to be near to their ideal body size.

BODY SIZE PREFERENCES In this thesis this is the body size that one prefer based on different characteristics such as health or richness.

WEIGHT REDUCTION BEHAVIOUR In this thesis those trying to reduce weight, regardless of how, are involved in weight reduction behaviour.

SOUTH ASIANS People from the Indian subcontinent (India, Pakistan., Sri Lanka, Bangladesh, Nepal etc.) (Misra and Vikram, 2004)

IMMIGRANTS (as defined in Norway) Immigrants are by Statistics Norway defined as people who are born outside of Norway and those in Norway with two parents born abroad (Henriksen, 2007).

Abbreviations

BMI - Body mass index

BSP - Body size preferences

CVD - Cardiovascular disease

DN - Department of Nutrition

FFQ - Food frequency questionnaire

FRS - Figure Rating Scale

IGT - Impaired glucose tolerance

SES - Socio-economic status

SPSS - Statistical Product and Service Solutions

UiO - University of Oslo

WHO - World Health Organization

TTM - The Transtheoretical Model

1. Introduction

1.1 Scope

This master thesis focuses on body size preferences among Pakistani women living in Søndre Nordstrand in Oslo. The high prevalence of diabetes and cardiac disease among South Asians worldwide is also present among South Asians in Norway (Jenum *et al.* 2005). In Norway most of the South Asians are from Pakistan (Statistics Norway, 2004). Since obesity is a major risk factor for these diseases, the high prevalence of obesity found in studies among Pakistanis in Oslo (Kumar *et al.* 2006) is alarming. One of the main methods to prevent the development of non-communicable diseases is weight reduction through healthy food habits and increase in physical activity (Misra and Vikram, 2004). Some cultures have traditionally favoured obesity, and considered it as a sign of health, wealth and fertility among women (Eknayan, 2006; Mokhtar *et al.* 2001; Sobal, 2001). If this view is supported by Pakistanis in Norway this will have implications for health related work with this population. In order to give patients of Pakistani descent advice on diabetes and cardiac disease it is of interest to investigate their views on what body sizes they find favourable. There have not been many studies on body size preferences in this population, however, some reflections on this topic have been seen in a qualitative study on dietary choices (Dawes, 2006), which point to larger body sizes being preferred.

1.2 The master thesis as part of a larger study

This master thesis is part of the randomized controlled lifestyle intervention study, InnvaDiab, run by the Department of Nutrition (DN) and Institute of General Practice and Community Medicine at the University of Oslo (UiO). It started in 2006 and is primarily focusing on changes in diet and physical activity among Pakistani women

with a high risk of developing diabetes type 2 or with newly diagnosed diabetes (within 6 months). In InnvaDiab the women are randomized into two groups, an intervention group and a control group. The intervention lasts for approximately 7 months, and is a combination of individual lifestyle-advice and 6 sessions in groups consisting of 10 - 12 persons. The participants are also invited to take part in a physical activity program twice a week.

In order to evaluate the effect of the intervention, data on diet, physical activity, body perceptions and anthropometric measures are collected both at baseline and after the intervention.

This master thesis will focus on baseline data of the women both in the intervention- and in the control groups, since the project is at the time still running and the intervention will not be finished before the submission of this thesis.

There are two PhD students working with InnvaDiab. Benedikte Bjørge works with the diet-part and Victoria Telle Hjellset works with the part on physical activity. Margareta Wandel is supervising Bjørge and has been the main supervisor of this thesis, while Bjørge has been the second supervisor. The baseline data on diet are the basis for this master thesis.

2. Background

2.1 Population originating from Pakistan living in Norway

2.1.1 Demographic aspects

Immigrants are by Statistics Norway defined as people who are born outside of Norway and those in Norway with two parents born abroad (Henriksen, 2007). There are 415 000 immigrants in Norway (Statistics Norway, 2007c), of which approximately 27700 are from Pakistan (Henriksen, 2007). Pakistani immigrants make up the largest immigrant group in Norway and 85% of them live in the capital of Oslo. Pakistan is a large country (796,095 sq.km) with 154 million habitants, situated in South Asia near countries like India, Sri Lanka, Nepal and Bangladesh, which all share much history, culture and traditions.

There are four provinces in Pakistan (The Pakistani Embassy in Norway, 2008), and most of the Pakistanis in Norway come from rural areas in the Gujrat district in the Punjab province (Statistics Norway, 2004). Pakistanis were among the first non-Western immigrants to come to Norway (Henriksen, 2007). In 2006 three out of ten had been living in Norway for at least 25 years. The first immigrants came as labourers seeking jobs and later on, family reunion became the main purpose of immigrating.

Studies show that Pakistanis are among the ethnic groups with the lowest income in Norway (Pedersen, 2006). Among other things this may be a result of the fact that Pakistani women have low work participation. Pakistanis are also among the immigrants with the lowest level of education (Henriksen, 2007). There are only small gender differences in education among Pakistanis in Norway.

Different environments with regards to culture and socio-economy in their countries of origin result in different patterns of disease among immigrants (Syed and Vangen,

2003). Socio-economic factors such as income, employment status or education are important determinants for the health status of immigrants.

2.1.2 The health of Pakistani immigrants living in Norway

Important diseases with regard to immigrants in Norway are diabetes type 2, cardiovascular diseases, musculo-skeletal problems and mental disorders (Syed and Vangen, 2003). Immigrants have a high prevalence of diabetes and cardiovascular disease compared to ethnic Norwegians. In Oslo it was found that ethnic Pakistanis had a higher self-reported prevalence of diabetes and distress than ethnic Norwegians (Syed *et al.* 2006). The researchers concluded that socio-economic status (SES) may partly explain the inequalities. Among South Asians living in Oslo in the age group of 30 to 59 years the diabetes prevalence was found to be 27.5% and 14.3% among women and men, respectively (Jenum *et al.* 2005). In comparison diabetes frequency among Westerners was found to be 2.9% for women and 5.9% for men. The difference remained after adjusting for adiposity, physical activity and education. In Oslo nearly 80% of the population with Pakistani background in the age of 35 to 65 years have a body mass index of 25 kg/m² or above, classifying them as overweight (Kumar *et al.* 2006).

2.2 Metabolic syndrome, obesity, diabetes and heart-conditions

Several studies report a high prevalence of non-communicable diseases among Pakistanis and other South Asians (most definitions include Indians and Pakistanis) (Bhopal *et al.* 1999; Jenum *et al.* 2005; Misra *et al.* 2007).

2.2.1 Metabolic syndrome

The metabolic syndrome, also called syndrome X, is a cluster of different health-parameters that may lead to diabetes, cardiovascular morbidity and mortality (Day,

2007). There are different definitions and various cut-off points and mandatory inclusion criteria for blood parameters and anthropometry (Day, 2007). Nevertheless, there is a consensus of some important components; glucose intolerance, obesity, raised blood pressure and dyslipidemia (Day, 2007). Some have also included insulin resistance and waist circumference as diagnostic criteria or mandatory components. The criteria by International Diabetes Federation (IDF) are waist circumference of 94 cm or more, and two of these components: Impaired fasting glucose: ≥ 5.6 , blood pressure: 130/85 mmHg, triglycerides: 1.7mmol/L, HDL ≤ 1.03 mmol/L. The criteria for clinical identification of metabolic syndrome are based on data from a Caucasian population and may not be applicable to Asian ethnic groups (Misra and Vikram, 2004). IDF do stress that separate waist circumference criteria should be set for different ethnicities (Day, 2007).

2.2.2 Diabetes, heart-conditions and obesity

Diabetes is one of the leading causes of death in most developed countries (International Diabetes Federation, 2003). Worldwide 194 million and 314 million people, or 5.1% and 8.2%, of the adult population have diabetes and impaired glucose tolerance (IGT), respectively, and this is expected to increase dramatically the next decades, because of globalisation and industrialization. IGT is associated with an increased risk of developing diabetes and cardiovascular disease (CVD), and approximately 70% of the individuals with IGT will develop diabetes type 2. The greatest number of persons with this disease are in the age of 40 - 59 (International Diabetes Federation, 2003).

Diabetes is a serious disease and may lead to coronary artery and peripheral vascular disease, stroke, neuropathy, amputations, renal failure and blindness (International Diabetes Federation, 2003). All of these complications lead to reduced life expectancy and enormous health costs for the society. Diabetes will be one of the most challenging health problems in the 21st century.

South Asians are at a high risk of developing diabetes and heart- and cardiac disease. This is seen even at lower values of blood parameters and anthropometric measures that are associated with diseases in Western populations (Bhopal *et al.* 1999). They have a 5 times higher prevalence of diabetes than Europeans and this is associated with increased intra-abdominal obesity and hyperinsulinemia (Bhopal *et al.* 1999).

Migrants or urbanized populations may have experienced a greater degree of lifestyle changes and they have higher rates of type 2 diabetes, which leads to different rates even within the same ethnic groups (International Diabetes Federation, 2003). The lowest rates are usually found in rural areas where people have high levels of physical activity as a part of their lifestyle. Many of the differences between these rates are caused by behavioural, environmental and social risk factors, such as diet, level of obesity and physical activity. There are also gender differences, as there is a female predominance in the number of people with diabetes. Worldwide the female numbers are about 10% higher than for males. That said, the gender differences may vary between regions and countries. In Norway, the prevalence have been higher among men than women, but the differences are getting smaller as obesity rates in men and women are becoming more alike (Midthjell *et al.* 1999).

Diabetes and obesity are linked and the severity of insulin resistance increases with adiposity (Misra *et al.* 2007). An association between obesity and insulin resistance has been observed at lower levels of obesity among South Asians compared to Europeans (Abate and Chandalia, 2001). South Asians tend to have a high percentage of body fat, insulin resistance, hyperinsulinemia, low muscle mass and abdominal obesity (Misra *et al.* 2007). The latter is evident even in non-obese, South Asians with normal weight. Higher concentrations of insulin can be seen already in the early years of childhood, even after adjustment for obesity and other confounding factors (Whincup *et al.* 2002).

According to an article by Misra *et al.* there are some factors with evidence of positive association of insulin resistance in South Asians. These are excess body fat, abdominal obesity and low birth weight (2007). The reasons for South Asians being

so prone to these conditions are a complex interaction between genetic, perinatal, nutritional and other acquired factors in the development of insulin resistance, type 2 diabetes and coronary heart disease (Misra and Vikram, 2004). According to Barker there might be epigenetic factors (situations in the foetal life) causing the variations in heart- and cardiac disease and diabetes type 2 among different populations (Barker, 2005).

2.2.3 Lower cut-off points for obesity in South Asians

The body mass index (BMI) is calculated as weight (kg) /height (m)² (Hall and Cole, 2006). It was first described by Adolphe Quetelet in the 19th century and reinvented in the 1950s by Ancel Keys. According to Hall and Cole currently, BMI is the best anthropometric estimate of overweight for public health purposes (Hall and Cole, 2006).

Overweight and obesity are internationally defined as having a BMI of or above 25 and 30, respectively (World Health Organization, 2004). This is based on the risk for non-communicable diseases. One of the limitations of BMI is that body composition differs with ethnicity. Since South Asians are prone to non-communicable diseases even at lower BMI, the World Health Organization (WHO) has suggested using a BMI at 23 as cut-off point for overweight in this ethnic group (World Health Organization, 2004). Some researchers have suggested that the cut-off point for BMI among South Asians should be even lower (Jafar *et al.* 2006; Razak *et al.* 2007). The cut-off points are an ongoing debate, and researchers are suggesting different values. As there has not been a consensus on this topic, the cut-off points that were proposed by researchers at the WHO expert consultation in 2004 will be the target for this thesis, however, as they suggest also the international cut-off points will be reported. The WHO's suggested BMI cut-off points for Asian populations are: Less than 18.5 kg/m² underweight; 18.5 - 23kg/m² increasing but acceptable risk; 23 - 27.5 kg/m² increased risk and 27.5 kg/m² or higher high risk (World Health Organization, 2004).

In addition to the BMI, waist circumference is also an important parameter, which is one of the factors included in the concept of metabolic syndrome (Hill, 2006). The general cut-offs included in metabolic syndrome, regardless of ethnicity are set differently by several organizations, and range from 80 to 88 cm for women and 94 to 120 cm for men (Day, 2007). According to some researchers the cut-off points should be set at 80 cm for South Asian women and at 90 for men (Misra *et al.* 2006).

2.2.4 Prevention of the metabolic syndrome in South Asians

Misra *et al.* emphasise the importance of prevention and control of the metabolic syndrome in South Asians (2007). These are some of their recommendations:

1. South Asians should be made aware of their high risk for developing diabetes type 2.
2. The preventive measures should especially target those with a family history of type 2 diabetes, and/or premature cardiac and heart diseases.
3. Body weight and anthropometric measures should be kept within normal limits being a BMI between 19 - 23 kg/m². The waist circumference should be maintained below 90 cm for men and 80 cm for women.
4. Overweight individuals and those with abdominal obesity should actively lose weight by lifestyle measures.

However, these recommendations for BMI will be meaningless unless overweight is regarded as a risk factor for disease by South Asians themselves. One of the reasons for the differences in obesity prevalence among people of different ethnicity and nationality may be differences in body image, both perceptual (how they see their bodies) and attitudinal (how they feel about their bodies) body image (Fitzgibbon *et al.* 2000). This affects how they respond to weight changes and weight control.

2.3 Body image and body perceptions

Body image has many definitions. One definition that describes the complexity of this concept is:

“Body image relates to a person’s perceptions, feelings and thoughts about his or her body, and is usually conceptualized as incorporating body size estimation, evaluation of body attractiveness and emotions associated with body shape and size” (Grogan, 2006).

Although this concept involves several constructs, in this study only body size and how people consider different body sizes will be studied in order to obtain information on their body size preferences (BSP). Understanding perceptions of body size can help us develop more appropriate dietary and physical activity programs for prevention of metabolic syndrome. Studies from the United Kingdom show that even though South Asians have more complications of obesity they are less likely to rate themselves as overweight, or to report that they are following a slimming diet, compared with people of European descent (Pomerleau *et al.* 1999). Body perception is important to implementation of advice on weight reduction. Compliance to dietary advice is affected by knowledge, attitudes, beliefs, habits, intentions and the environment (NiMhurchu *et al.* 1997). Ideals of body shape and size has been recognized as a psycho-social factor that may be a barrier to adopt change and influence dietary behaviour (Thomas, 2002). It is most probable that those who are aware of their overweight will be able to follow the advice given on weight reduction, as willingness to change is a key determinant of health behaviour and differing ideals of body shape and size may act as a barrier to weight control. Higher body size satisfaction may lead to a higher BMI by reducing motivation to maintain or lose weight (Lynch *et al.* 2007).

2.3.1 Measuring body size preferences

There are several different body figure scales that have been used to measure body image, body dissatisfaction, self-perceived body size and body size preferences (Gardner *et al.* 1999). One scale that has been widely used is the Stunkard Figure Rating Scale (Stunkard *et al.* 1983). It was developed for a study where children were to estimate the body size of their deceased parents (Stunkard *et al.* 1983). Critics stress that the scale is coarse (Gardner *et al.* 1998). Though, the scale appears in studies to be robust to classify individuals as obese or thin (Bulik *et al.* 2001). It has shown to be highly correlated with measured percentage overweight ($r = 0.9$), and to be a reliable predictor of obesity (Stunkard *et al.* 1983). The developer of the scale has argued that there is no better method to this date of estimating body size (Stunkard, 2000). The Body Figure Rating Scale by Stunkard comprise of drawings of nine female body sizes. In order to link the body sizes in the Stunkard Figure Rating Scale with BMIs Bulik *et al.* studied the body sizes that 16728 Caucasian women in the United States of America meant they had and related that to their BMIs (2001). The reliability of the self-reported BMI data was checked and considered to be acceptable. Previously to the linkage of BMIs to the nine figures, the scale was used to compare answers on different questions without considering which of the figures that represented thin, normal or obese body sizes (Fallon and Rozin, 1985).

2.3.2 Body size preferences in different cultures

Overweight and obesity are complex bio-psychosocial phenomena, shaped by a variety of factors some being social and cultural (Sobal, 2001). The culture a person is living in will most likely influence their eating patterns, activity level, and body weight. Within a culture conditions change over time, and historical period is also a strong influence on levels of fatness and thinness of individuals and populations. In general analyses suggest that most cultures in the world have valued moderate fatness and avoided extreme fatness (Sobal, 2001).

Overweight is favoured in some cultures

Each culture develops different standards for beauty, which include both size and shape (Rodin, 1993). Relationships between obesity and perceived attractiveness vary among communities and societies (Ulijaszek and Lofink, 2006). Traditionally in some non-Western societies the ideal for women is to be overweight. It has been seen as attractive and as a sign of good health, fertility, beauty, wealth, and power. Brown and Konner suggest that both genetic and cultural predispositions to obesity may be products of the same evolutionary pressures, involving two related processes; first, traits that cause fatness were selected because they improved chances for survival in the face of food scarcities, particularly for pregnant and nursing women; second fatness may have been directly selected because it is a cultural symbol of social prestige and an indication of health (Brown and Konner, 1987). Bigness tends to ensure reproductive success and survival in times of scarcity (Loustaunau and Sobo, 1997).

In Arabic culture plumpness has traditionally been regarded as a beautiful and feminine feature (Khawaja and fifi-Soweid, 2004). In Northern Africa obese women are a sign of status and a cultural symbol of beauty, fertility and wealth (Mokhtar *et al.* 2001). A study shows that among women with obesity and abdominal obesity there were more overweight South Asian women who viewed themselves as having a normal weight compared to European women (Patel *et al.* 2001). A magazine article written by Kishwar describes how losing weight in India is considered to be a sign of ill-being and how being plump is considered as positive (Kishwar, 1995). Gaining weight after getting married is considered to be a sign of a happy marriage.

South Asian mothers may have a larger body ideal for their children than women of other ethnic backgrounds (Hodes *et al.* 1996). South Asian women more often present themselves to a doctor with concerns regarding their children's weight than mothers with other ethnic backgrounds. If it is so that overweight is seen as desirable and something to work for, this can have implications for weight and body image later in life.

Previous times of under nourishment and a continuous fear for lack of food may probably contribute to the positive perception of obesity (Eknoyan, 2006). This can be seen reflected in art, literature and in medical perceptions. Centuries ago thinness was considered a women's misfortune also in Western culture (Seid, 1994). Not until the last half of the 18th century was obesity criticised because of aesthetic reasons. Economical and geographic circumstances may be some of the reasons why overweight still is idealized in some cultures. In Western societies the increased access to food has accompanied the slim body ideal (Littlewood, 2004).

Beliefs, perceptions, and attitudes about weight differ among ethnic groups in many societies (Sobal, 2001). Even among different ethnic groups living in the same country there might be differences in body ideal and perceptions. This has been studied especially in The United States (Davidson and Knafl, 2006; Fitzgibbon *et al.* 2000). In some ethnic groups, discontent with own body and eating disorders are less prevalent. One example is Afro-Americans that seem to have a higher threshold for classifying themselves as being overweight than Latin-Americans and Americans of European descent (Breitkopf *et al.* 2007). According to Sobal differences in ethnic groups in the way they deal with weight need to be examined and considered as an important factor in the etiology and epidemiology of fatness and thinness (Sobal, 2001).

2.3.3 Body perception among immigrants

Even though the history tells that larger bodies are idealized among people from poor countries, this is not always the case. In England the body perception among diabetics from Bangladesh was studied (Greenhalgh *et al.* 2005). It was found that the diabetics viewed obesity as unattractive and unhealthy. They associated obesity with infertility and diabetes with heart disease (Greenhalgh *et al.* 2005). No studies related to different body shapes and ideals among Pakistani women in Norway were found, however, some perceptions on this were revealed in a qualitative study on diet, where the women seemed to think that it was important to eat much to have stamina

(Dawes, 2006). There have been a few studies on this topic in Pakistan, and they focused on younger females (Mahmud and Crittenden, 2007; Mumford *et al.* 1992). The study by Mumford *et al.* found higher levels of unhealthy eating attitudes among girls in Pakistan compared to Caucasians in Britain (1992). The two samples had the same degree of body shape concerns. The study has been suggested not to be representative since the young Pakistani women were from very prestigious English-medium schools, and the measure for body image in this study has been suggested to be insufficient (Mahmud and Crittenden, 2007). In the study by Mahmud and Crittenden Australian Caucasian females in the age of 17 to 22 was compared to females in Urdu-medium and English-medium schools in Islamabad, Pakistan (2007). The Australian females showed greater body image dissatisfaction than the girls in Pakistan, even after adjusting for BMI. The English-medium females expressed significantly greater body shape concern than did the Urdu-medium females. The English-medium group was found to be more similar to the Australian girls regarding less satisfaction. This indicates according to the researchers that the traditional standards of beauty among young Pakistani females of upper socio-economic groups are being replaced by what is attractive in Western terms. Still this does not describe the body size preferences among Pakistani women in Norway, since the women are probable to have been living in Norway for some years and it is unknown if they have traditional perceptions or if they have adopted the ideals in Norway.

In addition to the fact that different cultures have different body ideals, acculturation is also of importance to the degree of complexity. Acculturation is a complex concept which refers to the cultural changes that occur when an immigrant group encounters a host country (Berry, 1997), and has classically been defined as changes in the original cultural patterns subsequent to contact between different cultures (Redfield *et al.* 1936). According to some researchers acculturation occurs at two levels (Satia-Abouta *et al.* 2002). At the individual (micro) level there are changes in attitudes, beliefs and behaviours and at the (group) level, acculturation may lead to physical, biological, political, economic and cultural changes. SES and demographic factors (age, gender, years living in the host country, fluency in host language and

employment) influence the degree of exposure to the host culture. Briefly, those who are highly acculturated are those who adopt many of the ideals, preferences and values of the host culture, whereas less acculturated individuals are those that have ideals, preferences and values deeply rooted in their original culture (Huff and Kline, 1998).

Immigrants may change body size preferences, and adapt to the preferences and ideal of the host country. Changes in ideals has been seen in Fiji where body shape concerns have increased with rapid social changes (Western media etc.) in a society that previously held a preference for large body sizes (Becker *et al.* 2007).

