

**INVESTIGATION OF WEIGHT MANAGEMENT-RELATED FOCUS
AREAS IN MIDDLE-CLASS OVERWEIGHT/OBESE BLACK (ZULU)
WOMEN TO ADVISE HEALTHY WEIGHT LOSS INTERVENTION
DEVELOPMENT**

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ABSTRACT

The South African Demographic and Health Survey (1998 and 2003) revealed that urban black women had the highest prevalence of overweight/obesity and central obesity across all population and gender groups. This trend was confirmed by the South African National Health and Nutrition Examination Survey (SANHANES-1) who reported a substantial increase in the prevalence of obesity among black South African women. Hence, the high prevalence of overweight/obesity and central obesity among urban black South African women needs to be addressed through targeted weight loss/management interventions, as obesity and central obesity are risk factors for the development of a number of non-communicable diseases (NCDs). However, from the international literature, it is evident that overweight/obese black women are less likely to embark on a weight loss intervention, while those who seek treatment, are unlikely to complete the intervention, as weight loss interventions targeting as well as including black women have reported attrition rates ranging from 0 to 79%. In addition, at this point in time, no common attrition tendencies have been documented for large clinic-based weight loss interventions targeting African-American women in the United States of America.

As there is a serious paucity of published information on weight loss interventions targeting overweight/obesity in urban black South African women, the aim of this research was to investigate weight management-related focus areas in overweight/obese black (Zulu) women residing in an urban area in South Africa. This information is essential to advise the development of healthy weight loss interventions and appropriate messaging to promote weight loss and maintenance in black South African women.

In order to achieve the this aim, the following research questions were formulated: (i) What is the weight management related profile of overweight/obese treatment-seeking black women; (ii) What is the outcome of a culturally sensitive healthy weight loss intervention in terms of weight loss, compliance (attendance of intervention sessions, lifestyle changes) and attrition: and (iii) Which factors may explain the outcomes of the culturally sensitive healthy weight loss intervention? To guide the investigation of these research questions the researcher first set out to identify weight management-related focus areas for overweight/obese black women from the literature. Ten succinct focus areas emerged and include the following: 1) treatment seeking behaviour; 2) weight loss success; 3) compliance to and attrition from weight loss programmes; 4) cultural influences on body shape and size perception and satisfaction; 5) cultural influences on food choices and eating patterns 6) cultural influences on physical activity; 7) environmental factors and social support; 8) appropriateness of the weight loss programme for the target population; 9) dietary restraint, disinhibition, perceived hunger and bingeing and 10) psychological well-being (depression). Findings on the three research questions were integrated to highlight pertinent insights gained in each of the

10 weight management-related focus areas (FA) in order to identify critical factors that need to be considered in the development and implementation of weight management interventions that target black South African women.

The target population for this study was treatment-seeking overweight/obese urban Zulu women with a BMI of $\geq 27 \text{ kg/m}^2$, aged 23 to 40 years who had no history of NCDs. The baseline data of all eligible subjects (n=99) were included in statistical analysis to provide insights in research question 1. Data collected over the 16 week intervention period for subjects who chose to participate in the healthy, culturally sensitive weight loss intervention was used to provide insights in research question 2 (the 20 completers experienced no significant weight loss, the attrition rate was 89%). To provide insights in research question 3, qualitative investigations were conducted involving in depth interviews with those who attended the baseline screening but did not participate in the intervention (n=6), subjects who dropped out at various times during the course of the intervention (n=13) and intervention completers (n=7), a focus group with intervention facilitators (n=6), as well two focus groups with newly recruited women who met the inclusion criteria of the study, but had never attempted weight loss (n= 12.).

Key insights in the focus areas that emerged from integration of the conclusions formulated for each research question, resulted in the formulation of the following recommendations for the development of weight loss interventions targeted at overweight/obese black (Zulu) women:

Focus area 1 (Treatment seeking behaviour): Ensure that prospective participants of a weight loss intervention have a clear understanding of what the intervention entails. Also that culturally sensitive healthy weight loss interventions have the potential to increase relevant knowledge and contribute to behaviour changes that could translate into a healthy lifestyle (healthy eating habits and increased levels of physical activity) and as a result, achieving weight loss and maintenance goals.

Focus area 2 (Weight loss success): Ensure early weight loss, also retaining the initial sense of excitement regarding the prospect of weight loss for motivational purposes. Provide insights in realistic weight loss goals, the need for gradual weight loss gradually and the importance of striving for healthy rather than aesthetic weight goals.

Focus area 3 (Compliance to and attrition from weight loss intervention): Emphasize that a weight loss diet does not need to be very restrictive in terms of food choices and that cultural nuances can be accommodated with the necessary planning. Provide clarity on the role of physical activity in weight loss, maintenance and health, as well as how to increase different types of physical activity in such a way that compliance is feasible and enjoyable. Include participants in decisions regarding

intervention development, location and suitable times. Consider payment of a monetary contribution on enrolment and a compliance contract to enhance intervention commitment.

Focus area 4 (Cultural influences on body shape and size perception and satisfaction): Conduct public awareness campaigns to inform and educate the public on the health risks associated with overweight/obesity and to dispel the myths and stigma associated with weight loss being an indicator of poor health, a HIV positive status or relationship problems.

Focus area 5 (Cultural influences on food choices and eating patterns): Education of participants on the energy density of food items consumed as a result of urbanisation and acculturation, especially fast foods, fatty meat, energy dense drinks and snacks. Creation of awareness on the fact that the type of foods, as well as portion sizes of the foods served at social events such as parties, weddings and funerals can contribute to weight gain and sabotage weight loss. Include practical activities such as supermarket visits, cooking demonstrations, the exchange of recipes and using participant recipes as examples for demonstrations of healthy food choices and preparation.

Focus area 6 (Cultural influences on physical activity): Emphasize moderation of cultural norms that may serve as barriers to increasing levels of physical activity. Clear insights into the various forms of physical activity, exercise guidelines, examples and opportunities are critical in this regard.

Focus area 7 (Environmental factors and social support): Emphasize facilitation of involvement of people who are important to the participant such as family, friends and peers, as they can serve as an important source of social support. Also emphasize involvement of participants themselves in identifying environmental factors that serve as barriers to weight loss and assisting them in identifying strategies to address these barriers.

Focus area 8 (Appropriateness of the weight loss intervention for the target population): Ensure matching of intervention facilitators and intervention participants in terms of race and ethnicity, intervention facilitators; also that facilitators must be sympathetic and supportive. Make use of a group approach for peer support and match individual participants with appropriate lifestyle recommendations for weight loss and management (even if a group approach is used). Provide very clear guidance on the strategies included in the intervention, for example in the form of an appropriate and user friendly weight loss manual.

Focus area 9 (Dietary restraint, disinhibition, perceived hunger and bingeing): Include coverage of cognitive behavioural concepts and skills development in interventions to address stress-related eating, binge eating, perceived hunger and especially disinhibitors such as exposure to large amounts of unhealthy foods at social events.

Focus area 10 (Psychological wellbeing (depression)): Consider pre-screening of subjects to detect the presence of depression or other psychopathology that may serve as a barrier to healthy eating habits and weight loss.

Although the research target group was overweight/obese Zulu women, these core weight management (loss) recommendations may also be of value in the development of National guidelines for the prevention and management of obesity in South Africans.

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LIST OF ABBREVIATIONS

ADA	American Dietetic Association
BDI	Beck Depression Inventory
BED	Binge Eating Disorder
BMI	Body Mass Index
BMR	Basal Metabolic Rate
BQHPA	Baecke Questionnaire of Habitual Physical Activity
CHD	Coronary heart disease
DOH	Department of Health
DRI	Dietary Reference Intake
DSM-5	American Psychiatric Association's 5 th Diagnostic and Statistical Manual
EAL	Evidence Analysis Library
EAR	Estimated Average Requirement
EEE	Estimated Energy Expenditure
EER	Estimated Energy Requirements
EI	Energy Intake
FAO	Food and Agriculture Organisation of the United Nations
GHQ	General health questionnaire
HbA1c	Glycosylated haemoglobin
HBM	Health Belief Model
HC	Health Club
HDL	High Density Lipoprotein
IDF	International Diabetes Federation
IHD	Ischaemic heart disease
ISAK	International Society for the Advancement of Kinanthropometry
KJ	Kilojoule
LDL	Low density lipoprotein
LSM	Living standards measure
MetS	Metabolic syndrome
MI	Motivational Interviewing
mmHg	Millimetres Mercury
MUFA	Mono-unsaturated fatty acid
NCDs	Non-communicable diseases
NHLBI	National Heart, Lung and Blood Institute
NHS	National Health Service
PA	Physical Activity
PUFA	Poly-unsaturated fatty acid
PURE	Prospective Urban and Rural Epidemiology
RDs	Registered dietitians
RMR	Resting metabolic rate
RSES	Rosenberg Self-esteem Scale
SADHS	South African Demographic and Health Survey

SANHANES-1	South African National Health and Nutrition Examination Survey
SES	Socio-economic status
SCT	Social Cognitive Theory
SFA	Saturated fatty acid
SPSS	IBM Statistical Package for the Social Sciences Statistics (version 22)
TEE	Total Energy Expenditure
TFEQ	Three-factor Eating Questionnaire
THUSA	Transition and Health during Urbanisation of South Africans
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
TTM	Trans Theoretical Model
USA	United States of America
WHO	World Health Organization

CHAPTER 1

1.1 INTRODUCTION AND RESEARCH STRUCTURE

Obesity is recognized as a chronic disease [World Health Organisation (WHO) 2004b] and is not only considered to be a global epidemic, but one that is starting to emerge in developing countries (Swinburn et al., 2011). Globally, women are more likely to be obese than men, while in Africa, women have nearly double the prevalence of obesity than men (WHO 2013). Changes in dietary and activity patterns are occurring rapidly due to urbanisation and the resultant nutrition transition, which in turn, has led to an increase in the prevalence of obesity and non-communicable diseases (NCDs) in middle-income, transitional countries (Finucane et al., 2011; WHO 2008; Popkin 2004) such as South Africa (Turok 2001).

The 1998 South African Demographic and Health Survey (SADHS) indicated that urban black women had the highest prevalence of overweight/obesity across all population and gender groups with 26.7% being overweight and 31.8% being obese, while central obesity was documented in 43.4% of the study sample (Puoane et al., 2002). Subsequently, the 2003 SADHS [Department of Health (DoH) 2007] confirmed that urban black women had the highest mean body mass index (BMI) across all population and gender groups, with 27.7% being overweight, 38.5% being obese and central obesity being present among 39.1%. The South African National Health and Nutrition Examination Survey (SANHANES-1) reported that South African women had a BMI which was significantly higher than that of men, and that the prevalence of overweight and obesity was also significantly higher in women. It also became evident that there has been a substantial increase in the prevalence of obesity amongst black South African women, as the SANHANES-1 data showed that 24.9% of black women are overweight while the prevalence of obesity has increased to 39.9% (Shisana et al., 2013). In addition, Case and Menendez (2009) highlighted the fact that the prevalence of obesity among black South African women is five times higher than that of their male counterparts, while numerous local studies have confirmed that obesity is an important problem amongst local black women (Malhotra et al., 2008; Steyn et al., 1998; Mollentze et al., 1995).

Obesity is associated with many health risks that include hypertension, impaired glucose tolerance, diabetes mellitus, an atherogenic lipid profile and ischaemic heart disease (IHD) (Van der Merwe & Pepper 2006), while central obesity is a known risk factor for the development of metabolic syndrome (MetS) and is also linked to the development of coronary heart disease (CHD) and type 2 diabetes (Lysen et al. 2012; Swinburn et al., 2011; WHO 2011; Huxley et al., 2010; Qiao & Nyamdorj 2010). However, the relationship between obesity and the development of NCDs among black South Africans is complex and has been subject to misinterpretation. As IHD and dyslipidaemia are less prevalent **among black South Africans, it contributed to the concept of "benign" or "healthy" obesity among**

rural blacks (Walker et al., 1989, p224), as it was assumed that obesity was not associated with NCDs **in this race group. Later work by Walker et al. (2001, p368) stated that "evidence suggests that the** health disadvantage of obesity in black women is less than that in Caucasian women, and would seem to have little influence on their proneness to hypertension, CHD and breast cancer". **The** association between obesity and IHD among black South Africans is inconclusive (Van der Merwe & Pepper 2006; Connor et al., 2005; Seftel et al., 1993) and research conducted among urban black women has shown a lower mortality due to IHD when compared to their Caucasian counterparts (Isles & Milne 1987). However, studies conducted by Sliwa et al. (2008), Case and Deaton (2006) and Faber and Kruger (2005), documented that obesity does predispose to hypertension, stroke, glucose intolerance and diabetes mellitus in black South Africans. According to the WHO (2004b), a modest weight loss of up to 10% of body weight can improve glycaemic control and insulin sensitivity, reduce blood pressure, reduce blood cholesterol levels and result in improvements in lung function and breathlessness.

It is therefore a matter of course that overweight/obesity and central obesity amongst urban black South African women need to be addressed, most likely through targeted weight loss interventions. However, authors such as Foley et al. (2012) explain that despite the increased risk of obesity and associated NCDs in black women, they have nonetheless been underrepresented in clinical trials of weight loss interventions. This situation may be linked to the fact that black women are less likely to volunteer for weight loss interventions, as they have a lower level of preoccupation with weight control, are less likely to perceive themselves as overweight, have so-called **"obesity-tolerant"** attitudes, experience less pressure from men to be thin and accept a larger body shape and size as a beauty ideal. This may limit either their motivation to lose weight or the effectiveness of weight loss interventions (Puoane et al., 2005a; Kumanyika 1993). Within this context, it needs to be noted that attrition from weight loss interventions targeting, as well as including, black women has been reported to range from 0% to 79% (Hughes & Walker 2011; Bronner et al., 2002). Fernald (2009) states that it is of great concern to health professionals in developing countries that a higher weight may be a symbol of increased social status, thereby contributing to social desirability. The latter was illustrated by Case and Menendez (2009) who found that in a group of urban Xhosa women, those with higher incomes were more likely to be obese. Within the public health nutrition arena, the acceptance of a larger body shape and size as the norm could imply that any initiative to address weight-related problems among black women may be a major challenge.

There is some evidence that black South African women may find themselves in the process of acculturation to Western norms. Stern et al. (1982) explain that in multicultural communities, individuals closer to the culture of the developed (Western) society are less sceptical about social values that promote thinness. Local qualitative research conducted by Puoane et al. (2006b) among young urban Xhosa women, revealed that some of them were weight conscious, but that this was not

the norm amongst all members of the study sample. Earlier research conducted by Mvo et al. (1999) among urban black women, found that although they expressed a desire to lose some excess weight, they did not experience social pressure to do so. An investigation targeting black South African female students that hail from both urban and rural areas, found that those residing in urban areas were more likely to be restrained eaters, to have attempted weight loss, to strive towards weight loss and fear weight gain than their rural counterparts (Senekal et al., 2001). It is therefore possible that urban black women recognize the inherent societal values of both a larger body shape/size (Kumanyika et al., 1992), while at the same time identifying with the values of a smaller body shape, despite the fact that in South Africa, weight loss and thinness is often associated with HIV/AIDS (Matoti-Mvalo & Puoane 2011; Puoane et al., 2006a; Kruger et al., 2005). This dichotomy poses unique challenges in attempts to address the high prevalence of overweight/obesity among urban black South African women.

Honas et al. (2003) stress the importance of conducting weight loss interventions and subsequent attrition studies on treatment-seeking subjects to facilitate the development of effective weight loss interventions to address the problem of overweight/obesity. In the light of the abovementioned dichotomy, such weight loss/weight management interventions targeting urban black women should be culturally sensitive to facilitate successful engagement with the intervention. Resnicow et al. (2000) and Resnicow et al. (1999) define cultural sensitivity as **"the extent to which ethnic/cultural characteristics, experiences, norms, values, behavioural patterns and beliefs of a target population as well as relevant historical, environmental, and social forces are incorporated into the design, delivery, and evaluation of targeted health promotion interventions"**. It could thus be argued that mainstream weight loss interventions may not be effective for black women because they are based on assumptions and values of the dominant culture (Western) such as personal autonomy and self-management, whereas African-American culture has been reported to be more oriented toward interconnectedness and group support (Sánchez-Johnsen 2005; Kumanyika et al., 1992b).

There is a paucity of published research on weight management interventions in overweight/obese black South African women. The researcher therefore set out to identify and investigate weight management related focus areas in middle class overweight/obese black (Zulu women) living in an urban area in South Africa to advise the development of healthy weight loss interventions and messages to promote weight loss and maintenance in the target group.

1.2 STRUCTURE OF THE THESIS

The first step in the research process (Chapter 2) was to conduct an in depth critical review of the literature to identify relevant weight management-related focus areas in overweight/obese black women and research questions for investigation. The investigation of identified research questions

are presented in Chapters 3, 4 and 5. An integration of the findings on the focus areas is presented in Chapter 6, which concludes with the identification of critical factors to consider in the development and implementation of weight management initiatives.

Chapters 3, 4 and 5 are formatted with a view to each being a stand-alone publishable paper. While methodology relevant to each of the sub-questions is addressed in turn, there is a degree of unavoidable overlap in the chapters as a result of this approach.

1.3 DEFINITION OF TERMS

1.3.1 Black women

For the purposes of this research, black women refer to women of African origin, more specifically women of the Zulu ethnic group. In the international context, McKinnon (2001) indicates that the terms African-American, Black American or Afro-American are used interchangeably to identify citizens or residents of the United States of America (USA) who have origins in any of the black populations of Africa. For the purpose of this study, the term, African-American women, was therefore used to refer to research conducted in the USA.

1.3.2 Middle-class

According to Mattes (2014), the term middle-class is used to describe the considerable middle layer of society where individuals are well educated, skilled and earn a good salary in a developed-country context. However, when applying this concept to highly unequal developing countries such as South Africa, there is disparity between the characteristics associated with middle-class in developed countries versus for example middle class in South Africans and then more specifically black South Africans. Within the South African context middle class individuals may be less likely to have tertiary education than a middle class counterpart in a developed country. In terms of the South African living standards measure (LSM), middle class would equate to LSM 5-7 (Mattes 2014).

CHAPTER 2 Literature Review

2.1 INTRODUCTION

The literature review firstly provides insight into the health risks associated with obesity among black South Africans, followed by an overview of the aetiology of obesity, with the emphasis on cultural perspectives. This is followed by a synopsis of intervention planning, with specific reference to the ecological approach, intervention planning frameworks and behaviour change theory. Considerations for and barriers to successful weight loss in black women are discussed in depth. A summary and critical discussion of published weight loss interventions targeting black women is presented, followed by the weight management–related focus areas that emerged from the literature. Hence, the key concepts included in this review are depicted in Figure 2.1. The aim and specific research questions for this research conclude this chapter.

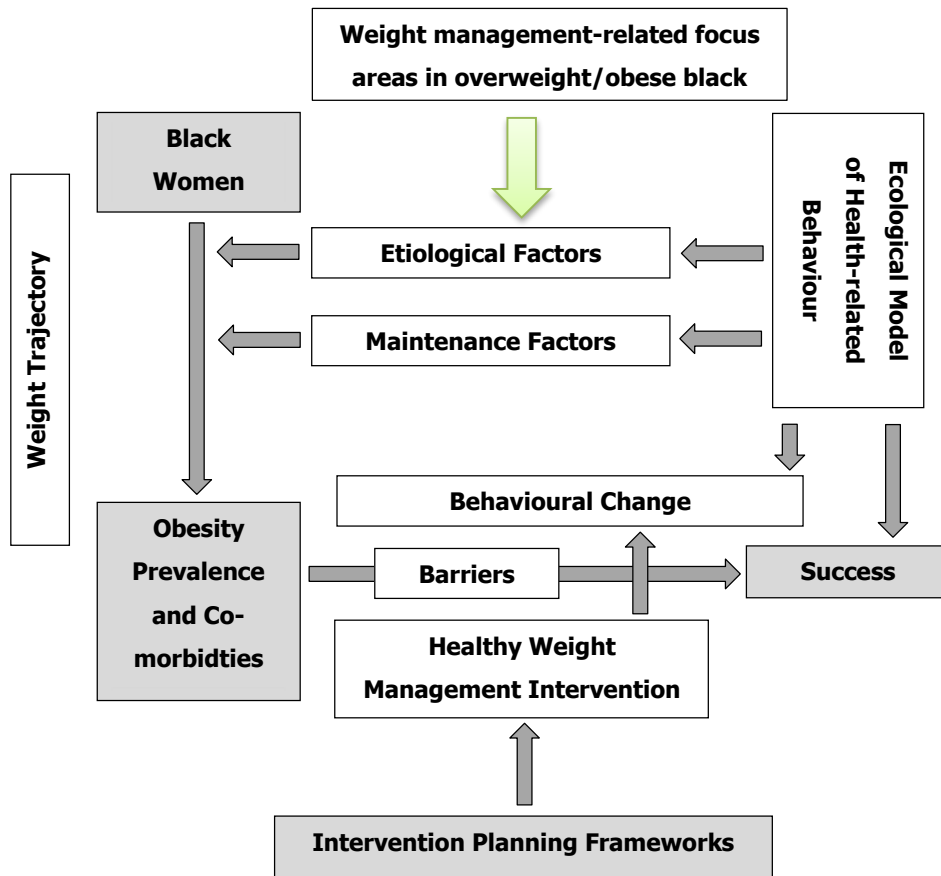


Figure 2.1: Conceptual framework for the literature review

2.2 HEALTH RISKS ASSOCIATED WITH OBESITY IN BLACK SOUTH AFRICANS

Local researchers perceived IHD and dyslipidaemia to be less prevalent among black South Africans as was alluded to in Chapter 1. This contributed to establishing the concept of “benign” or “healthy”

obesity among rural black women (Walker et al., 1989, p224), as it was assumed that obesity was not associated with NCDs among them. Subsequent research by Walker et al. (2001, p368) stated that **"evidence suggests that the health disadvantage of obesity in African women is less than that in white women, and would seem to have little influence on their proneness to hypertension, CHD and breast cancer"**.

However, subsequent research found that obesity does predispose to hypertension, stroke, glucose intolerance and type 2 diabetes in black South Africans (Sliwa et al., 2008; Case & Deaton 2006; Alberts et al., 2005; Faber & Kruger 2005; Schutte et al., 2003). Within this context, it should be noted that the overall prevalence of hypertension among black South Africans was 59% according to Steyn et al. (2001), while Mollentze et al. (1995) reported a prevalence of 36.3%. In the Heart of Soweto Study (Sliwa et al., 2008), it was documented that nearly 50% of patients who were being treated for hypertension in the absence of clinical heart disease were obese (Tibarzwa et al., 2008). More recent evidence generated by the SANHANES-1 study (Shisana et al., 2013) found that the prevalence of hypertension among black South Africans was 9.9%. The authors also concluded that overweight and obesity were highly prevalent among hypertensive subjects.

Urban obese black women have a high level of insulin resistance (van der Merwe et al., 2000). When compared to urban Caucasian women, local black women who are matched for BMI and body composition have (i) a higher level of insulin resistance; (ii) lower plasma insulin and C-peptide levels (also referred to as insulinopenia); (iii) a higher level of adipose tissue insulin resistance; (iv) higher post-absorptive leptin concentrations; and (v) lower fasting and three hour triglyceride concentrations (Van der Merwe & Pepper 2006). As a result, the pathogenesis of type 2 diabetes in black South Africans seems to be related to insulinopenia and insulin resistance (Joffe & Seftel 1994; Joffe et al., 1992). The International Diabetes Federation (IDF) (2009) state that the mortality from diabetes mellitus is four times higher in sub-Saharan Africa than the world average, while Popkin (1998) adds that this trend has been exacerbated by an increase in urbanisation. The SANHANES-1 study (Shisana et al., 20013) confirmed that the prevalence of diabetes mellitus, diagnosed as a Glycosylated Haemoglobin (HbA1c) level of >6.5%, was the highest in formal urban areas. However, the prevalence of impaired glucose homeostasis (HbA1c >6.15 and <6.5%) and diabetes mellitus was the second lowest amongst black South Africans at 8.7% and 8.2% respectively.

From the above it is evident that overweight and obese black women are at an increased risk for the development of NCDs and the need for weight reduction to improve long-term health outcomes. Should these women therefore be willing and able to lose weight, the health benefits related to a weight loss of up to 10% of body weight are numerous. These benefits include: (i) improvement in glycaemic control and insulin sensitivity; (ii) reduction in blood pressure that equates to an average reduction of 1mmHg systolic and 2mmHg diastolic blood pressure for each 1% loss of body weight.

The above implies that an estimated loss of 10kg can result in a 10mmHg reduction in systolic and a 20mmHg reduction in diastolic blood pressure, as well as a reduction in cholesterol levels and improvement in lung function and breathlessness (WHO 2004b).

To date, prospective trials have not provided clear evidence of an effect on mortality rates as a result of weight loss in overweight and obese subjects. This could be due to a lack of differentiation between intentional and unintentional weight loss (Gregg et al., 2003). Flegal et al. (2005) explain that except for statistical extremes, BMI only weakly predicts longevity. However, findings by Gregg et al. (2003) on a cohort of overweight and obese subjects were that intentional weight loss was associated with a reduction in all-cause mortality, independent of weight change, while self-reported intentional weight loss was associated with lower mortality rates. The authors conclude that attempted weight loss could be independently associated with reduced mortality as it serves as a marker for healthy behaviours. Williamson et al. (2000) reported that intentional weight loss of 5.8 BMI units (33.5 to 27.7 kg/m²) was associated with a 25% reduction in mortality of overweight diabetic patients, while in the National Health Service (NHS) observational cohort of women found that subjects who lost more than 5kg over a ten year period, reduced their risk for developing diabetes by 50% or more (Colditz et al., 1995).

2.3 FACTORS THAT MAY INFLUENCE THE DEVELOPMENT AND/OR MAINTENANCE OF OBESITY IN BLACK WOMAN

2.3.1 Multifactorial nature of obesity

According to the WHO (2004b), obesity is caused by an energy imbalance, whereby energy intake exceeds energy expenditure over a considerable period of time. However, many complex and diverse factors can result in a positive energy balance and it is the interaction between these factors rather than the influence of a single factor in isolation that is thought to be responsible for the development of overweight/obesity. Steyn et al. (2006) add that obesity is a complex phenotype where the interaction of multiple genes and environmental factors results in the manifestation of the disease. Although non-genetic factors are important, it is unlikely that these factors can fully explain the prevalence of obesity and NCDs in isolation. Figure 2.2 illustrates how numerous factors can contribute to the development of obesity in black women across the lifespan.

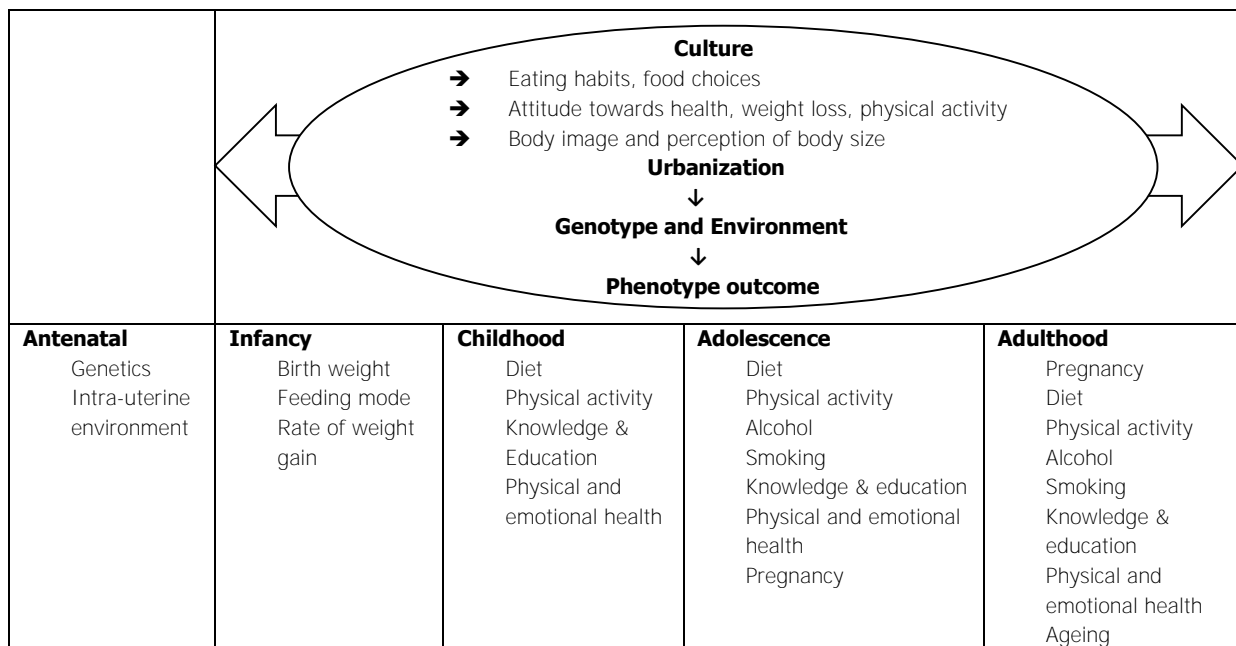


Figure 2.2: Multifactorial nature of obesity in black women across the life span.

The WHO (2004b) provides the following perspectives on the development of obesity:

- It can be caused by a minor energy imbalance, leading to gradual, but consistent weight gain over a considerable period. Once an obese state is established, physiological processes tend to maintain the new weight;
- Body weight is primarily regulated by a series of physiological processes but are also influenced by external societal and cognitive factors;
- Epidemiological trends indicate that the primary cause of the global obesity epidemic is related to environmental and behavioural changes as the rapid increase in obesity rates have occurred in a relatively short period of time for there to have been significant within population genetic changes;
- An increase in the amount of fat consumed and the resultant increased energy density of the diet in conjunction with reduced levels of physical activity, are thought to be the major factors that have contributed to an increase in the mean body weight of populations;
- The obesity epidemic can be viewed as a consequence of the social, economic and cultural problems facing developing and newly industrialized countries;
- Epidemiological, genetic and molecular studies suggest that some individuals are more susceptible to weight gain and the development of obesity than others. However, genetic and biological factors, as well as the cessation of smoking, gender and age interact to determine **an individual's susceptibility to weight gain**;
- Certain race groups are seemingly more at risk for the development of obesity when exposed to an affluent lifestyle, although susceptibilities to obesity comorbidities are not uniform across these groups.

Kumanyika (1987) suggested that the finding that a multifactorial disease such as obesity occurs differentially by race, is indicative of both genetic and environmental influences. From a theoretical- and intuitive perspective therefore, any of the following could serve as an explanation for the higher prevalence of obesity among black women versus that of their Caucasian counterparts: (i) higher energy intakes; (ii) comparatively lower levels of physical activity; (iii) reproductive or lifestyle variables that predispose to weight gain and; (iv) an inability or lack of motivation to lose weight or to maintain weight loss, which in turn, is related to food preferences or other cultural factors (Kumanyika 1987; Stunkard 1980) and (v) lower energy requirements (DeLaney et al., 2013). These concepts are unpacked in more detail in later sections of this literature review.

It is important to note at this point, that the literature shows that cultural perspectives regarding eating habits and food choices, physical activity and body shape norms/ideals may play an important role in the manifestation of weight gain and subsequent development and maintenance of an obese state in black women. Perspectives on these concepts are provided in the next two sections.

2.3.2 Cultural influences on eating habits, food choices and physical activity

Culture refers to the general customs and beliefs, way of life and social organization of a particular group of individuals (Walter 2008) and is learned, shared, transmitted inter-generationally, and **reflected in a group's values, beliefs, norms, practices, familial roles, and other social regularities** (Kreuter & McClure 2004; Wilson et al., 2004). The cultural characteristics of any given group may be directly or indirectly associated with their health-related priorities, body shape norms, decisions, behaviours [including eating habits, food choices and physical activity (PA)], and/or with acceptance and adoption of health education and health communication programmes and messages (Pasick et al., 1996). **This implies that a cultural group's traditional eating habits, food choices and engagement with PA could promote or prevent certain diseases** (Kreuter & McClure 2004).

Eating habits are considered to be among the oldest and most deeply entrenched aspects of many cultures and therefore cannot be changed easily, or if changed, can produce a series of unanticipated and often undesirable responses (WHO 2004b; Cassel 1957). Cultural influences on eating habits include peer group pressure, social conventions such as serving high-fat meals for family entertainment and celebrations, religious practices, the status assigned to different foods, the influence of household members and individual lifestyles (WHO 2004b; Kumanyika & Odons 2003; Airhihenburwa et al., 1995).

Local research conducted by Puoane et al. (2006b, p91) on the social meaning of food showed that food is used as a symbol of love, acceptance and humanity (ubuntu) and is associated with **happiness. One subject explained: "If you visit someone's house and are not given food, you feel that**

you are not welcomed". Puoane et al. (2006b, p91) also report that in some families, certain occasions require the consumption of certain foods. Regarding appetite, the above authors report that having a good appetite is a sign of health. In addition, eating large portions is a way of sending a message that one can afford to buy large quantities of food and that it is a sign of being successful. **Food is also used for emotional satisfaction: "I like myself, I like my food, and I eat as much as I can if I have the money"**. Some individuals reported eating more when they were depressed. It also **became apparent that food is used to facilitate social interaction: "When I visit relatives and friends I find myself having a meal each time I come to a different house. If I visit five houses on that day I should be prepared to eat in all five houses. I have to eat what is served to me otherwise it will look like I am undermining them"**.

Qualitative research conducted by Befort et al. (2008b) among obese African-American women highlighted the family-centeredness of their culture, as was evident that food was viewed as a way of bringing family members together, and the associated enjoyment expressed regarding the preparation of large meals for this reason. African-American women also seemed to prioritize family caretaking over their own health (Befort et al., 2008b; Kumanyika et al., 1992b). It is therefore suggested that African-American women are less likely to assume the self-centred focus associated with health interventions. This reluctance to focus on themselves may result in obese African-American woman often considering their own health as secondary to that of their children, or prioritizing caretaking responsibilities over self-care (Ahye et al., 2006; Samuel-Hodge et al., 2000).

The idea/importance of engaging in PA during leisure time is not understood/recognized in many cultures, especially in communities where energy conservation was historically of prime concern during periods of food shortage (Kumanyika 1987). It is therefore important to note that the improvement in the availability of food has done little to change this attitude towards PA and often persists across generations, even though the original justification for their adoption has long been forgotten (Kumanyika 1987). Wilcox et al. (2002, p353) and Airhihenbuwa et al. (1995, p426) refer **to the "rest ethic" of the African-American culture or the belief that rest is important after a "busy day" and highlight the fact that it may conflict with recommendations to increase leisure-time activity to manage weight.** Results from research by Puoane et al. (2005b, p10) among urban Xhosa women who were employed as community health workers, showed that attitudes towards increased PA were not positive, as these subjects could not understand why people engaged in PA if they were not **trying to lose weight. "If we exercise, we will lose weight and what will people think about us?"** Puoane et al. (2005b) adds that PA is a westernized concept that is viewed differently by Xhosa residents of an urban township. Historically, PA was viewed as something that is done while doing agriculture-related activities. It is therefore not surprising that when fun walks were organised in the above township, residents became spectators instead of joining the walk. The reason for non-

participation was cited as: "I used to walk a lot to fetch water and gather wood; I do not see the need of walking just for nothing" (Puoane & Tsolekile 2008, p11).

2.3.3 Cultural influences on body shape norms and beauty ideals

Kumanyika (1987) states that for African-Americans, cultural norms of beauty include the value ascribed to a comfortable margin of excess body fat. More lenient attitudes towards obesity, a lower **preoccupation with weight control, a positive body image and other "obesity-tolerant" attitudes** among African-American women were also reported by Kumanyika (1993, p650), Kumanyika et al. (1993, p416) and Kumanyika et al. (1992, p166). Maddox et al. (1968) and Huenemann et al. (1966a) explain that body image studies comparing African-American women to their Caucasian counterparts, found that African-American women have larger ideal body sizes, are less likely to perceive themselves as overweight, are more satisfied with their bodies at heavier weights and are more likely to report feeling attractive, even when they are dissatisfied with their weight. They therefore have more favourable body image attitudes and are more accepting of a larger body shape and higher percentage body fat than their Caucasian counterparts. According to Matoti-Mvalo and Puoane (2011); Puoane et al. (2006a); Puoane et al. (2006b); Puoane et al. (2005a) and Puoane et al. (2005b), it would seem that many black South African women do not want to lose weight because obesity is culturally and aesthetically looked upon with less disapproval in black women than is the case for their Caucasian counterparts. Of note is the fact that weight loss and thinness are often associated with HIV/AIDS within the South Africa context, which may contribute to the acceptance of a larger body size (Puoane et al., 2005c).

Befort et al. (2008b, p410) explain that some African-Americans may underestimate the extent of their overweight status as a result of the high prevalence of overweight and obesity in this population. In their research, subjects indicated that they perceived an obese person to be someone **who was "very heavy" and had illnesses related to her weight. Therefore, if a person was "heavy" but healthy, she was overweight and not necessarily obese.** This points to the possibility that black overweight/obese women are not necessarily realistic about their weight status and associated health risks. The high prevalence of overweight/obesity among them may be or become a cultural norm, which could contribute to their larger physical shape (Baturka et al., 2000; Wolfe 2000; Flynn & Fitzgibbon 1998). Mvo et al. (1999) also reported a lack of social pressure to lose weight among urban Xhosa women and that black women experience less pressure from men to be thin (Hebl & Heatherton 1998; Powell & Kahn 1995; Kumanyika et al., 1992), reducing the likelihood of aspirations to be thin (Kumanyika et al., 1992).

Local studies confirm the fact that black women are not realistic about their weight status, as was reflected by the high prevalence of obesity documented for black women in the 1998 SADHS, while

less than 16% of the women perceived themselves to be obese (Puoane et al., 2002). In a study conducted among urban Xhosa community health workers (mean BMI 40.0 ± 8.1 kg/m²), a moderately overweight shape (BMI 27 kg/m²) was preferred as it was associated with dignity, respect, health, wealth, strength, confidence and beauty, while being thin was associated with unhappiness or HIV/AIDS. In the latter study the community health workers also reported that a woman should be round and should feel herself when she moves stating that: **"A woman should not be light, everyone should admire her movements"**. Furthermore, seven percent of participants felt that they were somewhat thin (BMI 18.5-19.9 kg/m²) while nobody was thin according to their BMI's. About 45% perceived themselves to be overweight/obese or extremely overweight while in fact 95% were overweight and obese. This finding underscores the fact that the majority of these subjects did not perceive themselves to be overweight (Puoane et al., 2005b, p10).

Despite these clear indications that cultural norms influence body weight and shape ideals in black urban women, acculturation to Western norms are also a reality. Acculturation is defined as the process of psychosocial change that occurs when a group or individual acquires the cultural values, language, norms and behaviours of a dominant society (Wildes et al., 2001). Kumanyika et al. (1985a) reported that in the USA there were indications that acculturation to western norms may be taking place as attitudes towards the obese, assessed by the reactions of African-American men and women to photos of obese people, were generally negative, but significantly less so than that of Caucasians. These attitudinal differences were even less evident in subsequent studies (Kumanyika et al., 1985a; Kumanyika et al., 1985b; Morris & Windsor 1985), indicating that there may be a shift towards Western norms of beauty and thus possibly increased motivation to prevent obesity or lose weight. However, acculturation to Western norms of a thin-ideal may be less prominent in developing countries. Siervo et al. (2006) conducted a cross-cultural comparison between Gambian and African-Americans using published data on Figure Rating Scales. Findings were that urban Gambians were more obesity tolerant than African-American women. Among Gambians there was a high level of body satisfaction and obesity acceptance, especially among middle-aged women. Within the South Africa context, work by Puoane et al. (2005a; 2006b) illustrates that acculturation to Western norms is taking place. Qualitative research conducted by Puoane et al. (2006b) found that some young black women were weight conscious and therefore very selective in their food choices.

It is important to note that the acceptance of a larger body size does not necessarily imply that black women are not aware of the health risks associated with their weight. A qualitative study conducted by Puoane et al. (2005b) among urban female Xhosa community health workers found that subjects were aware of the relationship between overweight/obesity and high blood pressure, diabetes, heart disease and arthritis. On the other hand, subjects also reported weight loss (as a result of increased PA) which would be viewed as negative by members of the community. In addition, it is possible that

because of the underestimation of their weight status (Puoane et al., 2002; Mvo et al., 1999), many black women may not recognize the need for weight loss.

Despite possible awareness of health risks and acculturation, African-American women seem to be less likely to embark on a weight loss intervention than their Caucasian counterparts. Striegel-Moore et al. (1996) suggested that because African-American women experienced less social pressure regarding their weight status, they initiated dieting later in life, and were significantly less likely to embark on a weight loss diet at each developmental milestone. Walker et al. (2001) also concluded that because obese women are regarded with less disapproval in the African culture than is the case with Caucasian women, there is less incentive for obese black women to lose weight, even among urban women who have a higher level of education and are of a higher socio-economic status than their rural counterparts.

2.3.4 Concluding perspectives

The multifactorial nature of obesity needs to be considered in the development and implementation of interventions for the treatment/management of obesity. In black women, cultural perspectives regarding eating habits and food choices, PA and body shape and size norms clearly need specific attention. Application of the ecological model of health-related behaviour in intervention development may ensure that all relevant factors/influences are duly considered and addressed as relevant. Health behaviour change experts also recommend that an intervention framework should be applied and health behaviour change theories be considered in the intervention development process (Glanz et al., 2008; National Cancer Institute, 2005).

2.4 THE ECOLOGICAL MODEL OF HEALTH-RELATED BEHAVIOUR

2.4.1 Overview of the ecological model

Health education and interventions often place strong emphasis on individual cognitive processes to ensure behaviour change, with limited consideration of the fact that human behaviour is entrenched in cultural norms and social structures (Freudenberg et al., 1995; McLeroy et al., 1993; McLeroy et al., 1988). According to the latter authors, many theoretical models assume that health-related behaviour is the result of separate, isolated factors that influence health behaviour, each of which explains different aspects of individual behaviour. Krumeich et al. (2001) add that while these models recognize the importance of social norms in shaping behaviour, choices and attitudes, the main focus remains on the individual who is expected to, if properly educated, overcome social and cultural pressure and act rationally. It then follows that health education renders individuals responsible for

their health (also referred to as victim blaming) while ignoring structural, political and economic causes (Minkler 1989; Crawford 1977).

According to the National Cancer Institute (2005) and Baranowski et al. (2003), it is generally recognized that the environment people live in directly affects their health. The ecological approach emphasises the interaction between, and interdependence of factors within and across all levels of a **health problem, including people's interactions with** their physical and sociocultural environments. Key concepts inherent to the ecological model that facilitate identification of intervention points for health promotion include the fact that: (i) behaviour effects are affected by multiple levels of influences and; (ii) individual behaviour shapes and is shaped by the social environment people live in (Sallis et al., 2008; Glanz et al., 2008; McLaren & Hawe 2005).

McLeroy et al. (1988) suggested an ecological model for health promotion that identifies five levels of influence. The challenge for researchers lies in understanding interactions across the five levels of influence (Sallis et al., 2008). The latter authors suggest that concepts that cut across these levels include sociocultural factors and physical environments.

2.4.2 Levels of influence according to the ecological model by McLeroy et al. (1988)

Intrapersonal level influence on health behaviour centres on individual characteristics such as biological and psychological factors that influence behaviour. These aspects include knowledge, attitudes, beliefs, insight in personal eating behaviour and PA levels, personality traits, weight loss goals, as well as genotype (Cohen 2008; Sallis et al., 2008; National Cancer Institute, 2005; Bargh & Chartrand 1999; McLeroy et al., 1988). Based on the argument that failure to reach weight-loss goals may lead to psychological distress, which in turn may lower self-efficacy and undermine weight-loss efforts, Jeffery (2004) explains that it has become popular to recommend counselling as part of weight-loss interventions that targets the setting of realistic weight loss goals. The theoretical argument is that unrealistic weight loss expectations undermine behavioural efforts. According to Jeffery et al. (1998) and Linde et al. (2004), weight-loss goals are on average unrealistically high and more realistic goals are more likely to be attained.

Interpersonal level influence on health behaviour such as eating habits, food choices and PA levels involves interpersonal processes, such as engagement with social and cultural factors. In this context, primary groups include family, friends, peers and colleagues that provide social identity, support and role definition (Sallis et al., 2008; National Cancer Institute, 2005; McLeroy et al., 1988). Interpersonal pressure that will be counterproductive to weight loss will therefore be related to settings where obesity is equated to physical strength (Kumanyika 1993), desirable, a sign of affluence and happiness (Puoane & Tsolekile 2008). On the other hand, weight-based stigmatization

will be observed where obese individuals are treated poorly by colleagues and employees and discriminated against in terms of jobs and promotions (ten Have et al., 2011; Puhl & Heuer 2010). Educational settings also provide the opportunity for obese students to be teased by peers, viewed negatively by educators and even dismissed from university because of their weight (ten Have et al., 2011; Puhl & Heuer 2010). Kumanyika et al. (1992) point out that within the context of weight loss interventions, the sociocultural background of the intervention facilitators, professional staff orientation, **as well as staff attitudes and beliefs may be in conflict with the subject's own cultural** context i.e. cultural background, values, economic circumstances and food preferences.

Organizational influence refers to organization level rules, regulations, policies and procedures e.g. in the workplace, informal organizational structures e.g. shops, as well as health care e.g. access to doctors/clinics that may constrain or promote recommended behaviours (Sallis et al., 2008; National Cancer Institute 2005; Kumanyika et al., 1992; McLeroy et al., 1988). Examples of worksite based influence that may impact on weight include policies regarding food served at cafeterias and those regarding PA. An example of the influence of informal structures on health-related behaviour is that large supermarkets with healthier, fresher foods and lower prices may be more likely to be located in middle-class neighbourhoods, thus resulting in the availability of healthier food choices in homes in the area (Black & Macinko 2007; Morland et al., 2002; Fischer & Strogatz 1999). It has therefore been found that there is a relationship between the location of supermarkets and **individual's food** consumption patterns (Cheadle et al., 1991). Thus making it evident that a neighbourhood-based approach could enhance traditional obesity interventions that often ignore the environmental context that shapes health behaviours.

Community influence relates to social networks and cultural and religious norms or standards that exist as formal or informal influences among individuals, groups and organizations (Sallis et al., 2008; National Cancer Institute 2005; McLeroy et al., 1988). An additional community based influence is the sophisticated marketing and advertising techniques that companies employ to market their products, and in the process, creating and/or maintaining an obesogenic environment (Puhl & Heuer 2010). Changes in aspects of the physical environment that may contribute to decreased levels of PA, such as invisibility of stairs in buildings and a lack of parks, also constitute community influences (Puhl & Heuer 2010; Cohen 2008; Bargh & Chartrand 1999).

Public policy refers to government policies and laws that regulate or support healthy activities and practices for disease prevention, early detection, control and management (Sallis et al., 2008; National Cancer Institute 2005; McLeroy et al., 1988). It is therefore important to identify the pathways for behavioural change within an ecological framework through public policy changes (Swinburn et al., 2011; Puhl & Heuer 2010) e.g. making only healthy choices available in vending machines (Glanz et al., 1995), ecologically sound design of neighbourhoods, changes to the physical

environment (Adler & Stewart 2009; Jago & Bailey 2001) or placing signs to encourage the use of stairs (Kerr et al., 2001).

However, in addition to public policy, it should be borne in mind that when viewed from a broader perspective, the global obesity epidemic is influenced by local environments as well as global drivers that are producing more processed, affordable and freely available foods (Swinburn et al., 2011). In a local context, the increasing prevalence of obesity is also driven by what is referred to as **"Big Food"**, namely large commercial entities that seemingly dominate the food and beverage environment (Igumbor et al. 2012, pe1001253). It is therefore posited that global drivers impact not only on food availability, but also government policy.

2.4.3 Concluding perspectives on the ecological model

Addressing obesity from an ecological perspective emphasises the need for more than simple educational interventions focused on the individual, but rather the need for a collaborative approach to address the multiple influences that have an impact on the problem including intrapersonal level, interpersonal level, organisational and community influences, as well as public policy. Hence, cognisance should be taken of the fact that single-level interventions aimed at weight loss/lifestyle changes are unlikely to have significant or sustained population-based outcomes. It is therefore suggested that interventions designed to change beliefs and behaviours are likely to be more effective when policies and environments support the targeted behaviour changes (Puhl & Heuer 2010; Sallis et al., 2008; WHO 2004a).

The following example illustrates the various levels of influence in the ecological model on the development and maintenance of obesity in an adult woman:

*The woman may be aware of the fact that she needs to change her lifestyle in order to reduce her weight as well as her risk for the development of NCDs. At an individual level, her inability to act may be due to her fear of failure in exercising self-control in terms of modifying her eating habits and increasing her level of PA. At the interpersonal level her doctor may neglect to tell her that her current weight poses a health risk and that she should lose weight. In addition, she may have friends who told her that it is not important to lose weight. At the organizational level it may be hard to schedule an appointment with a dietician at the local government hospital because the hospital is under staffed. At a community level a large body size may be viewed as acceptable. At the policy level she may not have medical aid and thus be unable to afford the services of a private practicing dietician. Therefore the outcome, namely **the woman's failure to change her lifestyle and eating habits, may be the result of multiple factors that are inter-dependent.***

According to Sallis et al. (2008, p480), a limitation of the ecological approach is its lack of specificity related to which factors need to be addressed at which levels to change specific health behaviours, as well as the lack of information on how the broader levels of influence function or how factors interact across levels. As a result, **ecological models can be viewed as “robbing the individual of dignity”** by attributing their behaviours to a range of influences or alternatively, removing an unreasonable level of responsibility from the individual by recognizing the numerous factors that influence and **individual’s behaviour**.

From the above, it is clear that weight loss interventions targeting black women, should consider the following:

- Intrapersonal level influences on health behaviour that relate to individual characteristics such as biological and psychological factors including knowledge, attitudes, beliefs, insight into eating behaviour and physical activity levels, personality traits and weight loss goals as well as genotype. (Cohen 2008; Sallis et al., 2008; National Cancer Institute 2005);
- Interpersonal level influence on health behaviour by primary groups such as family, friends, peers and colleagues that provide social identity, support and role definition (Sallis et al., 2008; National Cancer Institute 2005; McLeroy et al., 1988);
- Organizational level influence such as organization rules, regulations, policies and procedures as well as health care such as access to doctors/clinics that may constrain or promote recommended behaviours (Sallis et al., 2008; National Cancer Institute 2005; Kumanyika et al., 1992b);
- Community level influence such as social networks and cultural and religious norms or standards that exist as formal or informal influences among individuals, groups and organizations (Sallis et al., 2008; National Cancer Institute 2005; McLeroy et al., 1988); and
- Public policy referring to local status and government policies and laws that regulate or support healthy actions and practices for disease prevention, early detection, control and management (Sallis et al., 2008; National Cancer Institute 2005; McLeroy et al., 1988).

2.5 INTERVENTION PLANNING THEORY

Health interventions and initiatives that are most likely to succeed are based on a clear understanding of targeted health behaviours and the environmental context in which they occur. As a result, health practitioners should use strategic planning models to develop and manage these interventions and continually improve them through meaningful evaluation. Examples of theories that are used for intervention planning include PRECEDE-PROCEED and social marketing.

2.5.1 PRECEDE-PROCEED

Planning models such as PRECEDE-PROCEED assist health professionals to develop interventions in a step wise manner, while integrating numerous theories to explain and address health problems. The first step involves using theory to develop a set of assumptions about factors contributing to a health problem. Research is then used to test, adjust and add to these assumptions. A theoretical framework and situation-specific research findings can then be used to design a targeted intervention strategy. The latter includes designing an evaluation to gauge whether or not the approach is effective, as well as selecting realistic, actionable goals that define in advance what intervention success would look like (National Cancer Institute 2005).