2.3.4 Body perception and factors that influence obesity rates

Obesity is influenced by social and cultural factors such as gender, occupation, income, marital status, being a parent, education and age (Sobal, 2001). It may be that some of these factors also influence the body sizes in the Pakistani women living in Norway.

Gender differences

In Pakistan it was found that women had a greater burden of clinical cardiovascular risk factors than men (Jafar, 2006). At all ages it was found to be more central obesity among women than men. Studies from Norway also show that Pakistani women have more obesity (Kumar *et al.* 2006) and a higher prevalence of diabetes than men (Jenum *et al.* 2005). It is of the greatest importance to get to know more about the Pakistani women's lifestyle. Not only because of their higher risk for disease, but also because of the impact a mother has on children, both in nursing and during the pregnancy. Women are also most often responsible for cooking in the home.

Education and work status

Education provides knowledge about eating, nutrition, activity, health and weight and leads to awareness of the dominant norms in the society about fatness and thinness. It

also provides people with motivations and skills to live up to cultural weight expectations (Sobal, 2001). In developing societies, those with the most education are the heaviest; the opposite is seen in post-industrial societies.

In Western societies women in low prestige jobs tend to be more obese (Sobal, 2001). Income provides opportunities to exercise control on many aspects of life, including diet and activity levels. Furthermore, low income levels produce stress, which may lead some people to store more body fat.

Marital status and being a parent

People tend to gain weight after entering marriage (Sobal, 2001). The weight increases after giving birth. Women with children are more likely to be obese than those with no children. In addition to hormonal factors one explanation is that mothers eat the food that the children do not finish. The risk is higher among minorities, rural dwellers and those of lower SES. The reason for this is unclear and cannot be exclusively explained by physiological reasons.

Age

There are social norms related to body shape ideals (Sobal, 2001). These change with age, younger people being more concerned with keeping a slim body. Overall, age and life stage are consistently associated with body weight, with the youngest and the oldest people being thinner and less likely to be obese.

Much of the literature on body image and body perceptions is based on studies of young women in relation to eating disorders; less is done on mature women and in non-clinical study-populations (Demarest and Allen, 2000; O'Dea and Abraham, 2000). Studies in older women found that the urge to keep a slim body declines with increasing age (Donath, 2000), which can be of importance to the prevalence of lifestyle diseases among older women. Slimness is more emphasised by younger people and standards for body weight differ with age (Sobal, 2001). Younger women

have less overweight and obesity, but they also have greater weight related concerns than older women.

2.4 Changes in food habits, level of physical activity and health after migration

2.4.1 Acculturation

Dietary acculturation is the process by which immigrants adopt dietary practices of the host country (Satia-Abouta *et al.* 2002). The dietary acculturation that takes place at migration is multidimensional, complex, and dynamic and varies with personality, culture and environment.

Westernization of traditional diets involves decreased intake of fibre and increased intake of fats and sugar (Brown and Konner, 1987), and may be some of the main reasons why the obesity prevalence is increasing. But not all dietary acculturation is detrimental to health (Archer, 2005). One example is the substitution of saturated fats with cooking oils among South Asians in Norway (Wandel *et al.* 2007).

According to Kocturk, food habits change according to special patterns after immigration (Kockturk, 1995). Some traditional foods are replaced more easily than others. Staple foods are rarely replaced, even after a long time in the host country. According to Kockturk immigrants most easily adapt to eating the foods that are sweet and tasteful such as fruit, nuts and new sources of fat.

Exposure to the culture of the host country influences the extent of acculturation in dietary habits (Thomas, 2002). The most rapid changes are done when it is considered to be more convenient, and does not interfere with religious guidelines.

2.4.2 The impact of immigration on nutrition and health

Misra and Ganda has reviewed the impact of migration on the incidence and prevalence of obesity and type 2 diabetes in different ethnic groups and populations in Western countries (Misra and Ganda, 2007). The risk of obesity and diabetes type 2 increased and followed a gradient, as migrants became more affluent and urbanized, indicating an important role of environmental factors. South Asian immigrants showed a prevalence of diabetes type 2 four times the prevalence in rural populations in their country of origin. The contributing factors were urbanization, mechanization, and changes in nutrition, and lifestyle behaviours. Migration may cause intermittent or persistent systemic stress (Misra and Vikram, 2004). Misra and Vikram hypothesize that this chronic stress may lead to an excess of cortisol levels and cytokine activation that may be a link between stress and the insulin resistance syndrome.

2.4.3 Traditional food habits and medical system in Pakistan

In order to be able to comment on the diet of Pakistani immigrants it is interesting to see what is traditionally eaten in Pakistan, and to get to know some of the foods commonly eaten. This also serves as a background to the context that the immigrants come from.

Food habits

The traditional diet consists of 2 - 3 main courses per day (The Danish Ministry of Food, 2002). The first meal usually consists of *chapatti*, flat and 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 and cardamom) or *kababs* (grilled meat) and French fries and sweet fizzy 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. The whole family is gathered. Fruit and a cup of chai tea accompany dinner. Snacks and sweets may be eaten with chai. *Mithai* is a name for different sweets as *barfi*, *jalebi* and *halwa*. These are made of milk, sugar and fats and can be added nuts or coconut. Snack meals consist of fruit, dates, nuts, sugarcane and chai or lassi.

Vegetables are traditionally used in huge amounts in salen and in salads. Onions, tomatoes, cauliflower, spinach, squash, carrots, aubergine, okra, pumpkin, potatoes, cucumbers, lettuce and reddish are the most used vegetables. Lentils and beans are often used especially in the countryside. Hot dishes of lentils are 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 fruits, guava, papaya and dates. Mutton, beef, chicken and offal are commonly eaten foods from animal sources. The meat is 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 is widely used in Pakistan (Jafar, 2006).

There are several types of bread eaten in addition to chapatti. Some of these are *paratha*, which is a chapatti made with fat, and *naan*-bread which is leavened bread made of white flour and fat. Rice is eaten, as already mentioned, boiled as an addition to salen, but can also be a dish called *pulao*, which is rice boiled in water added fats and spices. Rice can also be used as a dessert, cooked in milk and sugar into a dish called *zarda*.

Medical system

Food has an important place in the traditional medical system in Pakistan. Unani Tibb is a system of medicine practised today in India, Pakistan and Bangladesh (Sheehan and Hussain, 2002). It originates from ancient Greek, Arabic and Persian medicine.

This medical system is based on the idea of disease as being an imbalance of four humors in the body, blood, mucus, yellow bile and bile. Dominance of one of the humors gives each person their individual temperament.

A disease is treated by several lifestyle changes. One of the lifestyle changes is dietary change. In humoral systems foods may be categorized by hot and cold properties (Loustaunau and Sobo, 1997). This is not a thermal designation, but a symbolic construction concerning the essential character of an item or state. To keep a healthy balance in the body one will not eat hot foods if the imbalance one may have is due to there being too much hotness in the body. This medicinal system is practised as an addition to biomedical medicine, but may still influence food choices by linking food properties to health. These traditional ideas are still seen among people with a variety of ethnic backgrounds in the United Kingdom, particularly in relation to eating habits during pregnancy, postpartum and in the management of diabetes (Thomas, 2002).

The perceived medicinal characters related to foods is evident in immigrant South Asians in Great Britain, claiming different vegetables to be anti-diabetic, good for digestion, able to treat cold and coughs, to be “good for the blood”, healthy and strengthening (Pieroni *et al.* 2007). This view should be taken as a point of departure in efforts to improve and promote the intake of vegetables.

2.4.4 Diet and dietary changes after migration

Dietary changes after migration from South Asia have been described by studies done in Norway (Mellin-Olsen and Wandel, 2005; Wandel *et al.* 2007). The immigrants have experienced changes due to moving from rural areas to urban areas and from moving to a more affluent country (Wandel *et al.* 2007). A qualitative study among Pakistani women in Oslo, showed a change towards fewer hot meals, more irregular meal pattern, and a higher concentration of energy intake later in the day (Mellin-Olsen and Wandel, 2005). Lunch has become a less important meal, and the traditional afternoon tea is not common. The unleavened breads such as chapatti and

paratha are now substituted with leavened bread, especially at breakfast. After the arrival to Norway ghee was replaced by oil, for most of the cooking. The intake of meat, fish and potatoes increased, whereas the consumption of legumes decreased (Wandel *et al.* 2007). The use of whole fat milk is more common among this immigrant group than in the rest of the population (Natland, 2002). Fruit, berries, juice and vegetables were less consumed foods compared to the average of the Norwegian population. The Pakistani women had a high intake of fat (41 E %). Factors as income, education, contact with Norwegians, participation in clubs, age, years living in Norway, reading Norwegian newspapers and being able to use the Norwegian language affected the food habits (Wandel *et al.* 2007).

2.4.5 Diet and lifestyle

According to a review by Misra and Vikram some of the differences in body composition and cardiovascular risk profile in South Asians can be accounted for by various lifestyle factors (Misra and Vikram, 2004). Improvement in obesity, regional adiposity, and insulin sensitivity occur after calorie restriction and regular physical activity (Misra and Vikram, 2004). Physical activity may contribute to a more healthy metabolic profile, and according to Misra and Vikram South Asians have been shown to be less physically active when compared to other ethnic groups. Migration, urbanization and affluence are important determinants of physical inactivity.

Intake of saturated fats may cause weight gain, excess accumulation of body fat, and abdominal obesity in South Asians (Misra and Vikram, 2004). According to Misra and Vikram uneven distribution of meals and consumption of large amounts of calories during the evening meal may be some of the factors responsible for dyslipidemia. Furthermore low levels of long-chain polyunsaturated fatty acids may increase levels of tumor necrosis factor- α and other proinflammatory cytokines and may induce insulin resistance.

2.4.6 Recommended dietary intake

It is recommended to keep the intake of saturated and trans fatty acids at a low level (below 10 energy percent (E%)) (NNR, 2004), as these increase the blood level of LDL-cholesterol which is linked to coronary heart disease. These types of fat are found in meat, meat products, full fat milk, fast food and deep-fried foods. In general a reduction in fat intake will help to lower the risk of obesity.

A high consumption of dietary fibre contributes to reduced risk of overweight and the associated diseases. Sources of dietary fibre are vegetables, fruit and berries as well as cereal products. To reach the wanted level of protein (15 E %) in the foods meats and meat products can be eaten, but these foods contain saturated fat. Beans and lentils do not contain much fat, and have a high protein content (Messina, 1999), and should therefore be a choice for those trying to reduce the intake of saturated fat or fat in general (Desrochers and Brauer, 2001).

Keeping the intake of sugar at a low level will also contribute to a healthy weight, and should therefore not exceed 10 E% (NNR, 2004).

2.4.7 Physical activity in rural Pakistan

Most Pakistanis who live in Norway are from rural areas in Pakistan (Statistics Norway, 2004). Agricultural occupations typically require strenuous physical activity. Jafar has suggested that this is one of the reasons why there is a higher prevalence of cardiovascular disease risk factors in the urban population as compared to the rural population in Pakistan (Jafar *et al.* 2006).

2.4.8 Physical activity in the host country

Data from England show that Indian, Pakistani and Bangladeshi immigrants have a lower level of physical activity than other groups in the population (Health education authority, 1995). In a focus group study in Norway some of the participants claimed that smaller living areas and the habit of driving when visiting relatives and friends

and for shopping made them less active in Norway (Mellin-Olsen and Wandel, 2005). They also told that they found it difficult to leave the home in the winter time, when the weather is cold and there is a lot of snow. An important part in the treatment of diabetes and obesity is weight reduction by changes of lifestyle. A study in the United Kingdom found that South Asian women were less likely to take regular exercise than men (Rankin and Bhopal, 2001). A review shows a substantially lower physical activity in South Asian women than in the general population (Fischbacher *et al.* 2004). However, it is not known whether this is right or merely a result of a different cultural understanding of physical activity as a concept. If the latter is the case the methods used to report physical activity should be investigated.

2.5 Intervention and prevention

2.5.1 Intervention among immigrant groups

In order to reduce the high prevalence of diabetes and metabolic syndrome among Pakistanis the effort should be on prevention. Changes in dietary habits and in level of physical activity play major parts in the prevention of these health conditions. Reduction of obesity is crucial in prevention and in controlling and managing diabetes (Patel *et al.* 2001). Developing interventions to meet the needs of people from ethnic minority groups is according to Thomas dependent on two factors: an understanding of the modifiable risk factors and an understanding of the relevant health behaviours so that appropriate strategies can be defined (Thomas, 2002). An attempt to encourage dietary change in members of ethnic minorities must take into account the existing patterns and trends. Exposure to the host culture influences the level of acculturation of food habits. Within every culture there are traditional ideas about the associations between diet and health. There may also be different risk perceptions on disease and the effect of lifestyle changes in combating disease. Understanding the barriers to adopting change is always important in planning any intervention. Measuring attitudes, beliefs, and knowledge can be helpful in giving

information on how to enhance changes in dietary habits (Thompson and Byers, 1994). Different knowledge, attitudes, and beliefs about diet can be both barriers and help to behaviour change. These are the factors to be changed in the process leading to change in behaviour, and the enhancers of nutrition intervention messages.

An important factor to be aware of while promoting prevention is that South Asians according to studies have a more fatalistic view on their health (Lawton *et al.* 2006; Lawton *et al.* 2007), meaning that disease and the complications of diabetes might be seen as inevitable and unpreventable. This is surprising as traditionally have followed a medicinal tradition (Unani Tibb) which emphasises nutrition as an important part of good health (Loustaunau and Sobo, 1997).

2.5.2 The transtheoretical model and “stages of change”

Several models have been proposed to explain how and why individuals change their health behaviours after health promotion efforts (Thompson and Byers, 1994). The one that is used in InnvaDiab is the Transtheoretical Model (TTM). The Transtheoretical Model is a model of behaviour change (Greene *et al.* 1999), used to develop interventions to promote health behaviour change. The Model focuses on the decision making of the individual, and involves emotions, cognitions and behaviour. The model is transtheoretical since it originates from an analysis of 18 systems of psychotherapy that identified common processes of change, and integrates principles from several major theories of intervention (Prochaska *et al.* 2002). It is based on a number of cognitive theoretical frameworks as the Health Belief Model, the Theory of reasoned Action and Social Learning Theory (Whitelaw *et al.* 2000). The model was made by studying smokers (Prochaska *et al.* 2002).

The main feature of the TTM is the recognition of change as being a process of a series of stages. The model has been used in intervention studies on a broad range of health and mental health behaviours. The model consist of these core constructs: Stages of change, decisional balance, processes of change and self-efficacy (Prochaska *et al.* 2002).

TTM is based on some important assumptions, being (Prochaska *et al.* 2002):

1. No single theory can account for all of the complexities of behaviour change. Therefore this model is based on several major theories.
2. Behaviour change is a temporal process and happens through a series of changes.
3. Stages are both stable and open to change just as chronic behavioural risk factors are both stable and open to change.
4. The majority of people at risk are not prepared for action and will not benefit from traditional action-oriented prevention programs.
5. Specific processes and principles of change should be applied at specific stages if progress through the stages is to occur.

“Stages of change”

According to the Transtheoretical Model, change is a process of several stages (Greene *et al.* 1999). *Precontemplation* is the stage in which people are not intending to take action within a specific time frame, usually defined as the next six months. People in this stage may be uninformed or have only limited information about the negative consequences of their behaviour (Prochaska *et al.* 2002). Some may have unsuccessful attempts in the past, and lost their motivation to change. In this stage people tend to avoid information concerning their habit. They may not want to know the negative consequences. *Contemplation* is the stage in which people are intending to take action in the next six months (Greene *et al.* 1999). People may be stuck in this stage, trying to weigh the pros and cons of changing (Prochaska *et al.* 2002). These people do not benefit from traditional programs that are based on immediate action. *Preparation* is the stage in which people are intending to take action in the immediate future, usually measured as the next month (Greene *et al.* 1999). People in this stage intend to take action within the next six months. Often they have taken some action the past year, and have a plan of action. These people are suitable for action-oriented programs (Prochaska *et al.* 2002). In the stage of *action* people have made modifications in their life-styles within the past six months (Greene *et al.*

1999). Not all modifications of behaviour count as action in TTM (Prochaska *et al.* 2002). It must be a change that has been shown scientifically to change the risk for disease. *Maintenance* is the stage of working of to prevent relapse (Greene *et al.* 1999). In this stage people try to prevent relapse (Prochaska *et al.* 2002). They will eventually be less tempted to go back to their old habits. The stage of termination is the stage where one is free from the temptation of going back to the old habits (Prochaska *et al.* 2002). This may be an idealized stage. For some behaviour this may be unrealistic, and maintenance will be the main aim. Because of this, this stage has not been given much emphasis in TTM.

The process of going from one stage to the other is not linear; people may proceed from one stage to another, best described as in a cyclical movement (Prochaska *et al.* 2002).

One of the implications of the model is that people in the different stages will benefit from different approaches in interventions (Lechner *et al.* 1998). Behaviour change is most likely to happen when individuals engage in the right activities, or processes of change at the right time, or stage (Spencer *et al.* 2007). If an intervention is to work it is of importance to know the percentage of people in the different stages. In the present study the TTM served as a baseline assessment tool to compare women in different stages of weight reduction. When it comes to diet this model has been used to study at fat reduction, weight control, low consumption of diary products, low intake of fruits and vegetables, and inadequate consumption of grains (Prochaska *et al.* 2002). Studies using the Transtheoretical Model in Pakistani women or South Asians in general were not found.

Weight reduction has previously been studied by using the TTM (Jeffery *et al.* 1999; Prochaska *et al.* 1992). However, these have focussed on the construct of processes of change, rather than “stages of change” as was used in InnvaDiab. The stages in InnvaDiab meant that: Those in the stage of precontemplation were not trying to reduce weight, nor did they want to do this the next 6 months. The contemplators were not trying to reduce weight, but were considering doing so the next 6 months.

Those in the stage of preparation were trying to loose some weight, but not continuously. The people in action had been reducing their weight the last 6 months, and those in maintenance had been doing so for more than a half year.

3. Aim and research questions

The aim of this thesis is to contribute to increased knowledge on perceptions related to body size preferences among Pakistani women and to study how this affects their eating habits. The fact that little is done on this field in Norway and that the results from different countries are contradictory makes it interesting to study body size preferences among Pakistani women in Norway. In InnvaDiab the preferred body sizes are studied by using outline drawings of women with different body sizes. The drawings used were Stunkard's Figure Rating scale (Stunkard *et al.* 1983), which comprise of nine standard body forms, ranging from very thin to very fat.

If women of Pakistani descent think of overweight as positive then this will affect their compliance to advice on nutrition. The data collected at baseline from InnvaDiab will be used to answer the following research questions:

1. Which body perceptions do the women have and what values do they relate to different body shapes?
 - a) What body size do they relate to health and well being?
 - b) Which body size is related to being rich and of high status?
 - c) Which body size do they mean is preferred in Pakistan?
 - d) Which body size do they mean is preferred in Norway by Pakistani and Norwegian women?
 - f) Do the participants think that men and women have the same perceptions of body size?
 - g) Does the preferred body size increase with age?
2. What is the relationship between their body perceptions and their own BMI?
3. What is the relationship between their body size preferences and their stage in "stages of change" regarding weight reduction?

4. Is there a connection between stage in “stages of change” regarding weight reduction and the intake of foods which are in focus in InnvaDiab weight reduction advice, such as fruits and vegetables, and foods rich in fat and sugar?

5. Are the women’s obesity influenced by demographic factors and factors related to acculturation?

It is not the aim of this study to compare the views of Pakistani women with the body size preferences in Norwegian/ Western culture. In order to do so, it would be necessary to include a defined Norwegian group. The interest lies in the participants’ views in relation to the medical recommendations on anthropometric measures and intake of food.

4. Methodology

It should be stressed that the methods of inclusion and the questionnaire used were set and developed by the people responsible for InnvaDiab before this thesis was started. The project was approved by the The National Committees for Research Ethics in Norway and by The Data Inspectorate.

4.1 Sample

The participants were 200 women of Pakistani descent (26-65 years) living in the area of Søndre Nordstrand in Oslo. The inclusion was done continuously at the local health centre at Holmlia. The women were invited using several methods. One of the team workers in InnvaDiab held presentations of the project in mosques and at courses in Norwegian. Here the women were given an oral invitation to participate in the project. In addition the participants spread the word resulting in women contacting the project in order to be included. This method resemble the snowball-method, which has in earlier studies shown to be a good inclusion method among South Asian immigrants (Rankin and Bhopal, 2001).

The inclusion criteria were:

- Women in Norway: that were born in Pakistan or that were born in Norway by Pakistani parents.
- Born in 1979 or earlier (26 years or older).
- The participants were tested for being in good enough shape to participate in physical activity.

The exclusion criteria were:

- Women with type 1 diabetes

- positive auto-antibodies (anti-GAD, anti IA2)
- a diagnosis of diabetes type 2 more than 6 months ago
- pregnant the last year
- those with a heart-attack the last 3 months
- those living in the same household as already participating women

Demographic data, measures on height, weight, waist and hip circumference were collected. The measurements of height and weight allowed us to calculate the body mass index (BMI = weight in kilograms divided by the square of height in meters). After exclusion of two persons due to not fulfilling the criteria on ethnicity and age the sample comprised of 198 women. The demographic and anthropometric data is shown in Table 1.

Age, years of education, number of children, job, marital status and the command of the Norwegian language were assessed by self-report (Appendix 1 and 2). The study population had a mean age of 41 years (SD = 8.1) and had on average lived in Norway for 18 years (SD = 7.9). All with the exception of one participant were born in Pakistan. Ninety-three percent were married, and on average they had 3.5 children. Education in Pakistan is based on a complex division due to historical reasons (as being a British colony), with private schools and Urdu or English schools (Blood, 1995). Roughly the education system in Pakistan is divided in primary (1-5 grades), middle (6 - 8 grades), high (9 - 10 years), intermediate (11 - 12) and university level (<12 years) (Blood, 1995), four groups were made based on this and the frequency in each group, setting the cut-offs at no education, 8 years, 12 years and more than twelve years.