According to Gielen et al. (2008), the main purpose of this model is not to predict or explain the relationship between factors that are thought to be associated with an outcome, but to provide a structure for applying theories and concepts systematically for planning and evaluating health behaviour change interventions and policies. It therefore provides a formula for designing health education and health promotion interventions by guiding intervention planners through a process that starts with desired outcomes and works backwards to identify a combination of strategies for achieving objectives (Green & Kreuter 2005).

This model interprets health behaviour as being influenced by individual and environmental factors. As a result, it has two distinct parts: (i) an educational diagnosis (PRECEDE); and (ii) an ecological diagnosis (PROCEED). PRECEDE encompasses Predisposing, Reinforcing and Enabling Constructs in Educational/Environmental Diagnosis and Evaluation. This component of the model therefore posits that an educational diagnosis should precede the design of a health promotion intervention (Gielen et al., 2008; National Cancer Institute 2005). Interventions should therefore be directed at each of these sets of factors bearing in mind the characteristics of the behaviours that need to change and the population being targeted (Sjöström et al., 1999). PROCEED stands for Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development. In combination, these components of the model help health practitioners plan interventions that reflect an ecological perspective (National Cancer Institute 2005).

As stated by this model, behaviour is shaped by predisposing, reinforcing and enabling factors that jointly influence the likelihood that behaviour change will occur (Gielen et al., 2008). According to Green and Kreuter (2005), predisposing factors are precursors to behaviour that provide the rationale or motivation for the behaviour and include the individual's knowledge, attitudes, cultural and other beliefs, personal preferences, existing skills and self-efficacy beliefs. Reinforcing factors come into play after a behaviour has been initiated and provide ongoing rewards or incentives for the persistence or repetition of the behaviour. Examples include social support, praise, reassurance, peer

influence, significant others and indirect reinforcements. Lastly, enabling factors are precursors to behavioural change that facilitate motivation for behavioural change to take place or environmental policy to be implemented. These factors therefore enable individuals to act on their predispositions. In addition, they can affect behaviour directly or indirectly due to environmental factors that are conducive to change such as interventions, supportive policies, services and resources necessary for desired behavioural and environmental outcomes to occur. In certain circumstances, the development of a new skill is required to facilitate behavioural change (Gielen et al., 2008; National Cancer Institute 2005).

2.5.2 Social Marketing

Social marketing theory has its origins in commercial marketing concepts. According to Storey et al. (2008), social marketing has had substantial appeal for facilitation of health promotion and social change interventions, partly because it resembles effective commercial advertising. Key perspectives, principles and tactics adapted from commercial marketing for social change interventions can improve the strategic value of health communication and increase the likelihood that people will make healthy behavioural choices. The focus on outcomes that improve personal and social welfare is the main distinction between social and commercial marketing (Storey et al., 2008).

Storey et al. (2008) **explains that the most concise description of the theory's essential features** relates to the fact that it is the application of commercial marketing technologies to the analysis, planning, execution and evaluation of interventions designed to influence the voluntary behaviour of target audiences in order to improve their personal welfare and that of their society.

The five basic principles of social marketing include: (i) an attempt to change and maintain the voluntary behaviour of members of the target market; (ii) offering members of the target market benefits such as minimizing barriers to performing these behaviours; (iii) primary beneficiaries are the **target market**; (iv) **change is promoted by advocating the target market's self-interest**; and (v) subjects who engage with the marketing are fulfilling their own interest (Storey et al., 2008; Baranowski et al., 2003).

Research across the entire lifespan of social marketing interventions is essential. As a result, researchers should be involved in planning the intervention from the outset, rather than being consulted at its conclusion to evaluate intervention outcomes. During the design phase of an intervention, research helps intervention planners to determine: (i) the prevalence of the problem among specific populations; (ii) select target audiences in order to achieve maximum individual and social benefit; (iii) identify unique communication needs, media habits and preferences of the different target audience segments; (iv) record the social, cultural and structural/environmental

factors that positively or negatively influence behaviour; and (v) identify sources of personal influence over the behaviour of the intended target market (Storey et al., 2008).

2.6 HEALTH BEHAVIOUR CHANGE THEORY

2.6.1 Introduction

Health behaviour change theory can play a critical role throughout the intervention planning process (planning, implementation and evaluation), as it gives intervention planners tools, based on an understanding of human behaviour, for moving beyond intuition to evaluate and design health behaviour and health promotion interventions (National Cancer Institute 2005). Numerous systematic reviews have shown that the use of health behaviour theory in the development of interventions results in more significant intervention outcomes. Intervention planners can also use theories to guide an investigation into why people do not adhere to public health advice or do not take care of their health (Glanz et al., 2008). In this context, behaviour change theory can help to explain the dynamics of health behaviours, including the processes required to change them, and the influences of the numerous factors that affect these behaviours, including social and physical environments (Glanz et al., 2008).

Understanding health behaviour or intervention development to change behaviour requires consideration of more than one theory (National Cancer Institute 2005). In the sections that follow, theories and models of behavioural change that are applicable to the design of interventions targeting weight loss are discussed within the context of the levels of influence depicted by the ecological model. Examples of weight loss interventions, where the respective theories and models were applied, are included.

2.6.2 Health Belief Model

The Health Belief Model (HBM) highlights an individual's perceptions of the threat posed by a health problem (susceptibility, severity), the benefits of avoiding the threat and the factors influencing the decision to act (barriers, cues to action and self-efficacy) (Champion & Skinner 2008). An expansion of the original theory resulted in the identification of six main constructs that may influence an individual's decisions about whether to take action to prevent, screen for and control illness. As a result, it was argued that individuals are ready to act if they: (i) believe they are susceptible to the condition (perceived susceptibility); (ii) believe the condition has serious consequences (perceived severity); (iii) believe that taking action would reduce their susceptibility to the condition or its severity (perceived benefits); (iv) believe the material and psychological costs of taking action are outweighed by the benefits (perceived barriers); (v) are exposed to factors that prompt action (cues

to action); and (vi) are confident in their ability to successfully perform an action (self-efficacy) (Champion & Skinner 2008; National Cancer Institute 2005).

A key construct of the HBM is self-efficacy, which Bandura (1977) describes as an individual's **beliefs** about his/her capabilities to engage in levels of behaviour that influence events that affect their life. For example, an individual with high self-efficacy may engage in a health-related activity when an illness occurs, whereas an individual with low self-efficacy would experience feelings of hopelessness. In other words, individuals with high self-efficacy are more likely to view difficult tasks as something to be mastered rather than something to be avoided. They therefore have more active coping skills (Bandura & Adams 1977). However, for ultimate success, self-efficacy must be combined with the skills and necessary incentives to perform a particular behaviour (Bandura 1977).

When applied to weight loss, the HBM suggests that people will be motivated to lose weight if:

(i) they believe that weight loss will decrease their likelihood of contracting a life-threatening illness (this is based on the fear of comorbidities); (ii) they have an internal locus of control and expect that specific behaviours such as a reduced kilojoule intake and exercise will result in significant weight loss; and (iii) they are confident that they are able to perform the required behaviours (Baranowski et al., 2003; Williams et al., 1996). The HBM also suggests that if obese individuals do not believe that they have a weight problem and do not believe that an obese state is associated with health risks, it will be difficult to recruit them for a weight loss intervention (Williams et al., 1996).

2.6.3 Transtheoretical (Stages of Change) Model

The Transtheoretical Model (TTM) uses stages of change to integrate processes and principles of change across major theories of intervention (Prochaska et al., 2008; Prochaska & Velicer 1997; Prochaska & DiClemente 1983). **According to the National Cancer Institute (2005), the model's basic premise is that behaviour change is a process occurring through a series of stages as is illustrated in Table 2.1.** Individuals do not systematically progress from one stage to the next, but may enter the change process at any stage, relapse to an earlier stage and begin the process once more. According to Greene et al. (1999), only a quarter of a population is ready to take meaningful action to change a health behaviour at any given time. In addition, an estimated half of those with health problems are in the pre-contemplation stage of change that is characterised by denial and resistance to change.

Table 2.1: Transtheoretical Model Constructs

Stage	Definition	Potential change strategies
Pre-contemplation	No intention of taking action within the next six months	Increase awareness of need for change, personalize information about risks and benefits and/or determine why they are demoralized about their ability to change.
Contemplation	Intends to take action within the next six months	Motivate, encourage making specific plans
Preparation	Intends to take action within the next month and has taken some behavioural steps in this direction	Assist with developing and implementing concrete action plans such as a weight loss intervention, help set gradual goals
Action	Has changed behaviour for less than six months	Assist with feedback, problem solving, social support and reinforcement
Maintenance	Has changed behaviour for more than six months. Stage can last from six months to five years.	Assist with coping, reminders, finding alternatives, avoiding slips/relapses (as applicable)

Adapted from: Prochaska et al. (2008); National Cancer Institute (2005); Greene et al. (1999)

Greene et al. (1999) conclude that health care practitioners are likely to increase the effectiveness of interventions if they match feedback, the processes (how) and the decisional balance and temptation (why) with the stage of change (when). By asking the following questions, the health professional can assess at what stages potential intervention participants are in. They could therefore be useful when recruiting subjects for a weight loss intervention:

- Are you interested in trying to lose weight? (Pre-contemplation)
- Are you thinking about losing weight soon? (Contemplation)
- Are you ready to plan how you will lose weight? (Preparation)
- Are you in the process of trying to lose weight? (Action)
- Are you trying to maintain your change in lifestyle and eating habits? (Maintenance)

2.6.4 Theory of Planned Behaviour and associated Theory of Reasoned Action

The Theory of Planned Behaviour (TPB) and the associated Theory of Reasoned Action (TRA) are theoretical constructs concerned with an individual's **beliefs, attitudes, intentions, behaviour and perceived control over that behaviour**. Both the TPB and TRA assume that the best predictor of **behaviour is behavioural intention. The latter in turn, is determined by an individual's attitude towards the behaviour, as well as their beliefs about whether individuals who are important to them approve or disapprove of the behaviour (subjective norm)** (Montaño & Kasprzyk 2008; National Cancer Institute 2005). Baranowski et al. (2003) explain that the level of intention to perform a behaviour is higher among those who have a more positive attitude and greater subjective norm toward the **behaviour. The attitude towards the behaviour is an indication of the strength of the individual's beliefs about the outcome as a result of the behaviour, and the extent to which the individual positively or negatively values those outcomes**. The TPB and TRA assume that all other factors such as **culture, demographics and the environment, operate through the models' constructs and do not**

independently explain the likelihood that a person will behave in a certain way (National Cancer Institute 2005). According to Montaño and Kasprzyk (2008) and the National Cancer Institute (2005), the TPB is an extension of the TRA and includes an additional construct, namely **perceived behavioural control. This construct relates to people's belief that they can control a particular behaviour** (National Cancer Institute 2005).

Montaño and Kasprzyk (2008), conclude that a particular behaviour is most likely to occur if:

(i) an individual has a strong intention to perform it and the knowledge and skill to do so; (ii) there are no serious environmental constraints preventing the behaviour; (iii) the behaviour is salient; and (iv) the individual has previously performed the behaviour.

The theoretical constructs underpinning TPB have been shown to be effective in predicting physical activity and healthy eating behaviours in African-American women (Blanchard et al., 2003). Smith et al. (2007) conducted focus groups among African-American women to use the clarification procedure from TPB to define the constructs of attitude, subjective norm and perceived behavioural control regarding weight loss among the women. Subjects reported both positive and negative beliefs regarding weight loss. In terms of subjective norms, friends, family, mother, father, children, co-workers, doctor, husband, boyfriend and men in general were mentioned. Behavioural control, behaviour facilitators, as well as barriers to weight loss and maintenance were reflected by positive support from others, the supportive role of faith, time constraints, laziness, stress/emotions, caregiver responsibilities, food-centred work and family culture, food temptations and hairstyle management. Behaviours related to healthy eating, physical activity and active opposition to cultural norms such as eating large portions of energy-dense food, were identified as behaviours that facilitated weight maintenance.

2.6.5 Social Cognitive Theory

At the interpersonal level, social cognitive theory (SCT) describes a dynamic, ongoing process in which personal factors, environmental factors and human behaviour influence each other. Strecher et al. (1986) explain how this theory suggests that the relationship between individuals and their environment is subtle, complex, reciprocal and dynamic. According to SCT, three main factors affect the likelihood that a person will change their health behaviour: (i) self-efficacy; (ii) goals; and (iii) outcome expectations. If individuals have a sense of personal agency or self-efficacy, they can change behaviours, even when faced with obstacles. However, should they experience an inability to exercise control over their health-related behaviour, they are unmotivated to act or to persist through challenges or barriers, they find it difficult to change their behaviour. Although the theory recognizes **the fact that environments shape behaviour, it also recognizes the individual's potential abilities to alter and create environments to suit their personal purpose.**

Within the SCT, the ability to perform a behaviour is only possible if the individual knows what to do, how to do it and also believes that he/she can do it (self-efficacy). Knowledge gained through education (forming part of a weight loss intervention), could therefore facilitate weight loss and maintenance. Subject expectation, namely the weight loss an individual anticipates as a result of taking action, could relate to the overall goal of weight loss. An expectation could also relate to the knowledge gained through the intervention facilitator. Strategies to increase self-efficacy in weight loss interventions include setting incremental goals for behaviour change, for example exercising for ten minutes per day; behavioural contracting (a formal contract with specified goals and rewards); and monitoring and reinforcements (feedback from self-monitoring and record keeping) (National Cancer Institute 2005). Facilitators of weight loss interventions could therefore enable participants to lose weight by assisting them to set realistic weight loss, dietary and exercise goals, monitoring through regular group meetings and weighing session and promoting self-monitoring based on record keeping of exercise, eating habits and food choices. Within the context of SCT, observational learning or modelling, namely processes whereby individuals learn through the experiences of credible others, such as registered dietitians (RDs) or individuals who have been successful with weight loss, also need to be considered (National Cancer Institute 2005). Once implemented, new behaviours need to be reinforced to ensure repetition. Positive reinforcement in the weight management context includes praise for improvements in dietary intake and behaviour, PA and weight loss by peers or intervention facilitators. Negative reinforcements could assist the individual in eliminating a negative stimulus such as boredom or depression that may trigger eating.

2.6.6 Theories and models of behaviour change: summative perspectives

An overview of the key concepts of each of the theories discussed under section 2.6 of this literature review is presented in Table 2.2.

Table 2.2: Summary of theories: behaviour change

	Theory	Focus	Key concepts
Individual level	Health belief model	Individuals' perceptions of the threat posed by a health problem, the benefits of avoiding the threat, and factors influencing the decision to act	Perceived susceptibility Perceived severity Perceived benefits Perceived barriers Cues of action Self-efficacy
	Transtheoretical (Stages of change) model	Individuals' motivation and readiness to change a problem behaviour	Pre-contemplation Contemplation Decision Action Maintenance
	Theory of planned behaviour and theory of reasoned action	Individuals' attitudes toward a behaviour, perceptions of norms and beliefs about the ease or difficulty of changing	Behavioural intention Attitude Subjective norm Perceived behavioural control
Interpersonal level	Social cognitive theory	Personal factors, environmental factors and human behaviour exert influence on each other	Reciprocal determinism Behavioural capacity Expectations Self-efficacy Observational learning Reinforcements

Adapted from: National Cancer Institute (2005)

It should be borne in mind that when it comes to applying theories and models of behavioural change to weight loss interventions, they cannot always predict behavioural change (Ammerman et al., 2001) and it may also be appropriate to consider using a combination of theories. The work by Palmiera et al. (2007) illustrates this concept. The latter authors conducted a study to determine to what extent exercise and weight management, psychosocial variables, derived from SCT, TTM and TPB predict weight change among 142 overweight and obese women (mean BMI $30.2 \pm 3.7\text{kg/m}^2$) in a short-term, University-based weight loss intervention with a duration of 16 weeks. Outcomes indicated that exercise and weight management-related psychosocial variables improved during the intervention with exercise-related variables showing the greatest effect size. In addition, weight change was significantly predicted by each of the models under analysis, especially those that included self-efficacy. Bivariate and multivariate analyses found that a change in variables related to weight management had a stronger predictive power than exercise specific predictors and that change in weight management self-efficacy was the strongest individual correlate ($p < 0.05$). Among exercise predictors, with the exception of self-efficacy, importance/effort and intrinsic motivation towards exercise were the stronger predictors of weight reduction ($p < 0.05$). Palmeira et al. (2007) conclude that the models were able to predict 20 to 30% of variance in short-term weight loss and changes in weight management self-efficacy, accounted for a large proportion of the predictive power.

2.7 CONSIDERATIONS FOR SUCCESSFUL WEIGHT LOSS INTERVENTIONS

2.7.1 Perspectives on what constitutes successful weight loss in overweight/obese adults

The Institute of Medicine of the National Academy of Sciences (1995), defines successful weight loss as a reduction in initial body weight of 5% or more and the maintenance of that loss for at least one year. Berryman and Taylor (2013) agree with the latter by stating that the major challenge lies in the maintenance of weight loss over a period of time. According to Dansinger et al. (2005) and the United States Department of Health and Human Services (1998), a modest, realistic, but sustained weight loss of 10% of initial weight is medically advantageous if it can be maintained, as it is associated with a substantial improvement in glycaemic control and lipid profiles. A recommended weight loss of 5 to 10% of initial weight is also recommended by Jensen et al. (2013); Lysen and Israel (2012) and the American Dietetic Association [ADA] (2009).

Low intensity weight loss interventions are described as interventions where counselling takes place telephonically and/or via the internet as opposed to face-to-face contact (Carpenter et al., 2014). In a study conducted by Carpenter et al. (2014), the low intensity intervention included three proactive counselling phone calls with a RD and behavioural health coach as well as a comprehensive website over a six month period. However, subjects could contact a coach or RD at any time during intervention participation. Low intensity weight loss interventions usually produce a mean weight loss of one to five kg over a six month period (Arem & Irwin 2011), while more intensive interventions **(i.e. ≥ 14 sessions in six months) result in greater losses, but are associated with attrition rates of about 15% to 20%** (Jensen et al., 2013). Attrition rates from web-based weight loss interventions reviewed by Arem and Irwin (2011) were not reported for all the interventions but ranged from 21.2% to 41% at 12 months. Of interest were the lower response rates that were noted for African-Americans when compared to Caucasians in the study conducted by Rothert et al. (2006). Overall success in maintaining weight loss over a five year period after following conventional weight loss interventions are generally believed to be less than 5% to 10% (Jensen et al., 2013; Phelan & Wadden 2002).

2.7.2 Healthy weight loss interventions

Jensen et al. (2013) and WHO (2009) recommend that a weight loss intervention should consist of a lifestyle component that includes dietary change, nutrition education, increased PA and behavioural modification techniques. The WHO (2009) and Bronner and Boyington (2002) also recommend multi-component interventions that are adapted to the local context. In line with these recommendations, Senekal et al. (2008) state that the essential components of a weight loss intervention include:

(i) reasonable weight goals; (ii) a healthy eating component; (iii) a PA component; and (iii) a behavioural and psychological component.

In this section, the components of a healthy weight loss intervention are discussed inclusive of:

(i) the level of energy restriction required to facilitate a realistic rate of weight loss; (ii) dietary composition and food choices; (iii) PA required; (iv) behaviour change support; (v) nutrition education; (vi) implementation, location, duration and follow-up; and (vii) cultural sensitivity of the weight loss intervention.

Level of energy restriction: According to the ADA (2009), a negative energy balance is the most important factor affecting weight loss in terms of the amount and rate of weight loss. As a result, a reduction in daily energy intake of 2100kJ to 4200kJ is recommended to achieve a loss of 0.5 to 1kg/week (Jensen et al., 2013; Lysen & Israel 2012; ADA 2009). Jensen et al. (2013) indicate that a low energy weight loss intervention for women should provide between 5000kJ and 6300kJ per day. Hall et al. (2011) caution that the model usually referred to as the 14700kJ (3500 calorie) rule, i.e. reduction of energy intake of 14700 kJ/week or 2100 kJ/day, does not necessarily result in a weekly weight loss of 0.5kg and may thus overestimate potential weight loss. According to the above authors, this static weight loss rule does not account for dynamic physiological adaptations that occur with a decrease in body weight. On the basis of the model proposed by Hall et al. (2011), an approximate rule of thumb for an average overweight adult is that every change of energy intake of 100kJ per day will result in an eventual loss of bodyweight of about 1kg, with half of the weight change being achieved in about one year and 95% of the total weight change in about three years.

It should be noted that even with the same kilojoule intake, weight loss rates vary. Heavier individuals expend more energy than those who are less obese and lose weight more rapidly on a given kilojoule intake than those who weigh less. Many obese individuals who fail to lose weight on an energy restricted diet actually consume more energy than reported and often overestimate their level of PA (Lysen & Israel 2012).

Dietary composition: The evidence analysis library (EAL) recommendation made by the ADA (2009) is that an individualized energy restricted diet should form the basis of the dietary component of a comprehensive weight loss intervention, and that reducing the dietary fat and/or carbohydrate content is a practical way to create an energy deficit below estimated needs. Raynor et al. (2012); Pi-Sunyer et al. (2007) and Lindström et al. (2006) also ascribe to the fact that a low fat ($\leq 30\%$ energy from fat) (Lysen & Israel 2012; Raynor et al., 2012), reduced energy diet is the weight lost strategy most often recommended by governing health authorities. Macronutrient recommendations for healthy eating typically range from 50 to 55% carbohydrates, 15 to 25% protein and not more than 30% of total kilojoules from fat (Lysen & Israel 2012). Sacks et al. (2009) compared the effect

of four energy restricted weight reducing diets with different macronutrient compositions (35 to 65% carbohydrate, 15 to 25% protein and 20 to 40% fat) in obese subjects. Food choices in the diets were similar and met dietary guidelines for cardiovascular health. Findings were that satiety, hunger, satisfaction with the diet, attendance at group sessions, weight loss and improvements in clinical and biochemical indicators were similar for all diets. The authors concluded that energy restricted diets result in clinically meaningful weight loss, regardless of the macronutrient composition.

Physical activity: According to Lysen and Israel (2012), PA is the most variable component of energy expenditure. An increase in energy expenditure through exercise and other forms of PA are important components of weight loss interventions. The role of PA in the management of overweight and obesity is partly related to the effect of PA on energy expenditure, body composition, the relative proportions of lean and fat tissue, substrate oxidation and basal metabolic rate (Lysen & Israel 2012; Donnelly et al., 2004). It is important to note that achieving the energy deficit of 2100kJ to 4200kJ that is required to achieve a weight loss of 0.5 to 1kg/week through PA alone, is extremely difficult for the majority of adults. Promotion of increased PA levels is, however, important as it has an additive effect to weight loss experienced as a result of an energy restricted weight loss diet.

To help facilitate weight loss and prevent weight gain in adulthood, individuals should engage in 60 to 90 minutes of moderate- to vigorous intensity activity most days of the week (Lysen & Israel 2012; Nutrition and Your Health Dietary Guidelines for Americans 2005). Both aerobic e.g. brisk walking and resistance training is recommended as resistance training increases lean body mass, which in turn enhances resting metabolic rate (RMR) and the ability to increase energy expenditure. Aerobic exercise is important for cardiovascular health through raised RMR, energy expenditure, energy deficit and loss of body fat (Lysen & Israel 2012). Regular exercise is also associated with increased adherence to dietary interventions for weight loss and weight control, improved self-efficacy and better long-term weight loss maintenance (Botha et al., 2013; Lysen & Israel 2012). In this respect, **PA has the potential to be a powerful “agent of change” in the management** of overweight and obesity (WHO 2004b, p113). The American College of Sports Medicine (Donnelly et al., 2009) recommend that moderate PA of approximately 420 minutes/week is required to achieve a weight loss of 5 to 7.5kg, while higher levels of PA will result in larger weight losses.

Behaviour change support: Historically, cognitive behavioural management of obesity had its origins in the belief that obesity developed as a result of maladaptive eating and exercise habits, which could be corrected by the application of learning principles (Stuart 1967). However, as mentioned in the earlier sections, current understanding is that body weight is affected by numerous factors other than behaviour (Stunkard et al., 1990; Ravussin et al., 1988). Current recommendations include behaviour modification as it is deemed essential to assist individuals to develop a set of skills to change the lifestyle necessary to achieve a more healthy weight (Pi-Sunyer et al., 2007; Lindström

et al., 2003). The incorporation of various behavioural techniques into weight loss counselling is also encouraged by Kumanyika et al. (2007) for weight loss interventions targeting African-American women.

Cognitive behavioural therapy is largely based on principles of classic conditioning that affirm that eating is often prompted by cues that are strongly linked to food intake (Stuart 1967). As a result, cognitive behavioural therapy helps individuals identify the cues that trigger inappropriate eating and activity behaviours and learn to respond better/differently (Wing 2002). The distinguishing characteristics of cognitive behavioural therapy include the fact that it is: (i) goal-directed with measurable outcomes; (ii) process-oriented by helping individuals decide how to change; and (iii) advocates small, rather than substantial changes. The behaviour change process is facilitated through the use of a variety of problem-solving tools that include nutrition education, keeping food and activity records i.e. self-monitoring, controlling cues associated with eating (stimulus control), problem solving, cognitive restructuring and PA (ADA 2009; Bronner & Boyington 2002; Wing 2002). Although cognitive behavioural management provides individuals with the necessary skills to handle barriers to eating healthfully and being active, overcoming these barriers is difficult in an environment that encourages the overconsumption of energy-dense, palatable, low-cost foods and promotes lower levels of PA (Swinburn et al., 2011). In addition, Kumanyika et al. (2014) reports that existing interventions have less impact on the African-American population and that lifestyle behaviour change interventions result in lower levels of compliance in blacks than Caucasians.

Nutrition education: According to the ADA (2009) and Bronner and Boyington (2002), knowledge and skills related to making appropriate and healthy food choices, estimation of portion sizes and the kilojoule and fat content of foods, monitoring energy intake and activity levels are essential in ensuring weight management self-efficacy. Appropriate nutrition education is thus core to successful weight loss and maintenance. In a study involving overweight and obese women, Klohe-Lehman et al. (2006) enrolled participants in eight weekly weight loss classes that included diet, PA and behaviour modification based on SCT. Findings were that participants with a weight loss $\geq 2.27\text{kg}$ (**responders**) had more knowledge than those who did not. Weight-loss responders also increased knowledge in all six areas of the intervention and appeared more aware of diet, weight loss and health information than non-responders. Domel et al. (1992a) also reported greater weight losses in African-American women with better nutrition knowledge following an 11 week nutrition education and behaviour modification intervention. The relationship between nutrition knowledge and weight loss was also documented by Agurs-Collins et al. (1997) among older African-American subjects. It has also been shown that an improvement in nutrition knowledge improves attitudes, beliefs and self-efficacy towards the consumption of a healthy diet and a possible increase in PA (Carson et al., 2002).

Implementation, location, duration (follow-up) and facilitators: The typical design of published weight loss interventions involves weekly group meetings for the initial treatment-phase (approximately three to six months), biweekly meetings for the maintenance phase (six to twelve months) and monthly or bimonthly meetings for the later phase of the study (12 to 24 months) (ADA 2009). An overview of weight loss interventions targeting African-American women, reported in Table 2.4, Section 2.91, showed that the duration of interventions reviewed ranged from eight to 32 weeks, while the observed trend was for group sessions to be conducted weekly or biweekly. The review by Bronner and Boyington (2002) of weight loss interventions targeting African-American women, found that interventions of a longer duration were associated with greater weight loss. These authors report that the duration of interventions were seven to twelve weeks. According to Russel et al. (2001), intensive follow-up and contact with subjects seems to improve both participation and retention. This can take the form of group meetings, reminder phone calls and e-mails (Karanja et al., 2002; Walcott-McQuigg et al., 2002; Yanek 2000).

Advantages of using an implementation structure of group sessions to facilitate behaviour change include: (i) efficient use of time, funding and intervention facilitators; (ii) peer pressure as an outcome of group dynamics; (iii) competition among group members to meet outcomes; and (iv) consistency of message delivery to participants. However, if individual-centred interventions that **focus on participants' individual weaknesses such as a lack of goal** setting or problem solving skills are addressed, they have been reported to result in more enthusiastic participation and sustained weight loss long after the intervention has been terminated (Bronner & Boyington 2002).

Interventions that use existing community-based social structures such as schools and cultural networks, such as churches, for implementation may result in a reduction of barriers to implementation (Bronner & Boyington 2002). Yancey et al. (2006) also stress the importance of having accessible locations for intervention implementation that are community-based. Furthermore, involvement of ethnically appropriate group leaders and peer educators/lay facilitators, making use of a team approach and including participants in the planning and implementation stages, may reduce barriers to implementation (Bronner & Boyington 2002). Yancey et al. (2006) confirmed the importance of having staff from the target community providing social support to subjects. Research shows that demographic matching between subjects and intervention facilitators should focus on age, race, gender, ethnicity, socioeconomic status, employment status, level of education, marital status, family structure, and place of residence or other demographic variables. Such similarities are thought **to enhance the receivers' partiality to the source of information and could contribute to favourable** intervention outcomes (Kreuter et al., 2003; Fleming & Petty 2000; Marsden 1988). The importance of recruiting racial/ethnically matched project staff and participants is equated to the importance of community involvement (Yancey et al., 2006). The success of community-based weight loss interventions that target e.g. local church members (Kumanyika et al., 2007; Yanek 2000; Lasco et

al., 1999), the utilization of existing social networks (Kumanyika et al., 2007; Kumanyika & Charleston 1992), as well as ethnically and culturally appropriate lay leaders (Kumanyika et al., 2007; Kennedy et al., 2005) is confirmed by the above authors.

Hebert et al. (2004); Jensen et al. (2004) and Lemon et al. (1999) argue that RDs are the most qualified health professionals to assist clients in developing strategies essential for achieving weight loss and the maintenance thereof. According to these authors, numerous studies have shown that instruction by a RD is an effective weight loss strategy for numerous target groups in various settings. Raatz et al. (2008) concluded that the percentage weight loss significantly correlated with the attendance of RD-facilitated dietary instruction and was more beneficial than frequent weigh-in sessions in isolation when it comes to facilitating weight loss. In a mail survey of 514 RDs that included 350 (69%) who actively counselled overweight/obese clients, 74.1% agreed that they are the professionals best qualified to manage obesity. It is interesting to note that 66.7% believed their time would be better spent preventing, rather than managing obesity (Barr et al., 2004). However, it is important to bear in mind that other health professionals and lay weight loss facilitators may also play an important role in weight loss counselling and facilitation. McNabb et al. (1997) reported that lay weight loss intervention facilitators achieved results similar to that of professionals.

Kreuter and McClure (2004) add that in order to improve the effectiveness of health communication **in bringing about behavioural change, a person's perception of the source of information being similar** to him- or herself could result in the evaluation of the source to be more credible. Racial/ethnic matching of project staff and participants is also viewed as necessary for recruitment nearly as often as community involvement. The latter include working through community organizations such as churches.

Cultural sensitivity of the weight loss intervention: Cultural sensitivity can be explained as the extent to which ethnic/cultural characteristics, experiences, norms, values, behaviour and beliefs of a target population as well as historical, environmental, and social influences are incorporated into the design, delivery, and evaluation of targeted health promotion interventions (Resnicow et al., 2002; Resnicow et al., 1999).

Interventions can be made more culturally sensitive through the use of ethnic foods, modification of ethnic food recipes and the use of culturally-appropriate food guides (Bronner & Boyington 2002; Kanders et al., 1994). In addition, cultural sensitivity of a weight loss intervention can be improved by consulting subjects on the type of the exercise they would prefer to participate in (Karanja et al., 2002; Lasco et al., 1999; Kanders et al., 1994). Other approaches used to enhance cultural sensitivity include improving the effectiveness of communication by presenting the content in ways that are more likely to appeal to a specific target audience (Kreuter et al., 2003). Health promotion materials

that visually reflect the social and cultural background of the target audience are more likely to be accepted (Resnicow et al., 1999; Schiffman 1995).

However, Kumanyika et al. (2007) explain that there is a lack of consensus on how to improve the cultural sensitivity of weight loss interventions that target African-Americans. Cultural adaptations that have been used include: (i) matching the ethnicity of the intervention facilitators to that of the target group; (ii) designing intervention content to appeal to the perceived sociocultural perspectives of African-Americans; and (iii) involving community members in the conceptualization and development of the intervention content and format to ensure that traditions, views, norms, core values, and language are considered. Unfortunately these adaptations do not seem to result in any significant advantage in the ability of African-Americans to lose weight. Kumanyika et al. (2007) indicate that the apparent lack of effect of cultural adaptations may to some extent be explained by: (i) factors related to the research design, i.e. culturally adapted interventions differ from efficacy trials in that their settings are less responsive to control by the researcher; (ii) their duration is often shorter; (iii) the study population are less likely to have been selected on the basis of their ability to adhere to the intervention; and (iv) behaviour change approaches are less rigid and are developed to be more responsive to subject needs and interests. On the other hand, it is possible that other important outcomes are affected by culturally sensitive weight loss interventions. These include: (i) cognitive processes; (ii) coping strategies; (iii) stress management; (iv) social skills; and (v) personal administrative skills including time management, priority setting and problem solving as well as self-reflection and building self-confidence (Kumanyika et al., 2007). According to Kumanyika et al. (2007) benefits in these areas may occur whether or not the weight loss goal is achieved, but could ultimately result in positive implications for health and quality of life.

Other aspects to consider in interventions targeting black women include membership to a health club (HC), social support, motivators for increased physical activity such as sufficient time and knowledge regarding the health benefits associated with regular exercise, while motivators for improved dietary habits include feeling healthier, having family and community support and losing weight (Isaacs & Puoane 2011). According to Sparrow (2007), when conducting a weight loss intervention that includes South African black women, considerations for success refer to the importance of enhancing subject confidence in making healthy food and lifestyle choices and exercising regularly.

2.7.3 Intrapersonal factors associated with successful weight loss

Readiness to change: If treatment-seeking subjects who enter a weight loss intervention are not ready to change their dietary and lifestyle habits, their risk for drop-out is higher (Jensen et al., 2013). Greene et al. (1999) explain that subjects are in the contemplation phase if they are in the process of considering weight loss or entering into a weight loss intervention within the next six

months. However, if subjects intend taking action within the next month they are in the preparation phase, while the action phase implies that they are already participating in an intervention. In the preparation and action phases, subjects need all the support they can get as one of the focuses of the action phase is to prevent drop-out. The latter can be curbed through goal setting, problem solving, social support, feedback and reinforcement (Greene et al., 1999). According to Jensen et al. (2013), the clinician (or other weight loss facilitator), together with the client, should determine whether the patient/client is prepared and ready to embark on a weight loss intervention.

Weight loss goals: To ensure successful weight loss, individuals should set realistic goals upon entry into a weight loss intervention (Wamsteker et al., 2009). Treatment-seeking individuals should therefore understand the difference between a healthier weight (not necessarily in the normal BMI range) versus a BMI in the normal range versus an aesthetically desirable weight goal. It is recommended that weight loss goals should focus on small, sustainable weight losses over a longer period of time rather than more extensive weight losses in a shorter time. It is important to set realistic expectations about the time frame required to make sustainable behavioural changes and achieve weight loss goals (ADA 2009). Unrealistic weight loss expectations have been shown to be predictive of intervention drop-out (Wamsteker et al., 2009).

Motivation for weight loss: Motivation can be described as the enthusiasm for engaging in an activity or the need or reason for doing something (Walter et al., 2008). When considering this concept in terms of weight loss and the health belief model, Williams et al. (1996) explains that individuals will be motivated to lose weight if: (i) they believe that weight loss will decrease their likelihood of contracting a life-threatening illness; (ii) they have an internal locus of control and expect that specific behaviours such as a reduced energy intake and increased exercise levels will result in significant weight loss; and (iii) they are confident that they are able to perform the required behaviours. If obese individuals therefore do not believe that they have a weight problem and do not believe that an obese state is associated with health risks, it will be difficult to recruit them for a weight loss intervention. The statement by Texeira et al. (2002) that a lack of self-motivation is not conducive to weight loss, supports this notion.

Qualitative research by Befort et al. (2008c) explored perceptions and beliefs regarding body size, weight and weight loss among obese African-American women in order to facilitate the planning of a weight loss intervention and found that subjects viewed health as the most important reason for losing weight. However, research conducted by Chang et al. (2008) and Walcott-McQuigg (1995) among overweight/obese African-American women found that women involved in aggressive weight-management strategies such as formal or self-imposed diets to reduce or maintain their current weight, were primarily engaged in behaviours related to being physically active and to look attractive in their clothes. Health was seldom mentioned as a motivator for losing weight. A review of 11

published weight loss interventions targeting overweight/obese African-American by Bronner and Boyington (2002), found that the level of motivation for weight loss was associated with successful recruitment and that subject retention on the other hand, was influenced by factors such as social support, commitment, high intervention expectations and family participation.

Maryon-Davis (2005) stressed the importance of providing quality incentives as motivators for successful weight loss in individuals receiving primary health care. Zayas et al. (2004); Russell et al. (2001) and Ashing-Giwa and Ganz (2000) support the payment of weight loss incentives to motivate African-American women to lose weight. Qualitative research conducted among African-American women found that study participants strongly believed that incentives are necessary to motivate them to start exercising. Incentives suggested by women younger than 40 years included bonuses, work incentives such as days off, free exercise programmes and facilities, accessibility to facilities such as in the work place, promotion of a healthier lifestyle, child care, lower insurance rates, support systems/exercise groups and music/environments geared towards black women. Subjects older than 45 years viewed child care, convenient locations, affordability and a buddy system as incentives (Carter-Nolan et al., 1996). A systematic review and meta-analysis investigating the effectiveness of financial incentives to bring about behavioural change underscored the fact that interventions that include financial incentives are more effective than usual care or no intervention to enhance behaviour change (Giles et al., 2014). Initial greater dissatisfaction with appearance and drive for thinness (Clarke et al., 2007) and greater initial weight loss achieved within the first two to four weeks, were also positively associated with weight loss and weight maintenance in research conducted by Astrup and Rössner (2000). Herriot et al. (2008) found that the primary motivators for enrolling in a weight loss intervention were a current lack of self-esteem and confidence. Fabricatore et al. (2009) and Sacks et al. (2009) further reported that weight loss was strongly associated with attendance of sessions, which could reflect the motivational effect of weight loss as such.

Weight management self-efficacy (see section 2.6.2 Health Belief Model for a definition of self-efficacy). **Self-efficacy affects an individual's confidence in performing a particular activity, as well as the effort the individual is willing to devote to improving health-related behaviour such as weight loss.** A higher score for the perceived benefits of weight loss could for example reflect high levels of weight loss self-efficacy (Clarke et al., 2007). In addition, self-efficacy also entails the expectation of success (Elfhag & Rössner 2005). However, it needs to be taken into account that behavioral change models indicate that an **individual's** actual weight control behaviours may mediate the influence of self-efficacy on weight change (Linde et al., 2004).

It can therefore be argued that low levels of self-efficacy may result in giving up on weight management, especially after repeated cycles of weight loss and (Chang et al., 2008). According to Linde et al. (2006) and Martin et al. (2004), some studies indicate a significant relationship between

perceived self-efficacy and weight control, while other studies did not find such an association. As the majority of these studies were conducted amongst predominantly Caucasian samples, Martin et al. (2004) aimed to determine whether self-efficacy for weight loss was predictive of weight change in a sample of overweight/obese African-American women. Findings were that high levels of self-efficacy for weight loss before commencement of the intervention may have been detrimental to success, whereas increased self-efficacy as a result of the intervention resulted in better weight loss success. It was concluded that high pretreatment self-efficacy may be indicative of overconfidence or a lack of experience with the difficulties associated with weight loss.

2.7.4 Concluding perspectives on considerations for successful weight loss interventions

It is evident that a successful weight loss intervention should include a number of components and address various factors to ensure weight loss and the maintenance thereof. The key components of a healthy weight loss intervention include reasonable weight goals, restriction of energy intake, increased healthy- and decreased unhealthy food choices, daily PA and the provision of the necessary motivation (possibly including incentives), as well as support through weekly or biweekly group/individual sessions for a duration of three to six months to facilitate behavioural change. In addition, intervention planners should aim to address aspects that may enhance the cultural sensitivity of the intervention.

However, it needs to be emphasized that weight loss and the maintenance thereof, requires lifelong commitment to a healthy lifestyle, emphasizing sustainable and enjoyable eating habits and daily PA. Public policy changes to create environments that can assist individuals to embark on and follow through with healthy weight loss interventions in accordance with the ecological model of health-related behavior, can contribute to a greater likelihood of success (Kumanyika et al., 2014; Kumanyika et al., 2007).

2.8 BARRIERS TO SUCCESSFUL WEIGHT LOSS IN BLACK WOMEN

Obesity management is generally acknowledged as extremely challenging and requires consideration of numerous factors as is reflected in section 2.7. If individuals feel that they cannot exercise control over health behaviours, they are not motivated to act on it, or persist with poor health behaviour as a result of challenges or barriers (National Cancer Institute 2005). In a weight loss context, barriers can therefore be viewed as factors that constrain individuals in making healthy food choices and becoming physically more active (Chang et al., 2008; Smith Barnes et al., 2007). Ideally barriers should be assessed before an individual embarks on a weight loss intervention and should also be addressed as part of intervention strategies (Jensen et al., 2013)

In this section, potential barriers to weight loss associated with the following are discussed in more detail: weight history, weight loss and weight cycling history, and weight loss expectations/goals, psychological wellbeing, lifestyle changes needed to facilitate weight loss, environmental factors, as well as intervention implementation-related factors.

2.8.1 Weight history during infancy, childhood and adolescence

Rapid weight gain during infancy has been associated with an increased risk of obesity later in life (Stettler et al., 2002; Ong et al., 2000). However, research shows that BMI during adolescence may be a better predictor of adult BMI than childhood BMI (Siervogel et al. 2003; Guo & Chumlea 1999) and that children with overweight or obese parents have a higher risk of obesity at the age of 33 years, while those with two obese parents are 6.8 to 8.4 times more likely to be obese in adulthood (Lake et al., 1997).

The term tracking is used to describe the consistency through time of a biological variable (Hernan et al., 2009; Magarey et al., 2003). The longitudinal study by Magarey et al. (2003), tracked adiposity from childhood into early adulthood and investigated the association between weight status in early adulthood with that in childhood, as well as with parental weight status. Tracking of BMI was conducted from the age of six to 20 years, with the prevalence of overweight/obesity found to increase with age. A strong correlation coefficient of >0.6 suggested that BMI at six years of age was related to BMI at the age of 20. Weight tracking was stronger for shorter age intervals and for subjects where both parents were overweight, compared to those with only one or neither parent being overweight. Magarey et al. (2003) concluded that weight status at an earlier age was a more important predictor of weight status at 20 years than parental weight status. In a study conducted by Herman, Craig, Gauvin, Katzmarzyk (2009) on BMI tracking over a period of 22 years from youth to adulthood, it was found that BMI tracking was moderate to strong ($r=0.42-0.65$) in females, and moderate ($r=0.29-0.53$) in males. Approximately 38% and 42% of youths in the highest and lowest BMI quintiles, respectively, remained in these quintiles as adults. About 83% of overweight youths remained overweight as adults, while 85% of overweight adults were not overweight as youths. Almost all healthy weight adults had been healthy weight as youths. The odds of being overweight in adulthood was 6.2 times greater (95% CI: 2.2–17.2) in overweight compared with healthy weight youths.

The prospective follow-up study conducted by Rosenberg et al. (2003) among African-American **women, showed that the higher a woman's BMI at** age 18, the greater the weight gain over the next five year follow-up period. These results suggest that the trajectory towards overweight begins in puberty, if not earlier. This is in accordance with national data in the USA showing female differences in weight patterns between African-American and Caucasian women that has its origins in childhood as African-American girls were significantly more likely to be overweight than Caucasian girls and

African-American women were more likely to be obese than their Caucasian counterparts (Ogden et al., 2002; U.S. Department of Health and Human Services 2001).

South African evidence shows that the prevalence of overweight/obesity in the country increases with age. The 1998 SADHS, showed that 18% and 6% of female adolescents aged 15-19 years were overweight and obese respectively, while 26% and 37% of urban black women were overweight and obese respectively (Puoane et al., 2002). In the 2003 SADHS, the results for females aged 15-19 years recorded a prevalence of 16% for overweight and 8% for obesity, with 27 % and 34% of urban black women meeting these respective BMI categories (Department of Health [DoH], 2007). The SANHANES-1 showed that 11.9% of zero to 14 old black girls were overweight, while 4.8% were obese. Overweight was present among 24.9% of black women 15 years and older, while 39.3% were obese (Shisana et al., 2013). Bearing in mind international evidence on weight tracking from childhood into adulthood, there is a strong possibility that overweight South African children go into adulthood being overweight and continue to gain weight to become obese. However, with the high prevalence of stunting in South Africa (Shisana et al., 2013) it is important to bear in mind that stunting and a low birth weight are often accompanied by fat deposition, especially in the abdominal area, predisposing individuals to obesity in adulthood (James et al., 2001; Hoffman et al., 2000).

According to Garn et al. (1981), lifestyle characteristics of offspring including PA, dietary preference and macronutrient intake, are mostly modelled on the activities/habits that prevail in the household of origin. Sobal and Stunkard (1989) add that values and beliefs regarding eating and exercise, as well as attitudes towards obesity, are also instilled on children during the socialization process in the home. It is therefore possible that social learning may play an important role in the eventual expression of the functional phenotype and should be considered in any intervention aimed at addressing obesity and diseases of lifestyle (Senekal et al., 2003).

Based on the evidence provided above, it could be argued that a history of weight tracking (overweight/obesity) from childhood into adulthood, could serve as a barrier to weight loss in adulthood, as weight tracking reflects the interactions of genetic, metabolic, lifestyle (PA and eating habits/food choices) and perceptions/social learning that result in obesity. All these factors would need to be addressed/receive attention as part of intervention strategies to change the weight trajectory of the obese individual.

2.8.2 Weight loss patterns, weight cycling history, weight loss goals and expectations

Weight loss and weight cycling: Initial weight loss has been identified as a predictor for continued weight loss. The greater the initial weight loss, the better the subsequent outcome. In addition, initial weight loss can also be indicative of better compliance with the intervention (Elfhag &

Rössner 2005). However, repeated unsuccessful weight loss attempts that result in weight cycling are often the norm in obese subjects (Chang et al., 2008). Elfhag and Rössner (2005) explain that a history of weight cycling is an important consideration in treatment-seeking overweight/obese individuals as it represents failure to maintain weight loss, followed by renewed weight loss attempts. It is thought that this failure may be accompanied by feelings of guilt, hopelessness and poor self-esteem (Wooley & Garner 1991) and that it is sometimes associated with mental distress and psychopathology (Elfhag & Rössner 2005). The majority of evidence suggests that if a subject reports a high number of recent dieting attempts (e.g. four or more), it may be an indicator of potential attrition (Chang et al., 2008; Teixeira et al., 2004). Brownell (1993) explains that subjects who volunteer for formal weight loss interventions represent a self-selected group within the overweight/obese population that may be more resistant to treatment and may include many individuals who have repeatedly failed to control their weight. This possibility is illustrated by the finding of Kumanyika et al. (1993) in a subgroup of overweight African-American women who had previously attempted weight loss. Findings were that subjects were significantly more likely to have regained all or more of the weight lost during their most recent weight loss attempt.

Weight loss goals and expectations: It is not uncommon for individuals to have unrealistic weight loss expectations (Elfhag & Rössner 2005). Greener et al. (2010) explains that unrealistic weight loss expectations are characteristic of overweight/obese individuals. Although limited research is available regarding the weight loss goals of overweight African-Americans, a study by Cachelin et al. (1998) found no significant differences between Caucasian and African-American dieters regarding **“reasonable” and “ideal” weight loss goals.** Linde et al. (2004) examined the weight goals of female participants in a weight loss intervention and **found that the reported “goal weight” required a 24% weight loss whereas a “dream weight” required a 30% weight loss.** Foster et al. (1997) found that a sample of female participants in a weight loss intervention had even more unrealistic goals, wanting to **achieve a “goal weight” and “dream weight” requiring a weight loss of 32% and 38% weight loss** respectively. In addition, it is highlighted that weight loss to achieve goal weight was approximately three times higher than that lost during previous weight loss attempts and that **none of the participants achieved the “dream weight” that they had hoped for. The majority of participants ended up with a weight loss that was considered as a failure before commencement of the intervention,** despite the fact that the intervention was well designed and implemented. Although the studies conducted by Linde et al. (2004) and Foster et al. (1997) included African-American women, the study samples were predominantly Caucasian (58 to 89%). However, a study conducted by Dutton et al. (2004) on overweight/obese African-American women confirms the possibility that they may also have unrealistic weight loss goals. The percentage weight loss required to achieve the weight goals reported by Dutton et al. (2004); Linde et al. 2004) and Foster et al. (1997) is much higher than that recommended in expert guidelines (Lysen & Israel 2012; ADA 2009).

It can thus be speculated that a history of weight loss attempts, weight cycling and unrealistic weight loss goals and expectations may act as barriers both in terms of recruiting subjects for a weight loss intervention, successful completion of the intervention, as well as weight maintenance.

2.8.3 Psychological well-being

It is widely accepted that human eating behaviour is not merely related to hunger (Adolfsson et al., 2002), but emotional status including anxiety, anger, joy, depression, sadness and other emotions (Adolfsson et al., 2002; Canetti et al., 2002; Steptoe et al., 1998); also that individuals tend to overeat when they feel lonely, depressed, anxious, have a low self-esteem, are bored or tired; while a reduced food intake is associated with fear, tension and pain (Karlsson et al., 2000; Mehrabian 1980). Lyman (1982) reported that there is a greater tendency for individuals to consume healthy foods during positive emotions, while the tendency to consume unhealthy foods high in fat and/or sugar is greater during periods of negative emotions. The concept of emotional eating stems from psychosomatic theory of obesity suggesting that obese individuals display their emotions through eating as it reduces anxiety (de Zwaan et al., 1995). However, it is not possible to make a general statement about these relationships as it varies according to the particular characteristics and motivational state of the individual and the nature and intensity of the specific emotional state (Canetti et al., 2002; Oliver et al., 2000).

Fitzgibbon et al. (1993) reported that treatment-seeking obese subjects tended to exhibit, although not significantly so, greater psychopathology related to distress, binge eating and coping than non-treatment-seeking obese subjects and normal weight controls. The psychopathology in non-treatment-seeking subjects also tended to be higher than in normal weight controls. Further psychopathological features indicative of eating disorder pathology found in obese subjects include body dissatisfaction (Jackson et al., 2000), perfectionism (Pratt et al., 2001), disinhibition (de Zwaan et al., 1994), loss of control over eating (Darby et al., 2007), binge eating disorder (BED) (Castellini et al., 2008) and higher use of antidepressants (Castellini et al., 2008).

The following key aspects relating to the psychological well-being and eating behaviour of obese individuals that may act as barriers to seeking treatment, actual weight loss and weight maintenance are discussed in more detail in this section: depression, stress, self-esteem, emotional needs, dietary restraint, disinhibition, perceived hunger and BED.

Depression: It has been reported that treatment-seeking subjects may be more likely to report increased levels of depression than obese individuals in general (De Witt et al., 2010; Luppino et al., 2010; Castellini et al., 2008; Simon et al., 2008). McElroy et al. (2004) add that depression is a central aspect in obese individuals entering treatment and that there is an overlap between obesity

and mood disorders. Although numerous studies suggest that depression increases as the level of obesity in treatment-seeking obese individuals increases (Kim et al., 2007; Wadden et al., 2006; Werrij et al., 2006), others did not find this association (Castellini et al., 2008).

Werrij et al. (2006) reported that depression in overweight and obese individuals was associated with more shape, weight and eating concerns, a higher score on dietary restraint and lower self-esteem. As a result of their theoretical review of the obesity-depression relationship, Markowitz et al. (2008) suggest three potential mechanisms are responsible for this relationship that includes: (i) behavioural (e.g. functional impairment and repeated dieting); (ii) cognitive (e.g. body image dissatisfaction, poor self-rated health); and (iii) social (e.g. weight-based stigma) mechanisms that may mediate the association between the two variables. Other authors also agree that severely obese individuals experience stigmatization, discrimination (Puhl & Heuer 2010; Puhl & Brownell 2006; Kaminsky & Gadaleta, 2002) as well as major psychosocial disturbance (Stunkard & Wadden 1992), which may cause or aggravate depression.

Overweight has also been found to be associated with depression in African-American women, especially among those with a higher level of education (Siegel et al., 2000). However, these authors speculated that this relationship may be mostly explained by health factors associated with obesity, such as the presence of diabetes mellitus. Blazer et al. (2002) add that being African-American was strongly associated with depression/diabetes but not with depression/high BMI. Blazer et al. (2002) indicate that feelings of hostility and low levels of ethnic identity may also contribute to depression. The lowest level of depressive symptomatology was predicted by the combined effects of a strong sense of ethnic identity and relatively few kilograms overweight. It could therefore be argued that **strong identification with one's ethnic group, both in behavioural practices and in affect, are** protective against depression in African-American women of a normal weight, as well as those who are overweight/obese (Blazer et al., 2002). This finding could relate to the fact that African-American community is more obesity tolerant. As research shows that black South Africans are also more obesity tolerant (Puoane et al., 2005b), **a similar association between strong identification with one's ethnic group and protection against depression may be present.** This possibility is supported by the work of Case and Menendez (2009) who did not find an association between depression and obesity in a sample of urban Xhosa women where more than three-quarters were either overweight or obese. It is therefore possible that in a local context, the relationship between obesity and depression amongst urban black women is not a strong one.

A systematic review and meta-analysis of longitudinal studies conducted by Luppino et al. (2010), found that overweight and obesity at baseline increased the risk for the onset of depression at follow-up. As a result, the presence of depression in an overweight/obese individual could not only deter her/him from enrolling in a weight loss intervention, but could also serve as a barrier to weight loss

once enrolled. Clark et al. (1996) adds that depression at pre-treatment, may be an indication of an individual at risk for drop-out should they enrol in a weight management intervention. The possibility that the presence of depression may decrease the likelihood of an individual engaging in healthy lifestyle behaviours such as PA, fruit/vegetable and wholegrain cereal consumption, and increased risk for unhealthy lifestyle behaviours such as smoking, alcohol use and the consumption of fatty foods as stress coping mechanisms (Milligan et al., 1997), may explain the findings by Luppino et al. (2010). Based on data from a national survey conducted in the USA, Polivy (1996) suggests that overweight individuals may be **depressed in part because they are "dieting to lose weight,"** which can be viewed as a process that is stressful and emotionally distressing. These findings shed light on the bidirectional relationship between depression and obesity.

From the above it is evident that the relationship between obesity and depression is complex and not necessarily as strong in black overweight/obese women as in their Caucasian counterparts. However, it is clear that if present, depression may be considered as a barrier to seeking treatment for overweight/obesity, actual weight loss and weight maintenance in obese black women.

Stress: Dallman et al. (2003) proposed that the association between chronic stress, comfort eating and weight gain can be explained by the fact that stressed individuals may overeat to reduce activity in the chronic stress response network in the brain. Self-reported retrospective and prospective data suggest that food choice changes when experiencing stress, with a tendency toward an increase in the consumption of sugary, fatty (often snack type) foods (Oliver et al., 2000). Geliebter and Aversa (2003) and Solomon (2001) support the notion that eating is a coping mechanism for alleviating and dealing with stress and emotions by either under- or overeating. Elfhag and Rössner (2005) add that it is rather the ability to cope with stress that is crucial in weight management than the number of life changes and circumstances that serve as potential stressors. Common characteristics among individuals that regain weight loss, is the tendency to overeat in response to stressful or negative life events and negative emotions that can be evoked by stressors in everyday life and the tendency to use food to regulate mood (Elfhag & Rössner 2005).

An investigation regarding selected psychosocial factors that may influence weight control behaviour in middle-income African-American women by Walcott-McQuigg (1995), found that women with a higher BMI experienced more stress. Ethnographic data analysis by the same authors showed that more than 50% of the women thought that stress negatively affected their weight control behaviour. Major life stressors included family illness/death and work, while other stressors included the difficulty of being a black woman, safety issues and lack of career options. Occupational stressors included workload, managing others, on-the-job politics, racism and sexism (Walcott-McQuigg 1995). High stress levels and/or poor stress coping skills could thus act as barriers to seeking treatment for overweight/obesity, actual weight loss and weight maintenance in obese black women.

Self-esteem: According to Rosenberg (1979), a person with a high level of self-esteem has self-respect, considers themselves a person of worth, thereby appreciating their own merits but **nonetheless recognizing their faults. The term "low self-esteem" refers to individuals who "lack respect for themselves, considers themselves unworthy, inadequate, or otherwise seriously deficient as a person" (Rosenberg 1979, p54). High self-esteem results in feelings of social inclusion or decreased concern about social exclusion, whereas poor self-esteem is strongly associated with social anxiety, friendship problems, perceived social mistreatment and social alienation, even when controlling for related personality variables such as neuroticism, social desirability biases and narcissism (Crocker & Luhtanen 2003).**

Research on the association between BMI and self-esteem is inconclusive (Klaczynski et al., 2004). For example, Werrij et al. (2006) reported that the prevalence of poor self-esteem was higher in a sample of treatment-seeking women with class III obesity than those with class I-II obesity. A meta-analysis conducted by Miller and Downey (1999) showed that a negative association between self-esteem and BMI is evident, but that the strength of the association varies with socioeconomic status, ethnicity, age and gender. Fabricatore et al. (2009) and Teixeira et al. (2002) documented a relationship between poor self-esteem and attrition from weight loss interventions, while Teixeira et al. (2004) could not find a significant association between the two variables.

Research conducted by Rubenstein (2006) on women of a normal weight, overweight women participating in a weight loss intervention (Weight Watchers) and overweight non-treatment-seeking women, sheds light on whether low self-esteem should be considered as a barrier for weight loss. The self-esteem of the overweight non-treatment seeking group was lower than that of the other two groups. It is therefore possible that participation in a weight loss intervention and/or weight loss as a result of participation or both can explain the differences found in this study.

It could be argued that low levels of self-esteem as a result of body shape and size dissatisfaction may be less prevalent in black than in Caucasian women, as black women are more likely to accept their larger body size (Shisana et al., 2013; Puoane et al., 2005b; Puoane et al., 1998). However, it is possible that if present, low self-esteem may contribute to poor weight management outcomes in black women.

Emotional needs: Unfulfilled, emotional needs may result in poor food choices/eating behaviour and subsequent poor weight management outcomes (Adolfsson et al., 2002). As a result, these factors could be viewed as barriers to weight loss. This is supported by the possibility that treatment-seeking subjects may be more likely to report eating in response to negative emotions than obese individuals in general (De Witt et al., 2010; Luppino et al., 2010; Castellini et al., 2008; Simon et al., 2008). Canetti et al. (2002); Wadden et al. (2002b) and Fitzgibbon et al. (1993) add that the relationship

between emotion and eating behaviour is stronger in the obese than the non-obese and is stronger in individuals following weight loss diets than non-dieters. The implication therefore is that negative or unfulfilled emotional needs could result in unnecessary eating, and thus be a potential barrier to weight loss and weight maintenance in obese black women.

Dietary restraint: Dietary/cognitive/eating restraint refers to the tendency of some individuals to constantly and consciously restrict their food intake in order to control body weight and shape (Anglé et al., 2009; Karlsson et al., 2000; Wadden et al., 2002a) instead of using physiological cues like hunger and satiety as regulators (Anglé et al., 2009). In so doing, an attempt is made to shield themselves against the health risks associated with an obesogenic environment (de Witt Huberts et al., 2013). Food intake is thus determined by a balance between the desire to eat and the aspiration to lose weight (Canetti et al., 2002; Ruderman 1985). As a result, cognitive processes override physiological hunger and satiety cues (Bond et al., 2001). However, it should be noted that restrained eating, i.e. the effort required to resist the desire to eat (Canetti et al., 2002), is not necessarily the same as dieting (Lowe & Timko 2004). Restraint theory proposes that attempts to regulate food intake in order to control body weight and body shape can result in episodic overeating, weight gain (Mann et al., 2007) and the future onset of obesity (Stice et al., 2005). This is especially true for high levels of eating restraint (Mann et al., 2007). In addition, the model proposes a causal relationship between the future onset of binge eating (Stice et al., 2002), general eating disorders, emotional eating (Polivy et al., 1994) and depression (Blazer et al., 2002). In this context it is therefore clear that higher levels of dietary restraint could serve as a barrier to successful weight loss, despite the fact that restrained eaters are most often those who are attempting to control their food intake to lose/maintain body weight (Murray & Vickers 2009).

Another important perspective is that although restrained eaters consume less food than they would like to eat, it is not necessarily less than they need to maintain energy balance (Stice et al., 2007). There is also mounting evidence that restrained eaters do not actually restrict their food intake (de Witt Huberts et al., 2013). A consistent pattern that emerged in research conducted by Wardle et al. (2000) and McCann et al. (1990), was that subjects who score high on dietary restraint, increased their total energy- and fat intake when under stress, whereas intake was the same or lower in unrestrained eaters under the same circumstances (Rutledge & Linden 1998). In addition, dietary restraint and slimming leads to skipping breakfast and that this in turn may result in overconsumption later in the day (Holt et al., 1992).

Contrary to the above association between dietary restraint and overweight/obesity, it would seem that high levels of restraint do not seem to be characteristic of all obese individuals, as Boschi et al. (2001) found significantly lower levels of cognitive restraint in treatment-seeking obese than in non-obese subjects. Although a high level of dietary restraint does not seem to be a typical trait of obese

black women, it may be on the increase as a result of acculturation. A study conducted by Senekal et al. (2001) among black female students of rural and urban origin documented higher levels of dietary restraint than was reported for similar Caucasian groups. When viewed in a broader context, a low level of dietary restraint amongst black women in general, could be viewed as a barrier to weight loss if dietary restraint is seen to reflect control over energy intake. However, as high levels of dietary restraint may be associated with periodic overeating, weight management strategies should not place excessive focus on cognitive processes to control energy intake. Both low and high levels of dietary restraint could thus be seen as possible barriers to successful weight loss and maintenance.

Disinhibition: Disinhibition refers to a loss of control over eating (Karlsson et al., 2000; Stunkard & Messick 1985) and has been shown to be strongly associated with weight gain over time and obesity in adulthood (Hays & Roberts 2008; 2004; Clément et al., 2004; Provencher et al., 2003). Disinhibition theory states that the self-control of restrained eaters may be temporarily inhibited by **disrupting events or “disinhibitors”**. These disinhibitors **include specific “cognitions” (the perception of having overeaten or consumption of forbidden foods)** and alcohol or negative emotional states (such as anxiety, depression or stress) that tend to interfere with self-control and result in overeating (Hays & Roberts, 2008; Canetti et al., 2002; Lowe 1993). The positive association between disinhibition scores and BMI (Boschi et al., 2001; Westenhofer et al., 1999; Gendall et al., 1998) support the **possibility that the “disruption” of restraint by disinhibitors** may be associated with weight management problems, as a cause and/or the result. It would therefore seem that higher scores for disinhibition could be viewed as a barrier to successful weight loss and maintenance thereof as a result of the associated loss of control over eating and weight gain.

Within the South African context, cultural eating and socialization habits of black individuals/women may act as disinhibitors and result in food intake above requirements for weight maintenance or loss. Examples of possible disinhibitors include the following: traditions of large family meals, fried or roasted meats as a centrepiece of the of the meal (James 2004; Hargreaves et al., 2002), having a good appetite as sign of being healthy, and eating large portions as way of sending a message that one can afford to buy large quantities of food and thus being successful. These traditions should thus be viewed as potentially serious barriers to successful weight loss and maintenance via the process of disinhibition.

Perceived hunger: Perceived hunger refers to subjective feelings of hunger and food cravings as a result of internal and external triggers (Karlsson et al., 2000; Stunkard & Messick 1985). Internal triggers leading to the sensation of hunger includes thinking and fantasising about food and any other triggers. The level of cognitive activity in an individual may also influence the perceived hunger experienced. For example, an individual who is bored (low cognitive activity level) is more likely to

perceive hunger sensations (Murray & Vickers 2009). If not addressed, internal stimuli of perceived hunger may become barriers to successful weight loss and maintenance.

External locus of perceived hunger refers to hunger that is initiated by external stimuli (Bond et al., 2001). The amount of food on a plate or in a bowl, may implicitly suggest what might be considered a **“normal” or “appropriate” amount (Fischer et al., 2003; Birch et al., 1987)** and may influence how much individuals expect to consume and how much they end up consuming (Polivy 2005; Wansink et al., 2005). According to EPM-Communications (2003), 54% of American adults generally claim that **they eat until they “clean their plates”**. In this instance, a visual cue of a clean plate has been established as a benchmark and eating continues until the benchmark is reached or until satiety sets in (Wansink et al., 2005). In a global setting, the phenomenon of larger portions sizes result in what **appetite physiologists refer to as “passive overconsumption” (Blundell & King 1996), and what the National Heart, Lung and Blood Institute (NHLBI) (2013) refers to as “portion distortion”,** may be a barrier to reducing portion sizes, as is required for a weight loss diet. Participants in weight loss interventions may find it difficult to ignore this external stimulus, especially if they are reliant on such visual cues to determine when to stop eating (Wansink et al., 2005). The increased availability and **“visual”** attraction of large portion sizes may therefore serve as a barrier to weight loss to overweight/obese individuals with a higher external locus of hunger.

Perceived hunger, especially external locus of perceived hunger, may be a serious barrier to weight loss and maintenance in black women. Within the Black traditional South African culture that is associated with frequent social events characterised by an abundance of food and the expectation **from “others” to eat, is evident from the qualitative research** conducted by Puoane et al. (2006) **among urban Xhosa women: “When I visit relatives and friends I find myself having a meal each time I come to a different house. If I visit five houses on that day I should be prepared to eat in all five houses. I have to eat what is served to me otherwise it will look like I am undermining them”** (Puoane et al., 2006b, p91).

Binge eating and BED: According to the American Psychiatric Association’s **Diagnostic and Statistical Manual for Mental Disorders, 5th edition (DSM-5)** (American Psychiatric Association 2013), BED can be defined as repeated episodes of overconsumption of food at least once a week for a period of three months with a sense of a lack of control (ADA 2011). Individuals usually binge on highly palatable, energy-dense food that is typically high in fat, sugar or often both (Guertin & Conger 1999).

De Zwaan (2001) explains that BED is most common among the obese and obese treatment-seeking subjects who seek help for weight loss rather than binge eating. BED has been reported to be common among individuals who enrol in hospital, university-affiliated or other weight loss

interventions, with 23 to 47% of subjects reporting severe problems with binge eating (Castellini et al., 2008; Spitzer et al., 1993; Spitzer et al., 1992). The prevalence of BED in community samples has been estimated to be between two to five percent (De Zwaan 2001).

A local study conducted by Pienaar (2000) among 44 black male and female participants who attended a hospital-based weight loss intervention, reported that 66.7% of the women forming part of the study sample were diagnosed with BED. A further observation was that the prevalence of BED seemed to increase with the degree of obesity. Research conducted by Senekal et al. (2003) amongst economically active South Africans, found that "hardly ever or never bingeing" seemed to be protective against the development of overweight/obesity in this study sample.

Binge eating has been associated with recurrent weight fluctuations, depression, perceived barriers to weight loss, anxiety and substance abuse (Galanti et al., 2007; Ramacciotti et al., 2005; Sherwood et al., 1999). Lo Coco et al. (2011) reported that obese, treatment-seeking subjects with binge eating behaviours were more likely to have a low self-esteem. This finding was more apparent in obese than overweight subjects. Teixeira et al., (2004) and Sherwood et al., (1999) reported the association between binge eating and attrition from weight loss interventions.

It is therefore evident that the presence of BED may act as a direct barrier to weight loss as it may contribute to excessive energy intake. However, it could also contribute to the strengthening of other potential barriers such as poor psychological well-being and weight cycling.

Concluding perspectives: The reviewed evidence shows that the following barriers may be a serious concern when recruiting overweight/obese black women for participation in a weight loss intervention, as well as successful weight loss and maintenance thereof: high levels of stress and concomitant poor stress coping skills, negative and/or unfulfilled emotional needs that could result in excessive energy intake, low levels of dietary restraint, high levels of disinhibition with cultural eating habits and socialization acting as disinhibitors, perceived hunger as a result of frequent social events characterized by an abundance of food and the expectation from others to eat and the presence of binge eating and/or BED. Potential barriers that should also be considered, but may prove to have less of an impact on weight management among black South African women include depression as well as the presence of poor self-esteem.

2.8.4 Lifestyle changes necessary for weight loss

A review of the literature revealed that the barriers associated with following a healthy lifestyle, i.e. increasing PA levels and improving eating habits among black women are diverse and multifactorial in nature.

Dietary intake: When considering barriers to weight loss, the question arises whether there are specific dietary changes that overweight/obese black women need to make as part of a healthy weight loss intervention that they may find especially difficult to implement. Inappropriate portion sizes that contribute to excessive energy intake, snacking and fast-food consumption have all been implicated in weight gain (Wells 2006) and would need to be improved/changed to ensure weight loss and the maintenance thereof. An additional factor to consider is that food choices tend to be largely based on taste, convenience and cost (Livingstone & Rennie 2005), with energy dense, palatable foods providing substantially more energy for a given cost (Wells 2006). It is therefore not surprising that SANHANES-1 data showed that the factors that influence food purchases among females included cost, followed by taste, health considerations, shelf life, nutrient intake and convenience (Shisana et al., 2013).

Data from the Transition and Health during Urbanisation of South Africans (THUSA) study showed that the total mean energy intake of urban black women was approximately 8010 kJ/day (MacIntyre et al., 2002), while Hattingh et al. (2008) reported a mean energy intake of 11 128 kJ/day. When comparing the above energy intakes to the mean Estimated Energy Requirement (EER) of women 19 to 50 year of age who are sedentary, moderately active and active, this equates to an energy requirement of 7980 kJ (1800 calories); 8820 kJ (1900 calories); and 9660 kJ (2300 calories) respectively. However, it is important to take cognisance of the fact that the obese are known to systematically underreport energy intake (Mchiza et al., 2010; ADA 2009; Bailey et al., 2007) and that low levels of PA have been reported for overweight/obese black women (Puoane & Hughes 2005; Kruger et al., 2003; Kruger et al., 2002). As a result, the kJ intake reported by Hattingh et al. (2008) and MacIntyre et al. (2002), should be interpreted with caution. In addition, Mchiza et al. (2010) showed that underreporting may be especially prevalent among black women, as black women in their sample of urban women were significantly more likely to underreport energy intake (45%) than women of mixed-ancestry (31%) and Caucasians (24%) ($p < 0.01$).

When assessing usual and/or cultural eating patterns, it should be noted that a diet high in fat and relatively low in carbohydrate and dietary fibre is consumed by local black women as a result of urbanisation and acculturation (Goedecke et al., 2006). When Bourne (1996) stratified macronutrient distribution according to urban exposure among local black men and women, it was found that fat intake (expressed as a percentage of total energy intake), increased significantly. Carbohydrate intake on the other hand, decreased significantly in accordance with the level of urbanisation. Although total protein intake did not increase significantly, the intake of animal protein did, while the percentage of energy from plant protein decreased significantly. These findings were also supported by findings of the THUSA study conducted by Vorster et al., (2005), which documented how urban black women consumed less maize porridge but more fruits, vegetables and animal-derived foods and

fats and oils. In addition, work by Hattingh et al. (2008) found that the fat intake of urban black women contributed 33% to total energy intake.

Food choices that contribute to the energy intake and dietary composition of urban black women are related to aspects such as accessibility and affordability, resulting in a lack of dietary diversity and unhealthy food choices (Puoane et al., 2005a). Hence foods that are more freely available include full cream milk, fruit and vegetables that are of an inferior quality and expensive, as well as sausage, fatty meat and tripe (Puoane & Tsolekile 2008; Puoane et al., 2005a). Puoane et al. (2006b) add that daily meat consumption is associated with a high socioeconomic status and seems to have been learned during socialization processes. The importance of cost in shaping food purchases are highlighted by Temple and Steyn (2011) who explain that energy-dense foods are relatively cheap sources of energy but tend to have a low nutrient density. A comparative analysis of a typical South African diet with a healthier one showed that the healthier diet cost 69% more but is affected by food choices. The authors conclude that a healthy diet is unaffordable for most South Africans.

Many unhealthy foods are popular because they have an enjoyable taste (Temple & Steyn 2011). As a result, taste plays an important role in both food selection and preparation methods (Puoane & Tsolekile 2008). A narrative cited by Puoane and Tsolekile (2008, p10) after conducting qualitative **research among members of an urban black community yielded the following: "People who boil food are not civilized. Fried food is attractive and tasty like 'Chickin Licken'. If your neighbours boil food people say they are still backward because the food does not taste nor look attractive"**. Puoane and Tsolekile (2008) also explain that availability of food is based on consumer demand and that the most plausible solution is to empower consumers with nutrition knowledge which in turn, would result in shop owners and street vendors selling healthier options.

The majority of fast foods are a poor source of nutrients but save time and are easy to obtain (Temple & Steyn 2011). However, they are known to be high in energy and total fat (Smuts & Wolmarans 2013). It is therefore not surprising that fast food consumption among black female subjects aged 17.7 years who participated in the Birth to Twenty study (Feeley et al., 2009), was reported to be more than eight times in a seven-day period among 38% of participants. Findings by van Zyl et al. (2010) on a random sample of urban multiracial adults aged 19 to 30 years in Johannesburg, were that 11% of subjects ate fast food on a daily basis, while 27.6% and 20.8% ate fast foods two to three times a week and at least once a week respectively. The main reasons cited for purchasing fast food included time constraints (58.9%), convenience (58.1%) and taste (52.5%).

From the above it is evident that black women either consciously or subconsciously, seem to underreport their food intake, seem to show a preference for energy dense foods such as fatty meat and fast food as a result of acculturation, urbanisation, cost, availability, convenience and taste and

are prone to eating large portions as a result of cultural norms. As all these diet-related variables have the potential to affect dietary intake, it is possible that they can be viewed as barriers to weight loss. It is therefore imperative that they need to be addressed as characteristic of the dietary intake of a treatment-seeking sample of urban black overweight/obese women.

Eating patterns: Manson and Bassuk (2003) and Wolfe et al. (1994) explain that meal patterns have been found to be associated with obesity and may thus need to be considered as a barrier to weight loss and maintenance thereof (May et al., 2003; Ortega et al., 1998). Guidelines for healthy eating generally recommend regular meals as they are associated with a lower energy intake, greater postprandial thermogenesis and lower fasting total and low-density lipoprotein cholesterol levels. A regular eating pattern has also been shown to have beneficial effects on fasting lipid and postprandial insulin profiles and thermogenesis in healthy obese women (Farshchi et al., 2005). Unfortunately, available research has generated inconsistent results regarding the frequency of eating patterns and its relationship with weight status and is characterised by cross-sectional as opposed to randomized controlled trials (ADA 2009). Hence, several cross-sectional studies have yielded ambivalent results regarding the association between eating frequency and the regulation of body weight [American Dietetic Association Evidence Analysis Library (EAL) 2008].

Eating breakfast possibly plays a role in weight management (Timlin & Pereira 2007), but results were generated by cross-sectional studies that do not provide insights in causality. The ADA (2009) therefore conclude that although current evidence does not yet support making evidence based meal frequency or breakfast consumption recommendations for optimal body weight control, clinical judgement should be used when guiding individuals regarding weight management. The ADA (2009) explains that it is important to assist individuals in finding a meal pattern that prevents feelings of hunger from coinciding with exposure to an environment where high energy foods are freely **available. As a result, the ADA's EAL recommendation is that total energy intake should be distributed** throughout the day with the consumption of four to five meals/snacks per day, including breakfast. Consumption of more energy during the day may be preferable to consumption in the evening (ADA 2009).

Dietary factors that should thus be considered as potential barriers to weight loss and the maintenance thereof in black women, include the following: underreporting of food intake; consumption of large portions; poor food choices characterised by high fat options; hedonic qualities resulting in a preference for high fat cooking methods and fast food; affordability, availability and convenience often translating into food choices that are energy dense and of an inferior nutrient quality; and an irregular eating pattern. It is therefore not surprising that Smith Barnes et al. (2007) explain that African-American women view traditional foods and family eating expectations as a barrier to weight loss.

Physical activity/energy expenditure: As mentioned in section 2.3.2 (Cultural influences on eating habits, food choices and physical activity), it is well recognized that low levels of PA may contribute to the development of obesity and that a focus on decreasing sedentary behaviour and increasing levels of PA is essential for weight loss (see section 2.7.2 Healthy weight loss interventions and physical activity). However, evidence shows there are a number of barriers that would need to be overcome to ensure that overweight/obese individuals increase their level of PA (Isaacs & Puoane 2011; Puoane & Tsolekile 2008; Puoane et al., 2005a; Puoane et al., 2005b; Siegel et al., 2000). Urbanization is associated with a lower level of PA as a result of sedentary employment, increased use of public transport, limited outdoor space for activity during leisure time (Bradley et al., 2007; Friel et al., 2007; Sparling et al., 1994) and a higher prevalence of street violence and crime (Haughton McNeill et al., 2006; Sanders et al., 2006; Puoane et al., 2005a), making it unsafe to exercise.

Shifts in the overall distribution of work away from agriculture and other energy-intensive occupations, towards service sector occupations, have resulted in decreased energy expenditure during work time (Bell et al., 2001; Popkin 1998). Additional factors that may reduce the activity of daily living, especially in urban areas, include motorized transport to get to work/other locations, lifts and mechanisation of home production- and cleaning-related activities (Cohen 2008; Lanningham-Foster et al., 2003). The resulting reduction in energy expenditure could make it necessary/essential for obese individuals residing in urban areas to increase their level of PA during leisure time to achieve and maintain recommended levels of PA for weight loss and maintenance. This however, may prove to be challenging, as Buchowski et al. (2010) found that time spent in active behaviours such as moderate and vigorous PA was inversely related to BMI in African-American women. In targeting urban African-American women, Walcott-McQuigg et al. (2001) found that they were less likely than their Caucasian counterparts to participate in leisure time PA across age, occupational and income groups. South African data from the THUSA study confirms this trend, with PA decreasing with increased BMI (Kruger et al., 2003; Kruger et al., 2002). From the above it is therefore evident that the sedentary lifestyle of urban black women during work and leisure time could serve as a barrier to weight loss.

Cultural factors could also contribute to low levels of PA as Puoane and Tsolekile (2008, p11) explain how fun walks organised for urban black women in a Cape Town township to increase community participation in PA, resulted in community members serving as spectators instead of participants. One of the reasons given for non-participation was **"I used to walk a lot to fetch water and gather wood; I do not see the need of walking just for nothing"**. Poor environmental conditions such as a high crime rate, overcrowding, lack of green space for relaxation and exercise facilities were also mentioned as reasons for the low levels of PA (Isaacs & Puoane 2011; Puoane et al., 2005a). Withall

et al. (2009) and Haughton McNeill et al (2006) confirm that a lack of public sports facilities and access to them, as well as a lack of open spaces are barriers to increasing PA and subsequent weight loss. Hence, Puoane et al. (2006b) highlight the importance of addressing these barriers in community-targeted weight management interventions. Haughton McNeill et al. (2006) and Walcott-McQuigg et al. (2002) explain the importance of addressing barriers to PA by emphasizing that behaviour is dynamic and influenced by the interaction between personal and environmental factors. Therefore environmental factors and individual factors simultaneously shape behaviour (McNeill et al., 2006).

2.8.5 Socio-demographic and environmental factors

A systematic review of predictors of drop-out and therefore barriers to successful weight loss by Moroshko et al. (2011), identified variables such as age, gender, marital status, occupational status, level of education, socio-economic status (SES) and ethnicity as important for further investigation in treatment-seeking overweight/obese individuals. Swinburn et al. (2011) emphasize how certain environmental factors can influence weight status and that factors in the built environment can have a profound effect on behaviour.

Socio-demographic factors: For the purpose of this review, socio demographic factors that may act as barriers to weight loss/maintenance, include culture (refer to sections 2.3.2 and 2.3.3 for detail in this regard), age, income, level of education, marital status, parity and social support.

Age: A systematic review conducted by Moroshko et al. (2011) found that 17 studies were unable to demonstrate a relationship between age and attrition from weight loss interventions, while 13 studies found that a younger age was associated with a higher level of attrition. Only two studies found that older participants were more likely to drop out.

Income, employment status and level of education: An investigation into patterns of overweight/obesity in seven sub-Saharan countries, excluding South Africa, found that black women of a higher SES (a proxy for household wealth and education) were more likely to be overweight/obese than their poorer counterparts (Ziraba et al., 2009). Similar findings were reported by Fezeu et al. (2005) who conducted a study on urban black women in Cameroon. After adjusting for age, leisure time PA, alcohol consumption and smoking, the prevalence of overweight/obesity and central obesity increased with quartiles of household amenities. Similar findings hold true for local research conducted by Kruger et al. (2002) as part of the THUSA study who found that household income was significantly associated with BMI in that a higher level of income was associated with a 1.5-fold increase in the probability of being obese. Case and Menendez (2009) who conducted research among urban Xhosa women in Cape Town found that subjects of a higher SES were

significantly more likely to be obese. Sobal et al. (1989) shed light on these findings by explaining that in countries where obesity is associated with a higher SES, this relationship may be associated with the social influence in obtaining adequate food supplies, possibly coupled with cultural values that favour a larger body size. It would therefore seem that on the African continent as well as among black South Africans, a higher SES could be viewed as a barrier to weight loss as a result of lifestyle factors associated with a higher SES.

Moroshko et al. (2011), documented that three out of four studies that investigated the association between SES and drop-out from a weight loss intervention, did not find a significant association, whereas one found an association between lower SES and increased attrition rates. The importance of food cost in shaping food choices should not be overlooked, as energy-dense foods are a relatively affordable sources of energy and a healthy diet is unaffordable for the majority of South Africans (Temple & Steyn 2011). It would therefore seem that the relationship between SES and obesity is dependent not only on the study sample, but cultural norms associated with body weight and obesity.

Moroshko et al., 2011 conducted a review of studies that reported on the relationship between level of education and attendance of a weight loss intervention and found that two-thirds of the studies did not find a significant association, while the remaining third found that a lower level of education was associated with higher attrition rates. In addition, the studies that explored the association between occupational status and attendance did not find an association, whereas working outside the home, working longer hours and having a full-time job were associated with attrition (Moroshko et al., 2011). Senekal et al. (2003) reported that employment status and income did not influence the weight status of a multicultural sample of economically active South Africans. However, an increase in the prevalence of obesity was observed amongst individuals who were better educated and financially more privileged than the general South African population. It would therefore seem that a higher level of education and a higher income (a proxy for SES) can be viewed as a barrier to weight loss.

Marital status: A national survey conducted in the USA suggested that marital transitions, i.e. transition into marriage and transition out of marriage has a greater predictive value for changes in body weight than marital status per se (Umberson et al., 2009). Furthermore, divorce has a greater effect on body weight than getting married. The latter was confirmed by Honas et al. (2003) who conducted research on subjects who were enrolled in a clinic-based weight loss intervention. Findings included that being divorced was a significant predictor of drop-out. The effect that widowhood has on weight loss was reported as of particular concern in terms of population health trends, especially among African-American women (Umberson et al., 2009). It would therefore seem that getting married, divorcing, or becoming a widow may be barriers to weight loss.

Ziraba et al. (2009) found that young, unmarried Sub-Saharan women, were less likely to be obese, possibly because single women, unlike their married counterparts, are less likely to be multiparous, which in turn is associated with a higher risk of being obese (Heliovaara & Aromaa 1981). It would therefore seem that being single is protective against obesity, while being married could be viewed as a barrier to weight loss.

South African studies conducted by Case & Menendez (2009) and Malhotra et al. (2008) among urban Xhosa women also found that being married was associated with a higher BMI and larger waist circumference and that women who were co-habiting were significantly more likely to be obese. Similar findings were reported by Senekal et al. (2003) who found that being single was protective against the development of overweight/obesity when not adjusted for age and gender. However, this relationship disappeared when adjusted.

Parity: According to Williamson et al. (1991), higher parity may contribute to the tendency of African-American women to gain weight as Kumanyika (1987) reports that higher parity and teenage pregnancies are more prevalent among African-American than Caucasian women. A prospective follow-up study conducted on parous and nulliparous African-American women was conducted by Rosenberg et al. (2003). Findings were that greater pregnancy-related weight gain among African-American women contributed to their higher prevalence of obesity. From the above it would seem that in African-American women, higher parity and the weight gain associated with each pregnancy could be viewed as a barrier to weight loss, thereby implying that childbearing is an important contributor to weight gain among black women. However, Smith et al. (1994) found that multiparas, did not gain more weight than nulliparas, thereby confirming that parity is an increased risk for weight gain but that multiple pregnancies do not escalate the pattern of weight gain. Weight retention after childbirth may be the result of a change in lifestyle, as there is a greater decrease in PA during the follow-up period among women who bore a child than among nulliparous women (Rosenberg et al., 2003). Weight gain as a result of pregnancy as well as the change in lifestyle associated with parity could therefore be viewed as a barrier to weight loss.

Social support: Barriers to weight loss associated with poor adjustment and functioning that can contribute to attrition from weight loss interventions, include a lack of social or family support as well as lower reliance on this support (James et al., 2012; Moroshko et al., 2011). However, Teixeira et al. (2004) and Clark et al. (1996) did not find a significant relationship between attrition and social support.

A systematic review by McLean et al. (2003) showed that spousal involvement in weight loss interventions improved effectivity. Three studies included in the review that reported on treatment of both index members and spouses found significantly greater losses than treating index members

only. Conversely, three other studies suggested that treating index members alone resulted in greater losses as opposed to treating them with their spouses. An investigation into the support needs of overweight/obese African-American women enrolled in a weight loss intervention by Thomas et al. (2009) found that subjects were interested in receiving support from others as many reported a lack of social support from family and friends. Tangible forms of support such as exercising together was also viewed as important, as well as social support from somebody who had lost weight or achieved other health behavioural change (Thomas et al., 2009). Research conducted by Chang et al. (2008) on low income overweight/obese mothers that included African-American women, found that encouragement from others would facilitate long-term weight loss. Subjects sought advice on the prevention of weight gain from their mothers, friends, co-workers, other individuals with similar experiences, RDs and physicians. Although some mothers preferred to prepare healthy meals, their efforts were sabotaged by husbands/partners or family members who refused to eat healthy food. An additional barrier was a lack of encouragement from partners/spouses.

From the above it is evident that based on the target group of a weight loss intervention, a lack of social support could be viewed as a barrier to weight loss and that social stigma could result in eating as a coping mechanism.

Environmental factors: According to Ogden et al. (2007), over time, considerable effort was devoted to finding ways of improving the adequacy and stability of the food supply, as well as reducing energy expenditure to produce it. As a result, humans who were adapted to an environment in which food was limited and physical exertion was required, are now confronted with a food system in which palatable, energy-dense foods are freely available at an affordable price (Swinburn et al. 2011; Ogden et al., 2007). In conjunction with more persuasive and pervasive marketing, improved distribution systems make food more accessible and convenient at this point in time (Swinburn et al., 2011). The above phenomena hold true for middle-income countries like South Africa [Food and Agriculture Organisation of the United Nations (FAO) 2010; FAO 2004], where individuals of a higher SES that reside in urban areas tend to be the first to become obese (Swinburn et al., 2011). Wilkinson and Pickett (2006) further explain that independent of the overall wealth of a country, the higher the level of income inequality the higher the prevalence of obesity.

Although the nature of the built environment influences behaviours, it is important to note that this aspect of our environments has not changed simultaneously and universally to become more obesogenic over the past few decades. The built environment is therefore unlikely to have been a major driver of the obesity epidemic, although the way individuals have responded to the built environment has changed over time and might be important (Swinburn et al. 2011).

Black and Macinko (2007) explain that a neighbourhood-based approach should be considered in traditional individual level obesity interventions that often ignore the environmental context that shapes health behaviours, especially when healthy foods or opportunities for physical activity are unavailable. It is against this back drop that environmental factors applicable to urban female Xhosa residents of a township in Cape Town were assessed in terms of environmental barriers to weight loss. These include the availability of affordable, unhealthy food with a high fat content (Puoane & Tsolekile 2008; Puoane et al., 2005b), as well as urbanisation that is associated with opting for public transport as opposed to walking, poor environmental conditions such as high crime rates and overcrowding contributing to minimal physical activity (Puoane & Tsolekile 2008) According to Puoane et al. (2005a), urbanised communities are also increasingly exposed to fast foods and sugar sweetened beverages as a result of aggressive marketing campaigns.

A further environmental factor to consider is that the home environment defines the conditions to which a person is exposed. Provencher et al. (2005) reported significant associations for spousal and familial eating behaviour traits in the Quebec Family study. The latter researchers suggest that although the familial environment may be the major determinant of the observed associations, the contribution of genetics cannot be ruled out. It is a matter of course that treatment-seeking overweight/obese women would need support from their family and broader social environment to lose and maintain weight successfully. The work by Thomas et al. (2009) provides insight in weight loss support needs of overweight/obese Africa-American women by explaining that participants indicated that they were interested in receiving support from others, including supportive communication around health improvement as opposed to enhanced appearance.

Research by Chang et al. (2008) that included overweight/obese African-American women, showed how mothers chose to eat fast foods, candy bars and chips due to convenience and ease of preparation. Mention was also made of eating any foods that are available in the home such as sugar sweetened beverages and mini-donuts.

It is therefore clear that exposure to an obesogenic environment in and outside the home, as well as lack of appropriate support from family and friends, could serve as barriers to successful weight loss.

2.8.6 Intervention factors

Time constraints, subject mistrust of/perceptions regarding the intervention, location of the intervention, intervention facilitators and cost to subject have been identified as intervention-related factors that may become barriers if not aligned with subject needs.

Time constraints: Numerous researchers reported that time constraints contribute to non-compliance with a weight loss interventions (James et al., 2012; Moroshko et al., 2011; Chang et al., 2008; Mauro et al., 2008; Ruelaz et al., 2007; Smith Barnes et al., 2007). Research conducted by Ruelaz et al. (2007) amongst health care providers working at a primary health care clinic found that providers perceived a lack of time for exercise as a primary cause for weight gain amongst their patients. Chang et al. (2008) found that overweight/obese African-American women consistently reported a lack of adequate personal time and explained that if they had time, they would take a walk to relieve their stress. However, it was clear that feelings of exhaustion and a lack of time due to parenting commitments made routine exercise nearly impossible (Chang et al., 2008). Research by Befort et al. (2008b) documented exercise as too time consuming among 14.7% of successful weight maintainers and 38.1% of unsuccessful maintainers that previously participated in a university-based weight loss intervention. It is therefore evident that time constraints could serve as a barrier to compliance with weight loss interventions and maintenance thereof, especially when it comes to regular participation in physical activity, a pivotal component of a healthy weight loss intervention.

Mistrust of/perceptions regarding the intervention: When recruiting black women for participation in a weight loss intervention, the question arises whether mistrust of intervention facilitators or preconceived ideas regarding the intervention might serve as barriers or deterrents to enrolment and participation. These questions are answered by Yancey et al. (2006); Herring et al. (2004); Hoyo et al. (2003) and Story et al. (2003) who report that recruiting African-American women for weight loss interventions is far more difficult than recruiting them for observational studies. Perceptions of mistrust of scientific investigators, government and academic institutions were found by many to be a central barrier to recruitment, especially among African-American subjects (Robinson & Trochim 2007; Yancey et al., 2006; Herring et al., 2004).

Robinson and Trochim (2007) shed light on the above findings by citing that researchers: (i) often lack cultural sensitivity in communication and approaches to subjects; and (ii) experience a lack of compliance with testing and follow-up visits. Subjects on the other hand: (i) often lack awareness regarding the benefits of participation; (ii) have a sense that they only give and get nothing in return; (iii) have concerns about signing informed consent; (iv) have a lack of time to participate; (v) have socio-economic considerations such as parking, transportation and childcare; (vi) fear that their privacy will be invaded; (vii) view clinical trials as a last ditch effort for treatment; (viii) fear a lack of family support; and (ix) fear that research questions seem trivial and/or unimportant. It is therefore clear that issues of mistrust or perception regarding the intervention could influence enrolment in a weight loss intervention, compliance with the intervention and the ability to lose weight once enrolled (Walker-Sterling 2005).

Location of the intervention: When planning a weight loss intervention targeting overweight/obese women, it is important to consider whether the location of the intervention will be a barrier to enrolment, compliance and therefore weight loss. In selecting appropriate venues, cognisance should be taken of aspects such as neighbourhood safety (Withall et al. 2009; Walcott-McQuigg et al., 2002; Eyer et al., 1998) and travel distance to the intervention (Moroschko et al., 2011). However, according to the systematic review conducted by Moroschko et al. (2011), three interventions failed to find a significant association between travel distance to the intervention and drop-out, while the remaining four studies found that a greater distance to the intervention was associated with attrition. Walcott-McQuigg et al. (2002) add that African-American women are less likely to participate in weight loss interventions if they are not conveniently located. Strategies to reduce the level of perceived effort required for long-term weight loss may therefore improve weight maintenance (Befort et al., 2008b) and in so doing, reduce barriers to weight loss and enhances the maintenance thereof.

Intervention facilitators, intervention development and community involvement: Facilitators of weight loss interventions could influence weight loss outcomes by facilitating appropriate implementation and compliance with the intervention, motivating participants and having a supporting, positive attitude towards them. However, weight-related stigmatization has been documented in numerous settings, including healthcare environments where obese patients experience bias from doctors, nurses, dieticians and mental health professionals (Puhl & Brownell 2006; Foster et al., 2003; Schwartz et al., 2003). As a result, obese patients may be reluctant to seek health care due to the weight bias projected by health professionals. Teachman and Brownell (2001) found that health professionals who treat obesity had strong implicit negative attitudes and stereotypes towards obese individuals. This phenomenon was documented by a study involving RDs conducted by McArthur and Ross (1977) who found that 87% of respondents viewed obese subjects as self-indulgent, while 32% indicated that obese individuals lacked will power. However, it was explained that these attitudes were less prominent among health professionals than the general population.

The impact of such negative attitudes towards treatment-seeking overweight/obese individuals is illustrated by the fact that experiencing stigma was positively correlated with BMI in the study by Hoppe and Ogden (1997). Puhl and Brownell (2006) indicated that experiencing a greater level of stigma was associated with increased use of coping mechanisms that included heading off negative comments and eating, which could contribute to additional weight gain. The ADA (2009) therefore emphasizes the fact that nutrition professionals should be aware of their own biases towards overweight and obese individuals, as their beliefs influence their practice (Hoppe & Ogden 1997) and may thus serve as a barrier to successful weight loss and maintenance.

As mentioned in Section 2.7.2, healthy weight loss interventions, the importance of involvement of members of the target communities to be part of the intervention team and in providing social support to subjects is vital (Kumanyika et al., 2007; Yancey et al., 2006). However, Kumanyika et al. (2007) emphasises that because behaviours that determine weight status in African-Americans are embedded in the core social and cultural processes and environments of daily living of these populations, the identification of effective, sustainable solutions to obesity requires an ecological model that is inclusive of relevant contextual variables. In addition, the importance of multidisciplinary expertise, qualitative research and high quality community-based participatory research is emphasised in order to provide a better sense of the community processes that need to be included in any framework on which intervention design is based. Kumanyika et al. (2007) further explain how weight management interventions should be developed more holistically in order to consider other relevant social and health priorities and allow for the possibility that excess body weight is part of a multifaceted set of adaptations to adverse environments (Kumanyika 2005). Furthermore, community-based interventions that target e.g. local church members (Kumanyika et al., 2007; Yanek, 2000; Lasco et al., 1999), the utilization of existing social networks (Kumanyika et al., 2007; Kumanyika & Charleston 1992) as well as ethnically and culturally appropriate lay leaders have been reported to contribute to successful engagement with weight loss interventions (Kumanyika et al., 2007; Kennedy et al., 2005).

Cost of weight loss intervention: Studies investigating the relationship between health behaviour and environmental factors have shown that African-American women are less likely to participate in healthy lifestyle behaviours that could facilitate weight loss if they are not affordable (Walcott-McQuigg et al., 2002) and that the cost of weight loss interventions may therefore serve as a barrier to weight loss (Setse et al., 2008; Smith Barnes et al., 2007). Withall et al. (2009) also refer to the cost of exercising, healthy eating and transport as a barrier to weight loss. In order to improve participation and curb intervention attrition, an intervention conducted by Lasco et al. (1999), provided subjects with incentives that included free transport to intervention venues. Despite numerous other strategies employed, such as police protection for walkers and the provision of childcare, only 50 to 59% of participants attended all the biweekly exercise sessions over a period of 10 weeks. Despite the low compliance with the physical activity component of the intervention, Lasco et al. (1999) suggested that affordability of the intervention may be an important consideration. Subsequently Lasco et al. (1999) and Smith Barnes et al. (2007) comment that affordable food and physical activity options might increase participation of African-American women in weight loss interventions. A local perspective on affordability shaping food purchases is illustrated by Temple and Steyn (2011) who showed that a comparative analysis between a typical South African diet and a healthier option cost 69% more, although the cost discrepancy was affected by food choices. However, the authors concluded that a healthy diet is unaffordable for the majority of South Africans.

Holm et al. (1998) and Pleas (1998) are of the opinion that charging subjects a participation fee may enhance retention do to the fact it increases commitment to the intervention. However, a systematic review conducted by Moroshko et al. (2011) found that payment for the intervention significantly increased drop-out. It would therefore seem that the cost of a healthy weight loss intervention that includes healthy eating as well as physical activity strategies in addition to charging an enrollment fee could serve as a barrier to weight loss.

Attendance of intervention sessions: The strongest predictors of dietary change and maintenance thereof, is the attendance of intervention sessions (Tinker et al., 2007; Karanja et al., 2002; Walcott-McQuigg et al., 2002), as well as self-monitoring of dietary intake and exercise (Befort et al., 2008b; Elfhag & Rössner 2005). According to Russel et al. (2001), intensive follow-up and contact with subjects seems to improve both participation and retention rates, while Yancey et al. (2006) explain studies that addressed retention issues, highlighted the importance of having staff from the target community providing social support and having accessible locations for intervention implementation, as well as regular telephone reminders to improve retention (Zayas et al., 2004; Russell et al., 2001; Ashing-Giwa & Ganz, 2000). Lavin et al. (2006) and Yanek et al. (2001) explain that regular attendance is affected by income, financial concerns, age, employment status, perceived importance of weight loss and initial weight loss success. The irregular or non-attendance of interventions sessions is therefore a clear barrier to weight loss and retention rates.

2.8.7 Concluding perspectives

A review of the available literature revealed that the barriers associated with following a healthy lifestyle and improved eating habits while increasing the level of PA among black women, are diverse. An overview of the identified barriers to weight loss this population faces is presented in Table 2.3. The conflicting results presented in this review regarding barriers to weight loss is placed into perspective by Teixeira et al. (2004) who mention that the reason why some individuals succeed in adopting and sustaining behaviours associated with weight loss while others participating in the same intervention do not, remains unknown. However, it is thought that personal factors such as biological, psychological and behavioural factors could play a role in determining higher versus lower success rates, especially if they contribute to resistance to long-term behavioural change. It is also thought that treatment characteristics, socio-ecological environmental factors and interactions between these variables may play a role. After conducting a systematic review of the predictors of drop-out, Moroshko et al. (2011) add that a consistent set of predictors has not yet been identified; however psychological and behavioural factors and processes associated with the intervention were more commonly associated with attrition than subject background characteristics.

Table 2.3: Potential barriers to weight loss and maintenance in overweight/obese black women.

Factor	Factor components	Importance as a barrier	Socio-ecological level of influence
Weight history	Infancy, childhood and adolescence	Yes	Intrapersonal
Weight loss patterns	Weight cycling	Yes	Intrapersonal
Weight loss goals and expectations	Unrealistic	Yes	Intrapersonal
Psychological well-being	Depression	No	Intrapersonal
	Stress	Yes	Intrapersonal
	Poor self-esteem	No	Intrapersonal
	Unfulfilled emotional needs	Yes	Intrapersonal
	Low level of dietary restraint	Yes	Intrapersonal
	Presence of disinhibitors and disinhibition	Yes	Intrapersonal Interpersonal Organizational Community
	Perceived hunger	Yes	Intrapersonal
	Binge eating and BED	Yes	Intrapersonal
Lifestyle changes	Dietary intake including energy intake, portion sizes and fast food	Yes	Intrapersonal Interpersonal Organizational Community
	Irregular eating patterns	Yes	Interpersonal
	Lack of physical activity	Yes	Intrapersonal Interpersonal Organizational Community
Socio demographic and environmental factors	Age	Inconclusive	Intrapersonal
	Income, employment status and level of education	Yes	Interpersonal Community
	Marital status	Yes	Intrapersonal
	Parity	Yes	Intrapersonal
	Lack of social support	Yes	Interpersonal Community
	Environmental factors inside the home and in the community	Yes	Interpersonal Organizational Community
Intervention factors	Time constraints	Yes	Intrapersonal
	Mistrust of/perception regarding intervention	Yes	Intrapersonal
	Location of intervention	Yes	Intrapersonal Organizational Community
	Intervention facilitators, intervention development and community involvement	Yes	Interpersonal Community
	Cost of intervention	Yes	Intrapersonal
	Attendance of intervention	Yes	Intrapersonal

2.9 WEIGHT MANAGEMENT INTERVENTIONS TARGETING BLACK WOMEN

2.9.1 Weight loss interventions targeting African-American women in the USA

According to Allan (1998), overweight African-American women are less likely than their Caucasian counterparts to consider themselves as overweight and are less likely to participate in weight loss

interventions (Williamson 1993). In addition, when they do participate in self-imposed or formal weight loss interventions, they are less likely to achieve weight loss goals (Wing & Anglin 1996; Kahn et al., 1991) or weight loss maintenance than Caucasian women (Wing & Anglin, 1996; Kumanyika et al., 1991). An overview of weight loss interventions conducted amongst African-American women is presented in Table 2.4.

Table 2.4: Healthy weight loss interventions targeting African-American women in the USA

Authors	Sample	Intervention characteristics	Duration (weeks)	Weight loss	Retention Figures	Information provided
Culturally-targeted behavioural weight loss programme with motivational interviewing versus health education						
Befort et al. (2008a)	44 obese women (mean BMI 39.8 kg/m ²)	Culturally-targeted behavioural weight loss intervention. Randomized according to: 1) Motivational interviewing (MI) (4 sessions) (n=21) 2) Health education (HE) (4 sessions) (n=23)	16 w	Weight loss (mean BMI): MI: 1.0 kg/m ² HE: 1.1 kg/m ²	MI: 71% HE: 83%	Similar weight loss between groups.
Church-based weight loss program						
Kennedy et al. (2005)	37 obese women (mean BMI 38.5 kg/m ²)	Peer educator (church member) delivered intervention. Randomized according to: 1) Group sessions (GS) 2) Individual sessions (IS)	26 w	Weight loss for total group: mean 3.3kg IS: 3.4kg GS: 3.1kg	90%	Similar weight loss between groups. Improvement in quality of life and physical activity.
Steps to Soulful Living (Steps)						
Karanja et al. (2002)	66 obese women (mean BMI 39 kg/m ²)	Weekly group meetings and exercise sessions. Cultural adaptations according to subject input at baseline: -intervention format -content of group meetings -location -format of exercise	26 w	Weight loss: mean 3.7kg	Attendance figures: 76% ≥ 50% of sessions; 56% ≥ 75% of sessions; Mean loss 6.2kg Meeting attendance ≤ 75%: Mean loss 0.9kg	Larger weight losses associated with higher level of attendance. Weight loss larger than the norm documented for culturally adapted interventions targeting African-American women.