Table 1: Demographic details of the 198 participants in the InnvaDiab-project

Demographic and anthropometric variables		95% CI
<i>Age, mean (\pm SEM)</i>	41 (\pm 0.6)	(40.0, 42.3)
Min-Max	26-62	
<i>Marital status, frequencies(%)</i>		
Married	182 (92.9)	
Widowed	4 (5.1)	
Divorced/separated	10 (2.0)	
Singel	-	
<i>Number of children, mean (\pmSEM)</i>	3.5 (0.1)	(3.3, 3.7)
Min-Max	0-8	
<i>Country of birth, frequencies (%)</i>		
Norway	1(0.0)	
Pakistan	197 (100.0)	
<i>Years in Norway , mean (\pmSEM)(n=189)</i>	18.4 (0.6)	(17.3, 19.5)
Min-Max	0-35	
<i>Years of education, mean (\pmSEM) (n=192)</i>		
<i>Categories, frequencies (%):</i>	9.1(0.3)	(8.5, 9.7)
No education	21 (10.9)	
Middle school: 1-8 years	50 (26.0)	
High school: 9-12 years	92 (47.9)	
University: More than 12 years	29 (15.1)	
<i>In work, frequencies (%) (n=195)</i>		
Yes	67 (34.4)	
No	128 (65.6)	
<i>Self-reported Norwegian skills, frequency (%) (n=197)</i>		
Poor	35 (17.8)	
Below average	54 (27.4)	
Average	63 (31.8)	
Good	28 (14.2)	
Very good	17(8.6)	
<i>Weight, mean (\pmSEM)(n=196)</i>	74.4 (1.0)	(72.4, 76.4)
Median	72.3	
Min-Max	48.7-136.1	
<i>Height, mean (\pmSEM)(n=196)</i>	158.8 (0.4)	(158.0, 159.5)
Min-Max	145-172	
<i>Body mass index, mean(\pmSEM)</i>	29.6 (0.4)	(28.8, 30.4)
Median	28.7	
Min-Max	19.6-52.4	
<i>Waist circumference, mean (\pmSEM)(n=196)</i>	96.0 (0.9)	(94.3, 97.8)
Median	93.5	
Min-Max	72.5-148.5	

Medians are reported for the variables that were not normally distributed

Data on income which could have given more information on SES was not collected for several reasons; the most important was that it could possibly lead to lower

participation rates, that the women may not know this type of information and to avoid any work load on their families in order to obtain this information. That said, SES in Pakistanis in Norway has previously been studied in details by the Statistics Norway, and is low in this immigrant group (Henriksen, 2007; Pedersen, 2006).

4.2 Data collection

Most of the data collection was done by the staff of InnvaDiab before the start of this thesis. This part of the study is described in order to give a background to the data used in this master thesis, since this will be of importance in interpreting the results. The efforts linked to participation were reduced by having the study done at the local health centre, and by offering baby sitters at the time of inclusion. Earlier studies have shown that having small children in the family has been a reason for low numbers of South Asian women in health interventions (Hussain-Gambles *et al.* 2006).

4.2.1 Dietary intake

The dietary intake was studied by the use of food frequency questionnaire (FFQ) and repeated 48-hour recalls. The FFQ was a part of a larger questionnaire on diet, which was given in an interview form (Appendix 3). The questionnaire including the FFQ of selected foods was carried out by trained interviewers at the time of inclusion at Holmlia Health Centre, in addition to an oral glucose test. 48-hour recalls were carried out twice after the inclusion. The results from the 48-hour recalls were not used in the present study as the data was not finished before the submission of this master thesis. The interviewers were bilingual women, and had knowledge of traditional foods as is recommended in studying populations composed of individuals with another ethnicity and food culture than the majority population (Thompson and Byers, 1994).

The interviewers explained that the aim was to capture the respondent's real situation and the importance of reporting their food intake as exactly as possible. It was also explained that the group mean was to be investigated and not data on the individual level. The importance of trying to answer as rightly as possible was emphasised, since it has been seen that interviewing in a health setting may enhance biases related to what the respondent think is required in their diet, or what they believe the interviewers want to hear (Thompson and Byers, 1994).

4.2.2 The questionnaire

The questionnaire on diet consisted of several questions aiming to capture four main determinants of behaviour; the attitudes, social influences, self- efficacy and physical and economical environment and the topics were knowledge of food and health, body size, attitudes of food, knowledge on diabetes, intention and behaviour with regard to body weight and barriers to a healthy lifestyle. Prior to the study the questionnaire was evaluated by Pakistani students, test-retested and a mini-pilot study was conducted. Only selected questions from the questionnaire were used in this thesis. It should also be informed that the development of the questionnaire was not done by the author.

The food frequency questionnaire

The last month's intake of certain foods was collected by the dietary assessment method of FFQ, which is a method used to measure long term behaviour (Dodd *et al.* 2006), and focuses on the usual intake (Freudenheim, 1993). FFQs makes us able to rank individuals according to their usual consumption of foods or groups of foods and, when portion size estimates are included (as is done in semi quantitative FFQs), to rank individuals according to nutrient intake (Thompson and Byers, 1994). The FFQ in InnvaDiab was based on the food related questions in the questionnaire used in the Oslo Health Study (The Norwegian Institute of Public Health, 2000), subsequently modulated to be used in the Immigrant Oslo Health Study, taking into account the changes in diet after migration and the additional requirements of

immigrant groups (The Norwegian Institute of Public Health, 2002). In addition, advice from researchers by the Department of Nutrition studying food habits in immigrant women was placed emphasis on. The FFQ from the Oslo Health Study has been validated for the Norwegian population (Mosdøl, 2004). Some of the questions were from the DE-PLAN study. These questions have been validated in Finland (Lindstrom and Tuomilehto, 2003). The FFQ in the present study consisted of questions on selected foods as fish, fast foods, deep fried foods, beverages, vegetables, lentils, fruits, milk-and milk products, bread, flour, rice, nuts and seeds, sweets, sugar, supplements, fats and spreads. Type of preparation was asked for. Examples of portion sizes were given, but it is not clear if these were read by the translators and therefore the data are not considered to be sufficient in order to rank the individuals according to nutrient intake.

The questionnaire was in Norwegian and was translated by trained, bilingual interviewers (female) at the time of the interview, facilitating the study for the illiterate participants and those not fluent in Norwegian. The interviews were done in the language preferred by the participants, mostly being their mother tongue (Punjabi). The food groups studied in the present study by the FFQ method were: fast food, deep fried foods and snacks, vegetables, legumes, fruit and sweet foods (see question 6 a, 6 b, 7, 8, 9, 10 and 15 in Appendix 2). Examples of a typical portion size were also given in the interview. The respondents were asked to report the average frequency of consumption during a week the last month. The FFQ did not cover enough food items to be evaluated as the total food intake; rather it was used to differentiate between individuals on some key foods. The alternatives were given as categorical amounts.

Questions on changes in the consumption of type and amount of fat, vegetables, beans and lentils, fruit and berries, sugar, flour, and on weight reduction behaviour were posed. This was done using the “stages of change” construct from the TTM (Prochaska *et al.* 2002). The construct of “stages of change” is usually used to find an appropriate intervention method, and to see if there is any change after an

intervention. In this thesis it was used to study at the differences among people in the different stages. The questions asked were based on those in a previous Norwegian study (Lorentzen *et al.* 2007), and were modified to concern the dietary intake of various food groups.

Figures and questions on body size preferences










In order to study the body size preferences among the participants, drawings of women with different body shapes were presented to the participating women. The figures used were taken from the Stunkard Figure Rating Scale (FRS) (Stunkard *et al.* 1983). This scale consists of nine female silhouettes presented frontally, ranging from very thin to very obese (Figure 1). It was developed to determine the weight status of parents (Stunkard *et al.* 1983) and subsequently by Fallon and Rozin to consider body perception (Fallon and Rozin, 1985). This scale is frequently used in studies of body image. Later studies have tried to associate specific BMIs to the figures. In a study, by Bulik *et al.* (2001), Caucasian women and men were asked to report their height, weight, current body size, both by self-report and by using Stunkard's Figure Rating Scale. The researchers then calculated the means of the BMI that people related to each of the body figures (see Figure 1). These BMIs were used in the present study to link some measures to the figures. This has previously also been done in another study (Greenhalgh *et al.* 2005). The study by Bulik *et al.* was carried out in a Caucasian population (2001). It is therefore uncertain whether the body figure scale is applicable to the study population in the present study, and whether the participants associate the same BMIs to each of the body size figures as the Caucasian women in the study by Bulik *et al.* Because of the lack of waist-hip ratios linked to the figures, only the BMI was used in the analysis to answer the research questions. The figures were used to answer question 38 in the questionnaire (Appendix 2). The FRS was presented in an ordered array on a paper. The study-participants then answered questions from the interviewer regarding body size by responding with the numbers (1 to 9) underneath the figures. The questions posed were on the which body figure the women related to health and richness, what

preferences they believed there to be in different population groups and the body size figure they resembled the most. The questions were posed saying that the figural scale was of women in the age of 45.

4.2.3 Anthropometry

The participant's height, weight and waist and hip circumference were measured at inclusion by the InnvaDiab staff. Waist /hip-ratio is a measure used in order to classify abdominal obesity and was measured as described by Foxton (Foxton, 2006). Due to errors in the measurements of hip-circumference these data were not used in the analyses. However, according to Sundquist and Winkleby, studies show that waist circumference alone is more closely related to abdominal and visceral obesity than waist/hip-ratio. Thus these studies recommend using waist circumference when estimating the risk for CVD and diabetes type 2 (Sundquist and Winkleby, 2000). The waist circumference was used as a measure of obesity, and factors predicting waist circumference was investigated. The body mass index was calculated as weight (kg)/height (m)². Both the international cut-offs and those suggested for use in South Asian populations will be reported (23, 25, 27.5 and 30).

Figure 1: The Stunkard Figure Rating Scale and the related BMIs to each figure based on a study among Caucasian women in the United States.

Picture number Pictures for female body figures*	1	2	3	4	5	6	7	8	9
									
BMIs linked to the figures by Caucasian women **	17.5-18.9	18.8-19.8	20.3-21.5	22.6-23.6	26.0-26.4	29.5-31.3	33.1-36.7	36.9-41.4	41.4 -48.4

* Stunkard's Figure Rating Scale (Stunkard *et al.* 1983)

** Ratings made by American women aged 18 - 80 (Bulik *et al.* 2001)

4.3 Data handling

After the data were collected, they were converted into computer files. This was done by the InnvaDiab staff and the author of this thesis. The FFQ and questionnaire was precoded, but since the forms were not scannable the answers were manually punched into data files, which were cleared for errors by the master students, including the author. The questionnaire was punched into version 16.0 of the data program Statistical Product and Service Solutions (SPSS). Three months were used on the work with the data files.

4.4 Statistical analysis

All the statistical analyses were performed using version 16.0 of SPSS. The significance level was set at 0.05. The α -value was adjusted by Bonferroni correction. Both parametric and non-parametric tests were used after consideration of the distribution of the data. Non-parametric tests used were Wilcoxon ranked sign test and Friedman test, while the parametric tests used were Paired sample t-test and ANOVA, both one way and for repeated measures. All outliers were checked for failure in punching. One participant was excluded based on the logical assumption that the questions were not understood, since all the answers were extreme and identical regardless of the questions. The graphs were made using Microsoft Office Excel 2003.

4.4.1 The Figure Rating Scale

The answers given with use of the FRS were analysed as continuous variables. Even though one may argue that the scale is ordinal (Gardner *et al.* 1999), several previous studies using it has analysed the answers as being a continuous variable (Lewis and Cachelin, 2001; Lynch *et al.* 2007). This choice was decided after consolidation with researchers in public health nutrition. Sometimes the participants responded by

giving an interval rather than a distinct number. When an interval was given, the mean of the interval was registered, e.g. 8 - 9 was registered as 8.5.

4.4.2 Analyses related to body size perceptions

Descriptive analyses were conducted to find the frequency distribution and the percent of participants selecting each of the body sizes on the different questions.

The first research questions on the women's body size perceptions and the values they relate to different body sizes were analysed by the difference in body size perceived to be related to different characteristics. This was done by paired samples t-test and Wilcoxon signed rank test, and by ANOVA for repeated measures (Bonferroni post hoc test was employed in the case of significant group effect) and Friedman test (with Wilcoxon signed rank test as post hoc test for significant results) when more than two variables were compared.

In order to answer research question 2, concerning their self-perception of their body size was compared to their actual body size measured by BMI, and compared to the numbers from the study by Bulik *et al* (2001).

The difference between the self-perceived body size and the ideal body size is widely used in studies as a measure of body dissatisfaction (Gardner *et al.* 1998).

Furthermore, this is a validated method (Williamson *et al.* 1993). Question 38d on which body size the participants considered to be the most preferred among Pakistani women in Norway was used as an indication of their ideal, as no direct question of their body size ideal was posed in the questionnaire. By using this, the assumption was made that they were talking about their own BSP when responding to the question on what Pakistani women in Norway prefer. This variable was therefore called assumed ideal. The difference between their self-perceived body size and the answers given on 38d was calculated and used as a proxy measure of body dissatisfaction, called "body dissatisfaction". This variable was then used to find out

whether the people in the different stages of weight reduction behaviour (question 24 f), differed in level of “dissatisfaction” in order to answer research question 3.

Research question 4 was answered by comparing the participants’ FFQ answers on body size and their stage in weight reduction behaviour, by the chi square method. In order to fulfil the assumptions required for this test some of the categories were merged. The five stages in weight behaviour were collapsed to three categories (Group 1: stages precontemplation and contemplation, Group 2: stage of preparation and Group 3: stages of action and maintenance). The decision to do this was based on the frequencies in these groups, but also on the fact that the two first stages are stages without action. The third stage involves some action, whereas the fourth and fifth stages are stages that require action. The FFQ answers were also categorized into wider groups, based upon the recommendations of intake by the Nordic Council of Ministers (NNR, 2004). However, when this did not fulfil the assumptions required by the statistical methods used, the frequency in each group became the decider of where the cut-off points were set.

Multiple linear regressions were conducted to investigate associations between BMI, waist circumference and “dissatisfaction” with independent variables; age, BMI, years in Norway, number of children, whether they work or not, years of education and self-reported Norwegian skills (the original categorization was merged into new; poor, average and good). All the independent variables were adjusted for. The assumptions of normality, linearity, homoscedasticity, independence of the residuals and the influence of outliers were checked.

4.4.3 The variabels derived from the FFQ

Below is a description of how some of the variables were merged into new ones. The categorization in the FFQ was used to separate the participants in two groups; those making “healthy” choices and those not doing so. The cut-off points were set on the basis of Nordic recommendations for the intake of some of the food groups (NNR, 2004). In addition the distribution of the frequencies was also considered.

The cut- off point for fast food and for deep fried foods were set between those eating this type of food every week, and those eating it monthly, since these food should be eaten as rarely as possible in order to be able to stay within the recommended limits of fat intake. Fast food has shown to induce hyperinsulinemia and the development of insulin resistance, because of its fat composition (Isganaitis and Lustig, 2005).

For vegetables the cut off was first set according to the recommendations of eating three portions per day (NNR, 2004). However, the distribution made it more convenient to divide those eating vegetables more seldom than once a day, from those having this type of food as an everyday part of their diet. The distribution for the intake of beans and lentils was such that most of the participants were in the same category, making it difficult to use chi square. For the intake of fruit and berries the recommendations (NNR, 2004) were guiding in setting the cut- off point at 2 - 3 portions per day.

One has traditionally accepted in Norway that people may eat sweet foods (baker’s products, ice cream, pudding, chocolate etc.) once a week. This would have been the preferential cut-off point. But since the category including one portion ranged from one to three, three was accepted as the cut-off point. A portion of sugar was defined as two teaspoons sugar or honey, three sugar lumps or five sweets. The sugar used in the tea was not included. The cut-off point was set to 1 - 3 portions per week.

Table 2: The subdivision of the answers from the FFQ, based on recommendations of intake (NNR, 2004) and the distribution of participants in each group

	Group 1	Group 2
Fast food	≤ 3 portions per month	≥ 1 portion per week
Deep fried food	≤ 3 portions per month	≥ 1 portion per week
Fruit and berries	≥ 2 portions per day	≤ 1 portion per day
Vegetables	≥ 1 portion per day	≤ 6 per week
Beans and lentils	≥ 1 portion per week	< 1 portion per week
Sweet foods	≤ 3 portions per week	≥ 4 portions per week
Sugar, honey and sweets	< 1 portion per week	≥ 1 portion per week

4.4.4 The nature of the data and the numbers presented

The statistics were done by using tests that take into consideration that the variables compared are from the same person, unless groups made by categorization was compared on some variables. Some of the variables were not normally distributed. This was consulted with statisticians. Even though the data was not normally distributed, the sample size was above 30, which makes the parametric tests acceptable to use. According to statisticians a sample size above 30 does not influence the parametric tests (Pallant, 2007), therefore the numbers in the results section will be from the parametric tests, unless this is not proper. As different advices on which tests are appropriate in such situations were received, both parametric and non-parametric tests were conducted. Having both parametric and non-parametric results makes it possible to compare the present results with the results of other studies using different methods. In the text, only results from the test considered to be the most appropriate will be referred to. The results from both tests regarding the body size preferences are presented in Appendix 3. All the result details will for convenience not be reported in the text, but can be seen in Appendix 3.

In order to make some of the figures in the results section, the intervals were rounded off to the highest number. Statisticians argue that standard error rather than standard deviation should be given (Altman and Bland, 2005). Even so, many researchers use

the standard deviation. It was therefore attempted that both values are given, either in a table and figure or in the text.

Some questions led to a high number of missing data. This was usually due to the participants claiming not to know the answer.

5. Results

5.1 BMI and waist circumference

Figure 2 shows the percentage of the participants with a BMI above the recommendations generally used to classify overweight and obesity, and those suggested for use in South Asian populations (World Health Organization, 2004). Most of the participants (80%) had a BMI above 25, and the mean value was 29.6 kg/m², (SD = 5.6). Using the lower cut-off point suggested for South Asians at 23, 95% of the participants are overweight or obese. Depending on which cut-off (27.5 or 30) is used, 61% and 39% were obese. The mean waist circumference was 96 cm (SD = 12.5), and 95.3 % had a circumference above the suggested cut-off at 80 cm (Misra *et al.* 2007).

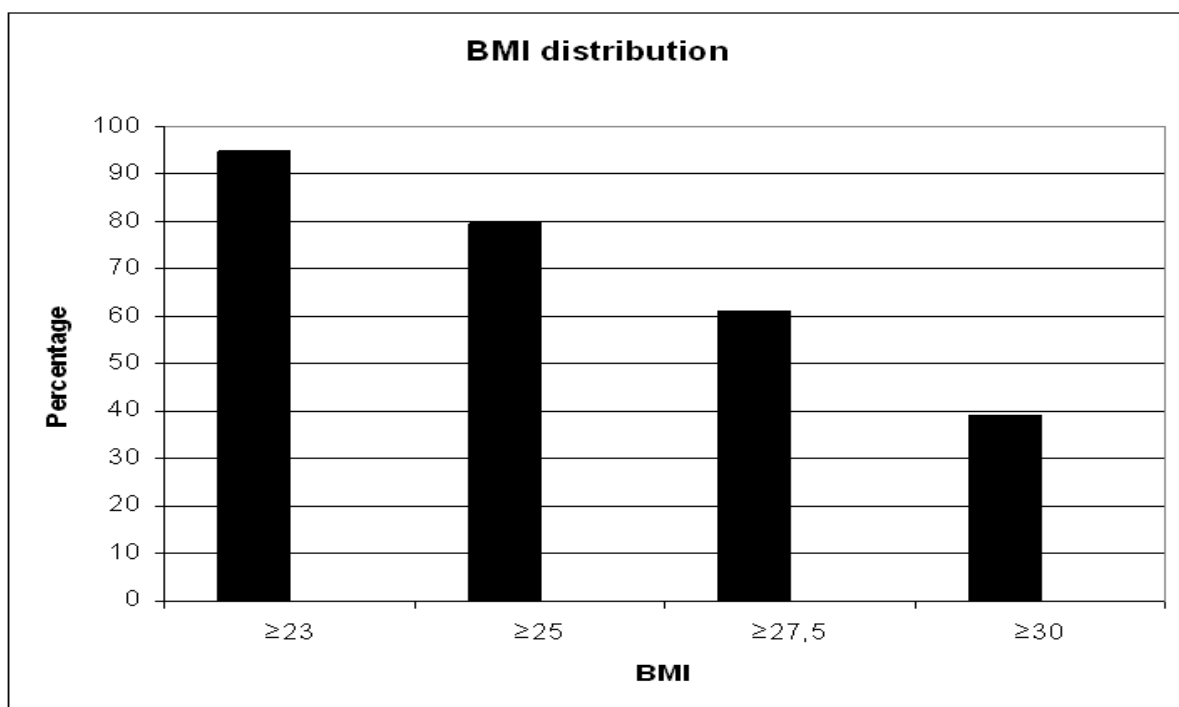


Figure 2: Percentage of participants with BMI above cut- off points used internationally and those suggested for South Asians (World Health Organization, 2004). $n = 198$

5.1.1 Predictors of BMI and waist circumference

Multiple linear regression by the enter method was carried out to analyze whether the demographic information, collected at the time of inclusion in InnvaDiab, could explain the variation in BMI and waist circumference. The variables included in the model were those believed to be parts of the acculturation process. In addition age, number of children and years of education was included. The five stages of weight reduction behaviour were merged into three wider groups. Tests for multicollinearity were conducted to rule out collinearity between the variables. Since the distribution of the body mass index and waist circumference was not normally distributed these variables were log transformed. The variables were checked for outliers, and the outliers were excluded when this was considered to be necessary.

Body mass index

The results from the multiple linear regression with the log-transformed BMI as the dependent variable can be seen in Table 3. Those in the preparation stage of weight reduction have significantly larger BMIs than others. However, it should be kept in mind that the stages of weight reduction behaviour may be dependent of BMI or conversely. Age, number of children and the years in Norway did only show significance before adjusting for all the other independent variables.

Waist circumference

The log transformed waist circumference is highly correlated to BMI, but as can be seen in Table 4, also the years of education seem to influence the variation. No education and lower levels of education (from 1 to 8 years of education) are related to high log transformed waist circumference. None of the other variables associated with acculturation could explain the variation of the log transformed waist circumference.