LEAP (Lifestyle enhancement awareness program)						
Walcott-McQuigg et al. (2002)	23 obese women (mean BMI 36.4 kg/m ²)	16 weekly sessions: Weight loss 16 weekly sessions: Weight maintenance	32 w	Weight loss: mean 6.1kg	69.6%24%	Weight loss significantly correlated with attendance and readiness to address emotional eating.
POWER (Pounds off with empowerment)						
Mayer-Davis et al. (2001)	33 obese (mean BMI 37.9 kg/m ²)	Randomized according to: 1) Intensive lifestyle 2) Intensive lifestyle and formal evaluation by completion of self-monitoring logs for diet and physical activity	8 w	Weight loss for total group: mean 1.15 kg	15% attrition	Similar weight loss between groups. Self-monitoring found to be very helpful, but did not result in better weight loss
Project Joy: Faith Based Cardiovascular Health Promotion						
Yanek (2000)	529 women enrolled from 16 churches (mean BMI 32.6 kg/m ²)	Comparison of three church-based intervention strategies: 1) Behavioural model with weekly group sessions including moderate exercise 2) Behavioural model with weekly group sessions including moderate exercise and spiritual components such as group prayers and health messages enriched with scripture 3) Control group of non-spiritual, self-help intervention. Data of intervention groups 1 and 2 pooled and compared to control group.	20 w conducted by health educators. Lay leaders offered weekly sessions for remaining 32 w. Follow up at 52 w	Weight loss for intervention group (mean BMI): 0.17 kg/m ²	65% attendance of first session and 26.1% attendance of last session. 56% attended one year follow-up.	Intervention group achieved significant decreases in BMI, waist circumference, energy- and total fat intake when compared to control group.
CHAPP (The Community Health Assessment and Promotion Project)						
Lasco et al. (1999)	70 obese women (mean BMI 34.5 kg/m ²)	Intervention components: Orientation, attitudes assessment, selection of a specific exercise class and bi-weekly information sessions on nutrition and community resources. Strategies employed: Individual consultations, reminder telephone calls,	10 w	<u>Weight gain:</u> >4.5kg (3%) 1.4-4.5kg (13%) <u>Weight loss:</u> <1kg loss	All sessions attended by 50-60% of participants	Based on a needs assessment. Community coalition designed and implemented an intervention designed to reduce attrition. Motivation for intervention attendance came from target

		<p>incentives, rewards for accomplishments, free transportation and child care. First weekly meeting included nutrition component followed by exercise. The second weekly meeting included assessment, counselling and a special interest component followed by exercise.</p> <p>The nutrition component included a 30 minute presentation on e.g. healthy food choices and sensible weight loss followed by 30 minutes that included demonstrations of healthy cooking techniques and recipe sharing.</p> <p>The exercise component included water aerobics, low-impact aerobic dance and walking.</p> <p>Participation was monitored and telephonic exit interviews were conducted with drop-outs.</p>		<p>(40%) 1.4-4.5Kg (31%) 5-9kg (10%) >9kg (3%)</p>		community rather than being imposed by outsiders.
PATHWAYS church-based program						
McNabb et al. (1997)	39 obese women (mean BMI 33.5 kg/m ²)	<p>Baseline screening regarding weight and lifestyle variables. Randomized according to:</p> <p>1) Intervention:</p> <p>Weekly small group sessions with content delivery via guided learning and small group instruction. Group leaders (trained lay facilitators that were church members) assisted and facilitated completion of learning activities including identification of own dietary problems e.g. analysis of dietary practices and setting goals based on self-assessment. Through assistance by group facilitators and peer group members, individuals arrived at personally relevant solutions. Weight loss but not slenderness encouraged.</p> <p>Extensive use of ethnic foods and food combinations. Emphasis placed on management of urban lifestyle issues</p>	14 w	<p>Weight loss: mean 4.5kg (5% body weight) Although p>0.05, subjects who attended >75% of sessions had mean weight loss of 5.7kg while those who attended <75% had a</p>	16% attrition	<p>Community-based intervention held in churches reached larger audience.</p> <p>Lay facilitators obtained results similar to that of professionals.</p> <p>Participants reported that weight loss was due to being treated as adult learners.</p>

		(n=19). 2) Control: Subjects placed on waiting list to receive intervention on conclusion of the study period (n=20).		mean loss of 2.8kg.		
BALI						
Kanders et al. (1994)	67 obese women (BMI 30-40 kg/m ²)	Weekly culturally sensitive nutrition and exercise intervention conducted as group sessions by black female group leaders. Meal replacement shakes provided. Incorporation of ethnic foods. Food and activity records kept.	10 w	Weight loss: mean 2.9kg	Attrition 9%	Use of culturally sensitive lifestyle education intervention.
Baltimore Church High Blood Pressure Program (CHBPP)*						
Kumanyika and Charleston (1992)	184 women (mean BMI 31 kg/m ²)	Behaviourally orientated programme. Intervention included dietary, exercise and individual behavioural counselling. Participants paid registration fee. Incentives were provided.	8 w	Weight loss: mean 2.7kg	41% at 6 months	Church-based health intervention provided social network that enhanced retention.

From Table 2.4 it is evident that the duration of interventions reviewed, ranged from eight to 32 weeks and attrition rates ranged from nine to 73%. Despite the fact that the 10 week intervention conducted by Lasco et al. (1999) was based on a needs assessment, a community coalition designed and implemented the intervention and it was designed to reduce attrition as much as possible, all sessions were attended by only 50 to 59% of participants. An observed trend was that weight loss was related to the frequency of attending the intervention sessions, thereby highlighting the importance of regular attendance to facilitate weight loss.

Nearly half of the interventions assessed were church-based (Kennedy et al., 2005; Yanek, 2000; McNabb et al., 1997 and Kumanyika & Charleston 1992). According to Yanek et al. (2001), in African-American communities, church members remain the primary source of social support and community leadership, particularly among older African-American women. Kramish Campbel et al. (2006) explain that church-based health promotion interventions can reach populations at large and have the potential for reducing health disparities. From a socio-ecological perspective, churches and other **religious organisations can influence members' behaviours at multiple** levels of change as it encompasses a collaborative partnership approach. In addition, church-based interventions utilize principles of community-based participatory research. Involvement of congregation members in intervention design and delivery, may improve recruitment, participation and sustainability as health interventions that incorporate spiritual and cultural contextualization, have shown to be effective if the target population is black women. According to Table 2.4, it seems that church-based interventions resulted in acceptable retention levels and reasonable weight losses. However, the intervention design, content, duration and sample size varied considerably, thereby making a comparative analysis problematic.

Of interest is the fact that none of the interventions reviewed made mention of the application of the ecological model of health-related behaviour or behavioural change theory in intervention development or design. However, it was evident that many interventions made use of a group-based approach to facilitate peer motivation and used biweekly or weekly contact sessions.

2.9.2 Weight loss interventions targeting black South African women

There is a paucity of publications on weight loss interventions targeting black South African women. The only two interventions targeting black women and included a focus on weight loss that could be identified are reported in Table 2.5.

Table 2.5: Healthy weight loss interventions targeting black South African women

Authors	Sample	Intervention characteristics	Duration (weeks)	Weight change	Retention figures	Comments
Sparrow (2010)	Multiracial hospital-based nursing staff (n=45) (BMI ≥ 25 kg/m ²)	Dietary and lifestyle intervention. Multidisciplinary approach. Joining- and weekly attendance fee used towards prize money for overall winner. Peer support facilitated through allocation of a "buddy" to each participant. Booklet to monitor progress included notes on discussion topics, meal plans and sample menus. Weight, waist and hip circumference were measured weekly.	12 weeks	83.3% of participants lost weight. Mean loss of 5.8% of initial body weight. All participants lost cm around waist and hips	60% attrition.	All participants reported improved confidence in making healthy food and lifestyle choices and a change in behaviour towards food/eating. 67% reported to be exercising regularly. Reasons for drop-out included work load and time constraints, annual leave coinciding with the intervention and falling ill.
Isaacs and Puoane (2011)	Female Xhosa members of a health club (HC) (n=26) (intervention); non-members (n=60) (control) (BMI not reported)	Comparison of health club member's physical activity and dietary habits (intervention) to that of non-members (controls). Baseline data pre-intervention not collected. No information on intervention format or content reported. Data collected post intervention via face-to-face interviews using structured questionnaires. Level of weight loss not reported	Not reported	Not reported	Not reported	HC membership provided members with the opportunity to enhance lifestyle practices related to physical activity and eating habits more than non-members. Hence HC membership served as a source of social support and a vehicle to enhance behaviour modification. Despite HC membership serving as a source of information to make lifestyle changes, socio-economic status and the environment members lived in, resulted in eating habits that were not in line with recommendations. Watching television served as a proxy for physical inactivity, although HC members spent less time watching television. Motivators for increased PA included personal motivation and confidence, sufficient time,

						<p>knowledge regarding health benefits, having community support, feeling good after exercise/gym and having an exercise partner.</p> <p>Motivators for improved dietary habits: feeling healthier and confident, having more money, family/community curiosity and support and losing weight</p>
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The work by Sparrow (2010) and Issacs and Puoane (2011) shows that group sessions/participation, family, peer and community support, monitoring of progress, time and knowledge to implement dietary and lifestyle changes habits may be important considerations in the development and implementation of weight loss interventions targeting black women. In addition, it is also evident that self-efficacy (confidence) gained through knowledge and support, are powerful agents of change when it comes to improving dietary and lifestyle habits. However, living in an environment that is not conducive to making the necessary changes could be a barrier to weight loss and the maintenance thereof.

2.9.3 Concluding perspectives on weight loss interventions targeting African-American and black South African women

From the information presented in Tables 2.4 and 2.5 and interpretative discussions, it is evident that the following should be considered in the development of weight loss interventions targeting black women:

- involving overweight/obese subjects from the target community in a needs assessments, intervention format, content and location prior to intervention implementation;
- incorporating the ecological model of health-related behaviour or behavioural change theory in intervention design and development;
- having a community-based intervention targeting e.g. local church members;
- having a community-based venue such as a church hall as opposed to e.g. a clinic to promote ease of access;
- training members of the target community as lay councillors to facilitate the intervention;
- planning weekly face-to-face contact sessions between subjects and intervention facilitators;
- inclusion of ethnic foods and recipes in the intervention;
- enhancing subject participation through cooking demonstrations, recipe sharing and preferred type of exercise to enhance weight loss;
- providing subjects with practical advice on weight loss in an urban environment;
- promoting realistic, achievable weight loss goals with the focus on the attainment of health as opposed to aesthetic reasons for weight loss;
- incorporating exercise as part of the intervention sessions as opposed to encouraging subjects to exercise in their leisure time;
- encouraging self-monitoring of food intake and physical activity;
- paying a joining fee and provision of incentives for successful weight loss.

Consideration of the predictors of intervention completion and successful weight loss gleaned from research conducted on African-American treatment-seeking overweight/obese women should also be

considered in the development of appropriate weight loss interventions for black women in South Africa. These predictors are presented in Table 2.6.

Table 2.6: Predictors of intervention completion and successful weight loss

Later obesity onset
More prior weight loss experience
More realistic weight loss expectation
Absence of psychiatric disturbance such as depression
More positive score for quality of life
Greater dissatisfaction with appearance and drive for thinness
Increased cognitive eating restraint
Decreased binge eating/ eating disinhibition
Higher eating and exercise self-efficacy
Better nutrition knowledge
Higher self-reported intake of complex carbohydrates, dairy products, dietary fibre
Following a low fat diet
Higher score for perceived benefits of weight loss
Positive attitude towards healthy eating
Increase in level of physical activity
Presence of social support such as being married

Sources: Clarke et al. (2007); De Panfilis et al. (2007); Klohe-Lehman et al. (2006); Teixeira et al. (2006); Jakicic and Otto (2005); Kumanyika et al. (2005); Wing and Phelan (2005); Teixeira et al. (2004); Zemel (2004); Honas et al. (2003); McLean et al. (2003); Wien et al. (2003); Howarth et al. (2001); Yanek et al. (2001); Young et al. (2001); Jeffery et al. (2000); Pinto et al. (1999).

2.10 WEIGHT MANAGEMENT-RELATED FOCUS AREAS FOR BLACK WOMEN

The weight management-related focus areas for black women that emerged from the literature relate to actual engagement and success with weight loss interventions (weight loss attempts) (see Focus areas 1 to 3 presented below) and associated characteristics and circumstances of overweight/obese black women (see Focus areas 4 to 10 presented below).

Focus area 1: Treatment seeking behaviour

Evidence shows that overweight/obese black women are less likely to aspire to weight loss or engage with weight loss than their Caucasian counterparts (Foley et al., 2012; Puoane et al., 2005a; Kumanyika 1993). The most likely explanation for this phenomenon relates to body shape and weight perception and satisfaction (see Focus area 4). There is information regarding what motivates African-American women to enrol in a weight loss intervention, as well as what predicts the completion of the intervention and weight loss (see Table 2.6). However, none of these variables have been documented for black South African women. Insight into what motivates or may motivate local black women to enrol in a weight loss intervention is of importance, as this information could be

used in the development of social marketing strategies to increase public awareness of the need for overweight/obese individuals to control their weight or lose weight using healthy weight loss methods.

Focus area 2: Weight loss success

Clinically meaningful weight loss has been described as a reduction in initial body weight of 5 to 10% and the maintenance of that loss for a period of six months to a year (Jensen et al. 2013; Lysen & Israel 2012; ADA 2009; Dansinger et al. 2005; Institute of Medicine of the National Academy of Sciences 1995). Weight loss success of black women who embark on a weight loss intervention varies. A review of the ten published weight loss interventions that targeted overweight/obese African-American women (see Table 2.4), showed that the mean BMI of participants varied between 30 and 40 kg/m², while the mean weight loss reported varied between 0.9 to 6 kg (8 studies) and 0.17 to 1.1 kg/m² (2 studies). One study reported weight gain of up to 4.5kg in 16% of the study sample. The only study that reported on weight loss in overweight/obese black South African women (Table 2.5) reported a weight loss of 5.8% of initial body weight. However, the question remains whether these losses are maintained and are clinically significant. It is further important to take cognisance of the fact that mainstream weight loss interventions that are based on assumptions and values of the dominant culture (Western) such as personal autonomy and self-management, may not be effective for black women. These women may be more responsive to interventions that focus on interconnectedness and group support. A number of predictors for weight loss success in African-American women have been identified (Table 2.6), but no such information is available for black South African women. It is therefore evident that more information on the potential for healthy weight management and weight loss success in black South African women is needed.

Focus area 3: Compliance to and attrition from weight loss programmes

The literature shows that active engagement with intervention sessions and compliance with recommended lifestyle changes (diet and physical activity) are core to successful weight loss (Tinker et al., 2007; Karanja et al., 2002; Walcott-McQuigg et al., 2002). This is also reflected in the findings of two of the studies reviewed in Table 2.4. Results from the two South African studies regarding compliance with lifestyle recommendations (Table 2.5) are conflicting. Sparrow (2010) states that all participants reported improved confidence in making lifestyle changes and 67% reported to be exercising regularly, while Isaacs and Puoane (2011) found that the eating habits of participants were not in line with intervention recommendations. High attrition from weight loss interventions is a well-recognized phenomenon and is typically expected to be approximately 50% of the intervention sample (Moroshko et al., 2011; Franz et al., 2007; Teixeira et al., 2004). Attrition from the 10 interventions shown in Table 2.4 varied between nine and 69.6%, with three out of the nine studies that reported on attrition indicating an attrition of more than 50%. Attrition was found to be 60% in the one South African study that reported on this aspect. Insights in factors that emerged from the

literature as potentially important influences on compliance and attrition in black South African women are covered in Focus areas 4 to 10. Insight into potential compliance of black South African women with healthy weight loss interventions and the prevalence of attrition and associated factors is essential to assist intervention planners in the development of appropriate, sustainable and successful weight loss interventions.

Focus area 4: Cultural influences on body shape and size perception and satisfaction

International and local research clearly shows that it is common for overweight/obese black women to perceive their body weight and shape as normal and acceptable. The fact that obesity is culturally and aesthetically looked upon with less disfavour, in actual fact, is seen as a cultural norm of beauty, health and prosperity, may explain this phenomenon (Matoti-Mvalo & Puoane 2011; Puoane et al., 2006a; Puoane et al., 2006b; Puoane et al., 2005a; Puoane et al., 2005b; Baturka et al., 2000; Wolfe 2000; Flynn & Fitzgibbon 1998). In addition, within the South Africa context, weight loss and thinness are often associated with HIV/AIDS, which in turn may contribute to the acceptance of a larger body size (Puoane et al., 2005c). There is no doubt that these factors result in less incentive for black women to consider weight loss. This also seems true for urban women who have a higher level of education and are of a higher socio-economic status than their rural counterparts. A better understanding of the interaction between cultural body shape and size perceptions and weight management and weight loss outcomes within the South African context is key to the development of appropriate, sustainable and successful weight loss interventions.

Focus area 5: Cultural influences on food choices and eating patterns

Besides being accepting of a larger body size that may contribute to perpetuation of energy dense food choices, black women experience a considerable number of culture and environment related barriers when it comes to making healthy food choices for weight loss. These factors include peer group pressure, social conventions such as serving high-fat meals for family entertainment and celebrations, exposure to large portion sizes, religious practices, the inherent status assigned to specific foods, the influence of household members, individual lifestyle, enjoyment of bringing family members together, preparation of large meals for such occasions and perceiving food as a symbol of love, acceptance, happiness and humanity (ubuntu) (Befort et al., 2008b Puoane et al., 2006b WHO 2004b; Kumanyika & Odons 2003; Airhihenburwa et al., 1995). Black South African women may also show preference for energy dense foods such as fatty meat and fast foods as a result of acculturation, urbanisation, cost, availability, convenience and taste (Feeley et al., 2009; Puoane & Tsolekile 2008; Goedecke et al., 2006). A further point for consideration is that these women may not be aware of their actual energy intake, as they have been found to be likely to underreport their food intake (Mchiza et al., 2010; ADA 2009; Bailey et al., 2007). Weight loss and the maintenance thereof will only be possible if weight management interventions consider and address these barriers, as it would determine whether or not overweight/obese black women would seek treatment, be compliant

with a healthy weight loss intervention, remain in the intervention and make permanent changes in their food choices to facilitate weight maintenance. Although some South African information is available on this focus area, more in depth insights in these barriers are essential for consideration by intervention developers.

Focus area 6: Cultural influences on physical activity

Cultural perceptions that PA is associated with work related activities and that exercise during leisure time is inappropriate [“I do not see the need of walking just for nothing” (Puoane & Tsolekile, 2008, p11)] seem to prevail in some urban black communities, despite improvements in food security. These perceptions and the negative attitude towards physical activity in general need to be addressed alongside ensuring access to exercise opportunities and a safe environment to do so (see Focus area 7). This is clearly illustrated by the findings of Puoane and Tsolekile (2008, p11), namely that fun walks organised for urban black women in a Cape Town township to increase community participation in PA in a safe environment, resulted in community members serving as spectators instead of participants. Walcott-McQuigg et al. (2002) emphasize that when attempting to address barriers to physical activity, consideration should be given to the fact that behaviour is dynamic and influenced by the interaction between personal and environmental factors, thus environmental factors and individual factors simultaneously shape behaviour (McNeill et al., 2006). Although exercise on its own is not associated with substantial weight loss, a restricted energy diet for weight loss must ideally be combined with a physical activity programme to ensure long term weight loss and maintenance. Although some South African information is available on the cultural barriers to increasing physical activity by doing exercise in leisure time and adopting an active lifestyle in general, more in depth insights concerning these factors in middle class black women living in urban environments is necessary to advise intervention planning.

Focus area 7: Environmental factors and social support

Urban South Africans live in an obesogenic environment that is known to constitute a major barrier to healthy weight loss and maintenance (Swinburn et al., 2011). This environment, which promotes energy dense food choices and low levels of physical activity in numerous ways, may extend to inside the home. Lack of appropriate support from family, friends and the community at large for the necessary dietary and physical activity changes within an obesogenic environment, constitutes a further serious barrier to successful weight loss and maintenance. International and some local evidence shows that community-based interventions that target e.g. local church members (Kumanyika et al., 2007; Yanek, 2000; Lasco et al., 1999), the utilization of existing social networks (Kumanyika et al., 2007; Kumanyika & Charleston 1992), buddy systems, positive role modelling (Thomas et al., 2009), as well as ethnically and culturally appropriate lay leaders may need to be considered to provide the necessary support for urban black women attempting weight loss. Changing the macro-environment relating to food supply, the built environment and generic safety

issues will not happen overnight. In the meantime a major focus for individuals who need to lose weight is to learn to cope with the prevailing obesogenic environment and to obtain optimal support from their micro-environment to make this possible. More in depth insights concerning these factors in the target population are necessary to understand the environmental and support challenges these women experience and advise possible actions that can be taken to address these problems

Focus area 8: Appropriateness of the weight loss programme for the target population

Matching the individual attempting weight loss with an appropriate weight loss intervention is core to compliance, remaining in the intervention and ultimate successful weight loss and maintenance.

Prominent factors that need specific attention to avoid “mismatches” in urban black women include time constraints (James et al., 2012; Moroshko et al., 2011), convenience of location (Withall et al., 2009; Walcott-McQuigg et al., 2002), cost (for enrolment, purchasing healthy foods and physical activity strategies) (Setse et al., 2008; Walcott-McQuigg et al., 2002), clarity/understandability of the intervention and cultural sensitivity of strategies, information and facilitators (Puhl & Brownell 2006; Foster et al., 2003). The development of a culturally sensitive intervention depends on the involvement of members from the target community (Kumanyika et al., 2007; Yancey et al., 2006), and should focus on inclusion of ethnic foods, modification of ethnic food recipes, the use of culturally-appropriate food guides (Bronner & Boyington 2002; Kanders et al., 1994). consulting subjects on the type of the exercise they would prefer to participate in (Karanja et al., 2002; Lasco et al., 1999; Kanders et al., 1994), improving the effectiveness of communication and promotion materials by presenting the content in ways that are more likely to appeal to a specific target audience (Kreuter et al., 2003; Resnicow et al., 1999; Schiffman 1995). At this point in time there is a total lack of South African information on this very important focus area.

Focus area 9: Dietary restraint, disinhibition, perceived hunger and bingeing

Moderate levels of dietary restraint and low levels disinhibition and perceived hunger may contribute to weight loss success in a person attempting weight loss. However, very high levels of dietary restraint and high levels of the other two eating behaviours may have the opposite effect by resulting in episodic overeating/bingeing. It is also possible that the low levels of dietary restraint that seem to characterise black overweight/obese women, may serve as a barrier to weight loss, bearing in mind that low dietary restraint may reflect lack of control over energy intake (Anglé et al., 2009; Karlsson et al., 2000). Care should be taken not to place excessive emphasis on cognitive processes to control energy intake (thus increase dietary restraint), as it may result in excessive levels of restraint and thus overeating/bingeing. Cultural eating and socialization habits of black South African women may act as disinhibitors and contribute to increased levels of external locus of perceived hunger, resulting in food intake in excess of requirements for weight maintenance or loss. These cultural practices/perceptions include the tradition of having large family meals, with fried or roasted meats as a centrepiece to the meal (James 2004; Hargreaves et al., 2002), frequent other social events

characterised by an abundance of food, viewing a good appetite as sign of being healthy, the **expectation from “others” to eat, as well as** eating large portions as way of sending a message that you can afford to buy large quantities of food and are thus successful (Puoane et al., 2006b). A profile of eating behaviours characterized by low/very high restraint, high disinhibition and high perceived hunger may contribute to the development of binge eating disorder. Local research shows that this disorder may be prevalent in urban black South African women and thus needs to be considered as a potential barrier to weight loss and maintenance in these women (Pienaar, 2000, Senekal et al. 2003).

Focus area 10: Psychological wellbeing (depression)

It is widely recognised that human eating behaviour is influenced by psychological wellbeing (Adolfsson et al., 2002; Canetti et al., 2002). Emotional states such as stress, anxiety, depression and others have been found to be associated with overeating, often involving high fat, energy dense foods and snacks (Karlsson et al., 2000; Mehrabian 1980; Lyman 1982). Treatment-seeking obese subjects have also been reported to experience psychopathology such as depression (Fitzgibbon et al., 1993), which may increase as weight increases (Kim et al., 2007; Wadden et al., 2006; Werrij et al., 2006). According to Siegel et al. (2000) similar associations may be present in black (African American) women, but may be less prominent as a result of the prevailing obesity tolerant culture. Very little information on the association between weight status and psychological well-being, specifically depression, is available for overweight/obese black South African women, whether treatment seeking or attempting weight loss.

2.11 RESEARCH AIM AND QUESTIONS

2.11.1 Research aim

Overweight/obesity among black South African women is a significant public health problem and the implementation of weight management interventions to promote weight loss and maintenance in these women is clearly indicated. As there is a serious paucity of information on weight management initiatives targeting black South African women, the aim of this research was investigate weight management-related focus areas in overweight/obese black (Zulu) women residing in an urban area in South Africa. This information is essential to advise the development of healthy weight loss interventions and appropriate messaging to promote weight loss and maintenance in black South African women.

2.11.2 Research questions

The following key research questions were formulated to gain insights in the weight management and weight loss focus areas outlined in section 2.10 (depicted in Figure 2.3):

1. What is the weight status profile and associated factors of overweight/obese treatment-seeking black women (Chapter 3)?
2. What is the outcome of a culturally sensitive healthy weight loss intervention in terms of weight loss, compliance (attendance of intervention sessions, lifestyle changes) and attrition in overweight/obese black women (Chapter 4)?
3. Which factors may explain the outcomes (weight loss, compliance and attrition) of the culturally sensitive healthy weight loss intervention in overweight/obese black women (Chapter 5)?

An integration of findings of these research questions is presented in Chapter 6 to highlight pertinent insights gained in each of the 10 investigated weight management-related focus areas, to identify critical factors that need to be considered in the development and implementation of weight management initiatives.

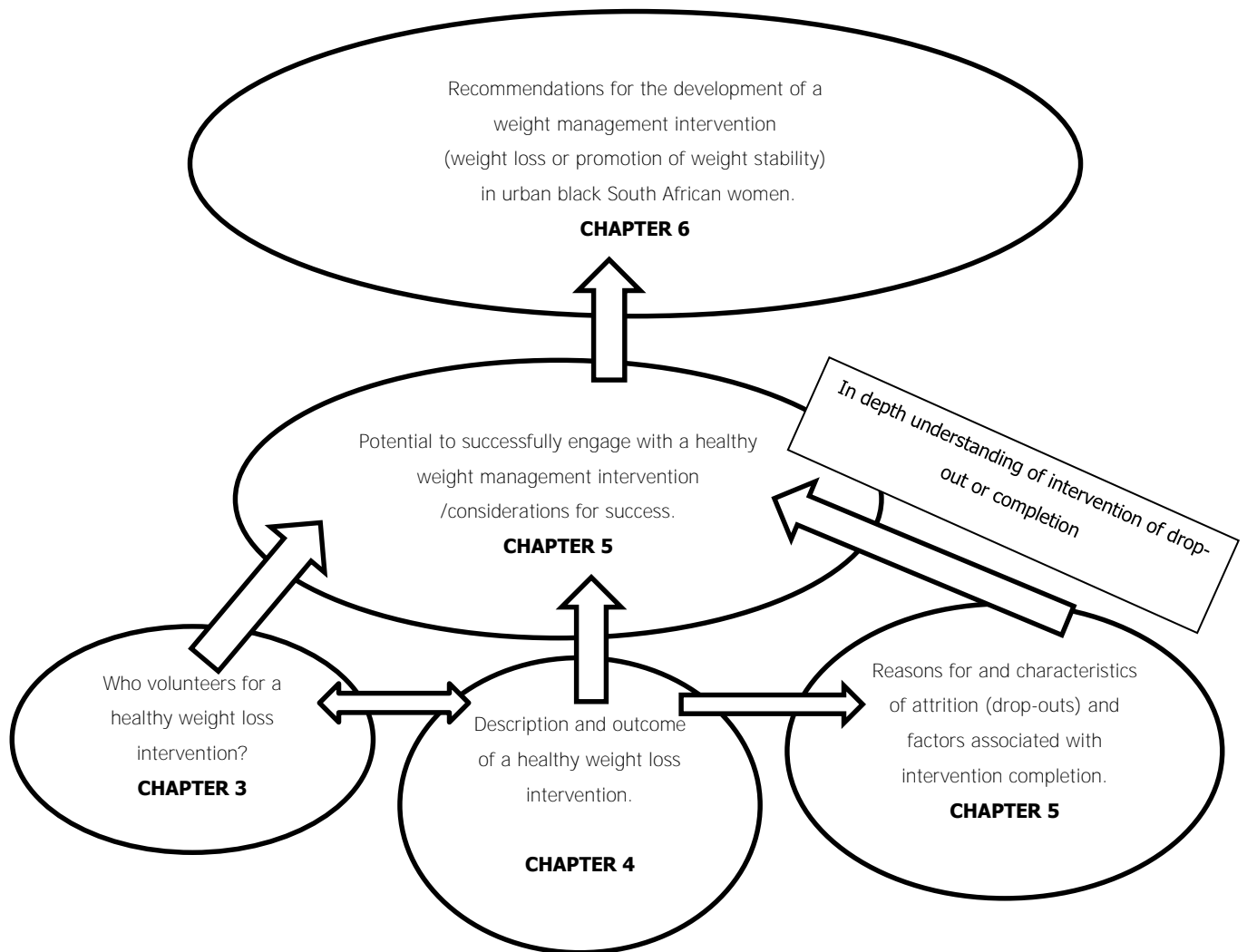


Figure 2.3: An illustration of the theoretical framework that evolved from the literature review

2.12 IDENTIFICATION OF STUDY SAMPLE AND DESIGN FOR THIS RESEARCH

Urban black female overweight/obese women who were recruited for an investigation into the association between genotype and weight loss outcomes in Caucasian and black (Zulu) subjects (Genotype Research) were targeted for this thesis. The sample size for the genotype research was calculated using the results of the study by Corella et al. (2005). These researchers found a significant interaction between a single nucleotide polymorphism and diet intervention outcome (weight loss over a period of 12 months) using a final sample size of 48 obese subjects. Based on this minimum target sample of 50 subjects who completed the full intervention was set. The Genotype Research aimed to compare weight loss using a healthy weight loss diet between genotype groups for particular polymorphisms, and did thus not include a control diet group.

The baseline data of all subjects who were found to be eligible for participation and attended a baseline screening session for the above mentioned research, were included in statistical analysis of the data set to provide insights in research question 1 (Chapter 3). Data collected over the 16 week

intervention period of subjects who chose to participate in the intervention was used to provide insights in research question 2 (Chapter 4). To provide insights in research question 3 (Chapter 5), qualitative investigations were conducted involving those who attended the baseline screening but did not participate in the intervention, subjects who dropped out at various times during the course of the intervention, intervention completers, intervention facilitators, as well as a newly recruited group of women who met the inclusion criteria of the study, but had never attempted weight loss.

2.13 OVERVIEW OF THE RESEARCH QUESTIONS, KEY VARIABLES AND DATA ANALYSES

To orientate the reader to Chapters 3, 4 and 5, a summary of the pertinent research questions, primary variables, assessment methods and key analyses for each of the chapters are depicted in Table 2.7.

Table 2.7: Summary of the primary variables, assessment methods and key analyses for each research question

Chapter and research question	Key variables Assessment methods Hypotheses (where appropriate)	Analyses
<p><u>Chapter 3</u> What is the weight management related profile of overweight/obese treatment-seeking black women?</p>	<p>Questionnaire developed for this research. Study variables included the following: -Socio-demographic and weight status-related variables -BMI and waist circumference -Blood pressure -HDL cholesterol, triglycerides and blood glucose -Dietary assessment intake – three day estimated food record, non-quantified food frequency questionnaire -Physical activity -Eating behaviour -Depression -Self-esteem -General health</p>	<p>In order to develop a profile of subjects at baseline: -Frequency distributions -Mean±SD -Median(IQR) -Kolmogorov-Smirnov used to assess normality of distribution of continuous variables -Two BMI categories were defined to facilitate association assessment -Cross tabulations were constructed and associations tested with the Pearson Chi-square test -Comparison of continuous variables between BMI groups were conducted using independent samples t-test or Mann-Whitney U test -Pearson correlation matrix including all continuous variables</p>
<p><u>Chapter 4</u> What is the outcome of a culturally sensitive healthy weight loss intervention in terms of weight loss, compliance (attendance of intervention sessions, lifestyle changes and attrition?)</p>	<p><u>Primary intervention outcome:</u> There is no change in the primary outcome [weight (BMI)] from baseline to follow-up (at 16 weeks after the implementation of the weight loss intervention). <u>Secondary intervention outcomes:</u> There are no changes in secondary outcome variables (waist circumference, blood pressure, habitual physical activity, psychological well-being and eating behaviour) from baseline to follow-up (at 16 weeks after the implementation of the weight loss intervention) There is no difference between intervention completers and drop-outs for all variables assessed at baseline</p>	<p>Analysis by protocol Pared samples t-test for normally distributed variables Wilcoxon signed rank test for non-normally distributed variables 95% confidence intervals for means to facilitate assessment of the clinical implications of the results</p>
<p><u>Chapter 5</u></p>	<p><u>Core themes investigated</u></p>	<p>Microsoft Word 2007 files</p>

<p>Which factors may explain the outcomes (weight loss, compliance and attrition) of the culturally sensitive healthy weight loss intervention (insights in</p>	<p>Perceived gains related to intervention enrolment Perceptions regarding a healthy weight loss intervention and healthy weight Considerations for success, i.e. enabling factors that promote enrolment, weight loss and curbing intervention drop-out The role of social support in promoting enrolment, weight loss and curbing intervention drop-out Barriers to enrolment, weight loss and factors that contribute to intervention attrition Perceptions of intervention facilitators regarding considerations for success to facilitate the planning of future interventions with a similar target group</p>	<p>imported into NVivo 9 software as primary documents for qualitative data analysis (QSR International).</p>
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Therefore, the research problem formulated for the purpose of this study is to describe the factors and outcomes of a healthy weight loss intervention for overweight/obese treatment-seeking urban Zulu women.

CHAPTER 3

Weight and health status, dietary intake, dieting practices, eating behaviour, physical activity and psychological well-being in urban black overweight/obese treatment-seeking Zulu women

3.1 INTRODUCTION

Data generated by the South African National Health and Nutrition Examination Survey (SANHANES-1) (Shisana et al., 2013) confirms the 1998 and 2003 South African Demographic and Health Survey (SADHS) (Department of Health [DOH], 2004; Puoane et al., 2002) observations that overweight, obesity and central obesity remain significant public health problems in South Africa. The prevalence of overweight in black women was 24.9% and that of obesity 39.9%, while the prevalence of central obesity in this population was **51.1% (≥ 88 cm)**. **It is important to note that black women have the highest prevalence of overweight and obesity across all population and gender groups and the second highest prevalence for central obesity across all non-Caucasian women due to an absence of data for Caucasian females** (Shisana et al., 2013).

Globally, obesity is recognised as a risk factor for NCDs, cardiovascular disease (CVD) and metabolic disorders such as hypertension, stroke, type 2 diabetes mellitus and dyslipidaemias (Lysen & Israel 2012, p470; Brown et al., 2009; Ingelsson et al., 2009; WHO 2009). Central obesity is a risk factor for metabolic syndrome (MetS), which refers to the clustering of central obesity with metabolic risk factors such as raised triglyceride and blood glucose levels, reduced HDL cholesterol levels and raised systolic and/or diastolic blood pressure levels. As a result, it is known to increase the risk for developing CVD and type 2 diabetes mellitus (Lysen & Israel 2012, p470; Mahan et al., 2012, pp533, 765; WHO, 2011). The association between obesity and CVD in South Africans is confirmed by SANHANES-1 (Shisana et al., 2013) which showed that CHD was the main obesity-related co-morbidity and cause of deaths. Research conducted by Walker and co-workers in the 1980s and 1990s, showed that IHD and dyslipidaemia were less prevalent among black South Africans and these researchers proposed that obesity was not associated with NCDs in this population group (Walker et al., 1989). Walker et al. (2001, p368) went on **to state that "evidence suggests that the health disadvantage of obesity in African women is less than that in white women, and would seem to have little influence on their proneness to hypertension, coronary heart disease and breast cancer"**. However, more recent evidence clearly illustrates that overweight/obesity, especially central obesity, is associated with hypertension, stroke, glucose intolerance and type 2 diabetes mellitus in black South African women (Sliwa et al., 2008; Alberts et al., 2005; Faber & Kruger 2005).

A primary approach to the management of obesity co-morbidities is to encourage and facilitate weight loss (Lysen et al., 2012, p471). However, experience shows that successful weight loss and

the maintenance thereof is extremely challenging amongst Africa-American women (Kumanyika et al 2014; Kumanyika et al., 2007; Kumanyika 1993; Kumanyika et al., 1992). At this point in time there is paucity of data on the engagement of black South African women with weight loss interventions. It could be surmised from the prevailing cultural acceptance of a larger body shape and size, social connotations that attach well-being to weight gain, as well as a lack of access to affordable healthy food choices and decreased opportunities for physical activity in urban areas, that incentive for weight loss among these women may be low (Kruger et al., 2005; Puoane et al., 2005a; Puoane et al., 2005b). This was confirmed by SANHANES-1, with 65.5% of black women surveyed, indicating that they were happy with their current weight. On the other hand, 53.0% of their Caucasian, 59.4% mixed-ancestry and 52.4% of Indian counterparts surveyed indicated that they were satisfied with their current weight (Shisana et al., 2013). Similar observations have been documented for African-American women (Allan 1998; Kumanyika 1993; Williamson 1993).

Puoane et al. (2005b) point out that although the majority of urban Xhosa community health workers surveyed was aware of the association between obesity and NCDs, it was unclear whether this would translate into an understanding of the need for, as well as the motivation, to lose weight. A survey targeting Xhosa women of a lower socio-economic status, found that subjects expressed a desire to lose some weight for practical reasons, but did not experience social pressure to motivate weight loss (Mvo et al., 1999). It can thus be argued that facilitation of the acceptance of a smaller body size that is in line with recommendations for health, would need to be a primary focus in weight loss interventions targeting black women to ensure successful weight loss and the maintenance thereof. The very high attrition rates from weight loss interventions targeting African-American women that range from zero to 79% (Bronner & Boyington 2002), may reflect the ambivalent feelings these women have in this regard (Sterling Lynch et al., 2007; Blixen et al., 2006a; Honas et al., 2003). Promotion of successful weight loss amongst black South African women at a public health level would need to contend with these challenges. Having insight into body shape and size perceptions and satisfaction of treatment-seeking black women on entry into a weight loss intervention may thus be necessary to guide the tailoring of these aspects in interventions targeting this population.

Additional characteristics and behaviours of treatment-seeking individuals may also need to be considered in the development and adaptation of interventions. For example, obese treatment-seeking individuals who enter an intervention have been reported to be more likely to be distressed (Fitzgibbon et al., 1993; Fitzgibbon & Kirschenbaum 1991) and depressed (Kim et al., 2007; Werrij et al., 2006; Musante et al., 1998) than those who do not seek treatment. Obese treatment-seeking individuals may also be characterized by impulsivity and low self-esteem (de Zwaan et al., 1994; Wolf & Crowther 1983), body dissatisfaction (Jackson et al., 2000), perfectionism (Pratt et al., 2001), disinhibition (de Zwaan et al., 1994), and loss of control over eating (Darby et al., 2007).

To date, no universal profile of body size and shape perception and satisfaction, life-style indicators and other characteristics of obese treatment-seeking black women enrolled in clinic-based weight loss interventions have been documented. The same holds true for reasons behind attrition (Honas et al., 2003). As a result, Honas et al. (2003) stress the importance of conducting studies that focus on profiling obese treatment-seeking individuals.

It is a matter of course that insight into relevant characteristics and behaviours of obese treatment-seeking black South African women is important, in order to facilitate the development of appropriate and potentially tailored weight management messages (education) and activities to promote progression of a treatment-seeking overweight/obese woman (contemplation phase of the Transtheoretical Model) to the action phase and ultimately successful weight loss (Prochaska et al., 2008). The aim of this phase of the research was to develop a profile of the weight status and related variables, health profile, dieting practices, dietary intake, eating behaviour, physical activity and psychological well-being, in urban black overweight/obese treatment-seeking Zulu women, bearing in 10 weight management-related focus areas identified from the literature (Section 2.10, pp72-77), namely 1) treatment seeking behaviour; 2) weight loss success; 3) compliance to and attrition from weight loss programmes; 4) cultural influences on body shape and size perception and satisfaction; 5) cultural influences on food choices and eating patterns 6) cultural influences on physical activity; 7) environmental factors and social support; 8) appropriateness of the weight loss programme for the target population; 9) dietary restraint, disinhibition, perceived hunger and bingeing and 10) psychological well-being (depression). The association of the investigated characteristics with BMI was also investigated.

3.2 METHODS AND PROCEDURES

3.2.1 Target population and sample

The target population for this cross-sectional phase of the study was treatment-seeking overweight/obese urban Zulu women who completed the baseline assessment of a weight loss intervention after they were found eligible for participation in the study. See Table 3.1 for inclusion and exclusion criteria.

A final convenience sample of 99 subjects completed the necessary assessments. Subjects were recruited by means of newspaper advertisements (see Addendum A) in one English and one Zulu newspaper that are freely available throughout KwaZulu-Natal, a national Zulu radio station, advertisements that were posted on the University of KwaZulu-Natal and Durban University of Technology inner web, personal e-mails to parents of Zulu scholars at two schools and recruitment

sessions at numerous government organisations, three government hospitals, two private companies and by word of mouth.

Table 3.1: Subject inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> • Female gender • Zulu ethnicity • Minimum BMI of 27kg/m² • Urban dwellers • Age 23 to 40 years • Literate (minimum qualification of grade 12) and basic proficiency in English • Socio-economic status: middle to higher income to ensure household food security status and access to essential amenities to implement the intervention effectively 	<ul style="list-style-type: none"> • Pregnant or lactating women • History of major eating disorders • Psychiatric illness • History of drug/alcohol abuse • Patients who receive (or have received within four weeks preceding the intervention) treatment with any drugs for weight loss purposes • Grave's Disease • Age younger than 23 or older than 40 years • Those who had been diagnosed with obesity-related diseases such as diabetes mellitus and Cushing's syndrome • Those who were physically disabled

Potential subjects were screened telephonically or via e-mail to determine whether they met the inclusion criteria for the intervention. Eligible subjects were then invited to attend a session to obtain informed consent (**see Addendum B**) and to verify that they met the inclusion criteria of the study. As one of the inclusion criteria for the intervention English proficiency, the informed consent form was not translated into Zulu. However, fieldworkers (registered dieticians and nutritionists) who are proficient in both English and Zulu were present to explain the consent form to participants where necessary.

3.2.2 Measures

Anthropometric measures

Weight was measured to the nearest 0.1 kg with subjects wearing no shoes and light indoor clothing after voiding the bladder. A digital electronic scale with a 250 kg capacity and a platform size of 305 mm x 305 mm to accommodate subjects with large feet was used. The scale was placed on a firm surface and calibrated with a five kg weight before each weighing session. Weight measurements were repeated twice and the average of the two measurements was recorded.

Free standing height was measured in metres (to the nearest 0.1 cm) with a standard stadiometer and subjects wearing no shoes. Subjects were requested to remove headgear, undo pony tails or hair extensions (where possible) and to look straight ahead while their head was positioned in the Frankfort horizontal plane. Where necessary, a knitting needle was gently inserted through the hair of a subject to ensure that the identification of the top of the head was accurate. Subjects stood with

their feet together, while heels, buttocks, scapulae and back of the head touched the vertical surface of the stadiometer where possible. They were requested to breathe in while their height was taken. This measurement was repeated three times and the average of the values was recorded.

BMI was calculated as weight (kg)/height (m²). Classification of BMI was done according to the categories suggested by the WHO (2004b) namely pre-obese (25.00-29.99 kg/m²), obese class I (30.00-34.99 kg/m²), obese class II (35.00-39.99 kg/m²) and obese class III (≥ 40.00 kg/m²) (WHO 2004b).

Waist-circumference was measured to the nearest 0.1 cm using a two metre, non-elastic measuring tape. Subjects were requested to wear a top and skirt or pants (i.e. no dresses) to facilitate the accurate recording of this measurement. The measure was taken at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest (hip bone) while the tape measure was positioned horizontally, irrespective of whether the umbilicus was above or below the tape (WHO, 2004b). Two fieldworkers were involved in taking of the waist measurement to ensure that the measuring tape was horizontal. The measures were repeated three times and the average of the values was recorded.

Blood pressure

Blood pressure was measured in a quiet place with subjects in a relaxed, seated position. An electronic automatic blood pressure monitor with dual measuring technology and an obese cuff (32-42 cm) was used. Care was taken to ensure that the cuff tube was placed in the centre of the elbow bend on the artery so that the lower edge of the cuff was approximately 2-3 cm from the antecubital fossa. The cuff fitted firmly, but not too tight, allowing two fingers to be inserted between the arm and the cuff. **The subject's arm was placed on a table with the palm relaxed and facing upwards.** In addition, it was ensured that the cuff was at the level of the heart. Subjects were requested not to talk or move during the procedure. Two measurements were taken on the naked right upper arm after subjects were at rest for at least five minutes. A stethoscope was used to verify the accuracy of **the monitor's reading as some subjects were** so obese that multiple readings had to be taken in order to document a mean blood pressure value. Subsequently the average of the two values for the systolic and diastolic measures was recorded to the nearest mmHg.

Biochemical measures

Fifteen ml of blood was collected from each subject from the vena cephalica by a trained phlebotomist before subjects went to work in the morning. Venepuncture was performed using a **plastic tube holder, a tourniquet, Precision Glide needles™ and 70% alcohol swabs,** with whole blood drawn into commercially available pre-vacutained tubes. A five ml silicon coated glass tube was used to prepare serum for analyses of fasting serum glucose, serum triglyceride and serum high-density

lipoprotein (HDL) cholesterol. After venepuncture, the blood in the tubes was allowed to clot for 20 minutes at room temperature, followed **by centrifugation at 2800 x g for 20 minutes in order for the serum to separate. Serum samples were frozen at -72° C in Eppendorf® vials. The serum HDL-cholesterol, serum-triglyceride and serum blood glucose levels were measured using standardised commercially available enzymatic colorimetric methods using the cobas® c311 automatic blood chemistry analyser (Ampath Pathologists® 2012).**

Serum total cholesterol: Serum total cholesterol was determined using an enzymatic colorimetric test. The method was performed using reagents supplied by Roche Diagnostics GmbH, Mannheim, Germany (cat. no 1491458). Cholesterol is determined enzymatically using cholesterol esterase and cholesterol oxidase. Cholesterol esters are cleaved by the action of cholesterol esterase to yield free cholesterol and fatty acids. Cholesterol is then converted by oxygen with the aid of cholesterol oxidase to cholest-4-en-3-one and hydrogen peroxide. Hydrogen peroxide created forms a red dye by reacting with 4-aminophenazone and phenol under the catalytic action of peroxidase. The colour intensity is directly proportional to the concentration of cholesterol, and can be determined photometrically. This method was calibrated against the Calibrator for Automated Systems (cat. no. 759 350, Roche Diagnostics GmbH, Mannheim, Germany). Precinorm U /normal values (cat. no. 171 735, Roche Diagnostics GmbH, Mannheim, Germany) and Precipath U /abnormal values (cat. no. 171 760, Roche Diagnostics GmbH, Mannheim, Germany) were used as control serum. The CV for the method was 0.33% (Ampath Pathologists® 2012).

HDL-Cholesterol: HDL-cholesterol (HDL-C) concentrations are usually determined in most clinical laboratories using the Friedewald calculation. This approach has several limitations and may not always meet the current total error recommendation in **HDL-C measurement of ≤12%**. HDL was determined using a standardised homogeneous HDL-C assay (HDL-CRoche; Roche Diagnostics, Indianapolis, IN) in which HDL is mixed with polyanion, amphoteric surfactant and an Enzyme-Colour Reagent. The reagents protect HDL against enzymatic breakdown, when a mixture of cholesterol oxidase and cholesterol esterase is further added to the sample. Hydrogen peroxide produced by the enzymatic reactions with non-HDL cholesterol is decomposed by catalase in the reagent. A second reagent is added, which contains sodium azide and removes the protective agent from HDL. The HDL is then enzymatically broken down, with the formation of hydrogen peroxide, which reacts with the chromogen. The intensity of the blue colour complex produced is measured spectrophotometrically at 400nm and the concentration of HDL calculated when compared with the absorbance of aHDL-C Calibrator (Ampath Pathologists® 2012).

Serum triglycerides: Serum triglyceride concentration was determined by using a colorimetric assay supplied by Roche, Diagnostics, Germany (cat. no. 1730711). The method is based on the work by Wahlefeld using a lipoprotein lipase from micro-organisms for the rapid and complete hydrolysis of

triglycerides to glycerol, followed by oxidation to dihydroxyacetone phosphate and hydrogen peroxide. The hydrogen peroxide thus reacts with 4-aminophenazone and 4-chlorophenol under the catalytic action of peroxidase to form a red dye (Trinder endpoint reaction). The method was calibrated against the Calibrator for Automated Systems (cat. no. 759 350, Roche Diagnostics GmbH, Mannheim, Germany). Precinorm U /normal values (cat. no. 171 735, Roche Diagnostics GmbH, Mannheim, Germany) and Precipath U /abnormal values (cat. no. 171 760, Roche Diagnostics GmbH, Mannheim, Germany) were used as control serum. The CV for this method was 1.3% (Ampath Pathologists® 2012).

Serum glucose: Serum glucose was determined in duplicate by using an enzymatic colorimetric assay (Glucose GDO-PAP; Roche Diagnostics GmbH, Mannheim, Germany; Cat. no. 1448668) on the Roche/Hitachi 902 auto analyser. This method is based on the oxidation of glucose to gluconolactone in the presence of atmospheric oxygen. The resultant hydrogen peroxide oxidises 4-aminophenazone and phenol to 4-(p-benzoquinone-monoimino)-phenazone in the presence of peroxidase (POD). The colour intensity of red dye is directly proportional to the glucose concentration, and can be measured photometrically. This method was calibrated against the Calibrator for Automated Systems (cat. no. 759 350, Roche Diagnostics GmbH, Mannheim, Germany). Precinorm U/normal values (cat. no. 171 735, Roche Diagnostics GmbH, Mannheim, Germany) and Precipath U/abnormal values (cat. no. 171 760, Roche Diagnostics GmbH, Mannheim, Germany) were used as control serum. The CV for the method was 1.41 % (Ampath Pathologists® 2012).

In all instances, Ampath Pathologists® (2012) made use of commercially available control samples that cover both the low and high concentration ranges for all measured variables.

Diagnosis of Metabolic syndrome (MetS)

The NCEP ATP III criteria (National Cholesterol Education Programme Adult Treatment Panel III) for the diagnosis of the MetS (Alberti et al., 2009; Alberti et al., 2005) (see Table 3.2) were used to determine the prevalence of each of the included MetS indicators, as well as the syndrome as such.