Table 3: The results from multiple linear regression analyses with log transformed BMI as the dependent variable

Log transformed BODY MASS INDEX						
Predictor variables	Crude B	95% CI	p-value	Adjusted B	95% CI	p-value
Age	0.002	(0.000, 0.003)	0.006	0.001	(0.000, 0.002)	0.311
Number of children	0.007	(0.001, 0.013)	0.022	0.005	(-0.002, 0.012)	0.157
Years in Norway	0.001	(0.000, 0.002)	0.035	0.000	(-0.001, 0.002)	0.693
Years of education (ref.: No education)						
<i>1-8 years</i>	0.003	(-0.019, 0.024)	0.801	-0.024	(-0.059, 0.010)	0.162
<i>9-12 years</i>	-0.004	(-0.023, 0.015)	0.676	-0.020	(-0.053, 0.014)	0.254
<i>>12 years</i>	-0.019	(-0.046, 0.007)	0.143	-0.028	(-0.068, 0.011)	0.161
Norwegian skills (ref.: Poor)						
<i>Average</i>	0.003	(-0.017, 0.023)	0.757	0.005	(-0.018, 0.029)	0.659
<i>Good</i>	-0.012	(-0.034, 0.010)	0.303	-0.001	(-0.031, 0.029)	0.946
Work Weight reduction (ref.: Precontemplation and contemplation)						
<i>Preparation</i>	0.012	(-0.008, 0.032)	0.222	0.024	(0.001, 0.047)	0.037
<i>Action and maintenance</i>	0.011	(-0.009, 0.031)	0.281	0.021	(0.002, 0.045)	0.069

Adjusted for all independent variables. Adjusted R-square log transformed BMI: 0.039

Table 4: The results from multiple linear regression analyses with log transformed waist circumference as the dependent variable

Log transformed WAIST CIRCUMFERENCE						
<i>Predictor variables</i>	Crude B	95% CI	p-value	Adjusted B	95% CI	p-value
Age	0.002	(0.001, 0.003)	<0.001	0.000	(0.000, 0.001)	0.267
Number of children	0.007	(0.003, 0.012)	0.002	0.001	(-0.002, 0.004)	0.560
Years in Norway	0.001	(0.001, 0.002)	0.001	0.000	(0.000, 0.001)	0.315
Years of education (ref.: No education)						
<i>1-8 years</i>	0.008	(-0.007, 0.024)	0.283	-0.010	(-0.023, 0.004)	0.179
<i>9-12 years</i>	-0.008	(-0.022, 0.006)	0.260	-0.014	(-0.027, 0.000)	0.050
<i>>12 years</i>	-0.024	(-0.043, -0.006)	0.011	-0.020	(-0.036, -0.004)	0.015
Norwegian skills (ref: Poor)						
<i>Average</i>	0.002	(-0.013, 0.016)	0.818	-0.002	(-0.012, 0.007)	0.646
<i>Good</i>	-0.015	(-0.031, 0.001)	0.062	-0.005	(-0.017, 0.007)	0.444
Work	-0.007	(-0.021, 0.007)	0.344	0.000	(-0.009, 0.009)	0.954
BMI*	0.601	(0.541, 0.660)	<0.001	0.565	(0.504, 0.627)	<0.001
Weight reduction (ref.: Pre-contemplation and contemplation)						
<i>Preparation</i>	0.011	(-0.004, 0.025)	0.140	0.003	(-0.007, 0.012)	0.591
<i>Action and maintenance</i>	0.002	(-0.012, 0.017)	0.739	-0.003	(-0.013, 0.006)	0.512

* = The BMI was log transformed

Adjusted for all independent variables










Adjusted R square log transformed waist circumference: 0.703

5.2 Self-perceived versus calculated body size

The participants were shown the Stunkard Figure Rating Scale and asked to select the body size that they believed to resemble themselves the most. This was called the self-perceived body size.

Since the Figure Rating Scale used in the present study was developed for a Caucasian population, it was relevant to find out if the Pakistani women in the present study had a different view of the relationship between BMI and the FRS, compared to those of Caucasian women. Each of the women's BMI was therefore placed into Stunkard's Figure Rating Scale for body size. In the study by Bulik *et al.* the mean BMIs were given for each body size and for different age categories (2001). The participants' BMI and age were then compared to the BMIs associated with the scale in different age groups, and the body sizes were used as a variable for their actual body size. This variable was called the calculated body size. If the body size they selected, the self-perceived body size, was the same as the calculated one, this would indicate that the FRS by Stunkard is applicable in the study population. Figure 3 shows the number of women who were placed according to the different body size numbers, based on their BMI and age. Since Bulik *et al.* only gives mean BMI values (2001), there were BMIs that did not correspond to a body size. Therefore ranges were made, by setting a point in the middle of two consecutive body size drawings.

Figure 3: The Stunkard Figure Rating Scale (Stunkard *et al.* 1983), the ranges of BMI based on numbers from Caucasian women aged 18 to 80, and the frequency of women with body sizes corresponding to body size number 1- 9 in the scale.

Picture number Pictures for female body figures*	1	2	3	4	5	6	7	8	9
									
Age in years	BMI ranges** used to find the women's calculated body size								
26-30	17.8-18.3	18.4-18.8	18.9-21.5	21.6-24.6	24.7-28.9	30.1-31.3	34.0-36.7	38.8-43.3	43.4-44.1
31- 40	17.6-18.3	18.4-19.7	19.8-20.5	21.1-24.5	24.6-28.5	28.6-33.6	33.7-38.9	39.0-44.9	45.0-48.4
41-50	17.5-18.4	18.5-20.5	20.6-22.0	22.1-24.5	24.6-28.0	30.1-32.4	32.5-37.4	37.5-42.3	42.4-45.5
51-60	17.7-18.8	18.9-20.7	20.8-22.5	22.6-24.8	24.9-28.0	28.1-31.6	31.7-35.8	38.1-41.9	42.0-45.7
61-65	18.9-19.4	19.5-20.6	20.7-22.5	22.6-23.9	24.0-28.0	28.1-31.3	31.4-35.0	35.1-39.2	39.3-41.1
Number of women with calculated body sizes***		1	4	17	61	68	28	12	7

* Stunkard's Figure Rating Scale (Stunkard *et al.* 1983)

** Ranges of BMI based on ratings made by US women aged 18 - 80 (Bulik *et al.* 2001)

*** The BMIs and age of the participants was compared to those in a study on Caucasian women (Bulik *et al.* 2001) and the corresponding body figure was selected. This was called the calculated body size.

The participants' self-perceived body size (where they placed themselves on the rating scale) was compared to the calculated body sizes. As can be seen in Figure 4 the overall picture is that the participants rated their own body size similar or near to similar to the calculated body size, but there is a tendency for higher frequency both towards the lower (< 4) and the higher ratings (> 7).



Figure 4: The self-perceived and the calculated body sizes. The self-perceived body size (mean = 5.7, SEM = 0.1), and the calculated body sizes (mean = 5.7, SEM = 0.1), found by comparing the BMIs and age with the numbers from Bulik et al. (Bulik et al. 2001). The body sizes are those in the Stunkard Figure Rating Scale (Stunkard et al. 1983). There were no significant mean difference, $t(191) = 1.0$, $p = 0.179$.

Eighty percent reported their body size with a difference of maximum 1 smaller or 1 larger body size figure than the Caucasian women. There was no significant difference between the mean self-perceived body size (5.7) and the mean calculated body size (5.7) (p -value = 0.179). Furthermore, no significant difference was found between the mean of the interviewers ratings of the participant women (5.7), and the participants own ratings of themselves on the figure rating scale ($p = 0.959$).

5.3 Body size preferences

The body size preferences among the participants were studied by analyzing body sizes associated with being in good health and being rich, which are two characteristics assumed to be desirable. The women were also asked which body size they believed was preferred by different population groups (Pakistani women, women in Norway of Pakistani origin and Norwegian women), to see how they believe that the body size preferences are in their country of origin and in the host country. Furthermore, the opinion the women had of what body size men preferred in women was investigated.

5.3.1 Health and richness

The body size related to health and richness was studied by asking the respondents to select the body sizes they associated most with each of these characteristics. Figure 5 shows the percent of the respondents associating the different body sizes with being in good health and with richness/ being well-off. The full range of the scale was used in the response to these two questions.

The responses on the question regarding health showed a clustering towards the smaller body sizes. Ninety-eight percent answered that body size number 5 or smaller was related to health. Twenty percent considered the smallest body size to be most likely to be in good health.

As for the question regarding health the question on richness was also most frequently associated with body size number 3. In comparison to the question on health, more people selected some of the larger figures when it came to richness. That said, also on this question many of the respondents (16.4%) considered the smallest figure to be related to richness.

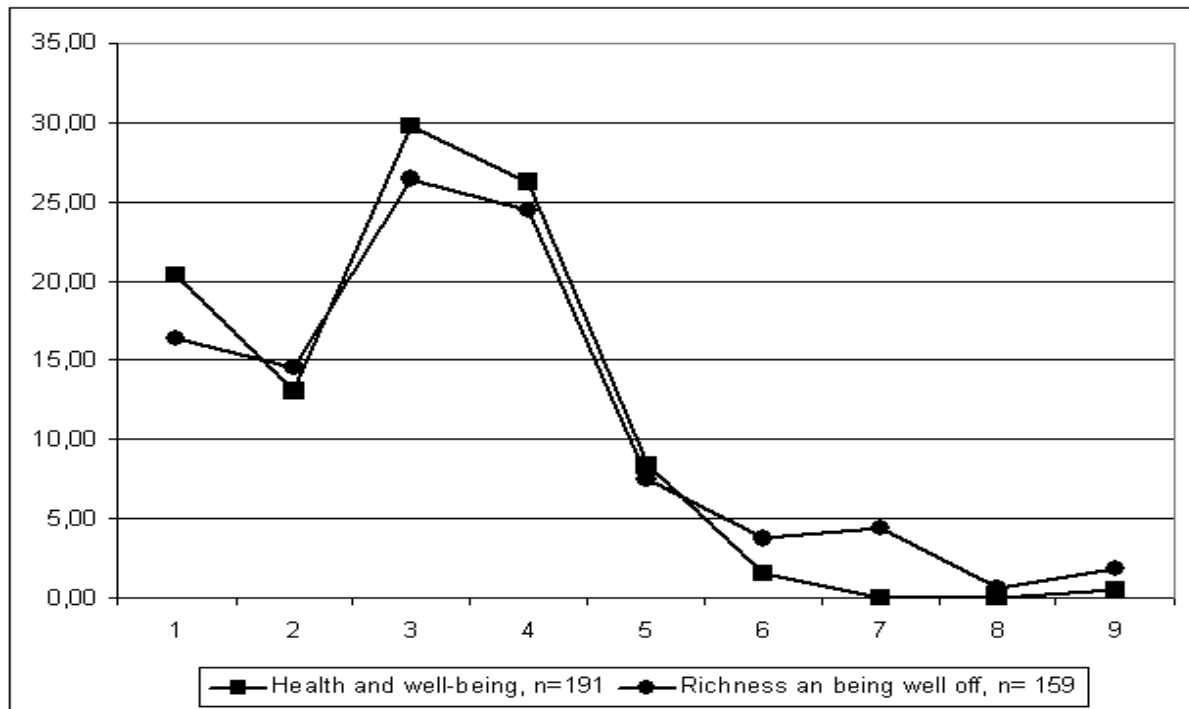


Figure 5: The percent of women relating each of the body sizes in the Stunkard Figure Rating Scale (Stunkard et al. 1983) with health and richness. Health (mean = 2.9, SEM = 0.1) and richness (mean = 3.3, SEM = 0.1), was associated with different body sizes, $t(157) = -2.9, p = 0.004$.

Comparisons between the responses on these two questions show that the participants related a higher mean body size to richness (3.3) than to being in good health (2.9). The mean difference was small, but significant ($p = 0.004$).

5.3.2 Predictors of body sizes related to health and richness

It was investigated if those who chose body size 4 or smaller (the thinner half of the scale) were more likely to be in the weight reducing stages of weight reduction behaviour. The distribution in the different stages of weight reduction among those relating health and richness to normal body sizes is shown in Figure 6. The five stages were merged to three groups.

Of those relating the smaller body sizes to richness there was significantly more in the stage of action and maintenance of weight reduction behaviour. The people in the stage of action and maintenance were significantly more likely to relate the thinner half of the Figure Rating scale with richness, $p = 0.036$.

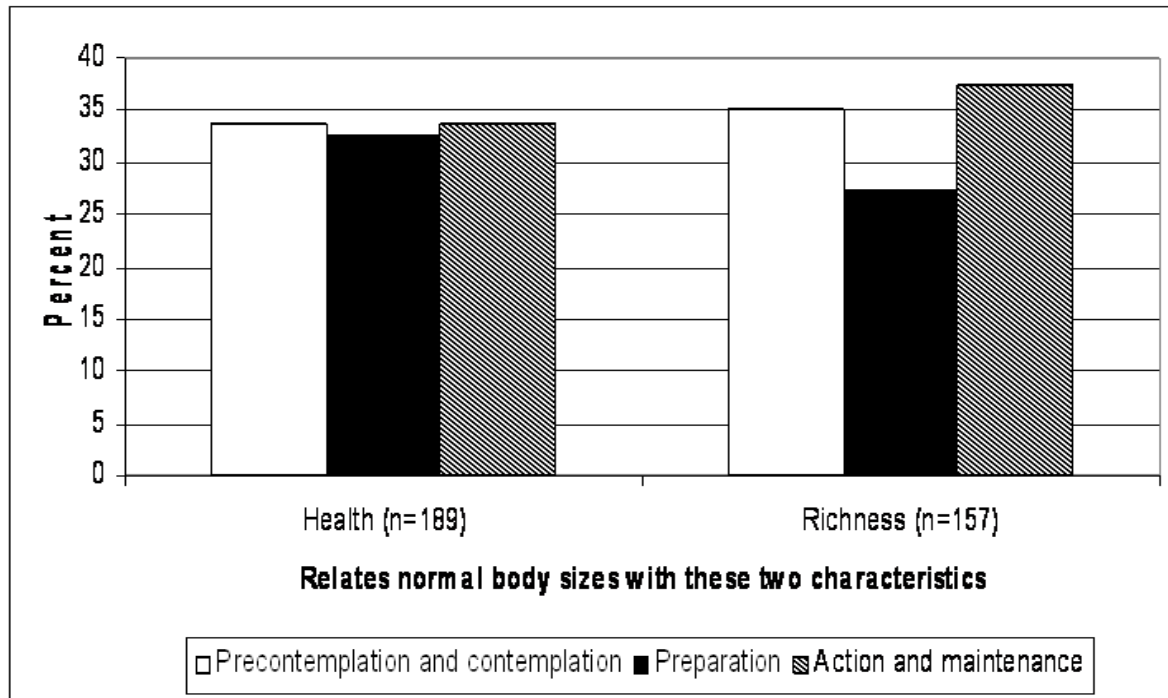


Figure 6: The percentage of the participants relating body size number 1-4 in the Stunkard Figure Rating Scale with health ($p = 0.188$) and richness ($p = 0.036$) that are in the different stages of in the "stages of change" construct in the Transtheoretical Model.

To find out if education and self-reported Norwegian skills had an impact on which body size the women associated with health and richness, descriptive analyses and chi square were conducted. This was done by separating those choosing body size numbers 1 - 4 and 5 - 9. There was found no significant differences (see Table 5).

Table 5: The results from the chi square analyses done to compare those relating body size number 1 - 4 with those selecting body size number 5 - 9 in the Stunkard Figure Rating scale (Stunkard et al. 1983), regarding self-reported Norwegian skills, years of education and the stage in "stages of change" (construct in the Transtheoretical Model) considering weight reduction (Prochaska et al. 2002).

	χ^2	p-value	Cramer's V
Health			
Norwegian skills*	(n=190)=1.703	0.439	0.099
Education*	(n=185)=1.241	0.777	0.073
Stage in weight reduction	(2, n=189)= 3.334	0.188	0.133
Richness			
Norwegian skills	(2, n=158)= 5.028	0.081	0.178
Education*	(n=157)=2.183	0.536	0.114
Stage in weight reduction	(2, n=157)= 6.628	0.036	0.205

* = Results from the Fisher's exact test.

5.3.3 The women's believes of BSP in different population groups

The women's opinions of which body sizes are preferred by different population groups (women in Pakistan, women in Norway of Pakistani origin, and Norwegian women) are shown in Figure 7. This was done to find out if they believe that they have a different body size preference from the women in their country of origin and how it is compared to women in Norway. It is important to bear in mind that this is the participants' believes of which body size other women prefer.

There is a large variation in the responses. The minimum rating to all these questions was 1, but the maximum answer differed, being 9 for the women living in Pakistan, 7.5 for the Pakistani women in Norway and 5 for the Norwegian women.

On average the participants think of Pakistani women in Norway as having a significantly smaller mean body size preference (3.4) compared to the mean of women in Pakistan (4.5), $p < 0.001$, and larger than the Norwegian women (2.5), $p < 0.001$.

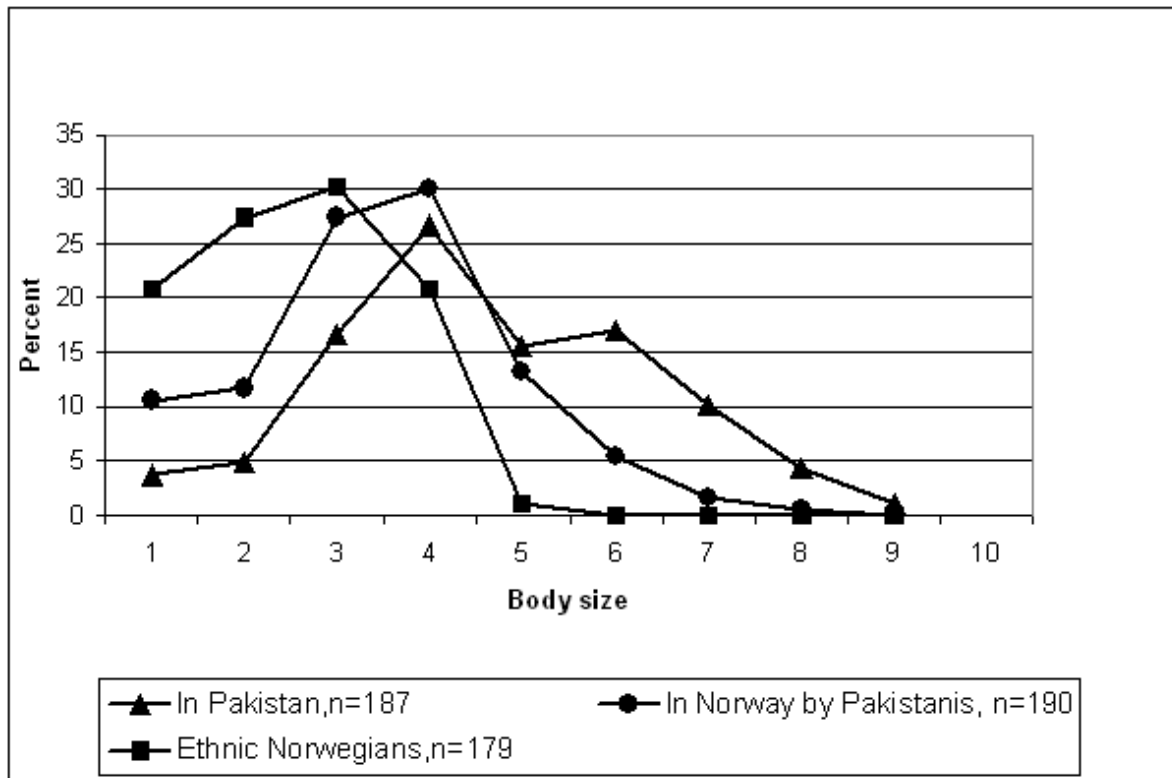


Figure 7: Body sizes from the Stunkard Figure Rating Scale believed to be preferred by different population groups according to the Pakistani women in Norway. The differences were significant $F(2, 170) = 0.001, p < 0.001$.

5.3.4 Body size preferences in men and women

The participants were asked whether they believed men to prefer a different body size in women than women themselves do. The majority (56%) did not consider there to be any difference in BSP among women and men. The 88 women who believed men and women to have a different BSP were asked to select the body sizes they believed men to prefer and women to prefer. Only 68% of these selected body sizes, as many claimed that they could not know what men wanted. The distribution of the answers is shown in Figure 8.

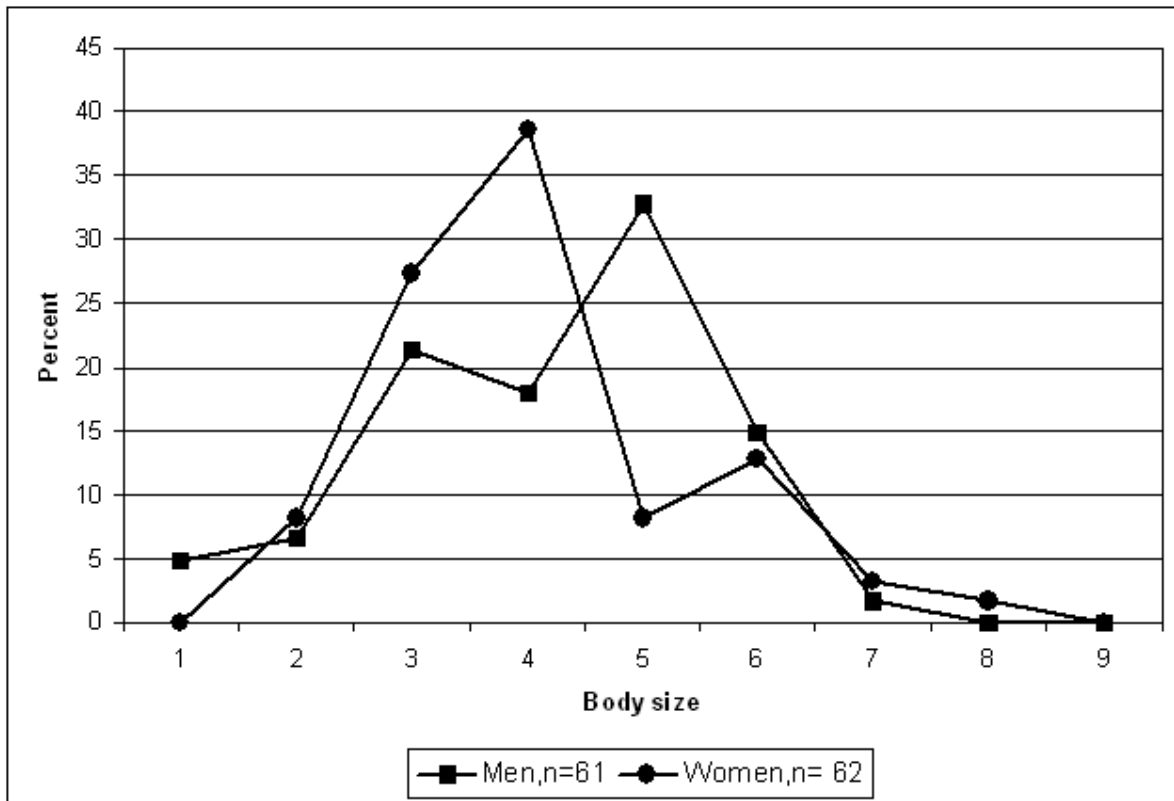


Figure 8: The body size believed to be preferred female body size by men (mean = 4.0, SEM = 0.2) and women (mean = 4.0, SEM = 0.2) according to the Pakistani women in Norway. There was no significant difference, $t(59) = 0.294$, $p = 0.770$.