Table 3.2: NCEP ATP III criteria for the diagnosis of the metabolic syndrome* in women

Indicator	Cut-off
Waist circumference	≥88 cm
Fasting plasma triglycerides	≥ 1.69 mmol/l
HDL cholesterol	< 1.24 mmol/l
Blood pressure	≥ 130 and/or ≥85 mmHg**
Fasting glucose	≥6.1 mmol/l

Source: Grundy et al. (2004)

* Diagnosis of metabolic syndrome: Presence of any combination of three of the listed indicators.

** Subjects with elevated systolic and diastolic blood pressure levels were only tallied once, even if both measures of blood pressure were elevated.

Dietary intake assessment

The researcher engaged with experts in dietary intake methodology to identify the most appropriate methods to assess the dietary intake of subjects in the study. A three day estimated food record was used to estimate total energy and macronutrient intake (**see Addendum D**). A non-quantified food frequency questionnaire (Harbron et al. 2014) (included in the survey questionnaire, **see Addendum C**) was used to investigate the usual frequency of intake of healthy foods (fruit and vegetables) and poor food choices (high fat foods, energy dense snacks and energy-dense drinks). The meal pattern of subjects was assessed by determining the frequency of intake of meals (breakfast, lunch and supper) and snacks (before breakfast, between meals and after supper) (included in the survey questionnaire, **see Addendum D**).

Three day estimated food record

The three day food record (**see Addendum D**) and portion size guide booklets developed by Senekal and Harbron (Harbron et al., 2014) for use in similar research conducted on overweight/obese Caucasian women were used in this research to determine total energy and macro-nutrient intake. Scale line graphs of food portion sizes in the portion size guide booklet were reproduced from the Food Photo Manual (Senekal & Steyn 2004). An additional food portion guide was developed by the researcher based on well-known household objects such as match boxes and light bulbs as a source of reference when estimating portion sizes (**see Addendum E**). Strengths and weaknesses of an estimated food record are reported in Table 3.3.

Table 3.3: Strengths and weaknesses of an estimated food record (prospective, quantitative method method)

Strengths	Weaknesses
<ul style="list-style-type: none"> • Greater precision in determining quantitative information • Less reliance on memory • Widely used method • Lower respondent burden than weighed food diaries 	<ul style="list-style-type: none"> • Underreporting of true intake • Reporting bias due to recording of intake (observation effect) influencing respondent's usual food choices during recording period • Observation effect appears to have macronutrient specificity in that women reduce their fat intake • Misreporting changed eating behavior (reporting effect) • Reporting effect does not appear to be macronutrient specific • Estimation of portion sizes • Sensitivity and specificity of the Goldberg cut-offs is poor at detecting a change in eating behavior as subjects appear to demonstrate observation and reporting effects at all times

Sources: Wrieden et al. (2003); Trabulsi & Schoeller (2001).

Potential limitations of the estimated food record to determine energy and nutrient intake in the current study sample were addressed through the following measures: Subjects received individual instruction from trained Zulu fieldworkers on how to complete the estimated food record booklet

accurately using the two portion size estimation guides (**see Addendums D and E**). On return of the completed estimated food records, they were checked by fieldworkers to identify ambiguous or vague recordings. Subsequently subject clarification was sought to ensure that food and beverage intake was recorded as accurately as possible. All food records were captured by a dietician experienced in capturing food records using the South African Medical Research Council (MRC) Foodfinder 3 software program (WAM Technology© and MRC RISD, 2001).

In order to obtain an indication of under-reporting in this study sample, the Goldberg cut-off method (Black 2000; Goldberg et al., 1991) was used. Samuel-Hodge et al. (2004) explain that the concept of energy under-reporting is based on the principle that in the presence of a stable weight, reported energy intake (EI) should equal total energy expenditure (TEE) or the ratio of EI:TEE should be equal to 1. When $EI < TEE$ the EI:TEE ratio is < 1 and reflects under-reporting. TEE in our study was calculated using the Estimated Energy Expenditure Prediction Equation for overweight and obese **women 19 years and older (BMI ≥ 25 kg/m²)** (Ireton-Jones, 2012, p28). An estimated physical activity level (PAL) for light activity of 1.55 was used in this calculation based on evidence from a South African study that suggested that urban women engage in light occupational activity (Kruger et al., 2002).

The cut-off of $EI:TEE < 0.79$ applied by Samuel-Hodge et al. (2004) to validate the reported EI in obese African-American women with type 2 diabetes (mean age: 59 years, mean BMI: 35 kg/m²) against TEE (assessed using acceleometry), and the cut-off of EI:TEE of 1.05 applied by Mchiza et al. (2010) to validate reported EI in a local sample of 31% black, 38% mixed ancestry and 31% Caucasian women (mean age: 40 years; mean BMI: 33.6 kg/m) against TEE (calculated using standard Schofield equations and PAL of 1.55) were applied independently to identify under reporters. The cut-off applied by Samuel-Hodge et al. (2004) represents the lower 95% CI of the ratio of EI:TEE where TEE was measured by doubly labelled water (Black et al., 2001; Black et al., 1997); while the cut-off applied by Mchiza et al., (2010) represents the 95% CI employed by Goldberg et al. (1991) and Black (2000).

Non-quantified food frequency questionnaire

The non-quantified food frequency developed by Harbron and Senekal (Harbron et al., 2014) to screen for the frequency of intake of healthy and unhealthy foods in overweight/obese Caucasian subjects was used in this study (**see Addendum C**). The food list was adapted by a team of Zulu dietitians to include locally available and cultural foods. The final food list included 67 food items allocated to nine food groups. These groups include starches (nine items); vegetables (three items); fruit (four items); milk and milk products (five items); meat, fish and chicken (13 items); fats (four items); fast foods and take-away foods (five items); snack foods, sweets and condiments (15 items); and drinks (non-alcoholic) (nine items). These nine groups were collapsed into four groups reflective

of poor food choices that may contribute to the development of obesity, namely high fat foods, energy dense snacks and energy-dense drinks (Black & Macinko 2008; Malik et al., 2006), as well as healthy food choices, namely fruit and vegetables (Table 3.4).

Table 3.4: Food groups generated from the non-quantified food frequency to screen for healthy-and poor food choices

Healthy/poor food group	Food groups from the original 9 groups included	Detail regarding food items included in the specified food groups
Poor food choices		
High fat foods	Starches	Potato: cooked, baked, mashed with fat added or potato salad
	Milk and milk product group	Full cream milk; yoghurt; maas; coffee creamer; cheese
	Milk substitutes	Coffee creamer;
	Meat, fish, chicken	Schnitzels; cordon bleu; red meat with visible fat eaten; chicken/turkey with skin; fried fish; sausages: Vienna's, Russians, frankfurter; bacon and processed cold meat; eggs: scrambled, baked, omelets
	Fats	Soft margarine; butter/hard margarine; salad dressing/mayonnaise (not fat reduced)
	Take-away foods	Pizza; pies; sausage rolls; potato chips; Kentucky fried chicken; hamburgers
	Other	Cheese sauce,; white sauce; meat sauce; chocolate spread
Energy-dense snacks (high fat and carbohydrate snacks)	Other	Vetkoek; samosas; koeksister; doughnuts; muffins; scones; cake; tart; cookies; chips; energy bars; health bars; breakfast bars; chocolate; ice cream; sweets
Energy-dense drinks (non-alcoholic)	Drinks	Juice; fizzy soft drinks; energy drinks; milk shake
Healthy food choices		
Vegetables		Cooked vegetables: any type (no sugar/fat/sauce added); vegetables; any type prepared with sugar/fat/sauces e.g. white sauce; mixed salad: lettuce, cucumber, tomato, peppers, onions, mushrooms, carrots in any combination or alone.
Fruit		Fresh fruit (any type); dried fruit (any type); fruit juice; fruit salad: fresh or canned.

The recall period for the food frequency was the past month. Frequency categories included number of times consumed per day, per week, per month or never/less than once per month. Results were expressed as the daily frequency of consumption of items in each of the five food groups depicted in Table 3.4. The aggregate frequency of consumption of foods in each food group was used for these

purposes. Strengths and weaknesses of a non-quantified food frequency questionnaire are reported in Table 3.5.

Table 3.5: Strengths and weaknesses of a non-quantified food frequency questionnaire (retrospective method)

Strengths	Weaknesses
<ul style="list-style-type: none"> • Ability to capture intake of infrequently consumed nutrients, ingested with a high degree of intra-individual variability • Free of reporting bias • Suitable for large scale surveys • Self-administered • Captures habitual intake of a range of foods • Low respondent burden 	<ul style="list-style-type: none"> • Random error due to poor recollection of past diet • Systematic error due to underreporting of true intake • Difficulties implicit to calculating absolute nutrient intake • Possible over-reporting of “healthy” foods such as fruit and vegetables

Sources: Wrieden et al. (2003); Trabulsi & Schoeller (2001)

Limitations of the non-quantified food frequency questionnaire were addressed through the following measures: Items included in the food item list were appraised and adjusted by the researcher and a team of Zulu fieldworkers to ensure that traditional Zulu foods in the specified categories were included in the list and ensure that other foods- **and fast foods eaten by the Zulu’s** were included to address cultural sensitivity. At least one Zulu speaking dietitian was present while subjects completed the self-administered non-quantified food frequency questionnaire to offer assistance and check that each frequency category was completed.

Survey questionnaire

A structured, self-administered questionnaire was developed for the purpose of the study. This process commenced with the development of a theoretical framework of weight management-related concepts based on an extensive review of the literature. This framework was presented to an expert panel for review and comment to ensure construct and content validity, after which the concepts/variables to be assessed were finalised. The questionnaire (**see Addendum C**) covered socio-demographic information, weight status related variables, dietary practices (meal pattern and the non-quantified food frequency), habitual physical activity, eating behaviour, general psychological wellbeing, self-esteem and depression. Published, validated instruments were used to assess habitual physical activity, eating behaviour, general psychological wellbeing, self-esteem and depression.

Socio-demographic and weight status-related variables

Socio-demographic information covered in the questionnaire included age, marital status, highest level of education attained, parity and living arrangements. Weight-related variables included perception of and satisfaction with current weight, personal weight history (during childhood and adolescence), period of most weight gained after completion of secondary education, dissatisfaction with specific body parts, history of weight loss attempts during the past two years and the type of weight loss strategies employed. The latter were classified as healthy (following a balanced slimming

diet, increasing physical activity, eating less or nothing between meals, and joining Weigh-less) and unhealthy (skipping of one or more daily meals, using appetite suppressants, diet formulas, milkshakes and powders). Other variables assessed included fear of gaining weight, having negative social experiences regarding weight status, frequency of weight monitoring, longest period for being on a continuous weight reducing diet, desired current body weight, weight retained for the longest period after the age of 20 years, age at first dieting attempt and maximum weight ever lost on a diet.

The questions included in this section were based on those developed by Harbron and Senekal following the process described above for the research conducted on Caucasian subjects who embarked on a healthy weight loss intervention (harbron et al., 2014). The questions used by Harbron et al. (2014) were reviewed by the researcher and a team of Zulu facilitators to ensure appropriateness for use in this research.

Physical activity

Physical activity was assessed using the Baecke Questionnaire of Habitual Physical Activity (BQHPA) developed by Baecke et al. (1982). This questionnaire was also used in a local study by Kruger et al. (2002) to investigate the association between overweight/obesity and physical activity in black South African women. The instrument consists of 16 questions and measures three components of physical activity, namely work-related physical activity, sport during leisure time and physical activity during leisure time, excluding sport (Florindo et al., 2006). The score for the work index is calculated from the first eight items (minimum score 7; maximum score 35), sport index from items nine to 12 (minimum score score 3; maximum score 15) and leisure-time index from items 13 to 16 (minimum score 4; maximum score 20). All items except items one and nine, are answered by choosing one of **five response options namely "never", "seldom", "sometimes", "often" or "always/very often". Scoring** is based on a five-point Likert scale with the maximum score for each of the three indices being five and a minimum score of one (Cuppett & Latin 2002). A high score reflects higher levels of physical activity (Choh et al., 2009). The questionnaire was developed, calibrated and tested for reliability using men and women between the ages of 20 to 32 years from a Caucasian population in the Netherlands (Baecke et al., 1982). According to Sternfeld et al. (1999) short-term test and retest reliability of the BQHPA is good. The BQHPA has subsequently been widely used over the past 20 **years in physical activity research (Currie et al., 2009; Tehard et al., 2005). The Cronbach's alpha of** the BQHPA for the current study sample yielded an overall value of 0.644, which is indicative of moderate internal reliability. Results generated by this questionnaire should thus be interpreted with caution.

Eating behaviour

The Eating Inventory (Three-Factor Eating Questionnaire [TFEQ]) developed by Stunkard & Messick (1985) was used to assess eating behaviour. The questionnaire was specifically developed for

assessment of obese populations (Anglé et al., 2009; Karlsson et al., 2000) and consists of 51 items that cover three dimensions of eating behaviour, namely cognitive restraint (21 items); disinhibition (16 items); and perceived hunger (14 items) (Anglé et al., 2009; Bond et al., 2001; Karlsson et al., 2000) (Table 3.6). The response to each question is rated as zero or one and then summed for all items. Higher scores denote higher levels of restrained eating, disinhibited eating and perceived hunger, respectively (Bond et al., 2001). The dimensions and constructs of eating behaviour measured by the TFEQ are summarized in Table 3.6.

Table 3.6: Dimensions and constructs of eating behaviour measured by the TFEQ and Cronbach’s alpha values for our study sample

Dimensions and constructs		Cronbach’s alpha for the study sample
Cognitive restraint of eating	Strategic dieting behaviour	0.782
	Attitude to self-regulation	
	Avoidance of fatty foods	
Disinhibition of eating	Habitual susceptibility	0.726
	Emotional susceptibility	
	Situational susceptibility	
Perceived hunger	Internal locus of hunger	0.805
	External locus of hunger	

Source: Bond et al. (2001)

Findings by Karlsson et al. (2000); Hyland et al. (1989) and Ganley (1988) confirmed the construct validity of the cognitive restraint and hunger factors of the TFEQ across different samples, including obese subjects, while disinhibition and hunger are unstable and require further testing. The internal reliability (Cronbach’s alpha) of the three TFEQ subscales for the current study sample are reported in Table 3.4. These values are indicative of acceptable internal reliability across the three dimensions of eating behaviour.

Depression

The presence of depression was assessed using the Beck Depression Inventory (BDI) developed by Beck & Baemesderfer (1974). The inventory consists of 21 items (Sharp & Lipskey 2002) and was originally developed to measure the intensity or depth of depressive symptomatology in adults and adolescents. However, it is now widely used as a screening tool to detect depression in clinical practice and research (Lasa et al., 2000; Nuevo et al., 2000; Beck et al., 1996), as well as in primary health care settings (American Psychiatric Association 2013). It enables screening for the presence of depression at a low cost, is easy to use (Sharp & Lipskey 2002) and takes five to ten minutes to complete (American Psychiatric Association, 2013). The BDI frames questions **within “the past two weeks, including today”**. For each item on the questionnaire subjects can choose one of four possible statements that best describe their feelings. A four-point Likert scale is used to score the responses ranging from zero for the absence of depressive symptoms or least depressive statements to three for the most depressive statement. The presence of depression is confirmed by a score ≥ 21 , with higher

scores reflecting more severe depressive symptoms while a score of ≤ 21 is not indicative of depression (American Psychiatric Association 2013; Sharp & Lipskey 2002; Beck et al., 1996). For the purpose of this study, the revised BDI-second edition (BDI-II) that was developed from the original BDI and BDI-IA versions to assess depressive symptoms corresponding to the criteria listed in the DSM-5-Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association 2013) was used.

Lasa et al. (2000) investigated the performance of the BDI as a screening tool for depression in a community survey and confirmed the predictive value of the selected cut-off point of the BDI as well as the fact that it has 100% sensitivity, 99% specificity and 98% overall diagnostic value. After conducting a five-country (n=7934) epidemiological study on depression using the BDI, Nuevo et al. (2000) supported the factorial validity of the BDI. The construct validity of the BDI was confirmed by **Schotte et al. (1997). Calculation of Cronbach's alpha for our current study yielded a value of 0.862,** indicating that the BDI has acceptable internal reliability for the current study sample.

Self-esteem

The Rosenberg Self-Esteem Scale (RSES) developed by Rosenberg (1965) was used to assess self-esteem. According to Schmitt & Allik (2005) and Gray-Little et al. (1997), the RSES is the most widely used instrument for the assessment of self-esteem. It is a 10 item Likert-type scale where the **response to each question can be answered with "strongly agree" (score=1), "agree" (score=2), "disagree" (score=3), or "strongly disagree" (score=4). A score of ≤ 15 indicates low self-esteem,** while a higher score is indicative of a higher level of self-esteem (Psychological Science 2011; Gullette & Lyons 2006). The RSES has practical advantages in that it requires a basic level of literacy, takes only a few minutes to complete (Schmitt & Allik 2005; Gray-Little et al., 1997), the item content is related to the construct, it possesses face validity and an acceptable to high level of internal reliability (Lo Coco et al., 2011; Schmitt & Allik 2005; Corwyn 2000).

Comparison of the results of the administration of the RSES in 53 nations that included Botswana, Demographic Republic of Congo, Ethiopia, Tanzania, USA and Zimbabwe, showed that the RSES factor structure was largely invariant across nations, thereby providing evidence for cross-cultural equivalence (Schmitt & Allik 2005). However, negatively worded items were interpreted differently across nations, leading the authors to conclude that direct cross-cultural comparisons using the RSES **may have limited value. The Cronbach's alpha of the RSES our study yielded a value of 0.815,** indicating that the RSES has acceptable internal reliability for the current study sample.

General Health

For the purpose of this study the 30-item General Health Questionnaire (GHQ) (Goldberg et al., 1976) that was derived from the original 60-item version was used. The 30-item self-administered GHQ

developed by Goldberg et al. (1976) differentiates between psychiatric patients as a general class from those who consider themselves to be well and was used to assess general psychological well-being. For each of the 30 items on the GHQ, subjects are asked to compare their recent state to their usual state by selecting one of four possible answers: **"not at all" (score=0), "same as usual" (score=0), "rather more than usual" (score=1) and "much more than usual (score=1).** A total score of zero to 30 can be obtained with a higher score being indicative of poorer mental health. A higher score is also **associated with a greater inability to carry out one's normal "healthy" functions** (Goldberg 1972).

The main shortcoming of the GHQ is the possibility that subjects with long-standing psychiatric disorders, such as those with a psychiatric illness spanning over several years, may obtain a low score **due to the nature of the response scale, i.e. subjects may select the "same as usual" option for most** questions and therefore not obtain a high score, despite having a psychiatric disorder (Goldberg et al., 1976). However, this was not considered to be a limitation for this study, as potential participants with **self-reported psychiatric disorders were excluded from the study (see Table 3.1).** The Cronbach's alpha our study yielded a value of 0.845, indicating acceptable internal reliability for this study sample.

3.2.3 Pilot study

The final questionnaire was appraised and revised by a panel of Zulu dieticians where necessary (excluding the above described published instruments), to ensure cultural sensitivity, after which it was pilot tested for content, readability, comprehension and self-administration. The pilot study involved 10 overweight/obese Zulu women who met the inclusion criteria stated for this study. No changes were made to the questionnaire as subjects understood, and were able to complete all questions satisfactorily, thereby reflecting good face validity.

3.2.4 Data-collection procedures

Subjects who met the inclusion criteria for the study (see Table 3.1) and completed the consent form (see Addendum B) during the initial screening session, were weighed and their height was measured **to confirm a BMI of $\geq 27\text{kg/m}^2$.** Eligible subjects subsequently completed the measures that were described under section 3.2.2., excluding the three day food record booklet and collection of blood samples during the screening session. A total of 16 screening sessions were conducted by Zulu speaking fieldworkers (registered dieticians) to assist subjects in their vernacular. Screening sessions were conducted in a designated venue at the University of KwaZulu-Natal, Durban University of Technology and other suitable sites in Durban and Pietermaritzburg.

All anthropometric measurements were taken behind a screen or in an adjacent venue to ensure subject privacy. After completion of the assessments, the three day estimated food record booklet (see Addendum D) and portion size guides (see Addendum E) were given and explained to subjects. They also received a pathology screening form, instructions regarding fasting to enable the collection of a suitable blood sample for screening and information on how to locate the pathologist closest to their place of work/residence. Before subjects left the screening venue, fieldworkers checked their completed questionnaires for missing values and ambiguous responses.

3.2.5 Fieldworker recruitment and training

All fieldworkers (n=10) were registered dietitians and included seven Zulu, two Caucasian, and one Indian female. Fieldworkers attended a two day training session conducted by the researcher and a level three anthropometrist (International Society for the Advancement of Kinanthropometry [ISAK]), to ensure that they were competent to conduct the anthropometric measurements according to ISAK standards. Fieldworkers were also given time to familiarise themselves with the study questionnaires. The extensive training of the fieldworkers was essential to ensure reliability of the data.

3.2.6 Data capturing, processing and statistical analysis

The process of duplicate data entry was applied with the primary researcher and a research assistant, capturing the data independently using the latest version of PASW computer software (SPSS Version 22). Subsequently, the two data sets were compared and cleaned to address any anomalies within each **subject's data set**.

For descriptive purposes, frequencies were tallied for categorical variables and means \pm SD or median inter quartile range (IQR) were calculated for continuous variables, depending on normality. The Kolmogorov-Smirnov statistic was used to assess the normality of the distribution of continuous variables, with a non-significant result ($p>0.05$) reflecting normality.

To investigate the association between BMI and select variables, two BMI categories were defined based on WHO criteria (WHO 2004b, p9), namely group 1: Pre-Obese and Obese class I (Pre & ObI) and group 2: Obese class II and Obese class III (ObII & ObIII), respectively. For comparison of categorical variables between the two BMI groups, cross tabulations were constructed and associations (differences in group profiles) tested with the Pearson Chi-square test. To test the null hypothesis of no difference between the two BMI groups, for continuous variables, the independent samples t-test was used for normally distributed variables and the Mann-Whitney U test for non-normally distributed variables. To further assess possible associations between continuous variables

and BMI, the Pearson's correlation coefficient was calculated. Significant correlations (p and r values) are reported as footnotes to tables. A p-value <0.05 was considered as statistically significant.

3.2.7 Data quality control

Reliability

Reliability relates to whether a particular technique, applied repeatedly to the same object, would yield similar results every time. However, it does not ensure accuracy or validity (Babbie & Mouton 2008; Katzenellebogen & Joubert 2007). In the current study, internal reliability of the published instruments was assessed using the Cronbach's alpha, which indicated acceptable internal reliability for all the instruments with the exception of the BQHPA for which the Chronbach's alpha is not indicated.

Reliability of the socio-demographic and weight history sections of the questionnaire was ensured by the compilation of an extensive theoretical framework covering these concepts and subsequent expert consultation to confirm core concepts to be covered in the questionnaire. The food list included in the non-quantified food frequency questionnaire was developed by an expert panel that considered the literature, foods most commonly consumed by South Africans and existing food frequency questionnaires. Both the questionnaire and the non-quantified food frequency questionnaire (**see Addendum C**) were appraised by a panel of Zulu dietitians to ensure cultural sensitivity. The use of registered dietitians as fieldworkers, extensive training of these fieldworkers in accordance with internationally standardised and recognised measurement techniques, pilot testing of the questionnaire, thorough checking of questionnaires after subject completion, training of subjects in the accurate completion of the estimated three day record using culturally sensitive portion size guides, thorough checking of the records following submission, as well as repeating anthropometric and blood pressure measurements. Double data entry limited data entry errors.

Validity

Validity refers to the extent to which research conclusions are sound, as well as the level to which documented data adequately reflects the actual meaning of the concept under investigation (Babbie & Mouton; Van der Riet & Durrheim 2008; Katzenellebogen & Joubert 2007). As indicated in the section on measures, the published instruments used in this research were validated for various groups. It needs to be borne in mind that validity in one group does not necessarily imply validity in another. The data generated by these instruments therefore need to be interpreted within the context of this limitation. Construct, content, and face validity of the socio-demographic, weight history and non-quantified food frequency sections of the questionnaire were ensured by the construction of the mentioned theoretical framework, consultation with experts, appraisal by Zulu dietitians and pilot testing. The relative validity of the non-quantified food frequency questionnaire

was not assessed. As a result, the data generated by this questionnaire should be interpreted as trends that would need confirmation. As mentioned earlier, in order to obtain an indication of under-reporting in this study sample, the Goldberg cut-off method (Black 2000; Goldberg et al., 1991) was applied.

3.2.8 Ethical considerations

Ethical approval was obtained from the Human Research Ethics Committee of the Faculty of Health Sciences at the University of Cape Town (HREC REF: 464/2006). The research was conducted according to international and locally accepted ethical guidelines for research, namely the Declaration of Helsinki and Guidelines on Ethics for Medical and Genetic Research of the Medical Research Council of South Africa. After being thoroughly informed, each subject signed a consent form (**see Addendum B**).

3.3 RESULTS

3.3.1 Socio-demographic profile

Thirty eight point four percent of the sample had a BMI ≥ 27 and < 35 (Pre-Ob and ObI group) and 61.6% a BMI ≥ 35 . The mean age of the sample was within the range stipulated by the inclusion criteria, with those in the ObIII & ObIII group being significantly older than those in the Pre-Ob & ObI group. Almost two thirds of the sample was unmarried; the majority had a tertiary education and less than a third lived with a husband/partner. There were significant associations between BMI and any of the other socio-demographic variables (see Table 3.7).

Table 3.7: Socio-demographic profile for the total group and by BMI groups.

Variables	Total group N=99		Pre & Ob _I n=38		Ob _{II} & Ob _{III} n=61		p
	n		n		n		
Age (years): mean ± SD	99	31.4 ± 5.4	38	29.86 ± 4.9	61	32.4 ± 5.5	0.019†
Marital status: column %							0.770‡
married	22	22.2	9	23.7	13	21.3	
unmarried	66	66.7	26	68.4	40	65.6	
divorced/separated	8	8.1	1	2.6	7	11.5	
no response	3	3.0	-	-	-	-	
Highest level of education: column %							0.297‡
with matric	16	16.2	8	21.1	8	13.1	
with tertiary education	83	83.8	30	78.9	53	86.9	
Living arrangements: column %							0.311‡
alone	15	15.2	4	10.5	11	18.0	
with parents	41	41.4	17	44.7	24	39.3	
with your partner	27	27.3	10	26.3	17	27.9	
no response	16	16.1	-	-	-	-	
Number biological children: mean ± SD	99	1.4 ± 1.4	38	1.3 ± 1.5	61	1.4 ± 1.3	0.311†

Pre = preobese; Ob_I = Obese class I; Ob_{II} = Obese class II; Ob_{III} = Obese class III

† Independent samples t-test: Pre & Ob_I vs Ob_{II} & Ob_{III}

‡ Pearson's chi-squared test: Pre & Ob_I vs Ob_{II} & Ob_{III}

Pearson correlation coefficient for correlation between age and BMI: $r=0.191$; $p=0.03$

3.3.2 Height, weight, BMI, Metabolic syndrome (MetS) traits

The sample had a mean ± SD height of 1.59 ± 0.06 m and a mean ± SD weight of 95.70 ± 20.12 kg. The mean ± SD BMI for the total group was 37.79 ± 7.47 kg/m² with the minimum BMI recorded being 30.32 kg/m² and the maximum 45.26 kg/m². The Pre & Ob_I group had a mean BMI of 30.68 ± 2.52 kg/m² and the Ob_{II} & Ob_{III} group had a mean BMI a mean BMI of 42.22 ± 5.93 kg/m². The mean BMI differed significantly between the two groups (independent sample t-test: $p < 0.001$).

Mean waist circumference for all subjects was above the cut-off specified by the NCEP ATP III criteria (Grundy et al., 2004), while the mean triglyceride, HDL cholesterol, glucose, diastolic and systolic blood pressure levels were within the normal ranges. There was a significant, positive correlation between BMI and waist circumference, triglyceride, glucose, diastolic and systolic blood pressure levels, while there was a significant negative correlation between between BMI and HDL cholesterol (see Table 3.8).

The most common Metabolic Syndrome (MetS) risk in the total sample was central obesity (waist circumference above indicated cut-off), followed by high blood pressure and low HDL levels. High triglyceride- and blood glucose were not common. MetS was diagnosed in 18 (24%) of the group for

whom blood samples were available (n=75). Subjects in the ObII & ObIII group were significantly more likely to be at risk of high blood pressure and low HDL levels and to have MetS, while those in the Pre & ObI group were significantly more likely to be at risk of central obesity (Table 3.8).

Table 3.8: Height, weight, BMI, Metabolic syndrome (MetS) traits and diagnosed MetS for total group (N=99) and by BMI groups.

MetS traits Cut-offs for MetS criteria¶	Total group			MetS diagnosed				p		
	n‡		% at risk¥	Pre & ObI n=38		ObII & ObIII n=61				
				n	% at risk ¥	n	% at risk ¥			
Triglycerides (mmol/L): Median IQR Cut-off: ≥1.69 mmol/L	75	0.9 (0.6;1.1)	4.0	25	0.9(0.6;1.2)	0	50	0.7(0.5;0.9)	6.6	0.150‡ 0.260¤
Waist circumference (cm): mean ± SD Cut-off: ≥88cm	99	99.1±15.7	96.0	38	86.2±7.8	100	61	107.1±13.8	93.4	<0.001†
Blood pressure (mmHg): mean ± SD Systolic ≥130 mmHg OR Diastolic ≥85 mmHg	99		74.7	38		23.7	61		59.0	0.001‡ 0.728† 0.732†
Glucose (mmol/L): Median IQR Cut-off: ≥6.1 mmol/L	75	4.7(4.4;5.1)	1.0	25	4.7(4.4;5.2)	0.0	50	4.6(4.4;4.9)	1.6	0.477‡ 0.391¤
HDL (mmol/L): mean ± SD Cut-off: <1.24 mmol/L	75	1.30±0.36	36.4	25	1.51±0.42	15.8	50	1.20±0.27	49.2	0.003‡ 0.281†
MetS diagnosed: 3 or more of above traits	18		24.0	1		13.3	17		22.7	0.002‡ 0381†

Pre = preobese; ObI = Obese class I; ObII = Obese class II; ObIII = Obese class III; NS = p>0.05

¶ NCEP ATP III (Grundy et al., 2004)

‡ n varies due to missing blood values

‡ Pearson's chi-squared test: Pre & ObI vs ObII & ObIII

¤ Mann-Whitney U test: Pre & ObI vs ObII & ObIII

† Independent samples t-test: Pre & ObI vs ObII & ObIII

¥ Percentage above/below cut-off for health; balance were not at risk

* Pearson's correlation coefficient for correlation with BMI (kg/m²):

triglycerides: r=0.293; p=0.011,

waist circumference: r=0.849; p<0.001,

systolic blood pressure: r=0.380, p<0.001,

diastolic blood pressure: r=0.439, p<0.001,

HDL cholesterol: r=-0.382; p<0.001

3.3.3 Perception of and dissatisfaction with current weight and perceived weight history

Although the majority of the total sample thought that they were currently overweight, about one in 10 thought that their weight was normal. The ObII & ObIII group were significantly more likely to think that they are obese than the Pre & ObI group. Two thirds of the total group indicated that they were very dissatisfied with their weight, with the ObII & ObIII group being significantly more likely to be dissatisfied. A clear trend for an increase in the number of subjects who perceived themselves to be overweight/obese from childhood to adolescence is evident in the total group, with no significant difference between BMI categories at the two time points (Table 3.9).

The three most commonly mentioned reasons for weight gain was pregnancy, followed by leaving school and having always weighed too much. Subjects in the ObII & ObIII groups were significantly more likely to report that they always weighed too much (Table 3.9).

Table 3.9: Perception of and dissatisfaction with current weight and perceived weight history for the total group and by BMI groups

Variables	Total group N=99		Pre & Ob _I n=38		Ob _{II} & Ob _{III} n=61		p‡
	n	%	n	%	n	%	
Perception: current weight (n=95) §							0.001
normal weight	9	9.5	5	13.9	4	6.8	
overweight	57	60.0	28	77.8	29	49.1	
obese	29	30.5	3	8.3	26	44.1	
Satisfaction: current weight (N=99)							0.009
satisfied	5	5.1	0	0	5	8.2	
somewhat dissatisfied	28	28.3	17	44.7	11	18.0	
very dissatisfied	66	66.7	21	55.3	45	73.8	
Weight during childhood (N=99)							0.183
underweight	10	10.1	5	13.2	5	8.2	
normal weight	54	54.5	25	65.8	29	47.5	
overweight	29	29.3	7	18.4	22	36.1	
obese	6	6.1	1	2.6	5	8.2	
Weight during adolescence (N=99)							0.310
underweight	4	4.0	2	5.3	2	3.3	
normal weight	56	56.6	31	81.6	25	41.0	
overweight	36	36.4	5	13.1	31	50.8	
obese	3	3.0	0	0.0	3	4.9	
Weight gain *							
after leaving school	24	24.2	11	28.9	13	21.3	0.389
after marriage	16	16.2	5	13.2	11	18.0	0.499
after pregnancy	49	49.5	15	39.5	34	55.7	0.097
after tragedy	12	12.1	4	10.5	8	13.1	0.680
due to work	6	6.1	4	10.5	2	3.3	0.148
have always weighed too much	18	18.2	3	7.9	15	24.6	0.033

Pre = preobese; Ob_I = Obese class I; Ob_{II} = Obese class II; Ob_{III} = Obese class III

§ n varies due to missing values

‡ Pearson's chi-squared test: Pre & Ob_I vs Ob_{II} & Ob_{III}

* Percentage "yes" reported, balance reported "no"

3.3.4 Dissatisfaction with select body parts and weight loss history

The majority of subjects were dissatisfied with their stomach and thighs, followed by their arms and buttocks. Dissatisfaction with calves and the waist was less common. The majority of subjects also reported engaging in weight loss during two years prior to the intervention. Reported successful weight loss methods seemed to be more likely to be healthy than unhealthy weight loss practices and seemed likely to have a duration of longer than a month. Most subjects feared weight gain and reported a negative social experience relating to their weight status, while two thirds monitored their weight more than twice a week. More than half reported having engaged with prior weight loss attempts lasting longer than a month. There were no significant differences between the BMI groups for these variables. The desired BMI of the total group was in the overweight (Pre Ob) range, with that of the Pre & ObI group being in the normal weight range and that of the ObII & ObIII group approaching the obese class I category. In addition, there was a significant difference in desired and weight retained for the longest period of after the age of 20 years when converted to BMI between the Pre & ObII and the ObII & ObIII group. The BMI maintained the longest by the total group after the age of 20 was close to the overweight range ($29.3 \pm 6.3 \text{ kg/m}^2$). The mean maximum weight ever lost on a diet was just over eight kilograms. The mean age at which the first diet was attempted was just over 24 years, with no significant differences between the two groups for these two variables (Table 3.10).

Table 3.10: Dissatisfaction with select body parts and weight loss history for the total group and by BMI groups

Variables	Total group N=99§		Pre & Ob _I n=38§		Ob _{II} & Ob _{III} n=61§		p‡
	n	%	n	%	n	%	
Dissatisfied with¥							
arms	62	62.6	21	55.3	41	67.2	0.298
stomach	82	82.8	33	86.8	49	80.3	0.403
waist	43	43.4	16	42.1	27	44.3	0.833
hips	51	51.5	21	55.3	30	49.2	0.556
buttocks	55	55.6	21	55.3	34	55.7	0.963
thighs	73	73.7	28	73.7	45	73.8	0.992
calves	26	26.3	8	21.1	18	29.5	0.391
Attempted weight loss during past two years¥	81	81.0	32	84.2	49	80.3	0.626
Most successful weight loss method:§ n=58							0.055
Healthy*	41	70.7	13	56.5	28	80.0	
Unhealthy**	17	29.3	10	43.5	7	20.0	
Fear of weight gain¥§	94	94.9	37	97.4	57	93.4	0.761
Negative social experience regarding weight status¥§	84	84.8	31	81.6	53	86.9	0.244
Frequency of weight monitoring§							0.394
less than twice a week	26	26.3	12	31.6	14	23	
more than twice a week	71	71.7	26	68.4	45	73.8	
Longest continuous period on diet:							0.220
less than a month	43	43.4	11	28.9	32	52.5	
more than a month	56	56.6	27	71.1	29	47.5	
Desired current weight converted to BMI (kg/m ²): mean ± SD§	87	27.3 ± 4.8	32	24.3 ± 2.7	55	29.1 ± 4.9	<0.001
Weight retained for longest period after age 20 converted to BMI (kg/m ²): mean ± SD§	32	29.3 ± 6.3	14	25.6 ± 3.7	18	32.2 ± 6.5	0.002
Maximum weight lost on a diet (kg): mean ± SD§	63	8.3 ± 7.3	22	8.8 ± 6.2	41	7.7 ± 9.0	0.505
Age when first began dieting (years): mean ± SD	74	24.4 ± 6.3	26	23.5 ± 7.2	48	24.9 ± 5.7	0.363

Pre = preobese; Ob_I = Obese class I; Ob_{II} = Obese class II; Ob_{III} = Obese class III

§ n varies due to missing values

∩ Number of participants who responded affirmatively

‡ Pearson's chi-squared test: Pre & Ob_I vs Ob_{II} & Ob_{III}

Pearson's correlation coefficient for correlation with BMI (kg/m²):

Desired current weight converted to BMI (kg/m²): r=0.629; p<0.001

Weight retained for longest period after age 20 converted to BMI (kg/m²): r=0.703; p<0.001

Maximum weight lost on a diet (kg): r=0.220; p=0.39

* Balanced slimming diet, increase in physical activity, eat less or nothing between meals and Weigh-less

** Skip one or more meals, appetite suppressants, diet formulas, milkshakes and powders

¥ Percentage "yes" reported; balance reported "no"

3.3.5 Dietary intake

Table 3.11 provides an overview of dietary intake according to the three day estimated food record completed by a sub-group of 41 subjects (40% of total sample). As there were no significant differences between the Pre & ObI (n=12) and ObII & ObIII (n=29) groups, the data for these BMI groups was not included in the table.

Table 3.11: Dietary intake of the sub-group (n=41) who completed the three day estimated food record.

Variable	Mean ± SD	p\$	% of EAR†	% MD
Three day estimated food record:				
Energy intake/day (kJ) (mean ± SD)				
Total	8053.8 ± 2581.0		83	
Week-day	6856.2 ± 2012.1			
Weekend	10218.5 ± 4132.2			
Weekend/week day difference	3362.3 ± 1120.7	<0.001‡		
Excluding % of subjects as under-reporters				
17.1% using EI:BMR<0.79 cut-off*	8784.2 ± 2156.3		90.5	
39.0% using EI:BMR<1.05 cut-off**	9690.3 ± 1711.1		99.9	
Protein intake/day (g) (mean ± SD) ‡				
Total	67.4 ± 21.7		108.2	15
Fat intake/day (g) (mean ± SD) ‡				
Total	72.8 ± 31.5			35
Saturated fat (SFA) (g)	22.9 ± 10.8			12
Mono-unsaturated fat (MUFA) (g)	23.1 ± 10.6			12
Polyunsaturated fat (PUFA) (g)	19.9 ± 10.3			11
Cholesterol (mg)	222.8 ± 123.9			
Carbohydrates intake/day (g) (mean ± SD) ‡	229.8 ± 70.6		229.8	50
Fibre intake/day (g) (mean ± SD)	17.3 ± 6.5			
Mean portions/day: ¶				
High fat foods	12.1 ± 21.8			
Energy-dense snacks	4.0 ± 8.5			
Energy-dense drinks	3.3 ± 5.7			

∩ Macronutrient intake was based on total sample (n=41), thus not on excluding under reporters

MD = Macronutrient distribution

\$ Pearson's correlation coefficient: variable correlated with subject BMI (kg/m²) indicated non-significant p-values

† based on EAR for women aged 19-50 Nutrition Information Centre at the University of Stellenbosch (NICUS) (2003)

‡ independent samples t-test: weekend energy intake versus weekday energy intake

* Goldberg cut-off methods (Black, 2000; Black et al., 1997) using using cut-off generated by Samuel-Hodge et al. (2004) using data generated for TEE (TEE measured by doubly labelled water). Seven under-reporters identified (1 under-reporter in Pre & ObI group and six under-reporters in ObII & ObIII group) – see three day estimated food record.

** Goldberg cut-off methods (Black, 2000; Goldberg, et al., 1991) using cut-off generated by Mchiza et al., (2010) using data generated for TEE (TEE measured with standard Schofield equations). 16 under-reporters identified (three under-reporters in Pre & ObI group and 13 under-reporters in ObII & ObIII group) – see three day estimated food record.

¶ Non-quantified food frequency questionnaire

The daily energy intake was below 83% of the Estimated Average Requirement (EAR) for women aged 19-50 years of age. When adjusting the Energy Intake for Total Energy, (EI:TEE) using a cut-off generated by Mchiza et al. (2010), the mean energy intake approached the recommended EAR for women aged 19 to 50 years. The difference between the mean week-day versus weekend day energy intake was statistically significant. Depending on the cut-off used (see foot note at bottom of Table 3.11), the level of under-reporting ranged from 17.1 to 39.0%. The macronutrient energy distribution for carbohydrate, protein and fat (50%, 15% and 35% respectively), was in line with recommendations for healthy eating, although the reported fat intake exceeded recommendations. The mean cholesterol- and fibre intake was 229.8mg and 17.3g respectively. The non-quantified food frequency questionnaire completed by 87 subjects yielded a mean±SD daily frequency of 12.1±21.8 for high fat foods, 4.0±8.5 for energy dense snacks, 3.3±5.7 for energy dense drinks and 2.8±2.3 for fruit and vegetables.

3.3.6 Habitual physical activity

The habitual physical activity for the total group and the two BMI groups is depicted in Table 3.12. The lowest median score for the total group was recorded for the sport index and the highest for the work index, with no differences between the two groups for the three indices (Table 3.12).

Table 3.12: Habitual physical activity* for the total group as well as the two BMI groups.

Variables	Total group (N=99)	Pre & Ob _I (n=38)	Ob _{II} & Ob _{III} (n=61)	p†
Work index:				
Median IQR	99 2.25(1.75;2.63)	2.25(1.75;2.50)	2.13(1.63;2.63)	0.660
Minimum value calculated	1.1			
Maximum value calculated	3.9			
Sport index:				
Median IQR	99 1.75(1.50;2.25)	1.50(1.50;1.75)	1.75(1.31;2.50)	0.119
Minimum value calculated	1.0			
Maximum value calculated	4.3			
Leisure index:				
Median IQR	99 2.00(1.50;2.25)	2.00(1.25;2.25)	1.75(1.50;2.25)	0.946
Minimum value calculated	1.0			
Maximum value calculated	4.5			

Pre = preobese; Ob_I = Obese class I; Ob_{II} = Obese class II; Ob_{III} = Obese class III; IQR = Interquartile range

* Baecke Questionnaire of Habitual Physical Activity

† Mann-Whitney U Test: Pre & Ob_I vs Ob_{II} & Ob_{III}

Pearson's correlation coefficient for correlation with BMI (kg/m²):

Work index : r=-0.132; p>0.05

Sport Index : r=-0.226; p value 0.029

Leisure index: r=-0.064; p>0.05

3.3.7 Psychological wellbeing

Results for indicators of psychological wellbeing are presented in Table 3.13.

Table 3.13: Psychological wellbeing for the total group and by BMI categories.

Variables	Total group N=99		Pre & Ob _I n=38		Ob _{II} & Ob _{III} n=61	
	n*		n*		n*	
Depression (BDI)¶:						
Mean ± SD	93	13.9 ± 9.2	35	15.4 ± 10.6	58	13.0 ± 8.2
Depressed (score ≥ 21)% ¥	24	25.8	12	31.6	12	19.7
Self-esteem (RSES)Ⓞ:						
Median IQR	95	20(18;24)	35	20(17;23)	60	20(18;24)
Low (score ≤ 15) % ¥	12	12.6	5	14.3	7	11.7
General health (GHQ) \$:						
Median IQR	94	12 (6;15)	34	10 (4;14)	60	13 (9;15)
Minimum value calculated		0				
Maximum value calculated		21				
Eating behaviour (TFEQ)β:	99					
Factor I Cognitive restraint score: Median IQR		8 (6;13)		8 (6;12)		7 (4;10)
Minimum value calculated		2				
Maximum value calculated		20				
Factor II Disinhibition of eating score: mean ± SD		9.1 ± 3.4		8.6 ± 3.3		9.4 ± 3.5
Minimum value calculated		1				
Maximum value calculated		16				
Factor III Perceived hunger score: Median IQR		7 (4.5;10)		9 (6;13)		6 (5;10)
Minimum value calculated		0				
Maximum value calculated		14				

Pre = preobese; Ob_I = Obese class I; Ob_{II} = Obese class II; Ob_{III} = Obese class III

* n varies due to missing values

¶ Beck Depression Inventory

¥ Balance in normal range

Ⓞ Rosenberg Self-Esteem Scale

\$ General Health Questionnaire

β Three-Factor Eating Questionnaire

Independent samples t-test: Pre & Ob_I vs Ob_{II} & Ob_{III} - non-significant p-values found

Mann Whitney U test: Pre & Ob_I vs Ob_{II} & Ob_{III} - non-significant p-values found

#Pearson's chi-squared test: Pre & Ob_I vs Ob_{II} & Ob_{III} - non-significant p-values found

Pearson's correlation coefficient for correlation with BMI (kg/m²):

Depression: r=-0.002; p>0.05

Self-esteem: r=-0.112; p>0.05

General health: r=-0.133; p>0.05

About a quarter of the total sample were depressed at baseline. Just over one in 10 of the total sample had a low self-esteem. The median score for GHQ (12) was in the middle scale range (1 to 21). The same was true for dietary restraint, disinhibition and perceived hunger scores. There was no significant associations between BMI and depression (BDI), self-esteem (RSQ), general psychological well-being and eating behaviour scores (TFEQ).

3.4 DISCUSSION

This research set out to develop a profile of weight status (BMI, waist circumference), health profile, body shape satisfaction, weight and dieting history, eating behavior, physical activity and

psychological well-being in a sample of urban black overweight/obese treatment-seeking Zulu women, bearing in 10 weight management-related focus areas identified from the literature (Section 2.10, pp72-77).

The sample consisted of young middle income women (mean age 31.4 years) of whom the majority were not married, but were living either with a partner or with parents and had a tertiary education. The literature shows that younger women may be less likely to complete weight loss interventions (Moroshko et al., 2011), and that in black South Africans a higher SES may be a barrier to weight loss as a result of lifestyle factors associated with a higher SES (Case & Menendez (2009). The fact that a lack of social support may act as barrier to weight loss (James et al., 2012; Moroshko et al., 2011) may not be a concern in our sample as the majority were living with significant others who could provide support.

The mean BMI of our study sample was in the obese class 1 range ($\geq 30\text{kg/m}^2$), with 61.6% having a **BMI ≥ 35 and the maximum BMI recorded being 45.3 kg/m²**. These results indicate that the majority of this sample of treatment-seeking Zulu women was extremely obese and at risk for obesity related comorbidities (Shisana et al., 2013; Lysen & Israel 2012; Janssen et al., 2004). The proportion of the sample who had central obesity was 96% and was positively associated with BMI. This finding is of importance as it points to the fact that almost the total sample of overweight/obese women had an increased risk for MetS, as central obesity has been shown to be a key determinant of MetS in sub-Saharan Africa (Fezeu et al., 2007). The SADHS (DOH, 2004; Puoane et al., 2002) reported that the prevalence of central obesity among black women was 51.1%, while the SANHANES-1 reported that black women had the second highest prevalence of central obesity (Shisana et al., 2013).

Our results on the other MetS indicators assessed in this research support the notion that overweight/obese treatment-seeking women are at risk for MetS and that this risk increases with increased BMI. Hypertension was prevalent in 74.4% and a low HDL-cholesterol level in 36.4% of the same sample, while elevated fasting triglyceride- and blood glucose levels were less prevalent. MetS was present in 24% of the sample, being significantly higher in the ObII & ObIII than the Pre & ObI group. This trend was consistent for all MetS traits. The proportion of subjects in our sample diagnosed with MetS is in line with the prevalence of 28% reported for an age-adjusted sample of African-American women where the prevalence of abdominal obesity was 62.1% [Adult Treatment Panel III (ATP III) criteria]. However, BMI was not reported in this study (Ford et al., 2009). The proportion with MetS in our sample is much higher than that reported by Fezeu et al. (2007) for a sample of urban women in Cameroon where the prevalence was 5.9%, 0.2% and 1.5% using the WHO, ATP III and International Diabetes Federation (IDF) criteria respectively. This may be explained by the fact that the sample had a mean BMI of 26.4 kg/m² and a mean waist circumference of 81.3cm. A further South African study among normal weight and obese urban black women in Cape

Town showed that the prevalence of MetS was 13% based on the IDF and 10% based on the ATPIII criteria (Jennings et al., 2009). The lower prevalence of MetS in the work by Jennings et al, (2009) was most probably the result of pooling of data for normal weight and obese women. Data from a South African case-control study to investigate health determinants of black women in an urban area, confirmed that obese subjects may have a significantly higher blood pressure and fasting triglyceride and blood glucose level than normal or overweight subjects (Schutte et al., 2005). Schutte and Olckers (2007) found that prevalence of MetS traits (HDL-cholesterol, blood pressure and fasting blood glucose) and diagnosed MetS (IDF MetS criteria) in another South African study (comparison between black and Caucasian women matched for BMI and age) found that black women had significantly higher blood pressure levels and higher odds ratios for meeting the MetS criteria in terms of HDL-cholesterol, blood pressure and fasting blood glucose.

Possible tracking of weight from childhood in the study sample is illustrated by the finding that the proportion of those who perceived themselves to be overweight/obese from childhood (35.4%) is similar to the proportion who perceived them to be overweight/obese during adolescence (39.4%). This phenomenon is further supported by the fact that about one in five subjects mentioned that **"having always weighed too much"** was the predominant reason for their weight status. These trends are in line with those from a longitudinal study conducted by Daniels et al. (2013), namely that the prevalence of overweight/obesity increased with age and that tracking BMI was established from six years of age to 20 years. Daniels et al. (2013) also found that weight status at an earlier age was a more important predictor of weight status at 20 years than parental weight status. However, according to Guo and Chumlea (1999), adult BMI is successfully predicted by BMI in adolescence but poorly by BMI in earlier years. Siervogel et al., (2003) also state that tracking of fatness from adolescence into adulthood is much stronger than from childhood into adulthood. Possible weight tracking among South African women is evident from the figures generated by the SANHANES-1 study where Shisana et al. (2013) report that the prevalence of overweight/obesity in black girls aged 2 to 14 years is 16.2 and 7.3% respectively, while overweight and obesity in black women is 26.7 and 31.8% respectively. These results or possible weight tracking support the importance of taking a life-cycle approach (Harris et al., 2010) in the prevention and management of obesity.

When considering the current perceived weight of our subjects, it is evident that the majority perceived themselves to be overweight and not obese, despite the mean BMI for the total sample being 37.8 kg/m². **Furthermore, although all subjects were overweight/obese as per the study's** inclusion criteria (Table 3.1), one in ten thought their weight was normal. This is indicative of a distorted body image or lack of understanding regarding the difference between overweight and obesity. Research conducted by Blixen et al. (2006b) among obese African-American women found that the majority did not see themselves as obese. Puoane et al. (2002) reported that although the highest rates of obesity were found among local black women in the 1998 SADHS, less than 16% of

these women perceived themselves to be obese. A later study conducted by Puoane et al. (2005b) among urban Xhosa women with a mean BMI of $40 \pm 8.1 \text{ kg/m}^2$ found that only 45% of the women perceived themselves to be overweight/obese or extremely overweight, while in fact 95% were overweight/obese. Befort et al. (2008a) explain that some African-Americans may underestimate the extent of their overweight status as a result of the high prevalence of overweight and obesity in this population. The same may hold true within the South African context as a result of the high prevalence of overweight/obesity in the country (Shisana et al., 2013). However, it needs to be considered that research shows that black women are more likely to be accepting of a larger body shape and size (Kumanyika et al., 2014; Kumanyika 1993; 1987; Puoane et al., 2005; 2002, Holdsworth et al., 2004). Findings by Holdsworth et al., (2004) **showed that subjects' perceptions of overweight and normal weight differed substantially from health definitions, as 36.6% of the sample perceived a "normal weight" to correspond with the silhouettes that reflect the overweight or obese categories.**

In the current study, the high prevalence of those who were somewhat/very dissatisfied with their weight status bears testimony to the fact that that they were a sample of treatment-seeking women. Subject dissatisfaction with various parts of their body was mainly related to their stomach and thigh area, with the lower level of dissatisfaction being related to calves and waist. This perception is of interest, seeing that nearly all subjects (96.0%) had a waist circumference above the cut-off used to diagnose MetS. However, the majority feared the prospects of weight gain and two thirds monitored their weight more than twice a week. The level of dissatisfaction was higher in the ObII & ObIII versus the Pre & ObI group, thereby indicating that the level of dissatisfaction increased in relation to the level of obesity. The latter finding could be indicative of acculturation and therefore striving towards western norms of beauty that include a healthier body weight. According to Teixeira et al. (2002), more stringent weight outcome evaluations and higher body size dissatisfaction among overweight/obese women are related to their readiness to lose weight.

It is interesting to note that despite the acceptance of a larger body shape and size in black communities, the majority of the sample reported a negative social experience related to their weight status, with the prevalence of stigmatization being slightly higher among the ObII & ObIII group. This finding could be indicative of the urban environment in which they live and acculturation to western norms of beauty that are starting to gain ground in local urban black communities. Puhl and Brownell (2006) report that in a sample of overweight/obese adults, more frequent exposure to weight stigma was related to more coping mechanisms that include eating and a resultant higher BMI. In descending order of frequency, coping mechanisms included eating, refusing to diet, and dieting.

The mean BMI subjects strived towards was in the overweight range (the mean BMI for total group was 38.8kg/m² and the mean BMI goal 27.2kg/m²), with those in the Pre & ObI group having a desired BMI in the normal weight range and those in the ObII & ObIII group having a desired BMI approaching the obese range. These weight loss targets/aims are in line with recommendations for initial conservative losses (5 to 10% of starting weight) that are not only conducive to successful longer term weight loss, but are also associated with substantial improvement in glycaemic control and lipid profiles (Jensen et al., 2013; Lysen and Israel 2012; ADA 2009). The BMI reported to have been maintained for the longest, was close to the obese class I cut-off (34.9 kg/m²), confirming that an initial weight goal in the overweight range may be realistic for obese women. However, a study conducted by Dutton et al. (2004) on overweight/obese African-American women showed that treatment-seeking African-American women may have unrealistic weight loss goals.

The desire to lose weight was also reflected in history of weight loss attempts in the study sample. Eight out of ten subjects reported engaging in weight loss attempts in the two year period prior to commencement of the study, with the mean age at first weight loss attempt being 24 years. It can be argued that the fact that these women sought treatment for overweight/obesity reflects weight loss failure (either did not lose weight, or was unable to maintain weight loss), despite the indication that healthy weight loss methods seemed to be common, and that their longest continuous period on a weight loss diet was more than a month. Brownell (1993) explains that treatment-seeking subjects who volunteer for formal weight loss interventions represent a self-selected group within the overweight/obese population that may include many individuals who have repeatedly failed to control their weight. In addition, repeated failed weight loss attempts that result in weight cycling, are often the norm in obese subjects (Chang et al., 2008). It is thought that this failure may be accompanied by feelings of guilt, hopelessness and poor self-esteem (Wooley & Garner 1991). MacGuire et al. (1999), also emphasise that obese, treatment-seeking subjects who enrol in university-based interventions, are characterised by numerous previous failed weight loss attempts. A theoretical economic analysis of the decision-making process related to weight loss attempts, showed that the extent of dieting was an increasing function of initial body weight and a decreasing function of the effort dieting requires. In addition, more dieting attempts are not necessarily related to a higher initial body weight (Rosin 2012).

It is possible that pregnancy-related weight gain is an important contributor to weight gain in the current study sample. This was reflected by the fact that one in two subjects mentioned this as reason for weight gain. It is therefore evident that a characteristic of this treatment-seeking group of women was the perception that pregnancy was their most important reason for excess weight gain, despite the fact that the mean number of biological children per subject was less than two. Several risk factors for maternal obesity have been identified with the most important thought to be high gestational weight gain (Harris et al., 1997; Scholl et al., 1995) and high pre-pregnancy body weight

(Boardley et al., 1995). A prospective follow up study conducted by Rosenberg et al. (2003) on African-American women found that weight gain associated with child bearing increased in accordance with higher baseline BMI and was noteworthy among obese women. These results imply that child bearing is indeed an important contributor to weight gain among African-American women. However, results generated by the THUSA study among South African black women found no relationship between parity and BMI. An observed trend was a higher waist circumference with an increasing number of births (Vorster et al., 2005). The second most common reason for weight gain mentioned by subjects in our study (one in four) was leaving school.

The relationship between a higher BMI and lower level of physical activity has been highlighted by the WHO (2004b, p112) in cross-sectional studies. In addition, Donnelly et al. (2004) state that weight control is associated with an increased level of physical activity. The level of habitual physical activity of our sample may be on the low side, as the median for the three indices of the BQHPA was 2.3 for the work index (minimum 1.1; maximum 3.9), 1.8 for the sport index (minimum 1.0; maximum 4.3) and 2.0 for the leisure index (minimum 1.0; maximum 4.5). The possibility that obese subjects may overestimate their level of physical activity (Lichtman et al., 1992) also needs to be considered when interpreting the results. The possibility that low levels of PA may be contributing to poor weight management in black women is supported by Williamson et al. (1991) and Kumanyika (1987), namely that lower levels of physical activity amongst African-American women contributes to their tendency to gain weight. Further support comes from the work by Sobngwi et al. (2002) who documented a significant association between physical inactivity and obesity in numerous sub-Saharan countries using the sub-Saharan Africa Activity Questionnaire. The local THUSA study conducted by Kruger et al. (2002) also found a statistically significant negative correlation between PA and BMI using the BQHPA. There is no doubt that emphasis on healthy PA is of primary importance for weight for weight management among black women. However, to increase PA among urban black South African women, a number of documented barriers e.g. environmental safety, need to be overcome (Isaacs & Puoane 2011; Puoane & Tsolekile 2008; Puoane et al., 2005a; Puoane et al., 2005b; Siegel et al., 2000).

Dietary intake investigated by means of a three day estimated food record in a sub- sample, showed that energy intake was 83% of the age appropriate recommendations for overweight/obese women (Ireton-Jones 2012, p28). If the possibility of underreporting (17.1% using cut-off generated by Samuel-Hodge et al., 2004; 39.0% using cut-off generated by Mchiza et al., 2010) is considered, actual total energy intake may be higher. Underreporting is a well recognized phenomenon amongst treatment-seeking obese women with prevalence ranging from 23 to 47% (Abbot et al., 2008; Klesges et al., 1995; Lichtman et al., 1992). Bearing in mind possible underreporting, it is interesting to note that total energy intake was significantly higher over weekends when compared to weekdays. According to Puoane et al. (2006) in research conducted amongst urban Xhosa women in Cape Town,

it was apparent that food is used to facilitate social interaction, which could be a possible explanation as to why the mean kilojoule intake varied so significantly between weekends and week days.

Macronutrient intake by the sub-sample of women in our sample (49% for carbohydrates, 15% for protein and 35% for fat) is in line with the Dietary Guidelines for Americans 2010 (US Department of Agriculture & U.S. Department of Health and Human Services, (2010)). However, the level of SFA reported exceeded the recommendation of less than 10% of total energy intake (US Department of Agriculture & US Department of Health and Human Services 2010). This can possibly be explained by the fact that the mean daily frequency of intake of high fat foods was 12.1 per day and energy dense snacks including vetkoek, koeksisters, chips and samoosas was 3.3 times per day. Dietary fibre intake was inadequate at 69.2% of the recommendation for women (US Department of Agriculture & U.S. Department of Health and Human Services 2010). In a study conducted by Hattingh et al. (2008) among urban black women residing in Bloemfontein, the median energy, protein and carbohydrate intake of all women exceeded the Dietary Reference Intake (DRI), with an energy distribution of 12% protein, 32% fat, and 52% carbohydrate. The authors conclude that the high median energy and macronutrient intake of the study sample may pose a potential risk for the development of NCDs.

Eating behaviour related problems i.e. dietary restraint, disinhibition and perceived hunger may not be a concern in black women as the mean/median scores for all three dimensions of eating behaviour were in the low to moderate ranges of scale scores. This possibility is supported by the fact that there was no association between scores and BMI. Work by Boschi et al. (2001) in obese African-Americans confirms that black women may have lower values for dietary restraint than their Caucasian counterparts. Low dietary restraint may result in excessive energy intake depending on the **“functionality” of the hunger-satiety system** in that individual. Our results do not reflect the positive associations found by Boschi et al. (2001), Westenhoefer et al. (1999) and Gendall et al. (1998) **between disinhibition scores and BMI. Disinhibitors include specific “cognitions” (the perception of having overeaten or consumed a forbidden food) or negative emotional states (such as anxiety, depression or stress) that tend to interfere with self-control and result in overeating** (Hays & Roberts 2008; Canetti et al., 2002; Lowe 1993). We posit that the low dietary restraint, disinhibition and perceived hunger scores and lack of association with BMI in our sample may reflect a culture where eating is associated with positive experience such as socialization, as well as showing the ability to afford certain foods or a variety of foods.

According to Wansink et al. (2005), subjects who participate in a weight loss intervention may find it difficult to ignore perceived hunger that may also be seen as external locus of hunger, especially if they are reliant on visual cues to determine when to stop eating. Although not necessarily prominent in our sample of treatment-seeking overweight/obese women, perceived hunger may prove to be a challenge for black women once they start with the intervention, as local black culture is associated

with frequent social events characterised by an abundance of food (Puoane et al., 2006b). The latter **is also associated with the expectation from "others" to eat, as is illustrated in the findings** by Puoane et al. (2006b) among urban Xhosa women where it became apparent that food is used to facilitate social interaction.

Obese, treatment seeking subjects who enrol in university-based interventions tend to have higher rates of psychopathology (LeCheminant et al., 2005; MacGuire et al., 1999), depression (De Witt et al., 2010; Luppino et al., 2010; Kim et al., 2007; Wadden et al., 2006; Werrij et al., 2006; Sharp and Lipsky 2002; Musante et al., 1998) and low self-esteem (Werrij et al., 2006), with increasing depression and decreasing self-esteem being associated with increasing BMI (Kim et al., 2007; Wadden et al., 2006; Werrij et al., 2006;). Siegel et al. (2000) also found an association between overweight and depression in African-American women, especially if they have a higher level of education. It needs to be noted that treatment-seeking subjects may be more likely to report increased levels of depression and eating in response to negative emotions than obese individuals in general (Wadden et al., 2002; Fitzgibbon et al., 1993; Rodin et al., 1998). In light of the abovementioned trends, it is not surprising that we found that one in four women in our sample were depressed and that about one in 10 had a low self-esteem. However, there was no clear significant association between these two variables and BMI in our sample. Studies that investigated this relationship have yielded mixed results (Klaczynski et al., 2004). A meta-analysis conducted by Miller and Downey (1999), found that a relationship between obesity and self-esteem does exist, but that the strength of the relationship varies with socioeconomic status, ethnicity, age and gender. It is possible that low self-esteem among black women is not a primary concern as they are more accepting of a larger body size. The moderate score for general psychological well-being (GHQ), reflects a moderate presence of problems with sleep, problem solving ability, confidence and stress,

3.5 CONCLUSION

The following conclusions can be drawn regarding the sample profile bearing in mind the identified weight management focus areas (FA), including namely 1) treatment seeking behaviour; 2) weight loss success; 3) compliance to and attrition from weight loss programmes; 4) cultural influences on body shape and size perception and satisfaction; 5) cultural influences on food choices and eating patterns 6) cultural influences on physical activity; 7) environmental factors and social support; 8) appropriateness of the weight loss programme for the target population; 9) dietary restraint, disinhibition, perceived hunger and bingeing and 10) psychological well-being (depression):

Our sample of treatment seeking women may have the necessary motivation to embark on a weight loss intervention as they were overweight/obese women intending to enrol in a weight loss programme (FA 1). They furthermore seemed to have a history of being overweight/obese and had

an increased risk for MetS, although they may not have been aware of the latter (FA 1). The high prevalence of those who were somewhat/very dissatisfied with their weight and their stomach and thigh areas, as well as those fearing the prospects of weight gain, may also contribute to motivation to lose weight (FAs 1 and 4). Motivation may also be strengthened by the negative social experience(s) related to their weight status reported by the majority of women, and may reflect changes in social/cultural views of overweight/obese black women (FA 7). Further factors that characterized our sample that may be viewed as potential promoters for weight loss success include reasonable weight loss goals (FA 1), the fact that the majority co-habitated either with a partner or family who may provide a supportive environment (FA 7), the low levels of disinhibition and perceived hunger (FA 9) and general psychological well-being (FA 10).

However, a number of characteristics point to the presence of potential barriers to entering in, compliance with and remaining in a healthy weight loss programme. These include the age of the group (relatively young at 31) (FA 1); the history of prior, seemingly unsuccessful weight loss attempts (FA 2); an age of 24 at first diet attempt despite indications of being overweight/obese during childhood and adolescence) (FA 2); the presence of a distorted body image, with underestimation of body weight being the norm (FA 4); low levels of physical activity in the form of sport and during leisure time, which may be linked to cultural perceptions and/or environmental factors (FAs 5 and 6); and very frequent intake of high fat foods (including meat) and energy dense snacks (combined 15.4 times a day), insufficient fiber intake and increased energy intake over weekends, which may be linked to actual food preferences, cultural eating habits, social/family events and environmental factors such as availability and affordability of poor food choices (FAs 5 and 7). Although eating behaviour indicators seem to be positive in this treatment seeking group, these may change during the intervention bearing in mind the culture of socialising (with eating as a core feature) and exposure to poor food choices (FAs 5, 7 and 9). Finally, the presence of low-self-esteem, but especially depression found in our sample may be barriers to successful engagement with a weight loss intervention (FA 10).

CHAPTER 4

Weight loss and attrition in urban black overweight/obese Zulu women on a healthy weight loss intervention

4.1 INTRODUCTION

The SADHS conducted in 1998 and 2003, reported a prevalence of overweight/obesity among urban black women of 26% and 37% versus 27% and 34% for these two study periods respectively (DoH 2007). **A waist circumference of ≥ 88 cm was reported as 43.4% versus 34.2% for the two study periods for black South African women in general (DoH 2007; Puoane et al., 2002).** The SANHANES-1 (Shisana et al., 2013) confirmed the SADHS data as the prevalence of overweight/obesity among black women in general was 29% and 40% respectively, while the prevalence of central obesity, determined with the same cut-off, was 51%. These statistics therefore illustrate that overweight/obesity and central obesity among local black women remain a significant public health problem. In addition, it is important to take cognisance of the fact that black women have the highest prevalence of overweight/obesity across all population and gender groups and the second highest prevalence for central obesity across all non-Caucasian women (due to an absence of data for Caucasian women) (Shisana et al., 2013).

The primary approach to the management of obesity co-morbidities such as NCDs, is to encourage and facilitate weight loss (Jensen et al., 2013; Lysen et al., 2012; Cecchini et al., 2010). Abegunde et al. (2007) cautions that the burden of disease related to NCDs in South Africa will increase substantially over the next couple of decades if interventions are not implemented to combat the trend. In addition, it is globally recognized that obesity is a risk factor for MetS and NCDs, and that sustained weight loss is essential to reduce this risk (Lysen & Israel 2012; Brown et al., 2009; Ingelsson et al., 2009; WHO 2009).

Weight management goals for overweight/obese individuals could include ceasing weight gain, small but sustainable weight losses or more extensive weight loss achieved through modified eating and exercise behaviours, as well as improvement in psychological well-being (Jensen et al., 2013; Lysen et al., 2012; ADA, 2009). Low intensity weight loss interventions have the potential to result in weight loss of one to five kg over a six month period, while more intensive interventions result in greater losses but attrition rates of approximately 15 to 20% (Phelan & Wadden 2002). A systematic review on predictors of drop-out conducted by Moroshko et al. (2011), found that drop-out ranged from 10% to 80%, depending on the setting and the type of intervention. Sustained weight loss of five to 10% of initial weight for at least one year improves the health risks associated with obesity (Lysen et al., 2012; US Department of Health and Human Services 1998).

Healthy weight loss interventions should focus on formulating reasonable weight loss goals, healthy eating, physical activity, psychological well-being, management of personal and environmental challenges/barriers to weight loss, as well as relevant education and cognitive-behavioural strategies to facilitate sustained change (Lysen et al., 2012; WHO, 2009; Senekal et al., 2008). A reduction in total daily energy intake, irrespective of the macro-nutrient composition of the diet, is essential to generate a negative energy balance and subsequent weight loss (Jensen et al., 2013; Hall et al., 2011). Macro-nutrient composition can be adjusted according to individual needs, but need to remain within the recommended ranges developed by the USA, Canada, Australia, New Zealand and Europe, namely 45 to 65% of total energy from carbohydrates, 10 to 35% for protein, and 20 to 35% for total fat. The quality of carbohydrate, in terms of fibre content and healthfulness of fats (SFA and trans fatty acids versus MUFA and PUFA), also need to be considered (EFSA Panel on Dietetic Products, Nutrition and allergies (NDA) 2010).

Long-term success with weight loss and maintenance thereof is notoriously difficult, with figures for successful weight loss among African-American women ranging from 1.15kg to 2.7kg for an eight week intervention (Mayer-Davis et al., 2001; Kumanyika & Charleston 1992) and 3.3kg to 3.7kg for a 26 week intervention (Kennedy et al., 2005; Karanja et al., 2002). Numerous studies have found that more than 50% of those who participate in weight loss interventions regain all the weight lost within three to five years after an intervention, while additional weight loss after regaining a small amount of weight is uncommon (Phelan et al., 2003). A review conducted by Wing and Phelan (2005) concluded that about 20% of overweight individuals successfully lose 10% of their body weight and keep it off for at least one year. This situation may be direr for black women and the promotion of weight loss for health benefits poses unique challenges (Befort et al., 2008c; Kumanyika, et al., 2007; Smith-Barnes et al., 2007). Obese black women, including South Africans, are characterized by lower levels of preoccupation with weight control, a lesser likelihood of perceiving oneself as overweight when overweight/obese, greater levels of body satisfaction at heavier weights, as well as having **“obesity-tolerant” attitudes that are culturally bound. These characteristics may limit motivation** to lose weight or the efficacy of weight loss interventions (Ard, 2007; Lynch et al., 2007). Authors such as Allan (1998) and Williamson (1993) indicate that overweight African-American women are also less likely to participate in weight loss interventions. However, when they do participate, they are less likely to achieve weight loss and/or weight maintenance than Caucasian women (Neve et al., 2010; Osei-Assibey et al., 2010; Kumanyika et al., 2005). To add to the latter findings, DeLany et al. (2013) conducted a comparative study between severely obese African-American and Caucasian women and found that despite similar levels of intervention compliance, the African-American women lost significantly less weight possibly as a result of lower energy requirements.

A further potential explanation is pointed out by Ahye et al. (2006) and Samuel-Hodge et al. (2000), namely that African-American women are less likely to assume the self-centred focus associated with

health interventions and consider their own health as secondary to that of their children. They therefore prioritize family caretaking responsibilities over self-care. According to Bronner and Boyington (2002), high attrition rates ranging from 0 to 79% also need to be considered as one of the major reasons for poor overall outcomes of weight loss interventions targeting African-American women.

WHO (2009), Befort et al. (2008b), Glanz et al. (2008) and Ard (2007) suggested that the cultural sensitivity of interventions may improve its chances of success. Strategies that have been implemented to ensure cultural sensitivity include recipe modification, use of culturally-appropriate food guides and existing cultural networks such as churches (Bronner & Boyington 2002). Involving ethnically appropriate group leaders and peer educators/lay facilitators, a team/group approach and participants in the planning and implementation stages, have also been mentioned as important strategies (Yancey et al., 2006; Bronner & Boyington 2002). However, there is no conclusive evidence that these strategies result in improved/successful engagement of African-American women with weight loss interventions (Kumanyika et al., 2007). The finding by Ard (2007) in a review of the obesogenic environment and the inclusion of culturally sensitive strategies as part of weight loss interventions targeting African-American women, was that these strategies did not seem to improve outcomes.

There is a paucity of research on the engagement of black South African women with healthy weight loss interventions. It can be speculated that outcomes may be similar to those reported for African-American women, as the cultural acceptance of a larger body shape and size has also been found to be a norm amongst black South African women (Matoti-Mvalo & Puoane 2011; Puoane et al., 2006; Puoane et al., 2005). This is also illustrated by the most recent SANHANES-1 (Shisana et al., 2013), namely that 65.5% of black women surveyed indicated that they were happy with their current weight, despite the fact that about 25% were overweight and 40% obese. Within the South African context, the perceived association between thinness and HIV/AIDS (Matoti-Mvalo & Puoane 2011; Puoane et al., 2006a; Kruger et al., 2005) also needs to be considered. It is thought that these factors may limit incentives for weight loss among these women (Kruger et al., 2005; Puoane et al., 2005b; Puoane & Hughes 2005).

South African health statistics clearly point to the fact that overweight/obesity in black women is a public health problem, yet we have very little insight in how to facilitate healthy weight management in these women. The aim of this study therefore was to investigate the weight loss success of treatment-seeking urban overweight/obese Zulu women enrolled in a healthy weight loss intervention. As attrition is an important problem associated with weight loss interventions, characteristics of drop-outs were also investigated.

4.2.1 Study design

The study design employed for the research was a quasi-experimental time series design without a control group. Jensen et al. (2008) explain that a quasi-experimental design (QED) can surpass the validity of a randomised controlled trial because they apply to data collected in a real world setting as opposed to a simulated one. Therefore, while experiments have a higher internal validity, they may sacrifice the ability to generalize to the real world (external validity).

For the purposes of this research the treatment-seeking subjects (urban overweight/obese Zulu women) assessed at baseline (see Chapter 3, p96), were invited to enrol in a culturally sensitive, healthy weight loss intervention that involved biweekly contact sessions over a 16 week period.

The primary outcome of the intervention was weight loss, while the secondary outcomes included waist circumference, blood pressure, physical activity (BQHPA), eating behaviour (TFEQ) and psychological well-being as was determined by the BDI, General Health Questionnaire (GHQ) and Rosenberg Self-Esteem Scale (RSES). In addition, baseline socio-demographic characteristics, anthropometric measurements, MetS indicators and diagnosed MetS, weight-related and lifestyle variables, as well as psychological well-being were compared between drop-outs and completers of the 16 week intervention in order to characterize drop-outs.

4.2.2 Target population and sample

The target population for the study was urban overweight/obese black (Zulu) women. The minimum target sample size was set at 48 to investigate independent associations between weight loss and gene polymorphisms as described on p78 Chapter 2. Subject inclusion and exclusion criteria and recruitment methodology can be viewed in section 3.2.1, p 83.

4.2.3 Intervention

Intervention components

As recommended in the literature, the intervention covered the following: identifying reasonable weight loss goals, restriction of energy intake and healthy eating, increased physical activity, ensuring/improving psychological well-being, management of personal and environmental challenges/barriers. Interventions that include a combination of physical activity and nutrition behaviour modification have been found to be more successful in facilitating weight loss than single component interventions (Sharma 2007). Application of behavioural principles in the treatment of obesity is based on the assumption that weight-related behaviour, such as eating and exercise, has a learned component that can be relearned and modified. In order to facilitate sustained weight loss,

individuals must therefore learn specific skills to assist them with a long-term change in eating behaviour and increased energy expenditure, as well as overcoming barriers to intervention compliance (Lang et al., 2006; Hall et al., 2002).

Intervention structure and duration

The indicated intervention components were covered in a set programme of biweekly group sessions with a duration of 60 to 90 minutes that was facilitated by a registered dietitian (see Table 4.1). Intervention facilitators also phoned subjects in the alternating weeks when group sessions were not scheduled to provide support. This structure is in line with recommendations for high intensity interventions as specified by McTigue et al. (2003) (more than one face-to-face counselling session per month for at least the first three months of the intervention), while Ross et al. (2000) recommend regular meetings, i.e. at least one per month during the period of active weight loss and Wadden & Butryn (2003) weekly sessions for an initial period of 16-26 weeks. Make-up sessions were conducted to accommodate subjects who did not arrive timeously for a group counselling session or was unable to attend.

Group sessions have been found to be more effective than individual counselling, are more cost-effective and have the potential to result in significantly higher weight losses than one-on-one counselling. This can most probably be attributed to the social support provided by group members, being with individuals who face similar challenges or as a result of competition to keep up with the group norm (Jones et al., 2007; Renjillan et al., 2001). According to Jones et al. (2007), hospital- and university-based clinics often use a group based approach (10-20 individuals per group) for weight management interventions. Sessions last 60 to 90 minutes and are facilitated by registered dietitians, behavioural psychologists or related health professionals.

Intervention content

An outline of the intervention content is presented in Table 4.1. Subjects were given the weight loss and lifestyle manual at the first intervention session, i.e. not at the baseline screening session (see Chapter 3). They were encouraged to read the relevant chapters in the weight loss and lifestyle manual (Senekal 2005) prior to each session, as well as after completion of the session to re-enforce the knowledge and cognitive thinking strategies learnt.

Table 4.1: Outline of intervention content.

Session	Topics	Activities	Chapters from weight loss and lifestyle manual* covered
1	<p><u>Intervention structure and introduction to lifestyle manual</u></p> <p>Reasonable weight goal</p> <p>Energy requirements</p> <p>Meal plans and allowances from various food groups, food group lists with portion sizes.</p>	<p>Explanation of intervention structure and manual.</p> <p>Interactive education: Realistic weight goals and diet plans.</p> <p>Completion of a personalized weight goal exercise and calculation of energy requirements for weight loss**</p> <p>Development of personalized meal plan and menu's</p>	<p>Chapters 4: Defining your reasonable weight goal</p> <p>Chapter 12: Healthy eating – lets get practical.</p> <p>Chapter 12: Healthy eating – lets get practical.</p>
2	<p><u>Eating behaviour</u></p> <p>Basic healthy eating tips</p> <p>Diet and eating behaviour checklist</p>	<p>Interactive education on the South African Guidelines to Healthy Eating, healthy food choices, dietary fibre and the glycaemic index with additional hand-out on the fibre and fat content of various foods.</p> <p>Completion of self-assessment diet and eating behaviour checklist: identification of need for change and actions to facilitate change</p> <p>Interactive education on how to interpret food labels and exchanging ready prepared products/meals for food group portions (kilojoule/carbohydrate/protein/ fat content of food groups). An additional hand-out was given to facilitate this exercise.</p> <p>Interactive education session to facilitate the recognition of cues that lead to unnecessary eating and cognitive thinking strategies to change undesirable eating behaviour.</p>	<p>Chapter 11: Healthy eating</p> <p>Chapter 12: Healthy eating – lets get practical.</p> <p>Chapter 19: The weight-management toolbox</p>
3	Physical activity	Completion of self-assessment physical activity checklist. Aspects required to facilitate and increase physical activity discussed.	Chapter 13: Be active!
4	<p>Writing goals</p> <p>Self-concept</p> <p>Body image</p> <p>Stress management</p> <p>Communication</p>	<p>Interactive session on formulation of realistic weight loss goals and the action plan required to achieve the goal.</p> <p>Completion of self-assessment self-concept checklist, defining goals on how to improve self-concept and actions to achieve it.</p> <p>Completion of body image checklist, defining goals on how to improve body image and actions to achieve it.</p> <p>Completion of stress indicator checklist, defining goals on how to improve stress levels and actions to achieve it.</p> <p>Completion of communication checklist, defining goals on how to improve communication and actions to achieve it.</p>	<p>Chapter 10: Writing goals</p> <p>Chapter 14: Self-concept</p> <p>Chapter 15: Body image</p> <p>Chapter 16: Stress management</p> <p>Chapter 17: Communication</p>

Session	Topics (cont.)	Activities (cont.)	Chapters from weight loss and lifestyle manual* covered (cont.)
	Managing your environment	Completion of environment management checklist, defining goals on how to improve environment management and actions to achieve it.	Chapter 18: Manage your environment
	Self-motivation	Interactive education on checklist-related exercises completed and how positive self-talk and imagery related to the above concepts can serve as motivation to facilitate weight loss.	Chapter 19: The weight-management toolbox
	Feedback on blood results	Individual feedback on outcome of fasting venous blood sample taken to determine blood glucose, triglycerides and HDL-cholesterol levels.	
5	Healthy cooking and eating	Interactive education on how to make recipes healthier by reducing their fat, sugar and salt content and increasing their fibre content. Hand-outs given to illustrate above concepts as well as an ingredient substitution list to facilitate recipe modification. Cooking demonstration on the use of legumes.	
6	Healthy food choices	Interactive education session with hand-outs regarding the comparison of the energy (kJ) content of foods from the fat/extras food group including alcoholic beverages and take-aways to illustrate concept that excessive energy intake is not necessarily related to quantity but quality.	
7	Weight loss and diets	Interactive education regarding healthy weight loss diets versus fad diets and weight maintenance after weight loss	Chapter 6: More about weight loss and diets Chapter 7: More about weight maintenance after weight loss
8	Eating healthy when dining out	Interactive education session on recommended food choice when dining out. Hand-out given that included buffet dining, a la carte menus and country-specific cuisine e.g. Italian restaurants.	Hand-out

*Senekal (2005): each subject received a copy of the manual

**Individualized energy needs for weight loss of 0.5kg-1kg/week were calculated using the formula by Dwyer (1995): $\{[2\ 940 + (30 \times \text{weight in kg})] \times \text{activity factor}\} - 3400$

The Stages of Change Model (Prochaska et al., 2008; Prochaska & Velicer 1997; Prochaska & DiClemente 1983) suggests that intervention success may depend on aligning intervention strategies with the stage of change of an individual intervention participant. As the participants included in this research were treatment-seeking and voluntarily enrolled in a weight loss intervention, it could be assumed that they were aware that they needed to change their weight (contemplation phase) and that their enrolment in the intervention was the first step towards action. However, this may not reflect readiness to change, i.e. actively progress to the action stage, existing behaviour related to dietary- and lifestyle practices such as dietary intake, physical activity, stress management etc.

Creating an awareness of the need to change these particular behaviours as per the Health Belief Model (Champion & Skinner 2008; National Cancer Institute 2005; Baranowski et al., 2003) by completion of self-assessments and interactive education on these components, was included in the intervention (see Table 4.1) to ensure that subjects were in the contemplation phase and seriously considered taking action. Self-efficacy, a key construct of the Health Belief Model (Bandura & Adams 1977) and Social Cognitive Theory (National Cancer Institute 2005) posits that a high level of self-**efficacy will enhance an individual's beliefs about his/her ability** to make the necessary changes. This concept was enhanced by assisting intervention participants to improve their insight into and understanding of their current weight-related behaviours through interactive education, a variety of practice sessions and development of cognitive behaviour change skills. The Social Cognitive Theory (National Cancer Institute 2005; Strecher et al., 1986) clarifies how a sense of self-efficacy can facilitate behaviour change, even in the presence of barriers to behaviour change. In addition, the ability to perform a behaviour requires the knowledge to know what to do and how to do it.

Cultural sensitivity of the intervention was ensured through the following measures: (i) a panel of Zulu dietitians appraised the weight loss and life style manual (Senekal, 2005) to ensure that subjects could relate to content, photos and illustrations and found it to be suitable for use in urban black (Zulu) overweight/obese subjects; (ii) a Zulu exercise educationalist was employed to facilitate the exercise component of the intervention; and (iii) intervention facilitators were predominantly of Zulu ethnicity.

Intervention delivery

Suitable times for intervention sessions were agreed on between intervention facilitators and subjects prior to commencement of the intervention. However, in practice it became evident that facilitators had to arrange more than one date per week (including weekends) to ensure that group members could attend, had to change dates at the last minute, and had to conduct **sessions in subjects' offices** to ensure continued participation.

The facilitation of group sessions were standardized, based on the weight loss and life style manual (Senekal 2005) and the topics and activities depicted in Table 4.1. Intervention facilitators were trained by the researcher and were given written guidelines to ensure that all sessions were conducted as per a standardized format and content. The information in the weight loss and life style manual (Senekal 2005), was supplemented with hand-outs that were adapted in accordance with requests from a particular intervention group if necessary. Other resources utilized to make group sessions more practical included the use of food models to depict portion sizes, empty food containers to educate subjects on how to read food labels and a cooking demonstration on using legumes as a source of low fat, high fibre protein. Subjects were also encouraged to bring food containers, recipes, advertisements and magazine features or newspaper clippings to sessions if they

required advice or clarification regarding the suitability of a product or recipe or the content of a mass media feature.

Monitoring of intervention compliance

A tick sheet that was developed by Schreuder et al. (2007) for monitoring subject compliance with the diet plan, physical activity and behaviour modification recommendations was used to monitor intervention compliance. Subjects were expected to complete the tick sheet prior to or during biweekly follow-up sessions. However, our subjects experienced the completion of the tick sheets as burdensome and submission of completed tick sheets to intervention facilitators was very poor. Final compliance scores were thus not computed and considered in the analyses of the intervention outcome.

4.2.4 Measures

The measures included in this study are summarized in Table 4.2. Detailed information on each measure is presented in Chapter 3 of this thesis.

Table 4.2: Outline of measures included in the intervention phase of the study.

Variable	Method/instrument	Baseline	Follow-up	Outcome	Comparison: completers versus drop-outs	Related reference
Height	Standardized methods according to International Society for the Advancement of Kinanthropometry (ISAK)	Yes	No	NA	No	
Weight		Yes	Yes*	Weight- and BMI change (P)		
BMI	Equation: height/weight ²	Yes	Yes		Yes	
Waist circumference (WC)	ISAK method with two metre non-elastic tape measure	Yes	Yes	Change in WC (S)	Yes	
Blood pressure (diastolic & systolic)	Standardized method with electronic blood pressure monitor and an obese cuff (32cm-42cm)	Yes	Yes	Change in BP (S)	Yes	
Fasting blood glucose	Ampath Patthologists© laboratory technique	Yes	Yes	NA	Yes	
Fasting triglycerides	Ampath Pathologists© laboratory technique	Yes	No	NA	Yes	
Fasting HDL-cholesterol	Ampath Pathologists© laboratory technique	Yes	No	NA	Yes	

<u>Variable</u>	<u>Method/instrument</u>	<u>Baseline</u>	<u>Follow-up</u>	<u>Outcome</u>	<u>Comparison: completers versus drop-outs</u>	<u>Related reference</u>
Energy and macro-nutrient intake	Three day estimated food record covering two week days and two weekend days	Yes	No	NA	Yes	Harbron et al., (2014)
Food choices	Non-quantified food frequency questionnaire (focus on healthy versus poor food choices developed for this research based on input from a panel of Zulu dietitians). It is important to note that some commonly consumed foods such as pap (maize) were not included as they were not identified as clear indicators of poor or healthy food choices. In terms of NCDs.	Yes	No	NA	Yes	Harbron et al., (2014)
Eating behaviour	TFEQ (restraint, disinhibition, perceived hunger)	Yes	Yes	Change in eating behaviour (S)	Yes	Stunkard & Messick (1985)
Physical activity	BOHPA (work, sport and leisure time excluding sport indices)	Yes	Yes	Change in each of the indices (S)	Yes	Baecke et al. (1982)
Depression	BDI (presence of depression confirmed by a score ≥ 21)	Yes	Yes	Change in BDI score (S)		Beck & Baemesderfer (1974)
Self-esteem	RSES (low self-esteem indicated by a score of ≤ 15)	Yes	Yes	Change in RSES score (S)		Rosenburg (1965)
General health	GHQ	Yes	Yes	Change in GHQ score (S)		Goldberg et al. (1976)

Weight-related variables including weight history	Questionnaire developed and standardized for the purpose of this research	Yes	No	NA	Yes	
Fear of weight gain					Yes	
Negative social experiences regarding weight status					Yes	
Frequency of weight monitoring					Yes	
Longest period on continuous diet and other aspects of past dieting behaviour					Yes	
Desired current body weight					Yes	
Socio-demographic variables					Yes	

P= primary objective; S= secondary objective; NA= not applicable

*Weight was taken at each of the 8 biweekly intervention sessions

4.2.5 Data collection procedures

Subjects who met the inclusion criteria for the study (see Table 3.1) and completed the consent form (see **Addendum B**) at baseline, were weighed and their **height was measured to confirm a BMI of \geq 27kg/m²**. Baseline measures were subsequently completed and intervention sessions commenced. As weigh-ins were conducted at each group session, the electronic scale used for this purpose was calibrated prior to each session with a standard five kg weight. All anthropometric measurements were taken behind a screen or in an adjacent venue to ensure subject privacy. Make-up sessions **were conducted in subjects' offices in the case of work-based interventions** and at the scheduled venue in the case of venue-based interventions to encourage compliance with the intervention and reduce attrition. At the conclusion of the 16-week intervention, the follow-up questionnaire was completed (see **Addendum C "Weight Programme Questionnaire"**). At the time of data collection, a Zulu speaking fieldworker (registered dietician) was always present to assist subjects in their vernacular.

On completion of the follow-up questionnaire by intervention completers, fieldworkers checked completed questionnaires for missing values and ambiguous responses and clarified these with subjects before they left the screening/intervention venue.

4.2.6 Fieldworker recruitment and training

All fieldworkers (n=10) were registered dietitians and nutritionists and included seven Zulu, two Caucasian and one Indian female. Fieldworkers attended a two day training session conducted by the researcher and a level three anthropometrist (International Society for the Advancement of Kinanthropometry [ISAK]), to ensure that they were competent to conduct the anthropometric measurements according to ISAK standards. Fieldworkers were also given time to familiarise themselves with the study questionnaire. Extensive training of the fieldworkers was essential to ensure reliability of the data.

4.2.7 Data capturing, processing and statistical analysis

Data was captured using the process of duplicate data entry, with the primary researcher and a research assistant capturing data independently using the latest version of PASW computer software (SPSS Version 22). Subsequently the two data sets for intervention completers were compared and cleaned to address any anomalies.

Descriptive statistics included frequency distributions for categorical variables and means \pm standard deviation (SD) or median inter-quartile range (IQR) for continuous variables, depending on normality of the data. The normality of variables was tested using the Kolmogorov-Smirnov statistic (K-S test) with a non-significant result ($p>0.05$) reflecting normality. The mean \pm SD is reported for normally distributed data, while both the mean \pm SD and median (IQR) is reported for non-normally reported data.

Primary and secondary hypotheses formulated for the purpose of the intervention phase of the study are presented in Table 4.3.

Table 4.3: Hypotheses formulated for the study and statistical analysis conducted to test the hypothesis

Hypotheses	Statistical test
<p>H₀₁: There is no change in the primary outcome [weight (BMI)] from baseline to follow-up (at 16 weeks after implementation of the weight loss intervention).</p> <p>H₀₂: There is no change in secondary outcome variables from baseline to follow-up (at 16 weeks after implementation of the weight loss intervention) (see Table 4.3 for list of variables).</p>	<ul style="list-style-type: none"> • By protocol analysis was applied, thus analysis of the subset of participants (in this research defined as completers) from the intervention who complied with the protocol sufficiently to ensure that their data would be likely to exhibit the effect of treatment (Shünemann et al., 2011). Outcomes should however be interpreted with caution as by protocol analysis may result in loss of power, and introduce bias given the incompleteness of data (Altman 2009) • Paired samples t-test for normally distributed variables • Wilcoxon signed-rank test for non-normally distributed variables • A p-value of < 0.05 was considered to reflect sufficient evidence to reject the null hypothesis. • The 95% confidence intervals for means were calculated for all outcome variables to facilitate interpretation of the clinical implications of the results.
<p>H₀₃: There is no difference between intervention completers and drop-outs for all variables assessed at baseline (see Table 4.2 for list of variables).</p>	<ul style="list-style-type: none"> • Cross tabulations were constructed for categorical variables to test for differences in group profiles using the Pearson Chi-square test. • Comparisons of continuous variables between the two groups were conducted using the independent samples t-test for normally distributed and Mann Whitney-<i>U</i> test for non-normally distributed variables.

4.2.8 Ethical considerations

Ethical permission was obtained from the Human Research Ethics Committee of the Faculty of Health Sciences at the University of Cape Town (HREC REF: 464/2006 and HREC REF: 023/2011). The research was conducted according to international and locally accepted ethical guidelines for research, namely the Declaration of Helsinki and Guidelines on Ethics for Medical and Genetic Research of the Medical Research Council of South Africa. After being thoroughly informed, each subject signed a consent form (see **Addendum B**).

4.3 RESULTS

4.3.1 Socio-demographic profile of intervention completers

Twenty subjects completed the intervention (79.8% drop-out). They had a mean±SD age of 33.7±5.4 years, 26.3% (n=5) were married, 68.4% (n=5) were unmarried and 5.3% (n=1) were divorced, separated or widowed. The highest qualification obtained for 20% of the sample (n=4) was grade ten, while the remaining 80% (n=16) had a tertiary education. Regarding living arrangements, 10% (n=2) lived alone, 30% (n=6) lived with their parents and 60% (n=12) lived with their husband

or partner. All subject had biological children with the mean±SD number of children per subject being 1.7±1.4.

4.3.2 Primary intervention outcome (H₀₁)

Results of the primary intervention outcome, namely weight (BMI) change are depicted in Table 4.4.

Table 4.4: Change in primary intervention outcome weight (BMI) from baseline to final follow-up in intervention completers (n=20).

Variables	Baseline	Follow-up	Change	95% confidence interval	p*
Weight (kg) (mean ± SD)	95.4 ± 15.2	93.3 ± 14.5	-2.1 ± 4.9	-0.19; 4.44	0.069
BMI (kg/m ²) (mean ± SD)	37.5 ± 5.6	36.7 ± 5.5	-0.8 ± 2.0	-0.14; 1.74	0.090

* Paired samples t-test: baseline versus intervention completion

The results show that there was no significant change in weight (BMI). The 95% confidence interval included an intervention effect of 4.4kg (1.7kg/m²), with one participant having lost 11.2kg. Power [probability of rejecting the null hypothesis (Hoenig & Heisey, 2001)] was calculated using the Open-epi, Power, Mean difference option and mean±BMI at baseline and follow-up (see Table 4.4) showed a power of 6.4%. Harvey (2014) caution that power calculations may problematic as they perpetuate an out dated focus on hypothesis testing in the in statistical analysis process.

4.3.3 Secondary intervention outcomes (H₀₂)

Results for the secondary outcomes are presented in Tables 4.5 (health related intervention outcomes and 4.6 (physical activity, psychological well-being and eating behavior).

Table 4.5: Change in health-related intervention outcomes in intervention completers from baseline to final follow-up.

Variables	Baseline	Follow-up	Change	95% confidence	P*
Waist (cm): mean ± SD	96.6 ± 14.2	94.0 ± 13.9	-1.9 ± 6.38	-1.13; 4.92	0.205*
Blood pressure (mmHg): mean ± SD					
Systolic	121.5 ± 18.3	112.0 ± 13.3	-9.89 ± 13.52	3.38; 16.41	0.005*
Diastolic	81.9 ± 11.1	75.2 ± 9.9	-6.84 ± 8.84	2.58; 11.10	0.003*

* Paired samples t-test: baseline versus intervention completion

From Table 4.5 it is evident that intervention completers had a statistically significant reduction in systolic and diastolic blood pressure levels on completion of the intervention. No change in waist circumference was evident.

Results depicted in Table 4.6 show that activity during leisure time and dietary restraint and increased significantly over the intervention period, while disinhibition and perceived hunger decreased significantly.

Table 4.6: Change in habitual physical activity, psychological well-being and eating behaviour of intervention completers (n=20) in relation to values recorded at baseline.

Variables	Baseline	Follow-up	Change	95% confidence interval	p
Physical activity ‡: mean ± SD					
Work index:	2.2 ± 0.7	2.2 ± 0.6	0.02 ± 0.4	-0.22; 0.17	0.948*
Min & Max score attained	1.1; 3.9	1.5; 3.3			
Sport index:	1.7 ± 0.6	2.4 ± 0.5	0.7 ± 0.7	-1.02; 0.34	0.095*
Min & Max score attained	1.0; 4.3	1.4; 3.3			
Leisure index:	1.9 ± 0.5	2.4 ± 0.4	0.5 ± 0.7	-0.85; -0.20	0.003**
Min & Max score attained	1.0; 4.5	1.5; 3.5			
Depression score #: mean ± SD					
Min & Max score attained	12.4 ± 7.2	5.7 ± 5.7	-6.7 ± 8.4	2.62; 10.75	0.198*
	0; 51	0; 21			
Self-esteem score Θ: mean ± SD					
Min & Max score attained	20.7 ± 5.0	23.9 ± 3.6	3.3 ± 4.9	-5.63; -0.89	0.925*
	0; 29	17; 29			
General health score δ: mean ± SD					
Min & Max score attained	8.8 ± 5.7	12.5 ± 3.0	3.7 ± 4.6	-5.91; -1.46	0.232*
	0; 21	7; 18			
Eating behaviour λ: mean ± SD					
Factor I Cognitive restraint	10.2 ± 3.2	15.7 ± 3.3	5.5 ± 4.7	-7.74; 1.51	<0.001**
Min & Max score attained	2; 20	9; 19			
Factor II Disinhibition	9.9 ± 3.2	5.8 ± 3.0	-4.1 ± 3.8	-7.74; -3.21	0.012*
Min & Max score attained	1; 16	1; 11			
Factor III Perceived hunger	7.4 ± 3.3	3.1 ± 2.4	-4.3 ± 4.0	2.35; 6.18	0.018*
Min & Max score attained	0; 14	0; 8			

* Paired samples t-test: baseline versus intervention completion

** Wilcoxon signed-rank test: baseline versus intervention completion

‡ Baecke Questionnaire of Habitual Physical Activity

Beck Depression Inventory

Θ Rosenberg Self-esteem Scale

δ General Health Questionnaire

λ Three-factor Eating Questionnaire

4.3.4 Subject comments on intervention

Table 4.7 provides an overview of the perceptions of completers with regard to the lifestyle manual and effectiveness in changes in knowledge of nutrition, physical activity and behaviour change.

Table 4.7: Perceptions of intervention completers regarding the lifestyle manual

Question	Completers (N=20)	
	% Yes	p*
Intervention completers who read the lifestyle manual	46	0.636
Believed lifestyle manual was helpful	100	**
Satisfaction with weight loss intervention (mean score)	80	0.154
Improvement in nutritional knowledge (mean score)	85	0.130
Improvement in knowledge regarding physical activity (mean score)	82	0.028
Improvement in knowledge regarding aspects of behavioural change (mean score)	84	0.028

* Pearson's chi-squared test: decrease in weight after intervention Yes versus No

** no p-value as all participants answered Yes

From the above it is evident that less than half of the intervention completers read the lifestyle manual. However, they all perceived the manual to be helpful. The latter was confirmed by their response that the lifestyle manual was perceived to be helpful, motivational, practical, and helped them to identify inappropriate dietary and lifestyle behaviours. The majority was satisfied with the intervention and perceived their improved knowledge regarding nutrition, physical activity and behavioural change to be as a result of the intervention.

Table 4.8 depicts responses to open-ended questions subjects were asked to evaluate the group sessions and the intervention.

Table 4.8: Responses to open-ended questions regarding group sessions and the intervention (n=20).

Question	Completers	
	Response	Frequency
Do you think the content of and discussions in the group sessions were applicable and helpful for you to lose weight?	Moral support and encouragement	3
	Very helpful regarding food preparation and labels	3
	Very informative and improved knowledge	5
Do you think the format and style of the group sessions were acceptable and applicable for you to lose weight?	Helpful and encouraging tips	2
	Sharing with group members	2
Do you think the group sessions are necessary and helpful for you to lose weight?	Encourage moral support and motivation	4
	Made friends	2
	Sharing experiences	3
Were you satisfied with the weight loss intervention and the services we provided? Please write any suggestions or comments.	Dieticians friendly, professional, supportive and patient	2
	Suggestions regarding changes in lifestyle are simple	2

From the above responses it can be seen that intervention completers found the group sessions to be informative, especially regarding food preparation and the interpretation of food labels, as well as good in providing moral support and encouragement via group members. Satisfaction regarding the format and style of group sessions was also expressed. In addition, subjects reported that group sessions were essential to facilitate weight loss as they served as a source of moral support and motivation and facilitated the sharing of experiences, while making new friends. Intervention

facilitators were viewed as friendly, supportive and professional while their suggestions regarding a change in lifestyle were simple to follow.

4.3.5 Comparison of baseline characteristics between intervention completers versus drop-outs (H₀₃)

Table 4.9 depicts a comparison of socio-demographic characteristics of intervention completers versus drop-outs at baseline.

Table 4.9: Comparison of socio-demographic characteristics at baseline between intervention completers and drop-outs.

Variables	Completers (N=20)		Drop-outs (N=79)		p ^{**}
	n*	%	n*	%	
Socio-demographic characteristics (column %)					
Marital status:					0.950
married	5	26.3	17	22.1	
unmarried	13	68.4	53	68.8	
divorced/separated/widowed	1	5.3	7	9.1	
Highest level of education attained:					0.742
matric	4	20.0	12	15.2	
tertiary education	16	80.0	67	84.8	
Living arrangements:					0.842
alone	2	10.0	13	16.5	
with parents	6	30.0	35	44.3	
with your husband/partner	12	60.0	31	39.2	
Mean age (years): mean ± SD	20	33.7 ± 5.4	79	30.8 ± 5.3	0.037
Number of biological children: mean ± SD	20	1.7 ± 1.4	79	1.3 ± 1.4	0.200†

*n varies due to missing values

** Independent samples t-test: completers versus drop-outs

† Mann-Whitney U test: completers versus drop-outs

From the above table it is evident that the only significant differences between intervention completers and drop-outs at baseline (cross-sectional phase of study) was that intervention completers were older than drop-outs.

Table 4.10 provides a comparison of subjects' weight status, health indicators and prevalence of the metabolic syndrome at baseline when comparing intervention completers to drop-outs.

Table 4.10: Comparison of weight status and prevalence of metabolic syndrome at baseline between intervention completers and drop-outs.

Variables	Completers (N=20)		Drop-outs (N=79)		p
	n*	Mean ± SD	n*	Mean ± SD	
Anthropometric values:	20		79		
Height (m): median IQR		1.59 (1.57;1.62)		1.58 (1.55;1.61)	0.391**
Weight (kg): median IQR		97.53 (90.49;102.33)		90.15 (79.64;107.78)	0.595**
BMI (kg/m ²): mean ± SD		37.5 ± 5.6		37.7 ± 7.9	0.812†
Waist (cm)		96.6 ± 14.2		99.7 ± 16.1	0.435†
Blood pressure (mmHg):	20		79		
Mean systolic: median IQR		119 (108;129)		120 (112;132)	0.858**
Mean diastolic: mean ± SD		81.9 ± 11.1		83.1 ± 14.0	0.723†
Glucose (mmol/L):	18	4.7 (4.5;5.3)	57	4.7 (4.4;5.1)	0.554**
HDL (mmol/L):	18	1.2 (1.0;1.4)	57	1.3 (1.1;1.5)	0.224**
Triglycerides (mmol/L):	18	0.8 (0.6;1.2)	57	0.9 (0.6;1.1)	0.822**
Metabolic syndrome % ‡	20	25.0	79	15.2	0.381†

* n varies due to missing blood values

** Mann-Whitney U test: completers versus drop-outs

† Independent samples t-test: completers versus drop-outs

‡ Metabolic syndrome diagnosed according to NCEP ATP III criteria

From Table 4.10 it is apparent that there were no significant differences between completers versus drop-outs in terms of weight status, health parameters or the prevalence of metabolic syndrome (MetS) at baseline.