The highest frequencies are different for men and women, as most believed men to prefer women the body size number 5, whereas the same for women was 4.

However, the distribution is such that the mean body sizes on these two matters do not differ significantly ($p = 0.770$), as the mean was 4.0 for both of the questions. The means being equal was due to the fact that almost half of the women (53.3%) believed that men like women to be larger than women do, whereas the rest believed the opposite to be the case, leading to ambiguous results.

The mean BMI in the women that believed men to have a smaller preference than women (mean = 30.5, SEM = 1.2) compared to those believing men to have a larger preference (mean = 28.4, SD = 5.0) was not significantly different, $p = 0.282$.

5.4 The questions on body size preferences and the participants' age

In order to find out whether age influenced any of the responses to the questions related to body size preferences, the participants were divided into four groups according to their age. All the questions on body size in the different age groups were compared. No significant differences were found except for in some of the questions related to believed body size preferences in different populations as is shown in Figure 9.

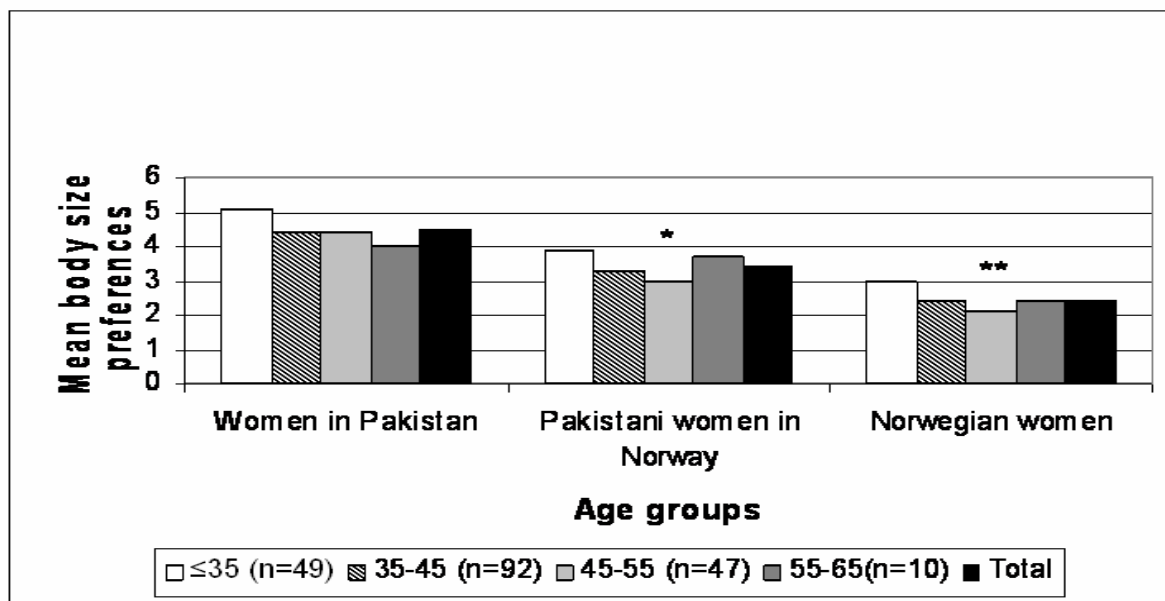


Figure 9: The mean believed body preference in different population groups (Pakistani women, Pakistani women in Norway and Norwegian women) according to the Pakistani women in Norway, divided in age groups and the total. * $F(3) = 3.647, p = 0.014, n = 189$ ** $F(3) = 6.173, p = 0.011, n = 178$

The women aged 35 or younger repeatedly considered the mean BSP to be larger than the older age groups.

The view on BSP among the Pakistani women in Norway was different for those in the youngest age group compared to those in the age of 45 - 55, $p = 0.011$. The youngest age group regarded the BSP among Norwegian women to be higher, than the women in the age of 35 to 45, $p = 0.008$ and those in the age of 45 to 55, $p < 0.001$. Women in the age of 55 to 65 believed the BSP in Pakistani women in Norway and the Norwegian women to be larger than those in the age of 45 to 55,

though, this difference was not significant. There was no significant difference in the mean body sizes believed to be preferred by women in Pakistan depending on the respondent's age group.

Details of the results from these analyses and from the non-parametric tests can be seen in Appendix 5.

5.5 “Body dissatisfaction” and stage in “stages of change” with regard to weight reduction

The discrepancy between self-perceived body size and the desired/ ideal body size has widely been used to measure body dissatisfaction. According to previous literature (Cororve *et al.* 2004; Demarest and Allen, 2000; Fallon and Rozin, 1985; Lynch *et al.* 2007) a positive discrepancy score indicates that one wishes to be smaller and a negative discrepancy indicates a wish to be larger, while those with no discrepancy are considered to be satisfied with their body size. In the present study the question of which body size the participants believe Pakistani women in Norway prefer was used as a substitute for their ideal body size, and will for clarity be called assumed ideal body size, rather than ideal body size which in the literature is the body size that the respondent wishes to be. It would not be right to call the discrepancy for body dissatisfaction, as it is not measured as in other studies, and will therefore be marked with inverted commas.

5.5.1 “Body dissatisfaction”

Most of the participants (79%) had a larger self-perceived body size than the assumed ideal body size. Still, some (12.8%) had a larger assumed ideal than the self-perceived body size. In Figure 10 the percent of people with a positive/ negative or zero discrepancy between self-perceived and assumed ideal body size is shown according to their BMI.

Most of the participants with BMIs that classify them as overweight or obese had a positive discrepancy (larger self-perceived body size than the assumed ideal body size). Still there were 20% in the BMI range of 25 to 27.5 that had negative discrepancy score or no discrepancy, indicating that they want to be larger or are satisfied, respectively. This was also the case for some of those with a BMI above 30. Forty percent with a BMI of 23.00 - 24.99 had a positive discrepancy, while the rest had a negative or zero discrepancy. This was the BMI range with the most women having a zero discrepancy score.

The mean BMI of those having no “body dissatisfaction” was 25.5 kg/m² (SEM = 0.8). Those with a larger assumed ideal body size than self-perceived BMI had a mean BMI of 25.9 kg/m² (SEM = 0.9), while those wanting to be smaller had a mean BMI of 30.6 (SEM = 0.4).

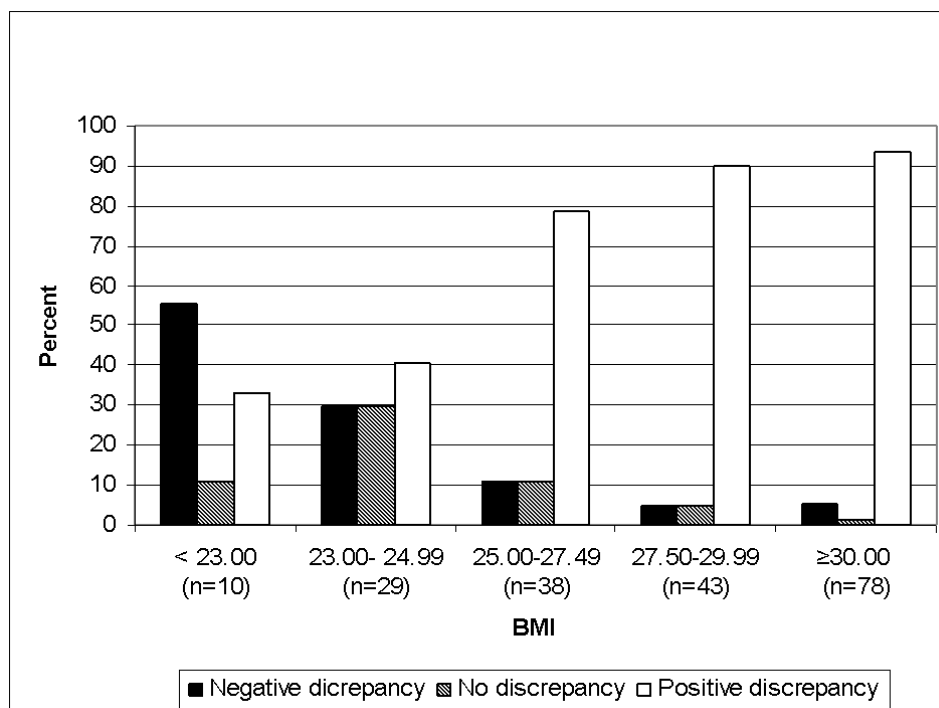


Figure 10: The percent of people having a negative (smaller self-perceived body size (BS) than the assumed ideal body size), positive (same self-perceived body size as assumed ideal body size) and no difference in self-perceived body size and ideal body size.

5.5.2 Predictors of “dissatisfaction”

Multiple linear regression was done to see if “body dissatisfaction” (measured as the difference between self-perceived and the assumed ideal body size) varied with demographic variables and variables believed to be linked to acculturation.

“Dissatisfaction” was highly associated with BMI (Table 4). Furthermore, the “dissatisfaction” increases as the level of education decreases. Those with a high education are more likely to have lower positive discrepancies, zero discrepancy or negative discrepancy.

Table 6: The results from multiple linear regression analyses with “dissatisfaction” as the dependent variable

“ BODY DISSATISFACTION”						
Predictor variables	Crude B	95% CI	p-value	Adjusted B	95% CI	p-value
Age	0.053	(0.014, 0.092)	0.009	0.051	(-0.038, 0.051)	0.772
BMI*	20.949	(16.929,20.949)	<0.001	19.277	(15.182, 23.372)	<0.001
Number of children	0.290	(0.079, 0.501)	0.007	0.088	(-0.102, 0.279)	0.362
Years in Norway	0.030	(-0.012, 0.071)	0.160	-0.004	(-0.051, 0.044)	0.880
Years of education (ref.:No education)						
<i>1-8 years</i>	-0.179	(-0.922, 0.565)	0.636	-1.503	(-2.447, -0.558)	0.002
<i>9-12 years</i>	-0.240	(-0.893,-0.412)	0.468	-1.221	(-2.146, -0.295)	0.010
<i>>12 years</i>	-0.925	(-1.827, -0.023)	0.044	-1.588	(-2.685, -1.588)	0.005
Norwegian skills (ref: Poor)						
<i>Average</i>	-0.173	(-0.863, 0.517)	0.621	-0.248	(-0.902, 0.405)	0.454
<i>Good</i>	-0.735	(-1.495, 0.025)	0.058	-0.397	(-1.210, 0.416)	0.337
Work	-0.464	(-1.143, 0.214)	0.179	-0.056	(-0.660, 0.549)	0.856

* = The BMI was log transformed

Adjusted for all independent variables

Adjusted R square for “dissatisfaction”: 0.399

It should be mentioned that the “dissatisfaction” variable includes the negative scores, which also express “dissatisfaction”, wishing to be larger.

5.5.3 Stage in weight reduction behaviour

Since a high percentage of the participants had a positive discrepancy score (a larger self-perceived body size than the assumed ideal body size) it was of interest to investigate if they were trying to reduce their weight. The percent of people in each stage in weight reduction behaviour according to the “stages of change” construct of The Transtheoretical Model is depicted in Figure 11.

The highest percent of the respondents were in the stage of preparation, trying to reduce their weight, but not regularly. Thirty-four percent of the participants were in the stage of precontemplation and contemplation, not trying to reduce their weight, while 32% was in the stages of action and maintenance.

There was no significant difference in the weight stage according to positive/negative/zero discrepancy in self-perceived versus assumed ideal body size, $\chi^2(4, n = 186) = 5.390, p = 0.250, \text{Cramer's } V = 0.120$.



Figure 11: The percent of people ($n = 193$) in each of the stages in weight reduction behaviour according to the “stages of change” construct of the Transtheoretical Model (Prochaska et al. 2002).

5.6 The dietary intake of certain food groups and weight reduction behaviour

5.6.1 The FFQ

FFQ was used to measure the frequencies of intake of some food groups that were in focus in the intervention of InnvaDiab targeted for reduction. These were energy rich food such as fast food, deep fried foods and sweet foods. The intake of vegetables, beans and lentils and fruit and berries was also investigated, as these play an important part of a healthy diet.

The distribution of the people in the different categories for the intake of fast food and deep-fried foods is shown in Figure 12. These foods contain much fat and should therefore not be eaten frequently. Few people had a daily intake of these foods, and most reported to eat them 1 to 3 times per month, but there were also a high frequency reporting weekly intake. Fast food was more frequently eaten than deep-fried foods and snacks, as 38% had an intake of 1 to 3 portions per week of this in comparison to 24% eating the same frequency of deep fried foods.

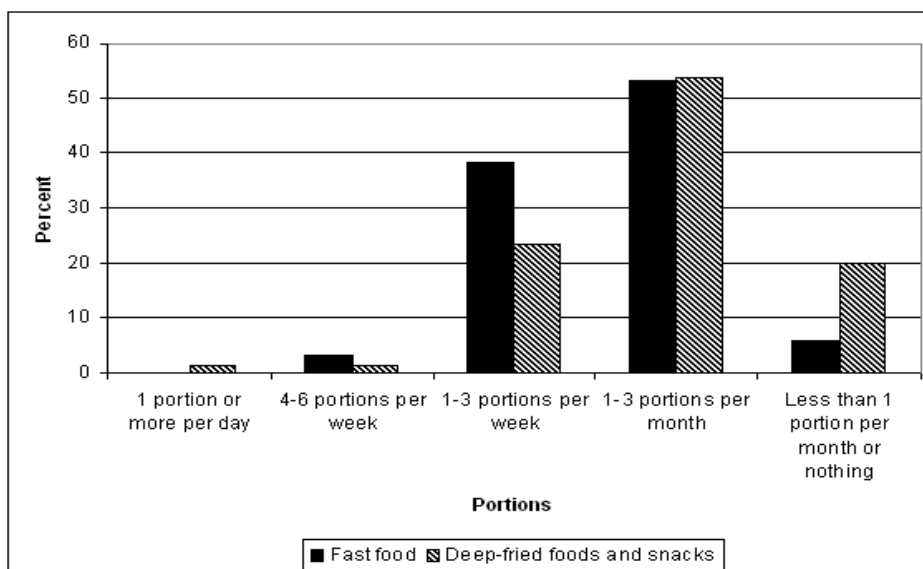


Figure 12: The percent of participants eating different frequencies of fast food ($n = 194$) and deep fried foods ($n = 196$) and snacks according to the FFQ.

One to three portions/ week of sweet foods (baker's products, ice cream, pudding, chocolate etc.) was eaten by 35.2% of the participants. One fourth of the women told that they ate a portion of sweet foods daily. Sugar, honey and sweets were eaten more rarely and a majority (75%) of the respondents told that they ate less than 1 portion per week as shown in Figure 13.

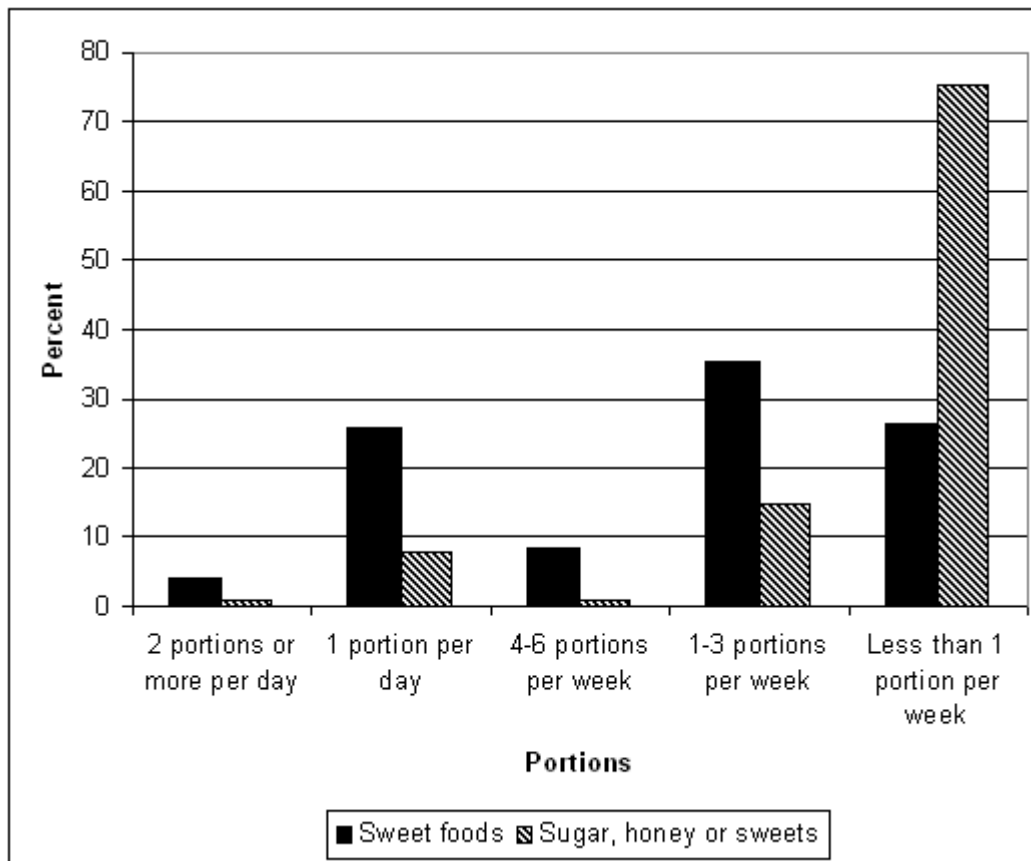


Figure 13: The percent of people eating different portions of sweet foods ($n = 193$) and sugar, honey and sweets ($n = 195$) according to the food frequency questionnaire

The recommended intake of vegetables is three portions per day (NNR, 2004). However, a portion of vegetables (see Figure 14) was rarely reported to be eaten more often than once a day. Fruits and berries were eaten more frequently, but still the majority did not report to be eating the recommended (NNR, 2004) two portions per day, in fact as many as 39% reported a maximum intake of 3 fruits per week which correspond to less than a half portion of fruit per day. This includes the 12% that eat less than 1 portion of fruit and berries per week. Traditionally beans and

lentils have constituted a major part of Pakistani cuisine, still 87% reported to not eat more than 1 to 3 portions of this per week. Eleven percent had an intake of less than 1 portion per week.

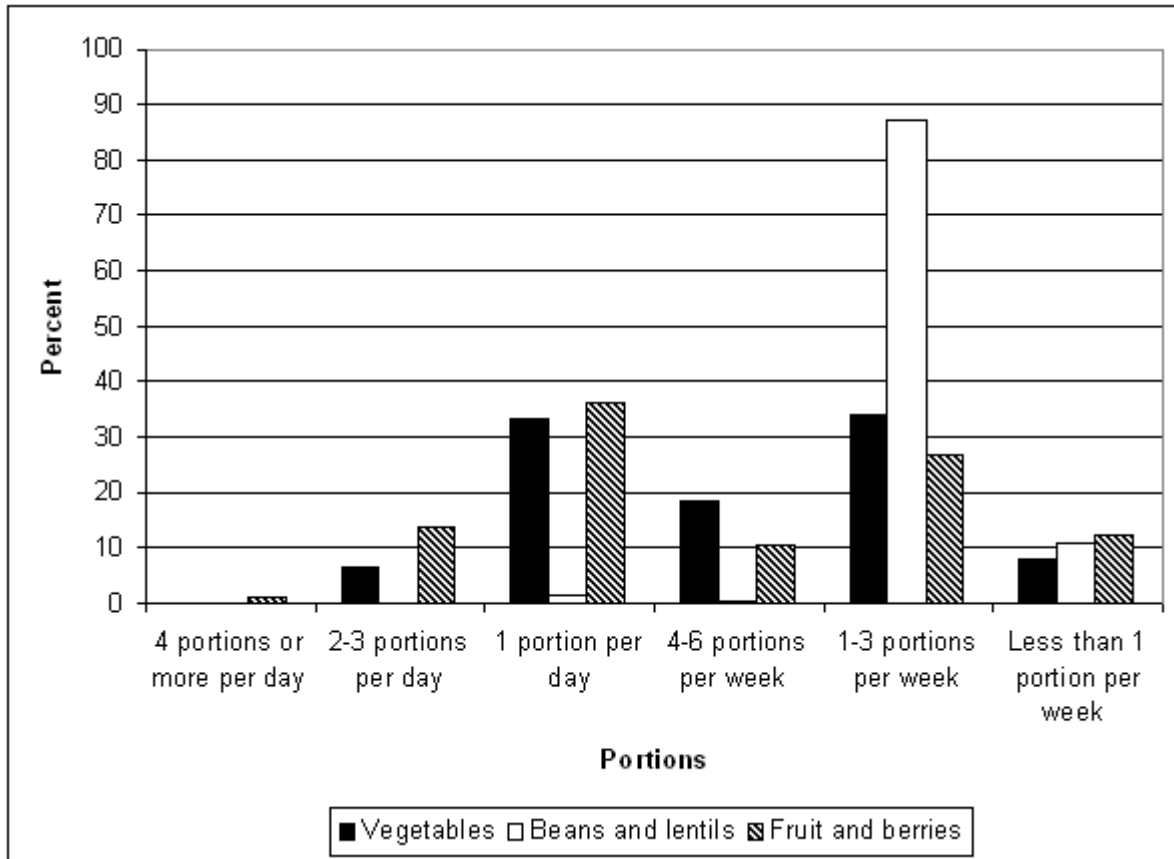


Figure 14: The intake of portions of vegetables, beans and lentils and fruit and berries (n = 196) according to the food frequency questionnaire.

5.6.2 The association of weight reduction behaviour with the frequency of intake of certain food groups

It was considered whether those claiming to try to reduce weight, were eating differently than those not doing so. The stages on weight reduction behaviour were categorized in three groups, by merging precontemplation with contemplation and action with maintenance, leaving preparation as a separate group. The answers from the FFQ was recategorized, making a cut-off point of the intakes, to separate the participants into two groups, depending on a “high” or a “low” intake of the food

groups. The statistics was done by chi-square and the results are summarized in Table 3.

The intake of fast food and deep-fried foods

Fast food was reported to be eaten more seldom by those in the stages of weight reduction behaviour, than those in the stages of not trying to reduce their weight as can be seen in Figure 15.

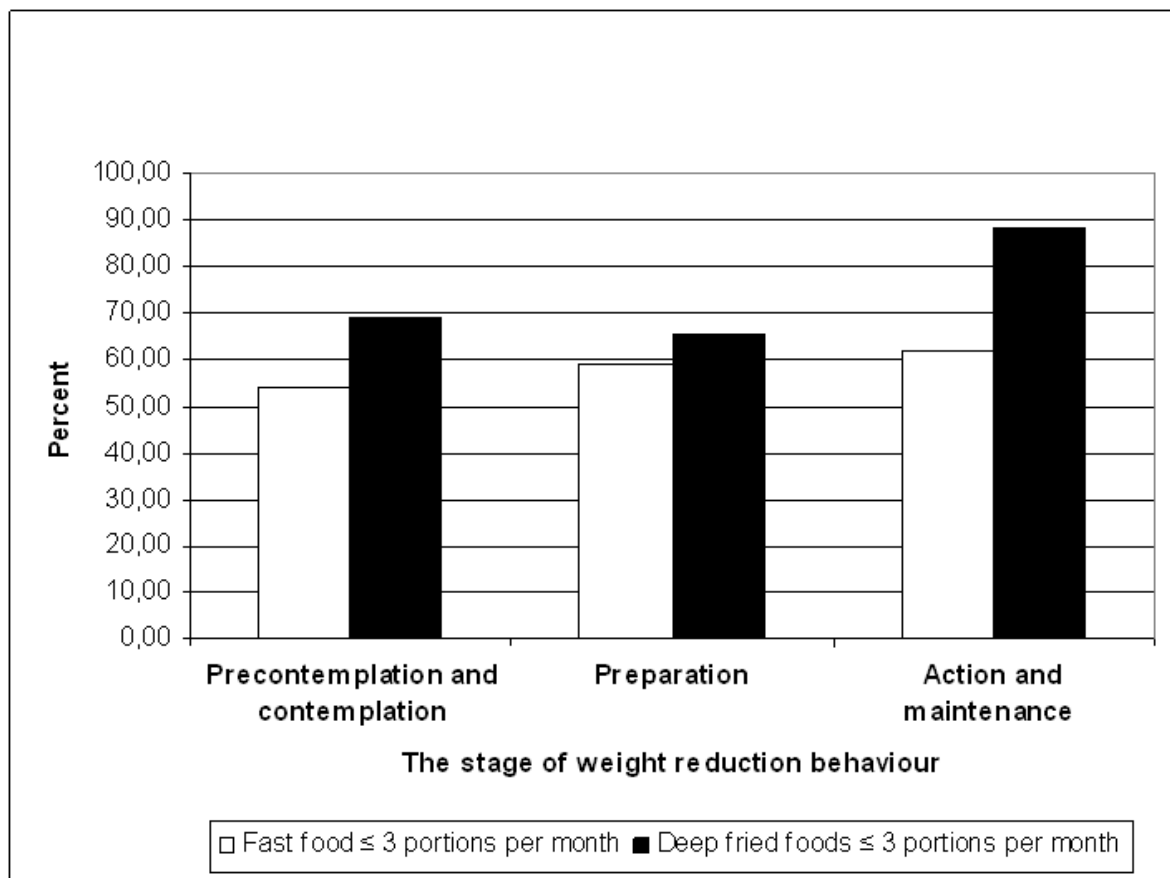


Figure 15: Percent reporting intake below cut-off points for fast food ($n = 191$), $p = 0.644$, and deep-fried foods ($n = 193$), $p = 0.007$, related to the stage in weight reduction behaviour.

In the stages of action and maintenance 38% reported to eat more than 1 portion per week. The intake of fast food was not significantly affected by the stage in weight reduction behaviour, $p = 0.644$. The picture was similar for the consumption of deep fried foods, as the majority of people regardless of stage in general did not eat more than a maximum of 3 portions per month. Significantly more people eating low levels

of deep fried foods were in the stages of action and maintenance than those eating deep-fried foods at least once a week in the same stages, $p = 0.007$.

Intake of sugar and sweet foods

Thirty-three percent in stage action and maintenance has a lower intake than 1 portion of sugar, honey and sweets per week, and this was more than those in the other stages. However, the difference of percentage was not significant, $p = 0.147$.

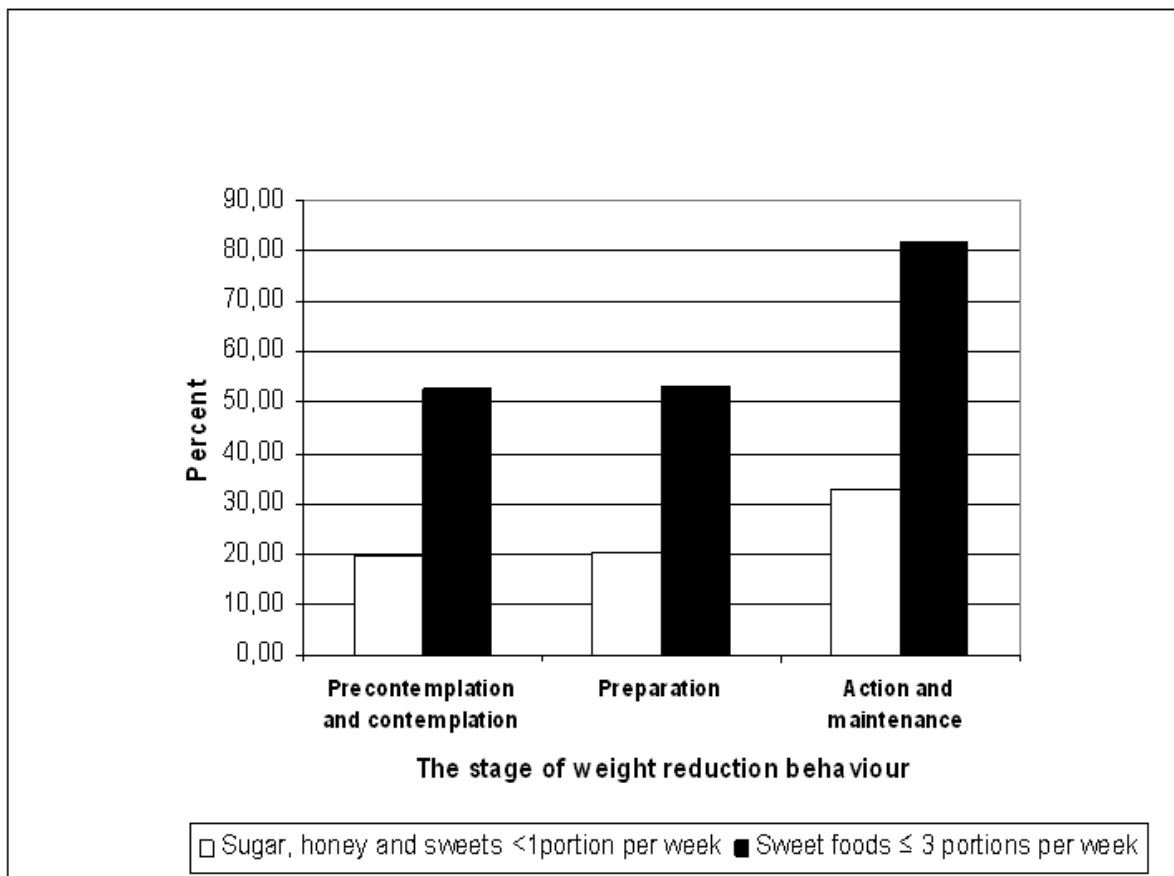


Figure 16: The percent of people in the different stages of weight behaviour eating below the set cut points of sugar ($n = 46$), $p = 0.147$, honey and sweets and sweet foods ($n = 72$), $p = 0.001$.

The majority of people reported to eat less than 3 portions of sweet foods per week, regardless of the stage they were in. There are almost the same percentages of people in the preparation stages and the precontemplation and contemplation eating low levels of sweet foods. Significantly more people in the stages of action and

maintenance eat low levels of these types of foods than those in the other stages, $p = 0.001$.

The intake of vegetables, fruits and berries, and beans and lentils

Only 6.6 % of the participants reported to eat 2 - 3 or more portions of vegetables per day (see Figure 17). Even though there was a higher percent of those in the action and maintenance stages, the difference of the percent in these stages compared to those in the others was not significant, $p = 0.123$.

Thirty percent responded that they ate a minimum of 2 portions fruit per day, while being in stage 4 and 5 in “stages of change” on weight, meaning that they were trying to reduce their weight. This was significantly more than those in the other stages, $p = 0.006$.

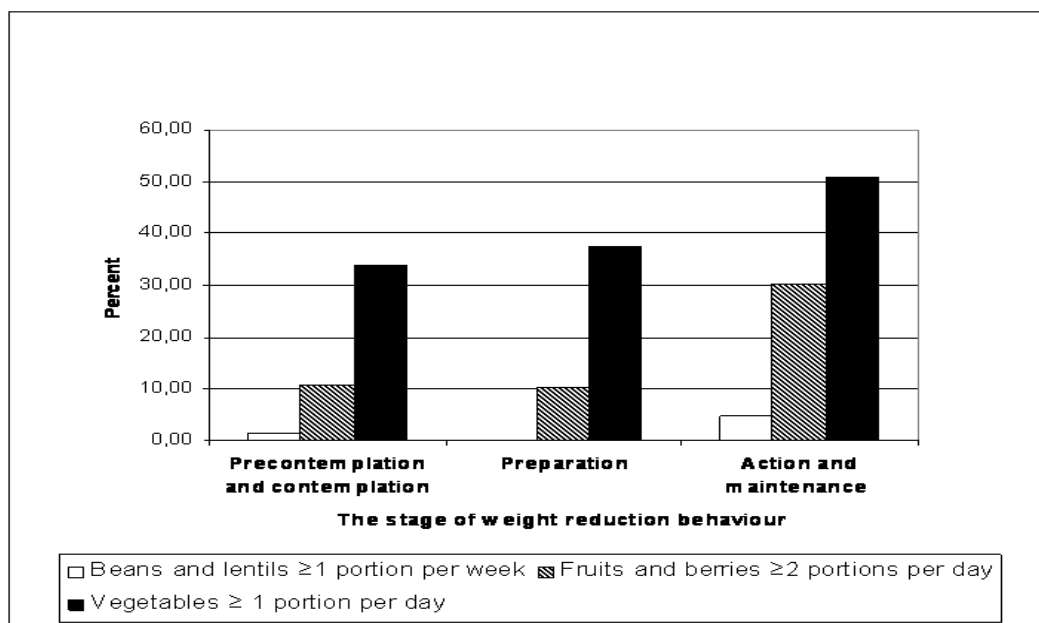


Figure 17: The percent of people in the different stages of weight reduction that have an intake of beans and lentils ($n = 4$)*, fruit and berries ($n = 140$) ** and vegetables ($n = 115$) ***, above the cut-offs according to the FFQ. *chi square was not done ** $p = 0.006$ *** $p = 0.123$

The intake of beans and lentils was never reported to be consumed more often than once a day. Very few people ate more than 1 - 3 portions per week, leaving almost all the respondents to be eating legumes 3 times or less per week (97.4%). It was not

possible to use a chi square to test any differences in the intake of beans and lentils according to weight reduction behaviour due to the frequency distribution leaving a too little expected count in the cells in the crosstabulation.

The details from the results from this section are shown in Table 7. Briefly summarized those who do try to reduce their weight are more likely to eat more portions of fruit and berries and less sweet foods and deep fried foods. The intake of fast food, sugar, honey and sweets and vegetables are foods, was not significantly dependent on weight reduction behaviour.

Table 7: Results from the chi square test regarding the intake of certain food groups depending on weight reduction behaviour divided in three groups (precontemplation and contemplation, preparation, action and maintenance)

Food group	χ^2	p-value	Cramer's V
Fast food	(2, n=191)=0.882	0.644	0.068
Deep fried food	(2, n=193) =9.9	0.007	0.226
Sugar, honey and sweets	(2, n=192)=3.8	0.147	0.141
Sweets foods	(2, n=190) =14.3	0.001	0.274
Fruit and berries	(2, n=169)=10.3	0.006	0.246
Vegetables	(2, n=193)=4.2	0.123	0.147

6. Discussion

Earlier studies in the field of perceptions of body size are mostly on young girls (Rozin and Fallon, 1988; Swami *et al.* 2007) and are often linked to body image (which is a wider construct than body size preferences) and eating disorders (Demarest and Allen, 2000; O'Dea and Abraham, 2000). The present study was focused on adult Pakistani women in Norway and their body size preferences. No previous studies on body size preferences in this population group have been found.

The aim of this thesis was not to compare the body size preferences in the study population with the rest of the population in Norway, but rather to study the BSP in relation to weight recommendations for South Asians, and to investigate if overweight is a preferred trait among Pakistani women living in Norway who have a high prevalence of overweight and diabetes (Jenum *et al.* 2005; Kumar *et al.* 2006). If so this would have important implications for how advice on weight reduction should be given to patients with a Pakistani background.

It is of importance to bear in mind that the results represent the participants' views and perceptions. The actual BSP in for instance Pakistan has not been measured, but the numbers depict how the participants (being Pakistani immigrant women in Norway with much contact with their country of origin) consider it to be. The BSP that men prefer in women is also the participant's views. It should also be kept in mind that all the questions on body size preferences were related to women in the age of 45 years, which gives some information on how a female, likely to be married and being a parent should look like. Still since the participants were in the age range of 26 to 65 analyses involving age as a variable only describe how women of different ages believe that a woman in the age of 45 should look like.

Many of the studies referred to are on South Asians. This is a classification used for many people in the Indian continent, and the studies may include Indian, Pakistani, Bangladeshi participants, but since each of these countries comprise of several

ethnicities it is recommended that direct comparisons are done with caution (Bhopal, 2002).

The discussion is divided in three parts. The first part concerns the sample, the second part concerns the methods and in the third part the findings are considered.

6.1 The participants

The participants were in the age of 26 to 63, and the mean age was 41 years. Most of the participants were married, and they had on average a higher number of children (3.5) than women in the general Norwegian population, who on average give birth to 1.9 children (Statistics Norway, 2008).

The mean BMI was high. In fact 61% had a BMI classified as obesity (using the cut-off point of 27.5 kg/m² suggested by the WHO (World Health Organization, 2004). It may be claimed that since the inclusion was not random the women will not be representative. In some aspects this will be correct, however, in the study by Kumar (Kumar *et al.* 2006) the same prevalence of BMI above 25 (80%) in Oslo was found as in the present study.

The participants have less years of education than the national level for women in Norway is, as 20% of the women in Norway have an education at University level (Statistics Norway, 2007a). The majority was not in work, and many of them reported to have poor command of the Norwegian language. The women's income was not measured, but data on this among the Pakistani community in Norway do exist, and some assumptions can therefore be done using these data. There are big ranges in how many years the participants have lived in Norway and this may be a reason for the large ranges in the answers.

All of the participants were living in Søndre Nordstrand. It might be that these women have similarities that make them different from the other Pakistani women in Norway. There may be family relations and also common area of origin in Pakistan.

However, Søndre Nordstrand is the area in Oslo where most of the Pakistanis in Norway live (Statistics Norway, 2007b). Only fifty-five percent of the Pakistanis living in Søndre Nordstrand are first-generation immigrants, as the rest are descendants. In the present study almost all of the participants were born in Pakistan. Therefore it is unknown how the body size preferences are among the descendants. It is probable that the body size preferences differ between the generations. Body size preferences was found to differ among generations of South Asian women in the United Kingdom (Bush *et al.* 2001). This may be due to differences in acculturation level, which affect BSP.

Since the women volunteered to the study after hearing about it by women already included and by InnvaDiab staff members, it could be that the women participating are those who do wish to have a healthy lifestyle, and that they as such are not representative for all the Pakistani first generation females in Norway.

6.2 Consideration of the methods

Since the study population has another cultural and ethnical background than the general population in Norway, some extra considerations were needed in developing the InnvaDiab study. The methods used were modified to better suit the study population by using advices from researchers that have done studies in Pakistanis living in Norway. Since the methods in this study were set before the start of this thesis, the choice of methods will not be discussed; however, their significance will be further looked into.

6.2.1 The questionnaire

Since the data used in this master thesis is only from baseline there is less probability that the participants have influenced each others answers. The questionnaire was filled by interviewers of the same ethnical background as the participants. Bilingual interviewers reduced the language barriers, and this may also have led to more people

of all ages to participate, as it possible that older women are less skilled in the Norwegian language than younger women and therefore usually find it difficult to participate in studies. The questions asked were part of a larger questionnaire. The questions on BSP were some of the last questions posed. Many of the women were affected by the oral glucose test that was done at the time of interview, since they had high increases in their blood-sugar. It might be that this has influenced their answers, such that they did not reflect thoroughly before answering, but it may also be that they because of this actually answered what lay near to their heart and did not “over think” before answering, leaving reflections of what the interviewer would like to hear aside. At the same time being weighed and having their waist circumferences measured could have led the women to select smaller body sizes than they would have done under different circumstances, and in another environment.

The questionnaire was in Norwegian, and was translated by the interviewer to help the respondents understand the questions. However, as the translation was done at the time of the interview this may have lead to unequal interpretations and translations. One can therefore not be certain that each respondent was actually answering the exact same questions. The questionnaire should have been translated to Urdu/Punjabi and could then have been read out load by the interviewer so that illiterate women could participate. It would also have eased the job if the questionnaire had been scannable, as much time was put into transferring the answers to computer files.

Working with a study population that is not of the same cultural background poses some extra challenges. How the questions are understood is not known in any studies, but working with a minority population makes it more difficult to understand the participants’ way of thinking. The interviewers were informed how the questionnaire was to be used by InnvaDiab staff, still how they understood the information given and how they actually used the questionnaire is uncertain. In order to find out how the questionnaire was used by the interviewers and understood by the respondents the author observed two of the interviews, which gave a picture of how the questionnaire was translated and to look for questions made by the respondents during the

conversation. This gave a picture of which questions the respondent found to be difficult, and those that they needed more information on to be able to answer.

Figures and questions on body size preference

In the present study the Stunkard Figure Rating Scale was used to investigate the BSP in Pakistani women living in Norway. It was unknown whether the body size scale would be applicable to the study population. There were several reasons why this was considered to be an uncertainty. Firstly the scale was made for a Caucasian population. A study done by Lynch showed that Afro-Americans selected a smaller figure to represent their current body size than did Caucasian participants (Lynch *et al.* 2007). One reason suggested for this was that people judge their own body size relative to that of other people in their ethnic group. However, the results show that the Pakistani immigrant women selected the similar figure as was done by the Caucasian population in the study done by Bulik *et al.* (2001). The results show that the women were able to classify their actual body size using the scale. This indicates that the scale can be used in this study population. Secondly the drawings show women wearing swim suits, which there are reasons to believe that the women in the study do not use for cultural reasons. Some researchers have transformed the scale by adding outlines of culturally appropriate clothing (Greenhalgh *et al.* 2005). In the present study, comments regarding the drawings being inappropriate were not experienced.

A Figure Rating Scale can be presented in different ways, and the way it is presented will affect the answers. The Stunkard Figure Rating scale was presented to the participants on a sheet with the consecutive body sizes placed side by side. In a study the a body size scale was presented in three different ways; ordered array, an unordered array and individually on cards from thin to obese (Doll *et al.* 2004). The questions asked were on current, ideal and socially acceptable body size. The results differed significantly according to presentation method. That study can not be directly compared with the present study since other drawings were used. However, different answers were given when the figures were presented in an ordered array.

This is probably due to the opportunity given to compare each body size side by side and that one also gets the impression of there being a scale from thin to obese. It might be that more women would choose some of the larger body sizes if the drawings had been presented individually on cards or in an unordered array, as presenting them in scale from thin to obese may give the impression that middle sized body sizes are more “correct” to select than the others. In spite of this, in the present study many of the women chose the smallest body size on some of the answers, so it can be assumed that they were not highly influenced by the presentation method.

All of the questions on body size preferences in the present study were closed, as it also have been in other studies on the same topic (Bush *et al.* 2001; Greenhalgh *et al.* 2005). An investigation was done of the validity of closed questions in a survey of British South Asian and the Caucasian population (Boniface and Burchell, 2000). The views expressed in the open interview were inadequately represented by the closed questions, especially among the South Asians. No results from focus group studies on body size preferences in South Asians were found.

The questions on body size figures were very differently posed than questions in this research field usually are. There are some “standard” questions repeatedly posed in studies of this kind, which were not in the questionnaire used in InnvaDiab. It was therefore attempted to use some of the questions as substitutes for the usually asked questions. There is no discussion that using substitutes depend on the assumption making that the substitutes give some of the same information as the questions that rather should have been posed. In body image research there are some constructs used, that have been validated, such as body dissatisfaction. Unfortunately the use of substitutes made the use of these constructs impossible, and direct comparisons of the results with other studies was proven difficult. One of the major problems experienced was that the questions in the questionnaire were linked to a woman of the age of 45. This made the use of substitute variables, less robust, and the interpretation of the results troublesome.