Table 4.11 depicts a comparison of habitual physical activity, psychological well-being and eating behaviour of intervention completers versus drop-outs at baseline. It is evident that there is no evidence of any significant differences between completers and drop-outs for any of these variables.

Table 4.11: Comparison of habitual physical activity, psychological well-being and eating behaviour at baseline between intervention completers and drop-outs.

Variables	Completers (N=20)		Drop-outs (N=79)		p**
	n	Mean ± SD	n*	Mean ± SD	
Physical activity‡:	20		73		
Work index: median IQR		2.0 (1.6;2.4)		2.3 (1.8;2.6)	0.311
Min & Max score attained		1.1; 3.6		1.3; 3.9	
Sport index: median IQR		1.8 (1.5;1.8)		1.8 (1.3;2.3)	0.538
Min & Max score attained		1.0; 4.0		1.9; 4.3	
Leisure index: median IQR		1.9 (1.7;2.3)		2.0 (1.4;2.4)	0.658
Min & Max score attained		1.0; 3.0		1.0; 4.5	
Depression score #: mean ± SD	20	11.8 ± 7.5	73	13.4 ± 10.0	0.517†
Self-esteem score Θ: median IQR	20	19.5(17.8;24.5)	73	20.0(17.0;23.5)	0.920
General health score δ: median IQR	20	8.5 (4.0;13.3)	73	12.0 (5.5;15.0)	0.134
Min & Max score attained		0; 19		0; 21	
Eating behaviour λ:	20		79		
Factor I Cognitive restraint: median IQR		10.5 (7.0;14.0)		8.0 (5.5;11.5)	0.101
Factor II Disinhibition: mean ± SD		9.8 ± 3.1		8.9 ± 3.5	0.302†
Factor III Hunger: median IQR		7.5 (4.0;10.0)		7.0 (5.0;10.0)	0.937

* n varies due to missing values

** Mann-Whitney U test: completers versus drop-outs

† Independent samples t-test: completers versus drop-outs

‡ Baecke Questionnaire of Habitual Physical Activity

Beck Depression Inventory

Θ Rosenberg Self-esteem Scale

δ General Health Questionnaire

λ Three-factor Eating Questionnaire

Table 4.12 depicts a comparison of total energy- and macronutrient intake as well as the consumption frequency of poor food choices (high fat foods, energy dense snacks and energy dense drinks) and fruit/vegetable intake of intervention completers versus drop-outs at baseline.

Table 4.12: Comparison of energy- and macro nutrient intake¶ and frequency of intake§ of poor food and healthy food choices at baseline between intervention completers and drop-outs.

Variables	Completers (N=20)		Drop-outs (N=79)		p
	n*	Mean ± SD	n*	Mean ± SD	
Three day estimated food record:	13		28		
Mean energy intake/day (kJ): mean ± SD					
Total		7543.2 ± 1971.0		8290.9 ± 2821.2	0.395
Weekday		6814.2 ± 1854.0		6876.4 ± 2117.8	0.928
Weekend		9090.9 ± 2857.5		10742.0 ± 4557.5	0.239
Mean protein intake/day (g): mean ± SD					
Total		62.6 ± 16.0		69.6 ± 23.9	0.341
Mean fat intake/day (g):					
Total: mean ± SD		62.1 ± 22.4		77.8 ± 34.2	0.141
Cholesterol (mg): median IQR		150.9 (112.6; 200.7)		219.7 (148.6; 332.7)	0.157†
Mean carbohydrate intake/day (g): mean ± SD		220.2 ± 56.0		234.3 ± 77.0	0.559
Total		50.7 ± 23.5		45.3 ± 23.9	0.501
Mean dietary fibre intake/day (g): mean ± SD					
Total		17.6 ± 6.1		17.1 ± 6.8	0.843
Mean portions/day ‡: mean ± SD	19		68		
High fat foods		10.4 ± 8.7		10.7 ± 10.2	0.896
Energy-dense snacks		3.3 ± 5.8		3.6 ± 5.8	0.829
Energy-dense drinks		2.8 ± 3.1		3.0 ± 3.5	0.812

* n varies due to missing values

** Independent samples t-test: completers versus drop-outs

† Mann-Whitney U test: completers versus drop-outs

‡ Non-quantified food frequency questionnaire

¶ In a subgroup who completed the 3 day record (one weekend and two week days)

§ In the total baseline group

There were no significant differences between completers and drop-outs for any of these variables at baseline. Results of the 3 day dietary record should be interpreted with caution due to the low number of subjects who completed the records.

Table 4.13 provides an overview of weight loss expectations at baseline for intervention completers versus drop-outs. The completers were significantly more likely to have attempted weight loss before. There were no further significant differences between the two groups for the variables depicted in Table 4.13.

Table 4.13: Comparison of weight loss expectations and weight loss history at baseline between intervention completers and drop-outs

Variables	Completers (N=20)		Drop-outs (N=79)		p
	n*		n*		
Desired weight in terms of BMI (kg/m ²): median IQR	18	26.2(23.3;29.3)	69	25.9(23.0;28.8)	0.933**
Weight (kg) retained for longest period after age 20: mean ± SD	8	73.4 ± 7.9	24	75.5 ± 17.2	0.762†
Age (years) when weight loss was initiated: Mean ± SD	20	22.4 ± 9.2	79	17.8 ± 11.5	0.068†
Maximum weight (kg) ever lost: median IQR	20	5.0 (3.5;10.5)	43	2.0 (0.0;7.5)	0.560**
Have attempted to lose weight before	19	95.0	62	78.5	0.019†
With which weight loss method were you most successful (column %)					
healthy ‡	12	75.0	29	70.1	
unhealthy #	4	25.0	12	29.3	

* n varies due to missing values

** Mann-Whitney U test: completers versus drop-outs

† **Independent samples t**-test: completers versus drop-outs

‡ Balanced slimming diet, increase in physical activity, eating less or not snacking between meals and joining Weigh-less®

Skip one or more meals, appetite suppressants, diet formulas, milkshakes and powders

4.4 DISCUSSION

The primary aim of this research was to investigate weight loss on and attrition from a culturally sensitive healthy weight loss intervention of 16 weeks in overweight/obese urban Zulu women. Secondary outcomes documented included changes in health indicators, eating behavior, physical activity and indicators of psychological well-being.

The results of the 20 participants who completed the intervention (11 % of the baseline group) show that the intervention did not result in a significant reduction in mean weight (BMI). Individual results show a maximum weight loss of 11.2 kg in one participant, while weight gain was experienced by another participant over the 16 week intervention. Bearing in mind the limitation of the low power of the final sample, it can be argued that the lack of overall success in weight loss could have been expected considering the trends regarding weight loss success found in African-American women, namely that they are less likely to be successful than their Caucasian counterparts (DeLany et al. 2013; Neve et al., 2010; Osei-Assibey et al., 2010; Kumanyika et al., 2005). One of the most plausible factors that may explain this outcome is that although black South African women may seek treatment and embark on a weight loss intervention, they may be less preoccupied with weight control, have greater levels of body satisfaction at heavier weights. These characteristics may limit motivation to lose weight or the efficacy of weight loss interventions (Ard, 2007; Lynch et al., 2007), even in middle income groups (Matoti-Mvalo & Puoane 2011; Puoane et al., 2006a; Puoane et al., 2005a; Puoane et al 2005b). A further consideration is that black women may have lower energy

requirements for weight loss and maintenance (DeLany et al. 2013). The latter authors concluded that in order to facilitate weight loss amongst African-American women, energy restriction should not be based on body weight alone but must be lower to account for lower energy requirements.

From a clinical significance point of view it needs to be noted that intervention completers experienced a significant reduction in both systolic and diastolic blood pressure, despite the lack of significant weight loss. Although no changes in any of the other health indicators were evident, the blood pressure results re-iterate the possibility that modest but sustainable weight losses may improve health risks associated with obesity (Lysen & Israel 2012; US Department of Health and Human Services 1998).

Physical activity may contribute to weight loss by increasing energy expenditure, but is especially important for maintenance of lean body mass during the period of restricted energy intake and the initial period of weight maintenance (Lysen & Israel, 2012; Donnelly et al., 2004). There were some indications in our sample of increased physical activity over the intervention period as is reflected in the significant increase in the leisure time index score. According to Puoane and Tsolekile (2008); Bradley et al. (2007); Friel et al. (2007); Sparling et al. (1994), leisure time physical activity could include outdoor activity such as jogging or walking. The fact that there was no increase in the sport index score indicates that the increase in leisure time activity was not in the form of exercise such as jogging, walking or playing netball. Cultural perceptions that physical activity is associated with work related activities and that exercise during leisure time is inappropriate (Puoane & Tsolekile, 2008), may explain this finding. As expected, physical activity during work did not increase over the intervention period and could be indicative of the fact that there are more barriers when it comes to addressing levels of physical activity in the work place, whereas it may be easier to implement lifestyle changes outside the work environment. Literature supports the possibility that weight loss interventions targeting black women may not necessarily result in increased physical activity levels. Only one of the 10 weight loss interventions targeted at African-American women (Lasco et al., 1999) and one of the two targeted at black South African women (Isaacs & Puoane, 2011; Sparrow, 2010) that could be found reported an increase in physical activity as an intervention outcome. Kennedy et al. (2005) reported that the levels of physical activity and quality of life in their sample increased significantly, with the mean weight loss following the 26 week intervention being 3.3kg (attrition was only 10%). Sixty seven percent of participants in a lifestyle dietary intervention (multiracial hospital-based nursing staff in a South African hospital) reported increased levels of physical activity. The mean weight loss was 5.8%, but attrition was 66% (Sparrow, 2010).

The psychological well-being of the total group of completers seemed to be good at baseline based on the findings that the mean Beck score for depression (12.4) was in the normal range (<21) (American Psychiatric Association 2013) and the mean GHQ score (8.8) was in the lower range

(maximum score = 30) (American Psychiatric Association 2013), reflecting good general psychological well-being. This was contrary to expectations as numerous studies have suggested that depression is positively associated with the level of obesity in treatment-seeking obese individuals (De Witt et al. 2010; Luppino et al. 2010; Simon et al. 2008; Kim et al., 2007; Werrij et al., 2006; Musante et al., 1998). The findings that indicators of psychological well-being did not change over the intervention period, may be explained by the fact that there was no significant change in weight. Had subjects lost weight, improvement in general psychological wellbeing may have been expected (Phelan et al., 2003).

Numerous researchers have reported negative relationships between being overweight/obese and self-esteem (Fabricatore et al., 2009; Werrij et al., 2006; Miller & Downey, 1999). Furthermore, lower self-esteem has also been found to be associated with unsuccessful weight loss in overweight/obese women (Teixeira et al., 2002). The finding that the mean RSES self-esteem score (20.7) indicated good self-esteem (> 15) (Rosenberg, 1965) at baseline was thus unexpected, as was the finding that there was no lowering in self-esteem over the intervention period despite the fact that on average subjects did not experience weight loss. It is possible that being a member of a weight loss group, rather than just trying to lose weight by themselves, was responsible for the fact that self-esteem remained favourable, as proposed by Rubinstein (2006). This possibility is supported by the results of the open-ended questions that evaluated the lifestyle manual, the intervention per se, as well as the group sessions show that participants viewed the group approach in a positive light in terms of knowledge gained and the moral support and encouragement group members gave each other.

Cognitive (Dietary) restraint level in our sample was moderate at baseline (10.2 out of a maximum of 20), which is in line with results reported for overweight/obese African-American women (Siegel et al., 2005). According to Murray and Vickers (2009), overweight/obese participants in weight loss interventions may be expected to experience an increase in dietary restraint and a decrease in disinhibition and perceived hunger over the course of the intervention. Such changes were clearly evident in our sample. An increase in cognitive restraint reflects increased control over food choices and may also indicate healthier eating habits (Blazer et al., 2002). High scores for disinhibition that reflect loss of control over eating (Karlsson et al., 2000; Stunkard & Messick 1985) and perceived hunger that reflect external locus of control, are associated with higher BMI values (Clément et al., 2004; Provencher et al., 2003; Boschi et al., 2001; Westenhoefer et al., 1999; Gendall et al., 1998). The expected outcome of increased dietary restraint and decreased disinhibition and perceived hunger thus is weight loss, which, however, was not evident in our sample. A possible explanation for this finding may be that total energy intake was not sufficiently restricted, despite the potentially positive changes in eating behaviour. The limited power of the small number of participants who completed the full intervention also needs to be considered when interpreting these data.

The decrease in perceived hunger among intervention completers is very encouraging, as perceived hunger may be a challenge for black South Africa women their culture is associated with frequent social events characterised by an abundance of food. The latter is associated with the expectation **from “others” to eat (Puoane et al., 2006b).**

Weight loss success depends on compliance with and staying in a weight loss intervention. We attempted to monitor compliance using a monitoring sheet developed and tested by Schreuder (2007) for a similar target population. However, participants in our intervention found completing the weekly tick sheet burdensome and the data on this aspect was very incomplete and thus not included in the analyses. As was expected based on literature on attrition of African American (Befort et al., 2008a; Kennedy et al., 2005; Karanja et al., 2002; Walcott-McQuigg et al., 2002; Mayer-Davies et al., 2001; Yanek, 2000; Lasco et al., 1999; McNabb et al., 1997; Kanders et al., 1994; Kumanyika & Charleston, 1992) and black South African women (Sparrow 2010) from weight loss interventions, the attrition in our study was very high at 80%. According to Russel et al. (2001) intensive follow-up and contact with subjects seem to improve both participation and retention. The current study can be classified as intensive, as there were more than one face-to-face counselling session per month for at least the first three months (McTigue et al., 2003; Ross et al., 2000). However, despite the above, the drop-out rate was very high. Yancey et al. (2006) explain that studies that investigated retention issues related to weight loss interventions highlight the importance of having staff from the target population, i.e. racial/ethnic matching of project staff and participants, providing social support and having an accessible location for the implementation of the intervention. Kreuter and McClure (2004) also emphasize the importance of matching intervention facilitators with the target population in terms of socio-demographic characteristics to enhance perception of trustworthiness of the information that is disseminated. These requirements were for the most part met in our intervention as the majority of facilitators were female Zulu dietitians and intervention sessions were conducted in the workplace. The appropriateness of the intervention is further supported by the responses documented for the open-ended questions posed to intervention completers. These participants found group sessions to be very informative, a source of moral support, motivation and encouragement and viewed intervention facilitators in a positive light. The lifestyle manual was also perceived as being helpful and motivational, which in turn provided subjects with necessary knowledge to facilitate weight loss.

It is evident that baseline characteristics of participants who completed the intervention and drop-outs do not seem to differ, with the exception of age and prior weight loss attempts. Completers were older, which is in line with the findings by Gunnarsdóttir et al. (2010) and Fabricatore et al. (2009) who documented that treatment-seeking subjects of a younger age are more likely to drop out of a weight loss intervention. Being older may also contribute to better insights in the importance of weight loss for health reasons, as well as higher levels of maturity that may facilitate compliance with

and remaining in the intervention. Completers were also more likely to report prior weight loss attempts, which may be linked to the fact that they were older. The available body of evidence is conflicting as to whether this characteristic is indicative of intervention success and/or attrition (Texeira et al., 2004; Brownell 1993; Kumanyika et al., 1993). Of note is that a history of repeated weight loss attempts may reflect poor success with weight loss and maintenance and weight cycling. The fact that weight loss in our sample of completers was not significant may point to perpetuation of this situation, despite the clear commitment to complete an intervention.

We speculate that factors such as cultural and other environmental influences on body shape ideals, eating habits and physical activity, as well as other personal challenges such as a lack of time and unrealistic weight loss expectations may have contributed to the attrition and the poor weight loss success.

4.5 CONCLUSION

Although the small sample size for intervention completion is a key limitation in determining the effectiveness of the intervention in terms of weight loss per se, the results of this research provide some additional insights in the 10 identified weight management focus areas (Section 2.10 pp 70-79). These focus areas include namely 1) treatment seeking behaviour; 2) weight loss success; 3) compliance to and attrition from weight loss programmes; 4) cultural influences on body shape and size perception and satisfaction; 5) cultural influences on food choices and eating patterns 6) cultural influences on physical activity; 7) environmental factors and social support; 8) appropriateness of the weight loss programme for the target population; 9) dietary restraint, disinhibition, perceived hunger and bingeing and 10) psychological well-being (depression).

Subjects who volunteered for the weight loss intervention seemed to be ready to embark on a weight loss intervention (FA 1), as they enquired about enrolment in response to recruitment initiatives, attended the screening session during which they completed baseline assessments, and finally agreed to participate in the actual intervention. Despite the apparent readiness of participants to lose weight and the apparent appropriateness of the intervention (FA 8, see next paragraph), attrition (FA 3) was very high, reflecting local and international experiences in this regard. The only characteristics that distinguished completers from drop-outs were being older (a positive characteristic) and having a prior history of seemingly unsuccessful weight loss attempts (a negative characteristic) at baseline (FA 1).

Completion of the intervention did not result in successful weight loss (FA 2), also reflecting international experiences in this regard. Poor weight loss outcomes were evident despite (i) the intensity of the programme and indications that it was appropriate (FAs 7 and 8) in terms of the

delivery approach (group and work based), intervention facilitators (similar socio-demographic profile) and creation of a secure, motivational and supportive environment, as well as the lifestyle manual used (FAs 5 and 6); (ii) the improvement in eating behaviours (cognitive restraint, disinhibition and perceived hunger) (FA 9); and (iii) the increase in leisure time physical activity (not sport, possibility because sport during leisure time may be viewed as inappropriate) (FA 6). Contrary to expectations, indicators of psychological well-being and self-esteem did not change (deteriorate) as could be expected in a scenario where weight loss was not successful (FA 10).

The pertinent question, namely whether this outcome can be explained by cultural influences on beauty ideals, eating habits and views on the importance of physical activity, as well as other potential influences could not be investigated in depth in this intervention study. We posit that qualitative research into factors that may promote successful weight loss on the one hand, and those that may act as barriers to successful weight loss and maintenance on the other, may provide insights in the elusive aspects that need to be considered in the development and implementation of weight loss programmes for black (Zulu) South African women.

CHAPTER 5

QUALITATIVE PHASE: INTERVENTION EVALUATION

5.1 INTRODUCTION

Attrition from weight loss interventions is not an uncommon phenomenon, as attrition rates documented for 11 published weight loss interventions targeting African-American women in the USA ranged from 0 - 79% (Bronner & Boyington 2002). A systematic review of attrition rates in weight loss interventions (that included black women) fulfilling British Dietetic Association Weight Wise criteria, documented attrition rates ranging from 6.5 to 76.6% (Hughes & Walker 2011). Despite being such a common phenomenon, only a few studies have provided insights into the factors contributing to this phenomenon in black women. Attrition hampers the outcome of weight loss interventions and requires further investigation to advise intervention developers on factors that may promote weight management (loss) success in overweight/obese subjects, as well as on unique barriers that need to be considered in intervention planning and implementation.

There is evidence that weight loss interventions targeting black women have to contend with unique barriers to weight loss. Qualitative research conducted on obese African-American women showed that they perceived the most common barriers to weight loss as a lack of time and access to resources, aspects related to self-control and extrinsic control as well as identification with a larger body size (Sterling Lynch et al., 2007). A comparison of the values and beliefs regarding weight loss between African-American women and their Caucasian counterparts, found that African-American women cited culture-specific barriers to weight loss to a greater extent. In addition, they also differed regarding their beliefs on how health care professionals could assist them with weight loss (Blixen et al. (2006b). Honas et al. (2003) identified female gender, being divorced, being African-American and being younger than 40 years as risk factors for drop-out.

According to Matoti-Mvalo and Puoane (2011); Puoane et al. (2006a); Puoane et al. (2006b); Puoane et al. (2005a) and Puoane et al. (2005b), it is apparent that many black South African women do not want to lose weight because obesity is culturally and aesthetically looked upon with less disfavour than is the case for their Caucasian counterparts. A survey conducted on a sample of urban Xhosa women found that a moderately overweight shape was preferred and was associated with dignity, respect, confidence, beauty and wealth (Puoane et al., 2005b). In addition, few overweight/obese black women view themselves as overweight and some associate thinness with HIV/AIDS (Kruger et al., 2005; Puoane & Hughes 2005). It is therefore evident that there may be limited incentives for overweight/obese black women to lose weight, even among urban women who have a higher level of education and are of a higher socio-economic status (Case & Menendez, 2009). As a result, it is not surprising that a South African study targeting black women reported that although subjects

expressed a desire to lose some weight for practical reasons, there was no social pressure to motivate weight loss. This led the authors to conclude that the attitudes towards weight and weight loss documented suggest that cultural perceptions of excess body weight would complicate the design of effective weight loss interventions as barriers to entry could be numerous (Mvo et al., 1999). Blixen et al. (2006b) conclude that these nuances need to be considered in designing culturally sensitive weight loss interventions. Walker-Sterling (2005) agrees that African-American women will gain substantial benefits from weight loss interventions that address the complexity of the disorder and are culturally sensitive.

Characteristics associated with lower attrition from weight-loss interventions in general include lower levels of depression at baseline; being a non-smoker, an exerciser and older; as well as having been on a larger number of previous weight loss diets (Clark et al., 1996; Yas-Reed et al., 1993). Other documented retention factors include that subjects who lose more weight early in the intervention, remained in the intervention for longer, while those with a higher baseline BMI achieved greater losses. However, a lower initial BMI was associated with remaining in the intervention for longer. This lead to the speculation that subjects with higher BMIs and higher weight loss goals experienced greater difficulty in passing the five week intervention screening phase, but that those with higher BMIs ultimately lost more weight than those with less weight to lose (Latner et al., 2002). Honas et al. (2003) conducted a review of large clinic-based weight loss interventions and found that no common attrition-related variables were evident, bearing in mind that sample size, intervention design, intervention content, treatment duration and definition of attrition varied between the studies. As a result, these authors state that it is of primary importance to conduct attrition studies that are representative of treatment-seeking subjects or those who are referred to weight loss interventions.

Within the public health nutrition arena the high attrition rates could imply that any initiative/intervention/campaign targeting overweight/obese black women **may be “doomed” to fail**, even at the outset. It is clear that the potential for health professionals to develop culturally sensitive, successful weight loss interventions depends on an in depth understanding of and insight in the barriers to weight loss, considerations for success and the factors that would motivate overweight/obese black women to lose weight (Blixen et al., 2006b). As there are no studies on attrition rates from healthy weight loss interventions in South Africans, the aim of this study was to investigate the phenomenon of attrition in black (Zulu) overweight/obese women. These investigations were conducted bearing 10 weight management focus areas identified from the literature (Section 2.10 pp70-79), including namely 1) treatment seeking behaviour; 2) weight loss success; 3) compliance to and attrition from weight loss programmes; 4) cultural influences on body shape and size perception and satisfaction; 5) cultural influences on food choices and eating patterns 6) cultural influences on physical activity; 7) environmental factors and social support; 8)

appropriateness of the weight loss programme for the target population; 9) dietary restraint, disinhibition, perceived hunger and bingeing and 10) psychological well-being (depression).

5.3 METHODS AND PROCEDURES

5.3.1 Study design

An exploratory study design using qualitative research techniques, including focus group discussions and semi-structured in-depth interviews, was employed. This approach was deemed most appropriate study design to investigate attrition based on the advantages of this type of research methodology summarized in Table 5.1, bearing in mind the limitations also referred to in Table 5.1. For the purposes of this study the definition of attrition included enquiring about the intervention but not enrolling, as well as enrolling for and starting the intervention, but not completing it (dropping out).

5.3.1 Study design

An exploratory study design using qualitative research techniques such as focus group discussions and semi-structured in-depth interviews were employed in this phase of the study. This was deemed the most appropriate method of data collection as is illustrated by the by the advantages and limitations referred to in Table 5.1.

Table 5.1: Advantages and limitations of qualitative research techniques.

Technique	Reference
<p>Qualitative health research in general:</p> <p>Advantages</p> <ul style="list-style-type: none"> - gaining in-depth description of subject views, experiences and social contexts that strengthen, support or diminish health - generates an understanding of the underlying motivations and attitudes of a target population, thereby helping to determine what people do as well as why they do it. - developing an understanding of how the intervention worked/why it did not work - enables development of context specific strategies for individual and collective change - ideal for conducting culturally sensitive research - no strict criteria for sample size - sampling is concluded when (i) resources in terms of time and money are exhausted; (ii) practical problems hampering access and availability of subjects are experienced; (iii) emergence of regularities in the data is found, i.e. theoretical saturation, and; (iv) overextension or going beyond the boundaries of the research is starting to emerge, inclusive of redundancy 	<p>Draper and Swift (2011)</p> <p>O' Cathain et al., (2007)</p> <p>Bernard (2002)</p> <p>Tillman (2002)</p> <p>Curtis et al., (2000)</p> <p>Groger et al., (1999)</p> <p>Hoepfl (1997)</p> <p>Gifford (1996)</p> <p>Patton (1990)</p>

<u>Technique</u>		<u>Reference</u>
<p>Focus group discussions: Advantages</p> <p>Limitations</p>	<ul style="list-style-type: none"> - involves a small, homogenous group of people (six to twelve) - guided by questions that are predetermined, open-ended and focused on the topic and are documented in a focus group guide - productivity enhanced by group members feeling at ease to discuss topics openly - involve fewer respondents for more difficult projects or those with more sensitive subject matter - enables better understanding of how African-American culture may contribute to dietary patterns, physical activity and weight loss behaviour - allows participants to critique, comment, explain and share their experiences, opinions, and attitudes on topic under discussion and allows them to qualify, clarify, and build upon each other's responses thereby resulting in generation of in-depth information and new ideas <ul style="list-style-type: none"> - requires a facilitator - number of questions might be limited due to time constraints - collection of verbal data could complicate analysis and interpretation - involving fewer respondents i.e. four in the discussion of less complicated topics may result in the loss of useful data - information generated should not be used to generalize - large number of participants may limit depth of response generated 	<p>Befort et al., (2008c) Tynan et al., (2007) James (2004) Sharcken Simon (1999) Merton et al., (1990) Patton (1990)</p> <p>Befort et al., (2008c) Tynan et al., (2007) James (2004) Sharcken Simon (1999)</p>
<p>Semi-structured in-depth interviews: Advantages:</p>	<ul style="list-style-type: none"> - requires small sample of individuals, i.e. 12-35, that are likely to provide relevant information, ideas and insights on a particular topic, thereby exploring their perspectives on a particular idea, programme or situation - theoretical saturation can be achieved within the first six interviews - a combination of data collection methods e.g. surveys, document content analysis and semi-structured interviews requires fewer interviews - conducted using interview guides that list the topics and issues to be discussed and with study questions posed being kept to a minimum of usually less than five - informal atmosphere, resembling a conversation among acquaintances - excellent for documenting reasons for a behaviour - facilitates an understanding of subjects' understandings or misconceptions regarding certain issues - generates confidential information such as implementation problems that would not be revealed in other settings - provides flexibility to explore new ideas that were not anticipated in planning the intervention, but are relevant to its purpose - relatively inexpensive to conduct - provides more detailed information than what is available through other data collection techniques such as surveys 	<p>Draper and Swift (2011) Befort et al., (2008c) Boyce et al., (2006) Groger et al., (1999) Morgan (1996) Kumar (1989)</p>

<p>Limitations:</p>	<ul style="list-style-type: none"> - quality of ideas generated viewed as superior to that of focus group discussions - focus group participants produce only 60-70% as many ideas as they would have in an in-depth interview - enables better understanding of how African-American culture may contribute to dietary patterns, physical activity and weight loss behaviour - findings may be biased if subjects are not carefully selected - findings could be susceptible to interviewer biases - time consuming to conduct, transcribe and analyse - when only a few individuals (i.e. fewer than 15) are interviewed, it may be difficult to demonstrate the validity of the findings 	<p>Boyce et al., (2006) Kumar (1989)</p>
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Limitations associated with focus group discussions were addressed through (i) the development of appropriate focus group guides (see **Addendum G and H**), using relevant literature and expert input from six academics including two Zulu and two Xhosa women with extensive, relevant experience; and (ii) through the use of a well-trained facilitator (Zulu dietitian). The facilitator had extensive experience in the field and facilitated the focus group with intervention facilitators and as well as the two focus groups with newly recruited overweight/obese urban Zulu women in English. The focus group facilitator was assisted by a scribe (the researcher). Limitations associated with semi-structured in-depth interviews were addressed by the development of an appropriate interview guide (see **Addendum F**), the use of an experienced, well trained female Zulu interviewer. The the researcher was not present when interviews were conducted.

5.3.2 Overview of sampling frame and subject recruitment

The study sample included three groups: (i) treatment-seeking overweight/obese women who showed interest in participating in a balanced weight lost intervention (contacted thr researcher following exposure to recruitment initiatives), but eventually did not enrol; those who enrolled but did not complete the intervention; and those that completed the intervention (see Chapter 4); (ii) subjects who met the entrance criteria for the study, were exposed to recruitment initiatives, but did not enquire about the intervention and had never considered weight loss; and (iii) the registered dietitians who facilitated the group sessions that formed part of the intervention (Table 5.2).

Table 5.2: Sampling frame and number of subjects that participated in qualitative phase of the study

Subject category	Number of eligible subjects	Number of subjects recruited	Mass media and other electronic media used to recruit subjects	Examples of potential subject response
Intervention facilitators	10	6	Daily News : 430 000 readers Izoleswe : 696 000 readers Radio Zulu : free advertising as the presenter of the programme saw the advertisement in Izoleswe Innerweb of Durban University of Technology (5 campuses) Innerweb of University of KwaZulu-Natal (5 campuses)	Durban-based venue 8/7/2008: 43.7% of enquiries arrive for baseline screening
Intervention participants	99	20		Pietermaritzburg-based venue 9/7/2008: 27.6% of enquiries arrive for screening
Number of subjects that enquired about the intervention, were found eligible but did not enroll in study	N/A	6		Durban-based venue 11/7/2008: 20.0% of enquiries arrive for baseline screening
Subjects meeting the entrance criteria for the study that were exposed to the social marketing aspects of the intervention but did not enquire about the intervention	N/A	13		Durban University of Technology-based group 16/2/2009: 30.0% of enquiries arrive for baseline screening

5.3.3 Focus group conducted with intervention facilitators

Sample

All registered dietitians and nutritionists that facilitated the intervention (excluding the researcher and focus group facilitator), were invited to participate in a focus group discussion that was conducted at a central venue in Durban. Participants were given an incentive in the form of a R200 gift voucher to compensate them for their time, effort and travel expense.

Focus group discussion guide

A focus group discussion guide (see **Addendum H**) was developed based on concepts derived from the following: (i) feedback from intervention facilitators (predominantly Zulu registered dietitians and nutritionists) during the intervention phase of the study; (ii) **field notes based on the researcher's** interaction with intervention facilitators and subjects; (iii) published literature documenting the barriers to weight loss experienced by South African black women and African-American women; (iv) consultation with two local experts in the field of weight management and four local experts in the field of qualitative research (including two Zulu and two Xhosa women) in accordance with

recommendations made by Krueger and Casey (2008). The focus group discussion guide was then pilot tested before implementation. However, due to the limited sample size, the discussion guide was piloted by interviewing one intervention facilitator (Indian dietitian) who was not able to attend the focus group discussion.

Focus group facilitator

The focus group was facilitated by a well-trained facilitator (Zulu dietitian) with extensive experience in the field who holds an Honours Bachelor of Arts in Counselling Psychology and an internationally recognised certificate in interpersonal skills facilitation as well as practical experience with small group facilitation. She also received training on facilitating focus group discussions from a Zulu woman who has extensive experience in facilitating focus group discussions. According to Krueger and Casey (2008), interviewing requires mental discipline, preparation and group interaction skills while Sim (1998) adds that the moderator's personal skills and attributes have considerable influence on the nature and quality of data gathered.

The researcher served as scribe for the focus group discussion and did not participate in the discussion except for verbally summarising the discussion at its conclusion by trying to probe participants on issues and examples that they might have only briefly discussed.

Procedure for conducting focus group discussion

All focus groups participants were served light refreshments on arrival and subsequently seated at a round table where an audio digital recorder was strategically placed to ensure that an audible **recording of all participants'** opinions could be made. The focus group discussion with intervention facilitators (n=6) was conducted on a Saturday morning at a time and venue suitable to all. Due to the fact that participants, the focus group facilitator and the researcher knew each other on a professional level, participants were at ease and the discussion, lasting approximately 90 minutes, flowed freely. On completion, the researcher gave a synopsis of the discussion that was documented to ensure that participants were satisfied with what was documented and that they did not have any additional comments they wanted to add to the discussion.

5.3.4 Focus groups conducted with urban overweight/obese Zulu women who met entry criteria for the study, were exposed to the recruitment initiatives, did not enquire about the intervention and had never attempted weight loss.

Sample

Two focus groups of newly-recruited urban overweight/obese Zulu women with inclusion criteria similar to that of subjects who participated in main study but have never considered or attempted weight loss were conducted after subjects were purposively sampled from the following three

research sites: (i) Durban UKZN-based venues; (ii) Pietermaritzburg UKZN-based venues; and (iii) remaining sites where subjects of the main study were recruited by word of mouth.

Focus group discussion guide

A focus group discussion guide (see **Addendum H**) was developed, based on the sample principles used to develop a discussion guide for intervention facilitators (see section 5.3.3). The focus group discussion guide was pilot tested before implementation by having a discussion with three Zulu women with similar entrance criteria to that of the two focus groups.

Focus group facilitator

The same focus group facilitator used to facilitate the focus group with intervention facilitators was used (see section 5.3.3). Having a Zulu dietitian as a focus group facilitator was also viewed as important in gaining the trust of focus group participants.

The researcher served as scribe for the focus group discussions and did not participate in the discussion except for verbally summarising the discussions at their conclusion and attempting to probe participants on issues and examples that they might have only briefly touched on in the course of the discussion.

Procedure for conducting focus group discussion

A procedure similar to that used for conducting the focus group with intervention facilitators was used (see section 5.3.3 p145). The one focus group conducted with newly recruited overweight/obese **urban Zulu women (n=7), took place during participants' lunch hour at a library venue of the University of KwaZulu-Natal**. As a result, there were no distracting noises or activities that could influence the discussion process. Participants were given a name badge to facilitate the scribing process that was conducted by the researcher. Despite the fact that participants only had an hour at their disposal, it proved adequate as the discussion flowed freely, subjects were happy to share their views and the researcher had sufficient time to provide a synopsis of the discussion that was documented. Subsequently no additions were made to the document scribed by the researcher.

The second focus group conducted with newly recruited overweight/obese urban Zulu women (n=6) took place on a Saturday morning at a venue of the University of KwaZulu-Natal. Participants were collected by the researcher from their respective homes to ensure that they were not inconvenienced by difficulties with transportation to the venue and to ensure that the focus group discussion could commence promptly. Although the discussion was initially strained, the discussion flow improved after the first ten minutes. On completion, the researcher provided a synopsis of the discussion that was documented. Subsequently no additions were made to the document scribed by the researcher.

5.3.5 In-depth semi-structured interviews

Sample

Urban, overweight/obese Zulu women in the following participant categories were recruited from the intervention for in-depth semi-structured interviews according to the sampling frame presented in Table 5.3.

Table 5.3: Proposed sampling frame of subjects approached for semi-structured interviews (n=32) and actual number of interviews conducted in brackets (n=26)

	Location	
	Venue based subjects	Work based Subjects
Enquired, found eligible but did not enrol in study (Group A)	4 (4)	4 (2)
Enrolled in study but stopped attending by week 1 and 2 (Group B – early drop-outs)	4 (2)	4 (4)
Enrolled in study but stopped attending by week 2-14 (Group C – late drop-outs)	4 (4)	4 (3)
Enrolled in study and completed week 14-16 of the intervention (Group D – intervention completers)	4 (4)	4 (3)

In order to recruit subjects for the semi-structured in-depth interviews, purposive sampling (Draper & Swift 2011; Curtis et al., 2000; Mays & Pope 1995), was used by phoning subjects in specific participant categories at random until a suitable number of face-to-face interviews were conducted with subjects in each participant category, based on the point at which similar stories, themes, issues and topics were emerging from the interviewees (Boyce & Neale 2006). This resulted in the number and distribution of in-depth interviews across the sampling frame reported in Table 5.3. This sampling strategy can be justified in accordance with remarks made by Draper and Swift (2011) and Hanse (2006) who explains that purposive sampling refers to a non-representative subset of a larger population that is deliberately selected to address the conceptual framework of the research question because they are rich sources of data that will provide an extensive and sophisticated understanding of the phenomena under investigation. In addition, the logic and power of purposive sampling lies in the quality of information obtained per sampling unit as opposed to their sample size per. The decision to conclude sampling must also take into consideration the research goals, the need to achieve depth of information through triangulation of data sources, and the possibility of greater breadth through examination of a variety of sampling sites (Taylor 2010).

In-depth semi-structured interview schedules

The in-depth semi-structured interview schedules (see **Addendum F**) were developed based on concepts derived from the following: (i) feedback from intervention facilitators (predominantly Zulu registered dietitians and nutritionists) during the intervention phase of the study; (ii) field notes based **on the researcher's interaction with** intervention facilitators and subjects; (iii) published literature documenting the barriers to weight loss experienced by South African black women and African-American women; (iv) consultation with two local experts in the field of weight management and four local experts in the field of qualitative research that included two Zulu and two Xhosa women in accordance with recommendations made by Krueger and Casey (2008). The interview schedule was pilot tested before implementation by having a discussion with four Zulu women with similar entrance criteria to that of subjects that were interviewed across the four subject categories (see Table 5.3).

Interviewer

The in-depth semi-structured interviews were conducted by the same Zulu dietitian who facilitated the focus group discussion with intervention facilitators and overweight/obese Zulu women who have never attempted weight loss (see section 5.3.3 and section 5.3.4). Having a Zulu dietitian as an interviewer was regarded as important in gaining the trust of subjects that were purposively sampled for the semi-structured, in-depth interviews.

Procedure for conducting in-depth, semi-structured interviews

The interviewer conducted the face-to-face in-depth, semi-structured interviews with different subject categories at a time and place convenient to them. Interviews were recorded with an audio digital recorder and the facilitator took notes on aspects such as non-verbal cues, while conducting the interviews. On completion of each interview, the facilitator provided each subject with a synopsis of what was discussed to ensure that subjects had no additional comments they wanted to add to the discussion.

5.3.6 Data capturing, processing, analysis and interpretation

Focus group discussions and in-depth semi-structured interviews were conducted in English, recorded on a professional quality audio digital recorder and transcribed verbatim by the focus group facilitator/interviewer using a transcription kit. Although qualitative data was collected in English, the focus group facilitator/interviewer was a Zulu registered dietitian. This ensured that transcriptions were done accurately in event of subjects wishing to express themselves in Zulu during the interview process.

The process of data capturing, processing and analysis and interpretation is illustrated by the following table.

Table 5.4: Steps depicting data capturing, processing, analysis and interpretation

	Steps	Measures taken to facilitate analysis and interpretation	Analysis concept and accompanying reference
1.	Focus group discussions and in-depth, semi-structured interviews conducted.	Discussions and interviews recorded on audio digital recorder while researcher/interviewer served as scribe.	
2.	Audio recordings transcribed verbatim by focus group facilitator/interviewer	Generation of seven qualitative data sets in Microsoft Word 2007 format	
3.	Qualitative data sets read independently by researcher and focus group facilitator/interviewer	Independently manually coded twice by researcher and once by focus group facilitator/interviewer to identify data themes while using literature review (inductive approach) (Chapter Two) as background information. This resulted in the generation of a preliminary coding framework.	Immersion in data (Bradley et al., 2006). Involving more than one coder enhances depth of analysis and findings (Thomas 2006). Process of manual coding also referred to as "in vivo" coding (Thomas 2006) .
4.	Development of coding framework	Assessment of coding framework and data sets by two experts in the field.	
5.	Microsoft Word 2007 files imported into NVivo 9 software as seven primary documents for qualitative data analysis (QSR International, 2010). Relationships between core themes were conducted by means of a relationship type referred to as "associated" .	Electronic coding and analysis systematically conducted by researcher in accordance with a final coding framework.	Descriptive coding of data (index or node) involved classification of a selected segment of text by means of a label (summary term) that expressed an essential quality of the data (Fade & Swift 2011). Sections of the text, i.e. a complete sentence or a whole paragraph were selected for coding as opposed to single words or group of words to maintain the context within which views were expressed (Thomas 2006). Where appropriate, sections of the text were coded to more than one core theme, i.e. a label that summarises the essence of a number of related codes (Thomas 2006). Inductive approach was used, implying that core themes were derived from the data and not just from the ore-determined coding framework (Fade & Swift 2011), thereby a data driven process referred to as open coding and facilitates the discovery of categories and patterns within the data (Braun & Clarke 2006).

	<u>Steps</u>	<u>Measures taken to facilitate analysis and interpretation</u>	<u>Analysis concept and accompanying reference</u>
6.	Compilation of field notes throughout intervention- (see Chapter Four) and qualitative phase (see Chapter Five) of study.	Observations, informal discussions with subjects and intervention facilitators, records of activities, journal notes and e-mails between researcher, supervisors and intervention facilitators were recorded alphabetically per core theme in a hand written journal on a daily basis. Field notes were then typed up in a more coherent fashion and used as an additional source of data to add depth to the interpretation and discussion of the focus group results and in-depth, semi-structured interviews.	Kawulich (2005)
7.	Interpretation of themes generated by focus groups discussions, in-depth semi-structured interviews and field notes in conjunction with available literature		Procees of triangulation results in: - increased confidence in research findings if they are convergent (Hanse 2006; Moran-Ellis et al., 2006; Rudd et al., 1999); - enhances validity of findings (Taylor 2010; Hanse 2006); - enhances comprehensiveness of qualitative research (Hanse 2006); - enables a more in-depth understanding of data as well as facilitating an understanding of various perspectives of the phenomenon under investigation (Hanse 2006; Miles & Huberman1994).
8.	Interpretation and discussion of seven core themes reported in results and discussion (section 5.7) section of this chapter.		

A theme captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set and is related to prevalence, both in terms of space within each data set and prevalence across the entire data set. However, as **it is up to the researcher’s judgement to determine what a theme is** and that the **“keyness” of a theme**, is not necessarily dependent on quantifiable measures, but rather whether it captures something important in relation to the overall research question (Braun & Clarke 2006). In this research the number of citings of a theme within a data set was recorded. Although it was considered in the identification of salient themes by the researcher in consultation with the focus group/in depth interview facilitator and two experts, it was not a key determinant in the process.

In order to interpret the tags used to identify excerpts taken from focus groups and semi-structured in depth interviews, the follow identification framework was used when referring to each of the seven primary documents that were imported into NVivo 9 software.

Table 5.5: Identification codes used to refer to primary documents

Primary document	Corresponding reference document
Primary document 1 (P1)	Intervention facilitators
Primary document 2 (P2)	Focus group 1 with participants that have never attempted weight loss
Primary document 3 (P3)	Focus group 2 with participants that have never attempted weight loss
Primary document 4 (P4)	Enquired, found eligible but did not enrol in study (Group A)
Primary document 5 (P5)	Enrolled in study but stopped attending by week 1 and 2 (Group B – early drop-outs)
Primary document 6 (P6)	Enrolled in study but stopped attending by week 2-14 (Group C – late drop-outs)
Primary document 7 (P7)	Enrolled in study and completed week 14-16 of the intervention (Group D – intervention completers)

5.4 VALIDITY AND RELIABILITY OF DATA

Hansen (2006) explains that it is well recognised that applying traditional scientific measures of rigour such as objectivity, reliability and validity to qualitative research is inappropriate. However, qualitative research assumes that to some extent what is perceived as reality, is socially constructed and that the production of research results is a constructive and interactive process involving subjects and researchers. Table 5.6 illustrates how validity and reliability was ensured in the qualitative phase of the study.

Table 5.6: Measures implemented to ensure reliability of validity of data in qualitative phase of study.

Concept	Measure implemented	Text reference
Validity	<ul style="list-style-type: none"> Agreement of findings between results generated by in-depth interviews, focus groups, field notes and the relevant literature, referred to as triangulation, contributes to internal validity. Concurring with focus group participants and subjects that were interviewed by means of in-depth, semi-structured interviews on completion of the interviews resulted in respondent validation Construct validity was ensured by extensive review of the literature documenting reasons for attrition of African-American women from weight loss interventions in order to assist with the formulation of the in-depth, semi-structured interview guides and focus group discussions. Content validity was ensured by expert review of the focus group discussion guides and in-depth semi-structured interview guides. Confirmality was ensured by manually coding the transcriptions of all focus group discussions and in-depth interviews twice by the researcher, followed by independent coding by the focus group facilitator/interviewer. After these three manual codings were conducted, electronic coding according to identified themes was conducted. Face validity of the focus group discussion guides and in-depth semi- 	Pilnick and Swift (2010); Taylor (2010); Hanse (2006); Thomas (2006); Whittemore et al., (2001) Devers (1999); Mays and Pope (1995); Kumar (1989)

	<p>structured interview guides were ensured by developing them in accordance with the following:</p> <p>(i) feedback from intervention facilitators (predominantly Zulu women); (ii) field notes based on the researcher’s interaction with intervention facilitators and subjects in the course of the intervention as well as personal observation; (iii) published studies documenting the barriers to weight loss experienced by local black women and African-American women; and (iv) consultation with two local experts in the field of weight management and four local experts in the field of qualitative research (all black women).</p> <ul style="list-style-type: none"> • In the context of qualitative research, Devers, (1999) explains that internal validity is interchangeable with “credibility” while external validity can also be referred to as “transferability”. • Triangulation during the interpretation of core themes generated by focus groups discussions, in-depth semi-structured interviews and field notes in conjunction with available literature results in enhanced validity of findings. 	
Reliability/ Dependability /consistency	<ul style="list-style-type: none"> • Training the focus group facilitator/interviewer • Pilot testing the focus group discussion guides and in-depth interview schedules • Ensuring consistency with coding by the researcher manually coding the transcripts twice, followed by independent manual coding by the focus group facilitator/interviewer • Credibility/stake holder checks through peer review of coding frameworks by the focus group facilitator/interviewer and subsequent checking by two experts with extensive experience in weight loss-related and qualitative research that were also the supervisors of the research project 	Hansen, (2006, p48); Thomas, (2006) and Devers, 1999),

5.6 ETHICAL CONSIDERATIONS

The qualitative phase of the study posed minimal risk to participants. Ethical approval was obtained from the Ethics Committee, University of Cape Town (code: HREC REF 023/2011). Individuals sampled for this study volunteered for participation and were guaranteed confidentiality and anonymity as each participant was allocated a coded number. The focus group discussion guides (see **Addendum G and H**) and introduction to the semi-structured interviews (see **Addendum F**) both stipulated that the discussions were confidential and that subject names would not be used when writing up the research report. All participants who participated in focus group discussions signed a written informed consent form before participating in focus group discussions.

Urban overweight/obese Zulu women in the different subject categories who were eligible for the in-depth semi-structured interviews were contacted telephonically by a Zulu registered dietitian (interviewer) to determine whether they were willing to be interviewed. They were informed that written consent would be required from them before the semi-structured interview could take place. Although there were no direct benefits to participation in the qualitative phase of the study, all

participants received a gift voucher to the value of R200 as compensation for their time, effort and travel expense.

Transcripts of focus groups and semi-structured interviews are kept in a secure location for a period of five years and are only be accessible to the researcher and study supervisors. Computer-based records are only be available to the researcher and study supervisors through the use of access privileges and passwords.

5.7 RESULTS AND DISCUSSION

The data that was generated by the qualitative phase of this study will not be discussed according to the sequence in which it was collected through the focus group discussions (see **Addendum H and I**) and in-depth interviews (**Addendum F**). Instead it will be reported and discussed according to core themes identified through integration of focus group discussions, in-depth interviews and field notes as this will aid in a holistic understanding of the data and place the results in perspective in terms of its application to public health practice and policy. The core themes that emerged from the qualitative data are as follows: i) Perceived gains related to intervention enrolment; ii) Perceptions regarding a healthy weight loss intervention and healthy weight; iii) Considerations for success, i.e. enabling factors that promote enrolment, weight loss and curbing intervention drop-out; iv) The role of social support in promoting enrolment, weight loss and curbing intervention drop-out; v) Barriers to enrolment, weight loss and factors that contribute to intervention attrition; and vi) Perceptions of intervention facilitators regarding considerations for success to facilitate the planning of future interventions with a similar target group. Data from in depth interviews and focus groups are presented followed by a discussion of salient themes for each of the mentioned core themes.

5.7.1 Core theme I: Perceived gains related to intervention enrolment

Results

Semi-structured interviews

Table 5.7 and 5.8 depicts the most prominent themes regarding why subjects were interested in the intervention and what weight loss would mean to them.

Table 5.7: Responses to the question: "Why were you interested in the intervention?"

Themes	Group A	Group B	Group C	Group D	Cumulative citing
	Cit.	Cit.	Cit.	Cit.	
Total					33
Assistance from dietitians	-	-	1	-	1
Gaining of knowledge	-	-	1	5	6
Health	4	-	-	-	4
Weight loss	5	6	5	6	22

Group A: Enquired, did not enrol in study; Group B: Early drop-outs; Group C: Late drop-outs; Group D: Completers

A major theme that emerged across all subject categories was weight loss. Improved health was only mentioned by subjects who enquired, but never enrolled in the intervention. Gaining knowledge was mostly mentioned by subjects who completed the intervention. Quotes to illustrate these findings are the following:

"I wanted to find out why it was so difficult to lose weight and why I was gaining weight so quickly" (P7 subject 4) and "I wanted to lose the weight and then learn to maintain it". (P7 subject 5)

Table 5.8: Responses to the question: "What would it mean to you if you lost weight?"

Themes	Group A	Group B	Group C	Group D	Cumulative citing
	Cit.	Cit.	Cit.	Cit.	
Total					39
Aesthetic reasons/looking youthful	4	1	-	1	6
Better fitting clothes	-	-	2	-	2
Finding clothes	-	2	-	-	2
Healthy eating/lifestyle	2	4	3	5	14
Improved mobility	-	-	1	-	1
Improvement in emotional wellbeing/self-esteem	3	3	3	2	11
No expectation of gimmicks	1	-	-	-	1
Stigmatisation/ridicule	1	-	1	-	2

Group A: Enquired, did not enrol in study; Group B: Early drop-outs; Group C: Late drop-outs; Group D: Completers

Improvement in eating habits and lifestyle and emotional wellbeing/self-esteem emerged as perceived gains in all subject categories. Aesthetic reasons were only prominent for those who did not join the intervention. A subject that never enrolled stated:

"We must believe that this (healthy eating) can cause us to lose weight. This helps us to be more healthy and have a normal weight". (P4 subject 3)

Another prominent theme that emerged across all subject categories was an improvement in emotional wellbeing and self-esteem. Although the following subject never joined the intervention she explained how being overweight/obese is not conducive to her emotional wellbeing:

"Emotionally it (would) help me a lot. It means I am free. Being overweight and gaining weight is something else – it is like a disease. It is a demon always trying to track you down and this I hate. Losing weight means you are free emotionally and physically and you are able to socialize well without feeling like you are wearing clothes you do not really like but are forced to because of weight" (P4 subject 4) while a group C subject added: *"Gaining weight made me lose my self-confidence..."* (P6 subject 1)

Facilitator focus group

Intervention facilitator's perceptions of why subjects were interested in joining the weight loss intervention are illustrated in the following table.