Some of the questions led to confusion, such as the questions on body size preferences in men and women. Some of the participants answered that believed men and women prefer the same body sizes selected different body sizes when asked which is preferred by each of the genders. The confusion may be due to the interviewers asking the participants to select body sizes even if the respondent claimed there to be no difference, and then felt obliged to answer differently. The wording of these questions should be thoroughly reconsidered before usage in future studies. Originally it was made an attempt to use the selected body size for women as the participants' ideal body size. However, since few answered these questions and an obvious confusion it was not used for this purpose. It should have been obligatory to give an answer to which body size they believed men and women to prefer.

In the present study the Stunkard Figure Rating Scale was used as a continuous scale. It has been argued by some authors that scale is more ordinal than interval, since there are not equal intervals between each of the consecutive figures (Gardner *et al.* 1999). Gardner *et al.* claim that the figures should be used as an ordinal variable and that only non-parametric statistics should be used. However, the scale can not be ordinal since they argue that the intervals are not similar. One may agree that the scale should be used as a categorical variable. However, this is not possible according to Gardner *et al.* since there are figures that are rarely used while answering the questions, still they do not mention it as being a problem for using statistical methods as chi-square, which is depended of the frequency for each group being above a certain value. The article also tells that all the 15 studies they reviewed had used the scale as a continuous scale and used parametric statistics. It is important to bear in mind that questions regarding what type of statistics used depends on the field one is studying. Since the scale is tolerably continuous, the writer of this thesis will argue that it is not a violation to look at the scale as being continuous rather than categorical. Likert scales are handled as continuous. In comparison to Likert scales the Figure Rating Scale is considerably more continuous.

Another critique of Stunkard's scale is that the consecutive drawings increase differently in the different body regions, and that the changes are not based on any scientific study on how the different parts change with increasing body size (Gardner *et al.* 1999). But then one also will have to consider the fact that how the different body regions change with increasing body weight will depend on individual and ethnic differences, which complicate the development of a figure scale that takes these considerations into account.

Food frequency questionnaire

The FFQ method was used to compare the people in the different stages in weight reduction behaviour and their intake of different food types. The FFQ in InnvaDiab was of selected food items and could not reflect the entire energy intake. The FFQ was done by interviewers. It has been found that past diet is more accurately recalled if the interview is interviewer- rather than self-administered (Freudenheim, 1993). This also lowered the difficulties that the respondents could have experienced being illiterate or with low education, as well as lowering difficulties due to language-barriers. In addition misunderstandings were easily resolved at the time of the interview. As the interviews were done at the health centre, at the same time of an oral glucose test, and right after the anthropometric measures were done, the answers may have been affected. The response may be biased by the respondent's perception of what an appropriate diet should consist of (Freudenheim, 1993), which will be reasonable to suggest that being at a health centre will intensify. Thus under reporting may be more common for some food groups compared to others. Some may also be over reported. Obese people, as many of the respondents in the present study were, under report more than normal weight people do (Westerterp and Goris, 2002).

The food groups in the FFQ were broad and included many foods. They were based on previous studies, and validated on different populations. Grouping of items may lead to an underestimation of intake (Cade *et al.* 2002). It may also be that people did not understand the groupings even though examples were given, and do not recognize which characteristics foods in this group have in common. In other cultures foods

may be classified according to different characteristics such as their digestibility or medicinal qualities (Teufel, 1997). If the respondents are unsure of the European way of categorizing, they may have difficulties reporting their food-consumption behaviour. To facilitate dietary reporting, it is recommended that food groups should fit the respondents' conceptual framework. Examples of a portion were also given. It is not sure how respondents deal with this (Cade *et al.* 2002). It is unclear if a person will ignore the portion size or select a different frequency category to allow the difference in portion. However, the FFQ was made based on validated FFQs and modified to better suit the study population by the help of researchers who have done 24-hour recalls and focus group interviews on changes in food habits in the Pakistani population in Norway. FFQ as a dietary assessment tool has been validated in South Asians earlier (Kelemen *et al.* 2003; Sevak *et al.* 2004).

As mentioned some of the interviews were observed. It appeared as if the examples of the portions were not always read or translated, and if they were so the respondents rather answered how many times these foods were served in their homes rather than how many portions they ate. In this case if a dish was made once a month in their household this was answered as a portion per month. The amount eaten was ignored. To investigate the cultural relativity of serving sizes it is recommended that focus groups composed of members of the target population should be asked to illustrate their concept of small, medium and large servings (Teufel, 1997). Culture-specific FFQ should be validated against multiple 24-h recalls of food intake, preferably including both weekdays and weekends.

In the present study the questions were precoded. In the study by Sevak open ended questions were easier to ask (Sevak *et al.* 2004), although some researchers do not recommend this because of the difficulties arising while analysing the answers (Cade *et al.* 2002).

Some of the advantages to the method of FFQ is that it does not interfere with a person's diet, as it concerns previous intake and that the respondent burden is lowered in comparison to methods such as weighed registration, recalls and diet

records (Thompson and Byers, 1994). It is also inexpensive compared to 24-hour recall (Dodd *et al.* 2006), which requires coding etc. However, other methods do give more details of dietary intake (Thompson and Byers, 1994), as the quantification of intake is more accurate with recalls or records. With FFQ there may be errors in frequency estimation and in estimation of usual serving sizes. Another difficulty is to obtain accurate reports for foods eaten both alone and in mixtures. The FFQ method in the present study served to group the participants into those doing “healthy” choices, such as eating much fruits, legumes and vegetables, and less fast food, deep fried foods, sweet foods and sugar from those doing the opposite. As it was used here it gave sufficient information to divide the participants based on their stages in weight reduction behaviour, and their intake of the mentioned food groups.

6.2.2 The use of “stages of change”

“Stages of change” is usually used to identify the stage a person is in, so that proper and custom made interventions can be developed according to the stage someone is in. In InnvaDiab it was used to see if there is a change in stage after the intervention. However, in the present study, only baseline data could be used, as the InnvaDiab intervention was still ongoing. Therefore the questions of “stages of change” were used as a cross-sectional measure in order to compare the person’s body size preferences and diet according to their stage in weight reduction behaviour. Using a cross-sectional measure is not as informative as questions on previous weight reduction behaviour could have been. There was not found any studies using the TTM the same way as in the present study.

It is not known how the TTM actually is understood by South Asians. Behavioural models developed in Caucasian populations may need to be modified for some minority groups (Satia-Abouta *et al.* 2002). There might be some difficulties related to that the stages are linked to times, such as 6 months which can be proper in the study of behaviours where the aim is to quit an addiction totally, such as smoking, whereas, weight reduction might be more gradual and not aiming for a total exclusion

of a behaviour. Most of the studies on weight reduction using the Transtheoretical Model have had “stages of change” questionnaires with many items (Jeffery *et al.* 1999; Prochaska *et al.* 1992), one of them using a 32-item instrument (Prochaska *et al.* 1992). The algorithm used in InnvaDiab consisted of 5 questions, which were to identify people according to which stage they were in. To classify people in stages based on one question is arguable, as people that were classified as precontemplators and contemplators in the present study may be women with a long history of weight reduction behaviour that have given up attempts to loose weight. The studies found to use the TTM to study weight reduction, have used the construct of processes of change, which are the activities that people use to change their habit, while moving through the stages (Prochaska *et al.* 2002). The processes of change provide important guides for intervention programs. The implications of using “stages of change” in the way as it was done in the present study are discussed more thoroughly in the discussion of the findings.

6.2.3 Cut off points in anthropometric measures

Waist circumference and BMI was used to measure the prevalence of overweight and obesity. Waist circumference may be a better estimate than BMI, since it measures the abdominal fat, which is highly linked to cardiovascular disease (Foxton, 2006). People having a normal BMI may still have abdominal obesity that will affect the risk of having a non-communicable disease. Since there were no waist circumferences associated with the Stunkard Figure Rating Scale, only the BMI measures were used to consider the results on the questions of body size preferences. The mean waist circumference were above the recommendations (Misra *et al.* 2007), as was the BMI. The fact that the waist circumference was not used does not have any implications in the present study, since most of the participants fell into the classification of overweight according to the BMI measures, and probably few people with abdominal obesity with a BMI within the normal range. The cut-off points used were based on the international recommendations and those suggested for South Asians by researchers (World Health Organization, 2004).

6.3 Findings discussion

In the present study the body size preferences of Pakistani women in Norway were investigated. On average the participants preferred small body sizes. Due to a high prevalence of overweight and obesity among the participants, their stage in weight reduction was studied. As physical activity is studied by other InnvaDiab team workers, emphasis of the present study was on diet related to body size preferences and stage in weight reduction.

6.3.1 Prevalence and predictors of overweight and obesity

Based on literature it was expected that the BMI and waist circumference would differ with age, number of children, years in Norway, years of education, command of the Norwegian language, work status and stage in weight reduction.

Age did not show any association with BMI and waist circumference in the present study. In a study from the United Kingdom body sizes tended to increase with age among South Asian women (Bush *et al.* 2001). It is interesting that age does not affect the BMI and waist circumference in the present study. It might be that being married and other life circumstances are more influential to the high BMIs. However, since the majority of the participants were married, it was not possible to test the significance of being married to high BMIs and waist circumferences.

Studies show that women are more likely to be obese after giving birth (Sobal, 2001). The number of children did not affect the BMI and waist circumference in the present study. As almost all the women had children, comparisons between those with no children versus those having children could not be done. In a study among urban Turkish women, having children increased obesity risk (Ersoy and Imamoglu, 2006). In the same study it was found that housewives were more obese than women working outside the home. They were also less likely to have higher education. In the present study work status did not affect the level of obesity. However, years of education did have an impact on waist circumference. It might be that abdominal

obesity it easier to comprehend as obesity, than having a BMI of 23, and this is can be a reason for why waist circumferences vary with education and not BMI. The cut-off points for BMI are based on the increased risk for diabetes and heart-disease. The medical definitions of overweight and obesity is not necessarily considered to be overweight and obesity by lay people (Crawford and Campbell, 1999; Donath, 2000). At a BMI of 23 a person may have large fat depots, especially intra-abdominal fat, without being perceived by others or perceiving oneself as overweight. It is possible that those with a high education have a slimmer body size ideal. However, their ideal is to keep a slimmer abdomen, and their perception of overweight is dependent on abdominal obesity rather than generally obesity.

As no specific questionnaire on acculturation was used in the present study, some demographic information (years in Norway, self reported Norwegian skills and work status) served as substitutes for this. This does not give conclusive data on how acculturation affects BMI, waist circumference and “dissatisfaction”; however, acculturation is measured in many different ways by researchers. There are studies that have used only years in the host country as a measure for acculturation (Ball and Kenardy, 2002). High acculturation has previously shown to lead to adoption of the Western culture’s ideal, making Latin American women in the United States of America adopt anti-fat attitudes (Pepper and Ruiz, 2007). In a study from the US the most acculturated Latin-American women were more likely to have smaller BMIs and waist hip ratios than traditional women, who are less acculturated (Ayala *et al.* 2004). The acculturated women were more likely to be more educated, be working outside the home, and reported higher household income. Lower acculturation among Mexicans living in the United States of America was significantly associated with larger waist circumference and abdominal obesity (Sundquist and Winkleby, 2000). These impacts of demographic factors and factors that are part of acculturation were not seen in the present study. Many of the variables expected to have an impact on BMI, waist circumference and “body dissatisfaction” did not show to have any effect. It may be suggested that the results are due to not having a random sample, since there were many overweight participants. However, the BMIs found show the same

percent of people with a BMI above 25 (80%) as the previous study in Oslo by Kumar *et al.* (2006). The high prevalence of overweight and obesity in the study population indicates that other factors are of importance to the high prevalence. One reason why these models were not able to explain much of the variance may be that income (an important component of SES), which was not measured in the present study, has a large impact on both BMI and body size satisfaction, as people with lower SES have both larger BMI and body size satisfaction (Lynch *et al.* 2007). It may also be that there is a higher acceptance of obesity in Pakistani women living in Norway than it is in Western culture. More questions on acculturation should have been posed, at least if the present study had been solely on body size preferences. This could have been done by using acculturation scales modified to better suit immigrants in Norway.

Since there is an alarming high prevalence of overweight and obesity in Pakistani women living in Norway, their body size preferences were investigated.

6.3.2 The use of the scale

To find out which body size preferences Pakistani women in Norway have the Stunkard Figure Rating Scale was used (Stunkard *et al.* 1983). To investigate how this scale was used by the participants their BMI was used to find the corresponding body size figure (by using the BMIs linked to the figures in a study on Caucasian women (Bulik *et al.* 2001)). This was used to estimate the calculated body size. The calculated body sizes were then compared with the body figure size they believed to resemble; the self-perceived body size. The results show that the participants had the same mean self-perceived body size as the calculated body size. Their mean self-perceived body size was 5.7. Body figure 6 is related to a BMI of 29.9 (Bulik *et al.* 2001), which is very close to the mean BMI of 29.6, meaning that they estimated their body sizes very close to how the Caucasian women did it. Also studies in women of women of other cultures and ethnicities have used the Stunkard Figure Rating Scale. Bangladeshi women in the United Kingdom used the scale similar to

the women in the study by Bulik *et al.* (Greenhalgh *et al.* 2005). It has also been considered to be appropriate to use this scale in studies among Afro-Americans (Lynch *et al.* 2007; Patt *et al.* 2002).

The women in the study by Bulik *et al.* were of all sizes (2001). The present study was comprised mostly of overweight women. It would perhaps be expected that overweight persons are unable to classify their own body correctly, as seen in previous studies, some of which are multiethnic (Klesges, 1983; MossavarRahmani *et al.* 1996). A study that compared Canadian women with women in India found that the Canadian women did overestimate their "fatness" of different body parts whereas women in India did not (Gupta *et al.* 2001). The fact that the participants in the present study classified their body size similar to women of all sizes in other studies indicates that they have a realistic image of their own body. This may be a result of being aware of their overweight, but could also be a sign of preferring or being satisfied with overweight, thus not exaggerating nor underestimating their body size remarkably.

6.3.3 Different characteristics are associated to different body sizes

Since South Asians, and especially South Asian women are very prone to the metabolic syndrome and its negative outcomes (Abate and Chandalia, 2001; Bhopal *et al.* 1999; Jenum *et al.* 2005) it was of interest to investigate whether overweight is a sought after trait. Firstly, the body size that the women related to being in good health and well-being was investigated, as well as the body size most related to richness and high status, assuming that these are two desirable characteristics.

Health and well-being

The mean body size related to health (2.9 on the Figure Rating Scale) is linked to a BMI within the recommended range for South Asians (see Figure 1). Questions on health were also answered by the participants from Bangladesh in a study in the United Kingdom (Greenhalgh *et al.* 2005). They considered a medium sized body to

be related to good health, mostly selecting body size number 3, 4 or 5 in the Stunkard Figure Rating Scale. Some of the participants in the present study selected the largest body sizes while answering these questions. In the study on British-Bangladeshis the word healthy was found to have two different meanings (Greenhalgh *et al.* 2005). They distinguished between “most health” and “best health”. In fact 77 out of 90 persons selected the largest body size as the one with “most health”, meaning “much flesh”. It is unknown whether the concept of health is also seen in two different ways among Pakistani people in Norway, however, very few people selected the largest body sizes, so it is likely that most of the women in the present study did understand the question equally, not distinguishing between “most health” and “best health”. Bush *et al.* found South Asian women to be positive towards a BMI above 28, and that they claimed this to be related to the intake of healthy foods and being healthy (2001), however, BMI of 20 and 24 was linked with having a long life. The reason for this ambiguity is not known, however, it might be that the concept of health in South Asians is different than in other cultures.

In the present study, there were no significant age differences in mean body size associated with good health. The study by Bush *et al.* showed that the British-born South Asians were more likely to choose the slimmer figures than those in the first generation of immigrants, and this might be linked to an acculturation process (2001). Forty percent of first generation South Asian immigrants thought that women with a BMI greater than 28 would be most likely to have healthy children, compared to 5% of the general population of women in the United Kingdom. The large range in body size linked to health in the present study may be a consequence of the fact that social class, ethnicity, income, age, education, and personal history affects what values a person attach to concepts such as health (Cassidy, 1994). The fact that no age differences were found on this question indicates that there are other factors not measured that have an impact on the belief of body sizes linked to good health.

Being rich and of high status

The mean body size linked to richness and high status (3.3 on the Figure Rating Scale) was linked to a BMI of 20.9 to 23.1, and was, as health, within the suggested range of BMI for South Asians. In Bush's study the figures depicting women with BMI 20 and 24 were frequently selected as the most likely to get a good job (Bush *et al.* 2001). This can not be directly compared to the question of richness in the present study, as it has traditionally not been respected or proper for women to be involved in work outside the home in Pakistan. In fact, such engagements may be related to loss of social status (Ferdoos, 2005). No studies were found that had asked the same question as in the present study making direct comparisons difficult.

Comparing the ratings of health and richness

A larger body size was associated with richness, compared to being healthy. This may indicate that richness and affluence is perceived to lead to a body size which is not considered to be as good for health, as it was in previous times. It may also be because being rich can be translated as being from "a family that eats and drinks well" in Urdu/Punjabi. Richness may earlier have been linked to being in good health, but it seems possible that the effects seen all over the world of affluent countries getting more obese (Seidell, 1995) has changed this view.

Some of the respondents associated the smallest body size with healthiness and richness. It may be that these respondents wanted to stress that they do not have the traditional, positive view on plumpness. The use of extreme answers and answers believed to be socially acceptable, differ with ethnicity (Warnecke *et al.* 1997). Studies on how Pakistanis and South Asians answer were not found.

It should be stressed that the mean body sizes related to health and richness were only slightly different. It could be that asking several questions using the same scale gives the participants the impression that they need to answer differently on each of the questions, giving more significant differences than what in fact actually is there. In addition we do not know what attributes being in good health or being rich are

associated with. In Afro-American women the meaning of a healthy body size was described as shapeliness, strength, stamina and presence (Allan *et al.* 1993).

The women relating the smallest body sizes to health did not differ with regards to education, Norwegian skills and stage in weight reduction, compared to those choosing the larger body sizes. Those linking the smaller body sizes to richness were significantly more likely to be in the stage of weight reduction. As such it might be that trends believed to be in the upper classes lead to weight reduction behaviour, whereas, the wish for being in good health does not affect the weight reduction behaviour. Such attitudes are also seen in Western culture (The Norwegian Institute of Public Health, 2008).

6.3.4 The body size preferences in different population groups as believed by the participants

In different groups

The women believe that they have a smaller body size preference (BSP) than women in Pakistan, and a larger BSP than Norwegians. The mean believed BSPs of Pakistani women in Norway and in Norwegian women fall into the category of normal weight (BMI 18.5 - 23.0) and correspond to BMI 20.9 - 23.1 and 19.3 - 20.9, respectively (Bulik *et al.* 2001). Whereas the BSP believed to be preferred in Pakistan (BMI 23.1-26.2) is above the recommended BMI of 23. This indicates that Pakistanis in Norway do not seem to prefer overweight. The women's belief of women in their country of origin preferring larger body sizes may be right. However, this is their beliefs and it is not known what body size preferences Pakistani women hold. It is also unknown whether the women's beliefs apply to Pakistani women today, or if their image of Pakistani women's ideal body size is from the time that they emigrated from Pakistan, when the country had scarce resources and there was an even higher problem with underweight than there is now. This can in addition to the lifestyle changes seen in immigrants be a reason for why they are more obese than people in their country of origin. As their country of origin might be experiencing change in the

traditional views on obesity, immigrant may be retaining these preferences. However, the study population believed BSPs in their country of origin to be larger than the BSP in Pakistani women in Norway, which was within the recommendations for BMI in South Asians.

The smaller BSP among Pakistani women in Norway may be attributed to acculturation. In Australia a strong acculturation effect was seen (Ball and Kenardy, 2002). The longer time spent in Australia the more women of various ethnicities reported weight-related values and behaviours similar to those of Australian-born women. A Westernization of ideal body size is seen in many developing countries. In India the media are portraying slimmer and a more fit female bodies as the ideal than before (Runkel, 2003). Studies on body size preferences in Pakistan (in adult women) were not found, and comparisons can therefore not be done. The lack of studies on this issue in Pakistan may be due to a focus on underweight and problems with combating diseases linked to underweight. Studies have reported evidence of comparable high levels of weight concerns or eating disorder symptoms for young females of Asian minority groups and British females in Britain (Furnham and Patel, 1994; Hill and Bhatti, 1995; McCourt and Waller, 1995). South Asian student girls showed lower dissatisfaction than Caucasian girls in the United States of America (Rozin *et al.* 2001). A very recent study comparing Pakistani and Australian girls found that the traditional standards of beauty in upper socio-economic groups are being replaced by what is attractive in Western terms (Mahmud and Crittenden, 2007).

The body size preference among Norwegian women is considered as thin by the Pakistani women. This view might stem from the dress code among Norwegian women, which is different from the traditional shalwar kameez (loose trousers and a long tunic like shirt) worn by Pakistani women. It has been suggested that the nature of the dress worn by Pakistani women makes them less likely to develop body dissatisfaction (Mahmud and Crittenden, 2007), and according to feminists Western dress code encourage women to perceive flaws with their bodies (Seid, 1994). The

mean BMI is 25.2 in 40 to 45 years old Norwegian women in Oslo (The Norwegian Institute of Public Health, 2008) and is considerably lower than in the study population in InnvaDiab. In a report by the Directorate for Health and Social Affairs in Norway weight and health was reviewed (Directorate for Health and Social Affairs, 2000). The culture for detesting obesity and the admiration of “perfect” women in the Western society is discussed in the report. As the ideal is getting thinner the mean weight is increasing, creating a larger difference between the ideal and the reality. Between 48% and 70% of women in the age of 24 to 54 are at regular intervals on a diet. Approximately 70% of women that are engaged in dieting and weight control behaviour mention other reasons than health for dieting. Up to 75% of women who are dieting have BMI-values between 20 - 25 kg/m², which is considered to be a normal weight. Not all the result in that report is based on Norwegian studies, but they do depict the trends in the society.

The younger age groups among the Pakistani women in Norway perceive a higher body size preference in Norwegian women (a body size corresponding to BMI 23.1), than the older participating women. The younger women are more probable to have grown up in Norway, and may have a better knowledge of the weight norms of Norwegian women. The older women may have chosen smaller sizes in order to emphasise that the BSP among Norwegian women is smaller than theirs. It is also important to bear in mind that the questions asked were related to the body size of women at the age of 45. Younger women may perceive older women as having a larger ideal. The comparisons with the oldest age group did not show any significant differences, which may be due to having too few persons in this group.

Differences in men and women

Most of the participants believe men and women prefer the same female body sizes. Of those who did perceive there to be a difference there were found no significant mean difference in the body sizes they selected, as the women were parted in half on their view of whether the men liked larger or smaller sizes than women do. The mean BSP for both men and women were within the limits of normal BMI.

There were many missing answers on these questions, mostly since the participants did not feel that they could know the answer for this. A high number of “don’t knows” has been seen in previous studies among South Asians as well (Greenhalgh *et al.* 2005; Rankin and Bhopal, 2001). It may have increased the difficulty with answering that weight is not an issue discussed between men and women. Maybe the Pakistani men are not very outspoken about how they want women to be. In cultures where there is less pressure for women to be thin, it appears that men may be more accepting of larger female sizes (Cachelin *et al.* 1998). And these cultures also do show larger female mean body sizes. When there is no feeling of pressure the ideal may be small but not that important to reach. In Western societies overweight is highly stigmatized (Puhl and Brownell, 2003). It may be that this trait is not as stigmatized in other cultures, such as in Pakistani and South Asian culture.

A study by Fallon and Rozin showed that undergraduate US females have a higher ideal than what they believe men to find attractive (Fallon and Rozin, 1985). These results have not been reproduced (Rozin and Fallon, 1988). In the latter study the female ideal was almost exactly the same as the women’s perception of the men’s ideal female figure, as was the case in the present study. The way the questions were posed can not be compared to other studies since the women’s own ideal body size was not investigated. This issue is unfortunate and is discussed in latter sections.

6.3.5 The assumed body ideal

It was a weakness of the present study that no questions were posed regarding which body size the women think is ideal. As a substitute the answers given to the question on which body size Pakistani females living in Norway think that a 45 year old woman should have, was used. The mean age of the participant’s was near to 45 years. Pakistani women in this age are likely to be married and to have children. This was true for the majority of the participants, and as age did not show to influence the BMI and waist circumferences, it was believed that the body sizes being linked to age 45 did not have an impact on how the women responded to this question, even if they

were younger or older than 45. And even if it did have an impact, the body size at 45 would be the size that they wanted to have as they get older or when they were in this age. It was therefore assumed that the body size selected was the size the women themselves preferred. Studies have compared the ideal body size with the body sizes believed to be preferred by female peers (Cohn and Adler, 1992; Mahmud and Crittenden, 2007). They found that the body size women believed to be most desirable to other women was significantly smaller than their own ideal. If this is the fact in the present study, the data on dissatisfaction will be exaggerated. However the discrepancy found in these studies may be due to the respondents feeling obligated to answer differently when asked several questions. There are also studies finding no discrepancy depending on how the question of ideal body size is posed. In the study by Cororve, Gleaves and Pearson (Cororve *et al.* 2004) they compared the answers on the ideal (theirs, their female peers', men's and attractive women's) to investigate if this would give significantly different answers. The answers were not affected by the way in which the ideal body size question was phrased. It may be that the results in the present study are exaggerated but considering the fact that the body sizes related to health and richness are not very different from what the women consider being preferred among Pakistani women in Norway, the last measure might just be a valid measure of the ideal body size. In an article by Cassidy the difference between cultures that focus on the individual and cultures focusing on a group is described (Cassidy, 1994). As Pakistani culture is based on a group belonging rather than an individualistic view (Lawton *et al.* 2007), it might be that asking about a group ideal rather than an individual's ideal is appropriate. Because of this the assumed ideal in the present study may be used as a substitute for the ideal body size, which usually is the body size people want to be (Bush *et al.* 2001; Fallon and Rozin, 1985; Mahmud and Crittenden, 2007).

International studies show an inverse relationship between the ideal body weight and socioeconomic status (Lynch *et al.* 2007). The study by Lynch in which Caucasians were compared with Afro-Americans, showed that SES is related to the ideals, whereas the ethnicity is related to self-perception. In this study Caucasian women had

an ideal of body size number 3.1 and the Afro-American women had a body size ideal of body size number 3.5 in the Figure Rating Scale (Lynch *et al.* 2007). The women had a mean age in their early thirties. The Afro-American women chose smaller self-perceived body sizes than the Caucasian women, even though they had higher BMIs. The researchers suggest that this is because one will judge one's body size relative to that of other people in one's ethnic group. The Pakistani women in Norway used the scale similar to the women in the study by Bulik *et al.* even though their mean BMI (24.1, SD = 4.7) was very different (Bulik *et al.* 2001). This indicates that the Pakistani immigrant women are very much aware of their body size. Their ability to perceive their weight may be because their overweight does not have the same impact on psychological health as it may have on women of other ethnicities. In cultures where overweight traditionally have been considered to be healthy and attractive, women seem to be more able to accurately select their size, compared to other women who usually overestimate their body sizes (Craig *et al.* 1996).

6.3.6 “Body size dissatisfaction” and weight reduction behaviour

The questions posed for this study was whether immigrant Pakistani women in Norway hold positive views for surplus body fat. The mean values tell us that the BSP among these women is within what is considered a normal weight. Still most of the participants were overweight. Those who had a discrepancy score of zero between their self-perceived body size and the assumed ideal body size had a mean BMI of 23.8, which is a little above the recommended cut-off point. Multiple regression showed that those with a higher BMI were more likely to be in the preparation stage of weight reduction, trying to do so, but not doing it regularly. This indicates that the most obese women do want to reduce their weight, but are struggling with doing so. The women that had a BMI above 30 did not have significantly higher “body dissatisfaction” than those who had a BMI below 30. According to Cachelin there can be three reasons for people reporting less dissatisfaction. Firstly they may be resigned

to being overweight, secondly their immediate social comparison group are also overweight, and the third reason may be a high overall self-esteem (Cachelin, 2001).

“Stages of change” as a measure for weight reduction behaviour

Even though they have BSP of normal weight and they have a larger self-perceived body size, there does not seem to be many in the stage of trying to reduce weight. This can not and should not be interpreted as saying that even though they are overweight they do not wish to reduce their weight, because the TTM is not a linear model, and suggests that people may be going back and forth through the stages (Prochaska *et al.* 2002). People may have a large positive discrepancy score and have a history of dieting but still answer that they at this point are not involved in weight reduction behaviours. It would perhaps have been better to ask questions on the history of the women’s dieting and weight. The study by Bush shows that the South Asian women in the United Kingdom were unhappy about their weight but less likely than the general population to have attempted to reduce weight in the past (Bush *et al.* 2001). Questions that could have been asked in order to give more information is frequency of weighing oneself, current attempts to change weight, past attempts to loose or gain weight and the influence of others’ perceptions as was done in the study by Bush (Bush *et al.* 2001). Weight history has been suggested as an important research topic when it comes to studying body size preferences (Cachelin, 2001). Additionally one could ask for the body figures most likely to get married as has been done in previous studies in the United Kingdom (Bush *et al.* 2001; Greenhalgh *et al.* 2005). This would potentially give valuable information on the ideal. It is also interesting that a study in the United Kingdom found that South Asians did rarely mention controlling weight as a way of preventing diabetes (Rankin and Bhopal, 2001).

Overweight and stigma

It may be that overweight is not as stigmatized in South Asian culture as it is in Western societies. In the study by Bush *et al.* it was seen that few of the South Asian

women experienced pressure from others to reduce weight (2001). They experienced the problems of overweight as novelties, and ambivalence was found in the answers on questions related to body size. The South Asian women related a BMI of 20 - 24 to prestige (likelihood of marriage and of having a good job), while linking the largest body sizes to healthy womanhood, reproductive success and with eating good and healthy foods.

As both those with negative and positive discrepancy scores were included in the regression, the interpretation is complicated. Still, one may argue that as 95% of the participants were overweight (using a cut-off at 23), those that are satisfied or wanted to be larger are in a group characterized by not being aware of their overweight. And therefore one can assume that those with a more positive discrepancy are more aware of their overweight and do not wish to be their current size, whereas those with negative discrepancy not being aware of their overweight.

Age was not found to have an impact on “body dissatisfaction”. Researchers have found different effects of age on body dissatisfaction. Rozin and Fallon found that body dissatisfaction remains apparent in midlife (Stevens and Tiggemann, 1998), and may increase as older women gain weight and move further from their ideal (Tiggemann, 1992). Older women may feel more relaxed to the norms surrounding body size and food (Tunaley *et al.* 1999). After a lifetime of preoccupation with body size and weight control, they feel that they deserve a period freed from the guilt and anxiety that surround these issues. In older age they feel that their weight is not under their control. Most of the women in the present study were married and had children. This can have led to a similar attitude towards overweight and weight gain, even at an earlier age. Women in all ages from 18 to 59 had some degree of body dissatisfaction (Stevens and Tiggemann, 1998).

The rest of the predictor variables did not influence the body satisfaction. This is similar to the result found in Australian women (the majority was Caucasian) where body dissatisfaction did not vary with age, marital status, education level or occupational status (Stevens and Tiggemann, 1998). This may also be a result of

years not being able to reach their ideal weight as young girls and therefore they may have a more realistic ideal. However, in the present study higher “dissatisfaction” was more common among those with lower education. It may be that the women with lower education chose the smallest body size for how Pakistani women in Norway want women to be. If this is the case it would be expected that the dissatisfaction (as it is measured here) would be larger than for those with higher education choosing more realistic body sizes. It is therefore likely that these results are a consequence of how dissatisfaction is measured. In the United States of America lower education was associated with a smaller difference between self-perceived and ideal body size in Afro-American women (Lynch *et al.* 2007).

We did not measure income, although education and work status was reported. Studies show that lower-SES persons are more satisfied with their body size than are higher-SES persons (Cassidy, 1994). However, Afro-American women had lower body size dissatisfaction than Caucasians independent of SES, age, BMI and marital status. It was not investigated how much the participants are exposed to media (both Western and South Asian), which may influence the ideal and body dissatisfaction (Presnell *et al.* 2004).

The concept of body dissatisfaction

Dissatisfaction may have many negative implications. It is linked to binge eating and restrictive dieting among other unhealthy eating behaviours (Levine and Piran, 2004). And may also make people avoid exercise (Grogan, 2006). The level of physical activity has been shown to be low in South Asian women especially. There may be several reasons for this, related to modesty and gender segregation (Johnson, 2000), but it may also be that the level of dissatisfaction does play a role in the avoidance of exercise (Grogan, 2006).

Obesity is stigmatized in Western society (Puhl and Brownell, 2003). According to Crandall and Martinez anti-fat attitudes only emerge if there is a cultural preference for thinness and a belief that weight is under personal control (Crandall and Martinez,

1996). In another study, countries that were ranked high on individualism such as Australia, Poland and the United States of America showed greater anti-fat attitudes than those ranked low on individualism like India, Turkey and Venezuela (Crandall *et al.* 2001).

It is unfortunate that no questions on what the women in the present study believe are the reasons for their obesity were asked. In a qualitative study among diabetics the Indian and Pakistani participants emphasised their life circumstances, working too hard, being immigrants and family responsibilities (Lawton *et al.* 2007). They saw their life circumstances as the main reason for their disease, making disease almost inevitable. In contrast, the Caucasian participants blamed themselves for not making the right lifestyle choices. The researchers suggested that there is a question of an individualistic versus a holistic view. In the holistic view the society and the life circumstances are seen as the main contributors to how a person's life develops. The person has little power to affect these circumstances and the results of these. Among South Asian immigrants in Canada it was found that the families were in the centre of the women's lives (Grewal *et al.* 2005). The family affects their actions, conducts and emotional and physical well-being. If they felt ill the family obligations and responsibilities took precedence, resulting in women ignoring or putting off health problems for as long as possible. They often put their own needs second to those of their family. In all of this overweight will not be the prime concern. Pakistani women belong to a collectivist society. Their identities are based on one's group membership rather than one's personal attributes and they may be less likely to face pressure and shape-related criticism (Mahmud and Crittenden, 2007). In South Asian culture divorce is not viewed positively (Grewal *et al.* 2005), this may make the women more confident that their men will not leave them based on their looks. In Western society physical appearance may be perceived as crucial for attracting and maintaining a relationship with a male partner, and women may experience pressure from their husbands to lose weight and control the amount of and types of food eaten (Tunaley *et al.* 1999).

Unfortunately, that direct questions on their satisfaction with their own weight were not posed. This could have been done as in Bush's study asking the question of how happy the women were with their current weight, giving them 4 alternatives, ranging from very happy to very unhappy (Bush *et al.* 2001). Another option would be to ask the question of which body size they would like to have, and then use this to calculate the difference between their self-perceived body size and the size they would like to have, giving an estimate of body dissatisfaction. The last option has been a widely accepted measure for body dissatisfaction while using body figure scales (Gardner *et al.* 1999), and is a validated method (Williamson *et al.* 1993).

It is still questionable if the discrepancy between the self-perceived body size and the desired size actually reveal how eager people are to reach this ideal. An ideal may be perceived as perfect and unattainable, leaving the person unwilling to reach the ideal. The author would therefore suggest this measure to be considered a discrepancy, rather than a measure of dissatisfaction, unless dissatisfaction is strictly defined by researchers in this field. The impact and meaning of the dissatisfaction is considered to be obtainable only by the use of psychological questionnaires aiming to capture a person's dissatisfaction and degree of will to do something about their dissatisfaction. Among Africans it was found that even though all of the overweight women reported that they were dissatisfied with their weight, 44% of those who were overweight considered that they were attractive (Kumanyika *et al.* 1993). Not all ethnical groups associate obesity with lower self-esteem (Davidson and Knafl, 2006). The construct of attractiveness is broader than size and the body alone. The weight at which the discrepancy begins may explain, in part, differences in obesity among ethnic groups (Fitzgibbon *et al.* 2000). A discrepancy between current and ideal body image is not necessarily comparable with perception of overweight. Perception of overweight may occur before or after there is a discrepancy between current and ideal body image. However, discrepancy between an individual's current and ideal body image may reflect body dissatisfaction and may be a factor that stimulates attention to weight loss activities. In an article by Tiggemann the distinction between thinking and feeling fat is emphasised (Tiggemann, 1996). Cognitive and affective measures of

body dissatisfaction can be distinguished. According to Tiggemann women feel fatter than they think they are. In her study she found as in the present study that BMI is highly correlated with discrepancy between self-perceived and ideal body size. It is argued that even though it may seem that people who *feel* fat is more likely to diet than people who *think* they are fat, those who feel fat are more likely to be depressed, leading to a lower motivation of weight reduction. The question on self-perceived body size in the present study was formulated as: “Which one are you?” referring to the figure scale. In the present study no distinction was made between which body sizes they think and feel they resemble the most.

Brodie and Slade found that the desire to diet was positively associated with a larger discrepancy between the actual and ideal body size in a sample of adult women (Brodie and Slade, 1988). In some ethnic groups body dissatisfaction is first seen in women who are overweight, whereas it is seen even while not being overweight in Caucasian women (Fitzgibbon *et al.* 2000). The level of body dissatisfaction is just one of many factors that may stimulate weight loss activities. Other factors may be health problems related to obesity, family members and pressure from peers.

6.3.7 The FFQ and stage in weight reduction behaviour

The women who are in stage 4 and 5 in weight reduction behaviour weight do not eat more vegetables than those in the other stages, but they eat more fruits and less sweet food, sugar and deep fried foods. It was not possible to use statistical tests on the intake of beans and lentils, because 87% fell in the same category of eating 1 to 3 portions per week.

The intake of vegetables, lentils, fruits and berries

The intake of vegetables was not affected by the stage in weight reduction behaviour. Vegetables are usually eaten in salens, and at dinner time, when the whole family is gathered. It may therefore be more difficult to change the intake of these foods. While

the intake of raw fruits may be easier, since this can easily be eaten throughout the day, both as a snack and as dessert.

Raw vegetables are rarely eaten since according to Unani-Tibb this should be cooked before consumption. Many parts of Unani-Tibb may not be followed anymore, but the concept of things being “pukka” (cooked) or “kaccha” (raw) has been seen to be important among Pakistani immigrants in Norway previously (Dawes, 2006). It may therefore not be seen as an option to eat more vegetables to reduce weight.

Vegetables in salen are cooked with fats. Thus, even if vegetables may be a healthier alternative to meat in salens, this dish may still be very energy-dense. It may therefore be that the women do not consider these foods as healthy to eat, especially if they are trying to reduce weight, and therefore do not report high levels of intake.

In many countries, fruits and vegetables are considered one food category, and the recommendations include both fruits and vegetables (e.g. the 5 a day recommendation). Fruits and vegetables are eaten at different occasions and it has been found that behavioural determinants differ for fruit and vegetables intake (Brug *et al.* 1995). It may also be that the women try to reduce their weight by generally eating less and not by increasing the intake of vegetables.

The intake of fast food and deep fried food

The intake of fast food was not affected by the stage in “stages of change”, regarding weight reduction. Deep fried food was eaten more seldom by those trying to reduce their weight. Deep fried foods are usually complementary foods and not the main dish in Pakistani cuisine. Therefore it can be easier to omit these foods from the diet. Pizza has become a favourite among children, and many Pakistani families make this or order it to please the children (Mellin-Olsen and Wandel, 2005). It has become a natural part of everyday foods, and it was not seen to be affected by the stage in weight reduction.

The intake of sweet foods, sugar, honey and sweets

Sugar was less eaten by those in the stages of trying to reduce weight. Some researchers argue that FFQ measures attitudes rather than actual behaviour (Drewnowski, 2001). Studies show that South Asians often report low values of sugar intake; this may be due to their awareness of sugar as being linked to diabetes. Eating too much sugar has been seen as a perceived risk factor for having diabetes by South Asians (Rankin and Bhopal, 2001). Many respondents related diabetes directly to the amount of sugar eaten. This may be a result of the fact that in Punjabi the word “sugar” or “sugar di bimari” (literally translated: sugar disease) are commonly used for diabetes. The most common preventive measures suggested were reducing the amount of sugar ingested and eating a healthy diet. The authors of that article found the absence of understanding of the role of obesity worrying.

6.3.8 Overweight is not preferred

The results from the present study suggest that Pakistani immigrant women in Norway do not prefer overweight and obesity. Traits assumed to be desirable like being in good health and being rich are not linked to having a surplus of body fat. The same findings were obtained in the study among British-Bangladeshis by (Greenhalgh *et al.* 2005). According to Cachelin the previous differences found between ethnic groups may merely be a result of differences in age, weight, levels of dietary restraint, range of SES, education and acculturation levels (Cachelin, 2001). The traditional preference for surplus body fat can not be held responsible for the high prevalence of overweight and obesity in this group. Several other reasons for the overweight prevalence are hypothesised as described in the section of introduction. Biology in the form of genetics may play a major role (Misra and Ganda, 2007), as well as a low level of physical activity and diets that do not promote a healthy weight and body size.

However this study does not totally disprove the hypothesis of big being perceived as a desired trait. There are no known analyses of the concept of obesity (Davidson and

Knafl, 2006). Davidson and Knafl found 8 dimensions of the obesity concept in different studies. The 8 dimensions were: objective measure, attractiveness, sexual desirability, health, body image, strength or goodness, self-esteem and social acceptability. Different cultural groups appear to have a different notion of the obesity concept. Culture plays an important role in how an individual understand obesity. To fully test the views on obesity a more thorough investigation including several of these dimensions is required. It may be preferable with a more qualitative approach, or at least a quantitative approach with open ended questions. More investigation of how the ideal and the dissatisfaction with body size affect weight reduction behaviours in this study population is needed. Overweight may not be something to aim for, but still not be detested, because other issues in life are regarded as fare more important. A woman may not be valued by her good looks but by her role in society, being a wife and a mother. Becoming overweight will as such not be experienced as a crisis. This may from one aspect be positive, but from another not be preferable, neglecting the adverse health outcomes that obesity bring about. This can be viewed as an acceptance of overweight, rather than a preference for it.

7. Conclusions and recommendations for future studies

The findings from this study can be summarized as:

- A smaller body size is related to being in good health than to being rich and well-off; however the difference is not large.
- Pakistani women in Norway consider themselves to have smaller body size preferences than women in their country of origin and larger than Norwegian women.
- The body size preferences related to good health and richness are linked to BMIs which are within the medically recommended cut-off point for reduced risk of diabetes and heart diseases.
- The discrepancies between self-perceived body size and the preferred body size did not influence the stage in “stages of change” regarding weight reduction behaviour.
- The intake of fruit is higher among people in the stage of actively trying to reduce weight, than in those not trying to reduce their weight, and they less frequently eat of deep fried and sweet foods.
- The intake of vegetables, fast food and sugar is not different for the people in the various stages in weight reduction behaviour.

The body sizes associated to health and richness, and believed to be preferred by Pakistani women in Norway, are positive seen from a medical point of view and are within the normal ranges of BMI. Those wanting to reduce their weight make more healthy dietary choices than those not trying to reduce their weight. This is a positive finding, and to prevent non-communicable diseases in this population group these women should be encouraged to choose foods that are a part of a healthy diet. The

women most likely do want to reduce their weight, but many may perceive this as difficult and struggle with doing so, making their attempts to reduce weight unsuccessful.

The Pakistani women believe that they have a smaller body size preference than the women in their country of origin. This indicates that the body size preferences of Pakistani women in Norway change with immigration. Even though it is not explicitly evident, there are some indications, based on the results and literature that the women do not consider their overweight as negatively as it is done in Western culture. It should be attempted to prevent overweight and obesity without leading to the development of negative attitudes concerning weight.

There are many questions arising from the present findings. Qualitative studies, such as focus groups and individual interviews are needed to highlight the feelings about body size preferences and the reasons for their nature. The nature of the questions posed give values that are difficult to interpret, forcing us to make assumptions and suggestions based on literature that can not be directly compared. Future research needs to describe the relationship between obesity, body dissatisfaction, and the desire to reduce weight in this population group.

8. References

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9. Appendix