Table 5.9: Responses to the question "Why were participants interested in the weight loss intervention?"

Themes	Citing
Total	12
Free service	2
Weight loss	4
Professional guidance	2
Health awareness	2
Quick fix	2

From the above themes cited, the most prevalent one that emerged was that subjects wanted to lose weight. One facilitator of a venue-based intervention reported:

"It is because they really felt bad about their bodies and saw the programme as an opportunity to lose weight and be happy with themselves. They were big and they felt uncomfortable. Some would say even when they ride in the taxis people ridicule them about their weight". (P1 subject 4)

Focus groups with overweight/obese women who have never attempted weight loss

When overweight/obese women were asked whether they thought there was a relationship between body weight and health, the following responses were generated.

Table 5.10: Response to the question: "What do you think is the association between weight and health?"

Themes	Non-participants (n=7)	Non-participants (n=6)
	Citing	Citing
Total	8	4
No relationship	2	4
Positive relationship	5	-
Culture	1	-

The one focus group (primary document three) seemed adamant that there is no relationship between these variables. One participant remarked:

"...you get people who really have big bodies but are healthy and then you get people who are skinny but they are not healthy". (P3 subject 1) A similar observation was made by one of the participants in the older group who said: *"...you could be small (really skinny) and then be unhealthy. Or else be big-ish and be healthy". (P2 subject 1)*

A major theme that emerged was that there was acknowledgement of the relationship between weight and health in the other focus group (primary document 2). This was illustrated by a participant explaining:

"But there is more risk if you are big in terms of health issues than if you are small but we do not know how the two interact". (P2 subject 1)

Perspectives on salient themes

From the themes reported under Core Theme I, it is clear that commonalities that existed between subjects, intervention facilitators, those that have never attempted to lose weight and field notes were the following: Both subjects and intervention facilitators cited weight loss as a reason for joining the intervention while subjects acknowledged the fact that, weight loss will translate into healthy eating habits, a healthy lifestyle and an improvement in emotional wellbeing and self-esteem. Intervention facilitators also acknowledged that subjects joined the intervention because they were aware of the relationship between weight loss and the health benefits related to it. It is therefore not surprising that subjects who have never attempted weight loss were not unanimous in their opinion regarding whether there is a relationship between weight and health. One discrepancy in opinion between intervention facilitators and subjects, was that subjects reported to be motivated to join the intervention because they wanted to gain knowledge, whereas facilitators perceived the free intervention to be a draw card.

The fact that both being motivated by an improvement in health only emerged as a major theme when for subjects that had never joined the intervention, is of interest. When this phenomenon is viewed in conjunction with the HBM (Champion & Skinner 2008; National Cancer Institute 2005), it is possible that these subjects were aware that they had a weight problem, knew that this problem could impact negatively on their health, but did not perceive the health threat posed by their weight to be serious enough to take action. It is also possible that personal and environmental barriers prevented them from joining the intervention and that these perceived barriers outweighed the perceived benefits that the intervention could potentially offer.

The TPB and the associated TRA are theoretical constructs that assume that the best predictor of behaviour is behavioural intention. **The latter concept in turn, is influenced by an individual's attitude** towards the behaviour and social normative perceptions regarding it, such as beliefs about whether individuals who are important to the person approve or disapprove of the behaviour (subjective

norm) (Montaño & Kasprzyk 2008; National Cancer Institute 2005). In addition, Baranowski et al. (2003) explain that the level of intention to perform a behaviour is higher among those who have a more positive attitude and greater subjective norm towards the behaviour. The attitude towards the **behaviour is an indication of the individual's strength of beliefs regarding the outcome as a result of** the behaviour and the extent to which the individual positively or negatively values those outcomes. The TBA and TRA also assume that all other factors such as culture and the environment operate **through the model's constructs and do not independently explain the likelihood that a person will** behave in a certain way (National Cancer Institute 2005). According to Montaño & Kasprzyk (2008) and the National Cancer Institute (2005), the TPB is an extension of the TRA and includes an **additional construct, namely perceived behavioural control. This construct relates to people's belief** that they can control a particular behaviour. Montaño and Kasprzyk (2008) conclude that a particular behaviour (in this case joining the weight loss intervention), is most likely to occur if an individual has a strong intention to perform it and the knowledge and skill to do so, if there are no serious environmental constraints preventing the behaviour, the behaviour is salient and the individual has previously performed the behaviour. From the above it is clear that all subjects who enquired about the intervention possibly had the intention to join, but that those who joined, possibly had greater subjective norm towards weight loss (Smith Barnes et al., 2007), and that those who remained in the intervention for longer and completed it, had greater perceived behavioural control over factors such as culture and lack of social support that could serve as a barrier to their weight loss efforts. In this regard Baranowski et al. (2003) add that among individuals with high levels of behavioural control, high levels of intention result in behavioural change.

The fact that an interest in gaining knowledge was a motivating factor that emerged for late drop-outs (group C) and featured prominently amongst intervention completers (group D) was confirmed by field notes made by **the researcher where two intervention completers reported: "I learnt such a lot from this course. Previously I never thought about what I was putting into my mouth" and "I learnt such a lot and lost a lot of weight and feel healthy, but if I don't exercise I don't lose".** A review of weight loss interventions targeting overweight/obese African-American women conducted by Bronner and Boyington (2002) found that subject recruitment was related to those who were motivated to lose weight. It is therefore possible that late drop-outs and intervention completers were motivated by the knowledge they gained through the intervention, which in turn facilitated weight loss.

The value subjects attached to weight loss included aesthetic reasons, improved emotional wellbeing and self-esteem for those subjects who never enrolled in the intervention. Field notes made by the researcher after talking to an early drop-out who had a BMI of 53 kg/m² on joining the intervention, indicated that her motivation for weight loss was that she would look good in her clothes, can pick anything off the shelf and do fun things like bungee jump. In addition, she explained that if you are

large, you are not taken seriously, as your weakness is visible and that others think your weight is a reflection of a lack of self-discipline, that you are a loser and weak. The fact that aesthetic reasons did not feature as a prominent theme in other subject categories could be indicative of the fact that these subject categories were not primarily motivated by what could be viewed as superficial reasons for weight loss.

An improvement in emotional wellbeing and self-esteem was a consistent theme across all subject categories, inclusive of subjects who never enrolled in the intervention. This could be indicative that poor self-esteem possibly served as a barrier to subjects in this category to move from precontemplation to contemplation and preparation as per the TTM (Prochaska et al., 2008; National Cancer Institute 2005; Greene et al., 1999). Fitzgerald and Spaccarotella (2009) acknowledge that from an ecological perspective, a lack of self-confidence and motivation could prevent individuals from addressing their diet and physical activity levels.

Although an improvement in health as a reason for enrolment in the weight loss intervention was a theme that emerged across all subject categories, it generated more citations amongst group B, C and D subjects with the highest number of citations generated by intervention completers (group D). This finding is of interest, as the latter subject category also made the most reference to gaining knowledge in order to improve health as a reason for interest in the intervention. Fitzgerald and Spaccarotella (2009) explain that from an ecological perspective, a lack of knowledge regarding nutrition and the health benefits of physical activity can be viewed as a barrier to improvement of diet and physical activity levels. Therefore, an interest in gaining knowledge expressed by these subjects could be indicative of their desire to overcome this barrier.

When viewed from a HBM perspective (Champion and Skinner 2008; National Cancer Institute 2005), subjects were ready to join the intervention because they believed: (i) they were overweight/obese; (ii) their weight status had serious health consequences; (iii) taking action would reduce their susceptibility to the chronic diseases of lifestyle associated with obesity; (iv) the material and psychological cost of taking action (perceived barriers) were outweighed by the benefits; (v) exposure to factors that prompted action such as the knowledge gained, the weight loss manual and the biweekly telephone calls from dietitians (cues to action) were motivational; and (vi) were confident in their ability to successfully perform an action (self-efficacy). Seeing that self-efficacy is related to the fact that one has the power to complete a given task or activity, the stages at which subjects dropped out of the intervention could be related to their level of self-efficacy where subjects that never enrolled, had the lowest level of self-efficacy at the outset while intervention completers had the highest (Bandura & Adams 1977). Although self-efficacy could therefore be viewed as a predictor of treatment outcome in weight loss interventions (Strecher et al., 1986), research conducted by Jeffery (2004); Fontaine and Cheskin (1997) and Prochaska et al., (1992) concluded that self-efficacy is a

weak predictor of weight loss and is inconsistent across study populations and gender groups. Although self-efficacy tends to improve with weight loss, treatment-induced increases in self-efficacy are not predictive of long-term weight loss success.

Discussions involving subjects who have never attempted weight loss regarding the relationship between weight and health status, revealed that participants in the one focus group (primary document 3) thought that there was no relationship between the two variables. In terms of the HBM (Champion & Skinner 2008; National Cancer Institute 2005) it is evident that these subjects did not perceive overweight/obesity to be a health risk and therefore did not acknowledge the fact that an overweight/obese state is a risk factor for developing NCDs. It could therefore be argued that their greatest barrier to taking action is possibly a lack of knowledge. However, participants from the other focus group (primary document 2) did show insight into the relationship between BMI and health. This theme is of interest as all subject categories acknowledged that weight loss would lead to better health. It is therefore clear that according to the HBM (Champion & Skinner 2008; National Cancer Institute 2005), that if obese individuals do not believe that they have a weight problem and do not believe that an obese state is associated with health risks, it will be difficult to recruit them for a weight loss intervention. When assessing the data generated by subjects that have never attempted to lose weight according to the TTM (Prochaska et al., 2008; National Cancer Institute 2005; Greene et al., 1999), subjects can be viewed as being in the precontemplation phase and that the strategy to motivate them to join a weight loss intervention would be to increase an awareness among them for the need to change their behaviour, personalize information regarding the health risks associated with an obese state as well as the benefits associated weight loss and/or determine why they are not confident regarding their ability to change their health-related behaviour.

5.7.2 Core theme II: Perceptions regarding a healthy weight loss intervention and healthy weight

Results

Semi-structured interviews

Subject views on what they thought the intervention entailed when they made contact with intervention facilitators included the following:

Table 5.11: Responses to the question “What did you think the programme involved when you contacted us?”

Themes	Group A	Group B	Group C	Group D	Cumulative citing
	Cit.	Cit.	Cit.	Cit.	
Total					41
Biggest loser	-	1	-	-	1
Blood tests to explain weight gain	-	1	-	-	1
Diet	-		1	1	2
Exercise	1	2	2	2	7
Food choices	-	1	-	2	3
Guidance and support with weight loss	-	-	1	-	1
Health	1	-	-	-	1
Healthy eating	1	-	-	-	1
Ideas about improvement/change in lifestyle	1	3	-	2	6
Measurements	-	1	-	-	1
No gimmicks	-	-	-	1	1
No idea	1	-	4	3	8
Portion control	-	-	2	1	3
Weight loss	5	-	-	-	5

Group A: Enquired, did not enrol in study; Group B: Early drop-outs; Group C: Late drop-outs; Group D: Completers

Table 5.11 shows that subject perception at the time of intervention enquiry, revealed that exercise and ideas about an improvement/change in lifestyle, food choices and portion control were the themes that emerged across the majority of subject categories. Especially group C and D subjects indicated that they had no idea of what the intervention entailed. Of interest was that the concept of weight loss was only mentioned by group A subjects.

Table 5.12: Responses to the question “What type of weight loss intervention will work best for you?”

Themes	Group A	Group B	Group C	Group D	Cumulative citing
	Cit.	Cit.	Cit.	Cit.	
Total					38
Changing your eating habits	-	-	1	-	1
Current programme	-	-	4	3	7
Diet pills	3	-	-	-	3
Exercise	4	4	-	2	10
Fasting	1	-	-	-	1
Healthy eating	1	-	-	-	1
Healthy eating and portion control	-	3	-	-	3
Healthy lifestyle	-	2	-	1	3
Larger portions	-	-	1	-	1
Practicing of will power	-	1	-	-	1
Prescriptive programme	-	2	1	-	3
Support group	-	1	1	-	2
Support group with exercise	-	-	-	1	1
Tasty options	-	-	-	1	1

Group A: Enquired, did not enrol in study; Group B: Early drop-outs; Group C: Late drop-outs; Group D: Completers

When it came to asking subjects what type of weight loss intervention will work best for them, group C and D subjects expressed satisfaction with the current intervention while groups A, B and D cited exercise and groups B and C mentioned a prescriptive programme and a support group. It was not surprising that 3 subjects in group A referred to appetite suppressants (“diet pills”) and one citing referred to fasting as these subjects never enrolled in the intervention and these weight loss methods are not viewed as components of a healthy weight loss intervention. Components forming part of a healthy weight loss intervention that were mentioned by subjects in group B, C and D included healthy eating, portion control and a healthy lifestyle.

Focus groups with overweight/obese women who have never attempted weight loss

When these overweight/obese women were asked what type of weight loss method will work best for them, the responses presented in Table 5.13 were generated.

Table 5.13: Responses to the question: “What type of weight loss method will work best for you?”

Themes	Non-participants (n=7)	Non-participants (n=6)
	Citing	Citing
Total	13	10
Exercise	2	4
Smaller portions	2	-
Family involvement	2	-
Fruit and vegetables	3	3
Group support	1	1
Reduced fat intake	3	2

Themes that emerged from both focus groups were that they would eat more fruit and vegetables, reduce their fat intake, exercise and require group support. It is of interest that all these components formed part of the current intervention. Family involvement and consuming smaller portions were also mentioned by the group of older women. Both groups mentioned tai-Bo as a form of exercise they would enjoy. Regarding the aspect of family involvement one subject explained:

“I think it would be better if we can get into our family systems first because they discourage us when we try to lose weight.” (P2 subject 1)

Perspectives on salient themes

Despite various social marketing strategies that were used to recruit subjects for the intervention phase of the study, Table 5.11 illustrates that a fair number of late drop-outs and intervention completers had no idea what the intervention entailed when they contacted intervention facilitators to enquire about it. Group B subjects knew that the intervention involved a change in lifestyle while

group A subjects acknowledged that it involved weight loss. A possible reason for this finding is that the group C and D subjects that were purposively sampled for the semi-structured in-depth interviews became aware of the intervention by word of mouth and not via formal communication channels. However, this is highly speculative as none of the subjects that were interviewed were asked how they became aware of the intervention. The only theme that emerged across all subject categories was that subjects thought the intervention included an exercise component. It should be noted that the number of citations per subject category for this theme was low as only one to two subjects per subject category mentioned this theme.

Themes related to **“what type of weight loss method will work best for you”** (see Table 5.12) included all the components that formed part of the healthy weight loss intervention implemented as part of this study except for family involvement. The latter is of importance, and was discussed by focus group participants (primary document 2) that have never attempted weight loss. Kumanyika (1993) clarifies the latter by explaining that African-American women experience less pressure to be thin, especially from men and are therefore less likely to aspire to a lower body weight. Obese African-American women that participated in qualitative research conducted by Befort et al. (2008c) explained that pregnancy, motherhood and caregiving are major causes of weight gain while qualitative research conducted by Puoane et al. (2005b) among urban Xhosa women revealed that subjects considered childbirth to be a cause of overweight. Sobal et al. (2003) also explain that marriage is associated with weight gain.

The impact of cultural norms on the acceptance of a higher BMI was discussed by subjects who have not previously attempted weight loss (see Table 5.10) was illustrated by the fact that an acceptable body weight was deemed to be what equated to a BMI of 27.7 kg/m² or more in both groups. A South African study conducted by Case and Menendez (2009) among urban Xhosa women reported that the ideal weight subjects strived towards equated to a BMI of 29.45 kg/m² while research conducted by Puoane et al. (2005b) among a similar study population yielded a weight preference equated to a BMI of 27 kg/m². However, in the current study the relationship between desired BMI and cultural norms was only verbalised by older participants. The cut-off stated by participants implies that the lower cut-off for an acceptable body weight would be classified as overweight according to WHO (2004b) criteria. Subjects engaged in a substantial amount of discussion around **the concept of an “ideal body weight” and it became evident that culture has a significant impact on the norm of what is considered to be an acceptable body weight and that a lower BMI is associated with illness. However, “illness” was not verbalised as being associated with a positive HIV status.**

5.7.3 Core theme III: Considerations for success, i.e. enabling factors that promote enrolment, weight loss and curbing intervention drop-out

Results

Semi-structured interviews

Subject views on what they perceived to be considerations for success are reported in Table 5.14 and Table 5.15.

Table 5.14: Responses to the question “Why did you keep coming to the programme?”

Themes	Group A	Group B	Group C	Group D	Cumulative citing
	Cit.	Cit.	Cit.	Cit.	
Total					16
Feel better				1	1
Good guidance and encouragement				2	2
Support group				4	4
Gaining of knowledge		N/A		4	4
Manual				1	1
Weigh-in sessions				1	1
Weight loss				3	3

Group A: Enquired, did not enrol in study; Group B: Early drop-outs; Group C: Late drop-outs; Group D: Completers

Major themes that emerged for intervention completers (group D) was that gaining knowledge, group support and weight loss motivated subjects to continue with the intervention. The same group also cited gaining of knowledge as a reason for joining the intervention. One subject explained:

"... when we got to the sessions she (referring to the facilitator) had given us the manual and we would go over the sections of the manual. So it was more to gain further information because we were learning quite a lot". (P7 Subject 6) Another subject mentioned: *"Another thing that amazed me was that with just smaller portions you can be full. I also learned to choose food that is healthy and right for your body...". (P7 subject 7)*

Table 5.15: Responses to the question "What made it easy to follow the intervention ?"

Themes	Group A	Group B	Group C	Group D	Cumulative citing
	Cit.	Cit.	Cit.	Cit.	
Total					27
Clear instructions		-	2	-	2
Following a healthy meal plan		-	1	-	1
Gaining of knowledge		-	1	2	3
Group support		2	-	1	3
It was not easy		-	-	1	1
Just like any other		1	-	-	1
Manual	N/A	1	-	4	5
Motivated by conception		-	-	1	1
Motivation provided by facilitator		-	-	2	2
No gimmicks		-	1	-	1
Programme not too restrictive/ everything in moderation		1	4	1	6
Seeing results		1	-	-	1

Group A: Enquired, did not enrol in study; Group B: Early drop-outs; Group C: Late drop-outs; Group D: Completers

A theme that emerged across all subject categories when subjects were asked what made it easy to follow the intervention was that it was not too restrictive and that everything was permissible in moderation. The improvement in knowledge that facilitated the ease of following the intervention again emerged in interviews with late drop-outs and intervention completers, while a major theme that emerged among intervention completers was related to the lifestyle manual that formed part of the intervention. One subject referred to the lifestyle manual as follows:

"The weight loss manual made it easy because it was there to guide. Even now the manual is by my bedside". (P7 subject 1) and *"The manual that we were given because we could read it ...". (P7 subject 5)*

Facilitator focus group

Intervention facilitator's perceptions of considerations for success are reported in Table 5.16 and Table 5.17.

Table 5.16: Responses to question "What feature/s of the intervention proved to be most effective?"

Themes	Citing
Total	6
Group motivation	4
Life style manual	2

Intervention features that proved to be most effective were group motivation and the life style manual. Two facilitator that conducted venue-based interventions remarked:

"the aspect that worked really well was the group time where people were motivating each other within the group. People had so many ideas on how to go about avoiding eating...". (P1 subject 4)

"The other thing that I think that motivated them was that they were also learning from each other, not just from us". (P1 subject 5)

Regarding the life style manual a facilitator acknowledged its value by stating:

"I also think the book that we used was very helpful. It was written in very easy language to understand". (P1 subject 3)

Table 5.17: Responses to question "What are the factors that you would consider when developing your own intervention?"

Themes	Citing
Total	12
Monetary contribution	2
Convenience of setting	2
Family involvement	5
Group activities	3

Aspects that facilitators would consider when developing their own weight loss intervention for a similar target group included the involvement of subject's families. One facilitator clarified this theme as follows:

"...coz I had a problem with one lady. She was staying with her aunt so obviously when she comes back from work they have already cooked. So whatever food that is cooked she has to eat...". (P1 subject 2)

Another facilitator added:

"I think that's the problem. They are trying to separate losing weight from their family life but it should be integrated...". (P1 subject 3)

Other major themes that emerged was the importance of group activities, that fact that a monetary contribution could decrease drop-out, that the intervention venue should be conveniently located and that subjects should be taken on a supermarket tour:

"...to show them the different foods because looking at the picture is not the same as going to the shop yourself...". (P1 subject 4)

Two facilitators mentioned that the free intervention was the reason for a lack of subject commitment as was illustrated by the following comment:

"I don't know how ethical it is but I would say maybe have some money that they pay into, have some sort of fundraising thing ... so that at the end of the sessions we are going to have a huge party...". (P1 subject 1) She

continued that: *"Because I find that everything was brought in for free that some of them did not feel the responsibility to come to every session..."*

However, the above opinions were contradictory to the fact that an opposing theme was documented in Table 5.9 namely that the free intervention was a draw card for subject enrolment. A comment made by a subject who was part of a work-based, lunch hour intervention and dropped out at an early stage (earlier referred to as group B participant), shed more light on the recommendation that a monetary contribution could improve subject adherence and compliance:

"...I was also studying at the same time I was also attending the weight loss programme so I did not have much time to give to the programme. So I decided I might as well focus on what I was paying for (my studies)...". (P5 subject 6)

Regarding the importance of a convenient intervention location, one facilitator mentioned:

"... some people had to take a taxi from Umlazi to town, then from town to the varsity, then walk down there and so for some people it was really an effort. So maybe sometimes what could work is in their communities... rather go to their places of stay rather than making them travel all the way". (P1 subject 5)

Focus groups with overweight/obese women who have never attempted weight loss

Responses of overweight/obese women were asked what they would do if a health worker told them that their weight could contribute to their risk for NCDs and what their views were on the relationship between weight loss and health, their responses are documented in Table 5.18 and Table 5.19.

Table 5.18: Response to the question: "What would you do if a health worker told you that your weight can cause health problems such as heart disease, hypertension or diabetes because it is too high?"

Themes	Non-participants (n=7)	Non-participants (n=6)
	Citing	Citing
Total	12	4
Follow advice	8	4
Require finances	2	-
Lack of social support	2	-

Both groups agreed that they would follow the advice by losing weight. However, the one group (Primary document 2) mentioned a lack of money and a lack of social support as barriers to losing weight. Despite the fact that these participants all held permanent positions at a tertiary institution one participant remarked:

"It is hard because you need to have money to lose weight. Like at home I do not buy my own food". (P1 subject 5)

Another subject from the same focus group added:

"I could try Weigh-less because I have seen somebody lose weight through going to the Weigh-less programme but it's expensive (referring to the Weigh-less endorsed products and the membership fee)". (P 2 subject 6)

The theme related to a lack of social support included:

"...and when you cook you do not cook two separate dishes but you cook for the whole family". (P2 subject 4)

An insightful comment made by one subject in the older focus group was:

"The diet should change for the whole family... Dr X is my family doctor. I do not even go to see him anymore. Every time we fight because of the weight. Here during a wellness day... they told me that I am too fat, even if the people around me look fatter. But the cholesterol that is in me is much more than the others (who look bigger). So my body is full of fat but I think about weight. What will be left now but my bones? Because I am not so fat... but I have that problem (high cholesterol) so I am fat inside..." (P2 subject 7)

Table 5.19: Response the question: "What do you think about the option or possibility of weight loss to ensure that you remain healthy?"

Themes	Non-participants (n=7)	
	Citing	Citing
Total	4	4
Attitude of person giving advice	2	-
Awareness of BMI	2	-
No relationship	-	4

From the above it is evident that participants in the one group (Primary document 3) did not agree that there is a relationship between weight and health status. However, the other focus group (Primary document 2) seemed to be aware that BMI and health are related. One participant verbalized this relationship as follows:

"Every individual has, so to say depending on your height you have a certain limit for your weight. So once you go over that you are in the risk factor". (P2 subject 1) In addition it was mentioned that the manner in which is information is brought across is important: "I think the person telling me I needed to lose weight is concerned and comes from a caring and loving place so that means I have to look within myself and think this is not right. Let me do something about it". (P2 subject 2)

Networks

According to Attridge-Stirling (2001), thematic networks are web-like illustrations or networks that summarize the main themes regarding a piece of text and seek to extract the themes salient in a text at different levels. In addition, they aim to facilitate the structuring and portrayal of these themes

and make the procedures that may be used in going from text to interpretation thereof clear, thereby highlighting salient themes and illustrating the relationship between them. They also remove any impression of hierarchy, giving fluidity to the themes and emphasize the interconnectivity between themes by means of the network. In the thematic network illustrated by Figure 5.1, themes that facilitated completion of the intervention from an intervention facilitator and subject perspective are depicted.

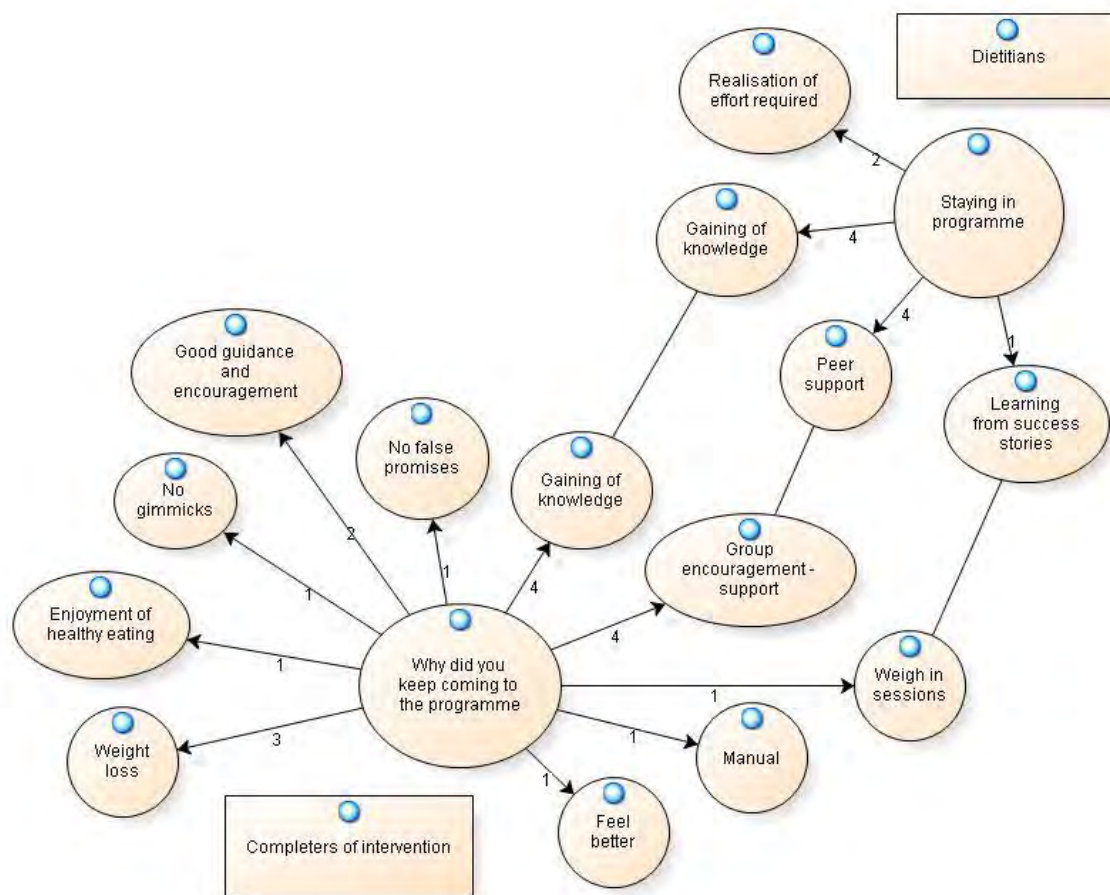


Figure 5.1: Thematic network illustrating the themes that facilitated intervention completion as was reported by intervention facilitators (dietitians) and intervention completers*

*Numbers on arrow lines represent number of citing reported by various groups

From the above network it is evident that the common themes reported by intervention facilitators and completers included the following: (i) gaining knowledge; (ii) peer support during intervention group sessions; and (iii) weigh-in sessions which facilitated peer learning and being motivated by other participant's weight loss. The ADA (2009); Bronner and Boyington (2002) and Carson et al. (2002) confirm that improved nutrition knowledge and skills related to making appropriate food choices, monitoring energy intake and activity levels are essential in ensuring weight management self-efficacy and a possible increase in PA. In addition, a lack of social support or family support is viewed as a barrier to weight loss and can contribute to attrition from a weight loss interventions

(James et al., 2012; Moroshko et al., 2011). It is therefore evident that the literature supports the findings depicted in Figure 5.1.

Perspectives on salient themes

Participant responses to the question regarding what they would do if a health worker highlighted the fact that carrying too much excess weight can cause NCDs (see Table 5.18), resulted in the majority responding that they will take action. However, potential barriers to weight loss such as money and a lack of social support were mentioned. These themes could imply that if overweight/obese subjects are empowered with adequate knowledge and the necessary social support, they would be more likely to address their weight status. This view corresponds with that of Fitzgerald and Spaccarotella (2009) who cite a lack of knowledge regarding nutrition and the health benefits of physical activity as well as the necessary skills being factors that could hamper weight loss.

Of interest was that older participants, who have never attempted weight loss, thought that the attitude of the health professional explaining the relationship between weight and health would be important in influencing them to take action. In addition, a theme that emerged was that they were aware of the relationship between BMI and health but that barriers such the role that food plays at social events would complicate their ability to lose weight. The attitude of health professionals that was mentioned is not unfounded as weight-related stigmatization has been documented in numerous settings, including healthcare environments where obese patients experience bias from doctors, nurses and dieticians (Puhl & Brownell 2006; Foster et al., 2003; Schwartz et al., 2003). As a result, obese patients may be reluctant to seek health care due to the weight bias projected by health professionals. The role that food plays at social events and it serving as a potential barriers to weight loss is underscored by Puoane et al. (2006b) who reports that having a good appetite is a sign of health and that food is used to facilitate social interaction.

The focus group discussion conducted with intervention facilitators yielded similar results in terms of aspects that contributed to intervention success as it included group support and gaining of knowledge which was facilitated by life style manual (Senekal 2005). However, when facilitators were asked what they would do differently if they were to develop a weight loss intervention for a similar target group (see Table 5.17), they reported that family involvement would be a primary feature, followed by group activities such as supermarket visits, a more convenient intervention location and a monetary contribution paid by participants. The latter was echoed by a group B participant who remarked that because the intervention was free and she was also studying part time at the time of the intervention, she chose to focus on that which she paid for, namely her studies. The importance of a suitable location for the intervention venue is supported by Withall et al. (2009); Walcott-McQuigg et al. (2002) and Eyler et al. (1998). However, studies have shown that African-American women are less likely to participate in weight loss interventions if they are not affordable (Walcott-

McQuigg et al., 2002) and that the cost of weight loss interventions may therefore be a barrier to enrolment (Setse et al., 2008; Smith Barnes et al., 2007).

The main theme that emerged when subjects were asked what made it easy to follow the intervention was the weight loss manual (Senekal 2005) as was reported by intervention completers. Other aspects that enhanced intervention success were that it was not too restrictive. This aspect received the most citations from late drop-outs. Additional themes that emerged included the knowledge gained, group support, motivation provided by the intervention facilitator and the clear instructions received. Bronner and Boyington (2002) explain that factors influencing subject retention in a weight loss intervention targeting African-American women included social support, family participation and group sessions to facilitate behaviour change. Studies conducted by Jensen et al. (2004); Lemon et al. (2004); Hebert et al., (1999) and Franz et al, (1995) confirmed that weight loss facilitation conducted by a RD is an effective weight loss strategy.

Apart from knowledge and group support, intervention completers were also motivated by their weight loss. These findings shed light on the fact that intervention completers were not only interested in the intervention because they thought they would gain knowledge, but were motivated by their newly found knowledge and subsequently applied it. Clarke et al. (2007) echoes these findings by explaining that weight loss and an improvement in nutrition knowledge is associated with intervention success. A local study conducted by Issaacs and Puoane (2011) also found that social support enhanced behavioural change in Xhosa women.

5.7.4 Core theme IV: The role of social support in promoting enrolment, weight loss and curbing intervention drop-out

Results

Semi-structured interviews

Subject views on what will/did people around them say regarding their weight loss attempts are reported in Table 5.20.

Table 5.20: Responses to the question: "what will/did people around you think about you trying to lose weight?"

Themes	Group A	Group B	Group C	Group D	Cumulative citing
	Cit.	Cit.	Cit.	Cit.	
Total					42
Cultural norms	-	-	-	2	2
Negative social support	3	2	2	4	11
No idea	-	1	-	-	1
Positive social support	3	6	9	9	27
Social stigma	-	1	-	-	1

Group A: Enquired, did not enrol in study; Group B: Early drop-outs; Group C: Late drop-outs; Group D: Completers

Common themes that emerged across subject categories were indicative of both positive and negative social support. However, the majority of citings were indicative of positive social support, especially in group C (late drop-outs) and group D (intervention completers). A group B subject (early drop-out) who clearly had embarked on numerous previous weight loss attempts remarked:

"They were supportive but for me it was just another diet and for me like I have said, it is stuff I have been doing anyways, so it was one of those things (where people said... Ag shame, maybe this one will work). (P1 subject 5)

Another group B subject explained:

"There have mixed responses, because others think it's a good thing to lose weight and others are like people are getting 'sick' nowadays. Why are you also wanting to lose weight? There is some form of negativity toward weight loss". (P5 subject 3)

An intervention completer with a BMI of 33 kg/m² at baseline, also mentioned cultural norms in her response when she replied:

"Some were supportive. Some would say weight loss is a waste of time and money. The say, 'what's wrong with your body anyway? There is nothing wrong with it'. Some would say 'Black people have big bodies anyway'. Some would discourage you and say 'why because you are not that big' and make you look at those who are bigger than yourself". (P7 subject 3)

Another intervention completer remarked:

"Some would say 'oh we will see what will happen' so I showed them!" (P7 subject 7)

Facilitator focus group

Facilitator responses relating to the question on the effect of culture on drop-out and factors that resulted in subjects remaining in the intervention are reported in Table 5.21 and Table 5.22.

Table 5.21: Responses to the question "What was the influence of culture on subject drop-out?"

Themes	Citing
Total	3
Social functions	2
Supportive partners	1

Intervention facilitators reported that the effect of culture on drop-out was especially related to social functions and social support. One facilitator clarified this association as follows:

"Another thing I constantly had was the reason for (a lack of weight loss) was oh, on the weekend there was a party, during the weekend there was a wedding, during the weekend I had to attend a funeral and you know when you are in that social environment I cannot say oh no I am so sorry I cannot have that, I cannot have that..." (P1 subject 1)

Another facilitator added:

"...and if I don't feel like it and we are at a social gathering it's a Saturday and I am allowed to cheat..." (P1 subject 3)

A lack of social support which could be related to cultural norms that serve as a barrier to weight loss was highlighted by a facilitator explaining that:

"The person who actually lost the most weight was the one whose husband supported her in her losing weight. And the rest of them whose partners were not really that interested they were I'm ok if you are like this, they did not really stick to the programme". (P1 subject 1)

Other comments made by two different facilitators were:

"Also involving the whole family is really important, not necessarily inviting all of the family members, but maybe talking to the person who is the head of the family..." (P1 subject 4) as well as: "And depending on the support the whole thing of culture, get their families even to the point of saying let's make this a family programme... so that the woman does not do this thing and she is ridiculed with oh, this thing of yours (referring to the weight loss intervention)..." (P1 subject 5)

Table 5.22: Responses to the question "What aspects contributed to subjects remaining in the intervention?"

Themes	Citing
Total	10
Peer support	4
Knowledge	4
Realisation of effort required	2

Aspects that contributed to subjects remaining in the intervention were peer support and the knowledge they gained. A venue-based intervention facilitator reported:

"... there were two ladies that were losing. They were really consistent, so the rest of the group looked up to them and felt that they also needed to try harder and maybe achieve the same results and maybe listen to those ladies on how they were doing it. It was also because they were getting new ideas and learning about new opinions on weight management from the group". (P1 subject 4)

The fact that knowledge served as a motivation tool for staying in the intervention was illustrated by the comment:

"The ones who stayed were enjoying the knowledge...". (P1 subject 5)

Focus groups with overweight/obese women who have never attempted weight loss

Responses of overweight/obese women on the question what people around them would say if they decided to lose weight, are recorded in Table 5.23

Table 5.23: Responses to the question "What would people around you say if you decided to lose weight?"

Themes	Non-participants (n=7)	Non-participants (n=6)
	Citing	Citing
Total	28	5
Positive social support	1	2
Negative social support	3	2
Culture and social norms	16	-
Social functions	4	-
Disease stigma	3	-
HIV stigma	1	1

Negative social support was a prominent theme emerging from both focus groups. However, positive social support was also cited by both groups. Although limited to one citing per group, the stigma of HIV associated with weight loss was mentioned as well as perceptions by members of the community that you are in poor health if you lost weight. One explanation provided was:

"They (older people) associate weight loss with sickness, like there is something wrong with you. Like are you depressed or you are probably sick. Probably cancer for example". (P2 subject 1)

Other participants remarked:

"They would say maybe you are in an abusive relationship". (P2 subject 3)

and

"...uneducated people always think you are sick so they will say some bad stuff about you." (P3 subject 1)

Culture, social norms related to an acceptable body weight and the importance of food at social functions **at great length as barriers to weight loss that would emerge from people's comments about** their potential weight loss efforts should they have embarked on a weight loss intervention. This was illustrated by the following quote:

"I think they will probably say, look at your family or your family line where you come from. They are really not the smallest people in the world ... you won't lose a lot of weight. You will probably lose a little bit then probably in December or whenever you have family gatherings where your mom or grandma are going to cook an 'overbearing lunch' and feed you (serve you) and if you do not eat it she would be 'or do you think you are now civilized' (a term that means do you think you are better than your people)". (P2 subject 2)

A participant from the same focus group explained:

"I would like to lose weight. I am not happy with my current weight...Although my husband does not want me to lose weight. He used to say to me 'I don't want a skinny wife ...'" (P2 subject 4)

Another participant added:

"And dieting is not a huge thing with Black people... I also think with like feeding, when you are a baby...the baby cries and we want to feed them. I do not think Black babies have an eating plan". (P2 subject 2)

Perspectives on salient themes

Negative social support featured as a prominent theme across all subject categories. However, positive social support emerged as much more prominent theme across all subject categories. The distinction between positive and negative social support for weight loss among participants who have never attempted weight loss was less clear. Thomas et al. (2009) report that qualitative research conducted among overweight/obese African-American women found that many reported a need for social support based on an improvement in health rather than enhanced appearance. In addition, subjects expressed a need for social support but many reported a lack of support for weight loss from family and friends.

Intervention facilitators also acknowledged the fact that subjects did not receive the necessary social support from family, friends and peers. This barrier was confirmed by subjects as negative social support and featured as a theme across all subject categories. In field notes made by the researcher after conducting an informal survey amongst intervention completers in Pietermaritzburg, a venue-based subject reported: **"I did not receive enough/any encouragement from my family, friends or colleagues to continue with the programme, especially from colleagues"**.

Only one reference was made of positive social support by older subjects who have never embarked on a weight loss intervention while younger women in this category were more optimistic that they would receive positive social support. The latter could be indicative of a higher level westernization amongst younger members of an urban community. A field note made by the researcher when talking to a subject that was a member of an intervention that was conducted at a facilitator's home

describes how the subject was **of the opinion that “cultural norms are changing and it is no longer acceptable to be big”**. **From a public health perspective this concept requires further investigation.**

When intervention facilitators were asked whether they thought culture was responsible for subject drop-out, they confirmed that it did play an important role. Facilitators explained that the role of culture was related to the focus on food at social events and the fact that subjects used this as an excuse for not adhering to the intervention, especially over weekends when events such as parties, weddings and funerals were very prevalent. Qualitative research by Thomas et al. (2009) among overweight/obese African-American women confirmed that cultural aspects have an impact on weight loss **efforts as subjects described social pressure to consume energy dense high fat “home cooked”** foods at church and fellowship meetings, especially over weekends. In addition, research by Caster (1980) on African-American women explained that cultural differences in diet are expressed in peripheral foods that tend to be eaten over weekends or on special occasions. Local research among urban Xhosa women report that the consumption of large portion sizes is a common practice (Puoane et al., 2005b) and having a large appetite is a sign of being happy (Puoane et al., 2006b).

South African black women have a larger ideal body sizes, are less likely to perceive themselves as overweight/obese, are more satisfied with their bodies at heavier weights and are more likely to report feeling attractive. They therefore have more favourable body image attitudes and are more accepting of a larger body shape than their Caucasian counterparts (Matoti-Mvalo & Puoane 2011). Befort et al. (2008b) adds that obese African-American women believed that body size should not **influence one’s feelings of attractiveness, self-esteem** or happiness. According to Matoti-Mvalo and Puoane (2011); Puoane et al. (2006a); Puoane et al. (2006b); Puoane et al. (2005a) and Puoane et al. (2005b), it would seem that many black South African women do not want to lose weight as obesity is culturally and aesthetically more acceptable for black than Caucasian women. In a local context, weight loss and thinness are often associated with HIV/AIDS which may contribute to the acceptance of a larger body size (Puoane et al., 2005c).

Positive social support was a prominent theme that featured across all subject categories with the majority of citings reported by late drop-outs and intervention completers. This finding could be indicative of the fact that the reason why late drop-outs remained in the intervention for longer and completers were able to complete the intervention was because they received the necessary social support. Fitzgerald and Spaccarotella (2009) confirmed the importance of social support at an interpersonal level of the ecological model when it comes to losing weight. Of interest though, is the finding that Group A subjects (who never enrolled in the intervention) and intervention completers both had the highest number of citings when it came to discussing the negative social support they would experience/had experienced. However, it would seem that this served as a barrier to enrolment in the intervention for group A subjects, whereas in intervention completers, this barrier was

overcome by an even higher level of positive social support received from family, friends, the intervention group they were part of as well as the intervention facilitators.

Despite their ability to complete the intervention, intervention completers were the only group to report that cultural norms did/could hamper their weight loss efforts. It is however possible that these subjects felt so empowered by the knowledge gained and positive social support they received from group members and facilitators, that despite cultural norms such as male preference for a more curvaceous female form that could serve as a barrier to weight loss (as was expressed by the older focus group participants that have never attempted to lose weight), they still managed to overcome this barrier. Baturka et al. (2000); Wolfe (2000) and Flynn and Fitzgibbon (1998) also report that African-American women are more likely to experience cultural pressure to be self-accepting of their physical shape, regardless of their size and are subject to social pressure from peers and family members to maintain their current weight, even if they are overweight (Powell & Kahn 1995; Rosen et al., 1993; Harris et al., 1991).

5.7.5 Core theme V: Barriers to enrolment, weight loss and factors that contribute to intervention attrition

Results

Semi-structured interviews

Barriers to weight loss are reported in relation to the data depicted in Table 5.24, Table 5.25 and Table 5.26.

Table 5.24: Responses to the question “Why did you not join the intervention?”

Themes	Group A	Group B	Group C	Group D	Cumulative citing
	Cit.	Cit.	Cit.	Cit.	
Total					5
Blood values	1				1
Family responsibility	1		N/A		1
Time constraints	1				1
Work commitments	2				2

Group A: Enquired, did not enrol in study; Group B: Early drop-outs; Group C: Late drop-outs; Group D: Completers

Reasons why subjects did not join the intervention were related to work commitments, family responsibility, an inability to visit the pathologist for the baseline screening of blood values and time constraints.

Table 5.25: Responses to the question "Why did you stop coming to the intervention?"

Themes	Group A	Group B	Group C	Group D	Cumulative citing
	Cit.	Cit.	Cit.	Cit.	
Total					18
Blood values and food diaries		1	-		1
Gimmick		1	-		1
Hunger		-	2		2
Lack of finances		-	1		1
Lack of weight loss/weight plateau	N/A	2	2	N/A	4
Relocation		1	2		3
Stress		-	1		1
Time constraints		4	-		4
Work		1	-		1

Group A: Enquired, did not enrol in study; Group B: Early drop-outs; Group C: Late drop-outs; Group D: Completers

Reasons why subjects stopped attending the intervention sessions included time constraints, a lack of weight loss and relocation. A group C subject explained:

*"For me I just got tired of counting food and then I was not exercising that much so for the first weeks I did lose and then after that **there was no improvement in my weight loss**". (P6 subject 4)*

Table 5.26: Responses to the question "What made it difficult to follow the programme?"

Themes	Group A	Group B	Group C	Group D	Cumulative citing
	Cit.	Cit.	Cit.	Cit.	
Total					25
Disbelief in everything permissible in moderation		1	-	-	1
Eating healthy snacks		-	1	-	1
Entrenched habits		-	-	1	1
Exercise		-	2	2	4
Family eating habits		3	-	1	4
Initial dietary restriction		-	1	-	1
Lack of finances	N/A	1	-	-	1
Lack of fruit and vegetables		2	-	-	2
Lack of self-discipline		1	-	1	2
Lack of time/work		1	-	-	1
Meal pattern		-	-	2	2
Portion control		-	1	2	3
Temptations		-	-	2	2

Group A: Enquired, did not enrol in study; Group B: Early drop-outs; Group C: Late drop-outs; Group D: Completers

Aspects that made it difficult to follow the intervention included exercise, portion control, family eating habits and a lack of self-discipline. The citations related to family eating habits and a lack of fruit and vegetables in the home were indicative of potential barriers to weight loss experienced by early drop-outs. One early drop-out (group B) clarified these barriers by explaining:

"I think the one thing that would have made it much easier is it's easier for someone who lives on their own.

The main difficulty is that you are with people here ...". (P5 subject 3)

Another group B subject explained:

"At home there are many family members and it's difficult to have different food for everyone. Everyone eats the same oily food for instance and you find that you cannot change everyone's eating habits to healthier ways of eating..." (P5 subject 5)

Facilitator focus group

In an attempt to gauge barriers to intervention success, intervention facilitators were asked to discuss which aspects of the intervention did not work and what the reasons for subject drop-out were. These results are reported in Table 5.27 and Table 5.28.

Table 5.27: Responses to the question "Which aspects of the intervention did not work?"

Themes	Citing
Total	11
Conflict with family preferences	1
Effort related to venue	2
Focus on weight loss	1
Food diaries	1
Lack of understanding of physical activity	3
Lack of physical activity	2
Self-monitoring tool	1

Aspects of the intervention that did not work included a lack of subject understanding regarding what is meant by an increase in physical activity, a lack of subject physical activity and the effort required to get to the venue where the intervention was conducted. A lack of subject understanding regarding what is meant by an increase in physical activity can be illustrated by the following facilitator quote:

"...physical activity was a very foreign concept to them. For example they think walking from where the taxi dropped them off at the gate to their office is being physically active and we've actually got a wonderful wellness gym on campus right here at the sports centre only for staff, state of the art equipment..." (P1 subject 3)

The difficulty associated with finding a suitable venue can be illustrated by the following quote of a facilitator who conducted sessions at a Pietermaritzburg venue:

"... initially everyone said, no this venue is fine. We are all able to get there, it's ok. Then somewhere along the line the plot changed and they did say it is this venue. It is just not really working for us. But when you ask them again where would you like it to be no one raises you know the convenient place/suggestions ". (P1 subject 1)

However, a facilitator who conducted sessions at a work-based facility over lunch time responded with the following two quotes:

"Even that won't work. I would wait for them here 20 minutes and then go to my office and phone them and say hello, it's X, where are you? And then they would say oh no... ". (P1 subject 3)

A lack of subject physical activity was clarified by the following quotes:

"...some of them came from the township where it is dangerous to exercise on the roads...". (P1 subject 4) and "when it comes to exercise, physically go with them to the gym, arrange with whatever that is nearby to show also that there are big people that are in the gym..." However, in response another facilitator added: "they will tell you they do not have time". (P1 subject 1)

Table 5.28: Responses to the question "What were the reason/s for subject drop-out?"

Themes	Citing
Total	8
Psychological issues	3
Lack of weight loss	2
Lack of subject commitment	3

Reasons for subject drop-out included psychological issues such as stress-related eating and a lack of subject commitment. One facilitator explained:

"I think for me what came across as the major reason why most of them fell off was the realization that my eating patterns are not just linked to how good the food tastes, and how it's presented but psychologically. I dealt with it a lot. I think at every session I would deal with one person who was eating due to psychological reasons. Most of them realized oh you know I eat because I am stressed.... I need to deal with those issues first before I start focusing on how to lose weight". (P1 subject 1)

Another facilitator acknowledged the importance of psychological factors that need to be addressed in the facilitation of a weight loss intervention by adding:

"... we talked about the issue of psychology. You know, sometimes you might need to throw in a little bit and maybe be aware that I might need to refer...". (P1 subject 5)

A lack of subject commitment was illustrated by the following facilitator comment:

"...firstly participation was good until they realized they need to commit and you need to change your lifestyle". (P1 subject 5) while another added: "I think it's the commitment". (P1 subject 3) While a comment related to location/venue was: "... venue can be anywhere. If people want to get there they will get there...". (P1 subject 1)

Focus groups with overweight/obese women who have never attempted weight loss

Responses of overweight/obese women that have never attempted weight loss were asked what they viewed to be an acceptable weight, their responses are reported in Table 5.29 while Table 5.30 reports on additional barriers to weight loss these subjects could experience should they try to lose weight.

Table 5.29: Response to the question "What do you deem to be an acceptable weight?"

Themes	Non-participants (n=7)	Non-participants (n=6)
	Citing	Citing
Total	11	6
Culture	6	-
Weight range	5	6

From the focus group discussions it became clear that subjects perceived an acceptable weight to equate to a BMI ranging from 27,7kg/m² to 39, 5kg/m². It is therefore not surprising that these subjects have never attempted weight loss as they perceive an overweight/obese state as an acceptable weight. However, it is also possible that barriers prevented them from attempting weight loss.

Perceptions regarding the role of culture on body shape and size norms varied. One subject remarked:

"You cannot go beyond or less than 70kg (BMI 27,7kg/m²). It won't work in our culture. They look at you and they talk (behind your back). They will say, 'just look at this one, she is losing weight, what's wrong with her? Is she sick or what? They would say you must wear size 38, 40, 44 are ok". (P2 subject 6)

Another subject remarked:

"I am trying to be at least 80 (kg). It should be 80-100kg (BMI 31,6 kg/m² - 39,5kg/m²). Then it will be fine because my husband will be seen as someone who is supportive and caring and in our culture they can learn our situation inside our house (inner state of happiness) by looking at the wife...It's like now we are losing our culture as blacks because they even say a Zulu woman's beauty lies in the size of her body". (P2 subject 7)

Some participants were quite defensive in their responses to the question. As a result, one's response was:

"I think whatever weight is fine. If you feel comfortable about your weight that is what matters". (P3 subject 4)

Table 5.30: Responses to the question "What are additional barriers to weight loss that you have not already mentioned?"

Themes	Non-participants (n=7)	Non-participants (n=6)
	Citing	Citing
Total	3	0
Fast food	1	-
Cost	2	-

Additional barriers to weight loss that emerged included eating fast food when socializing and the cost related to losing weight.

Networks

The relationships between what made it difficult to follow the intervention or aspects of the intervention that did not work as was discussed by intervention facilitators, early and late drop-outs as well as intervention completers are illustrated in the network in Figure 5.2.

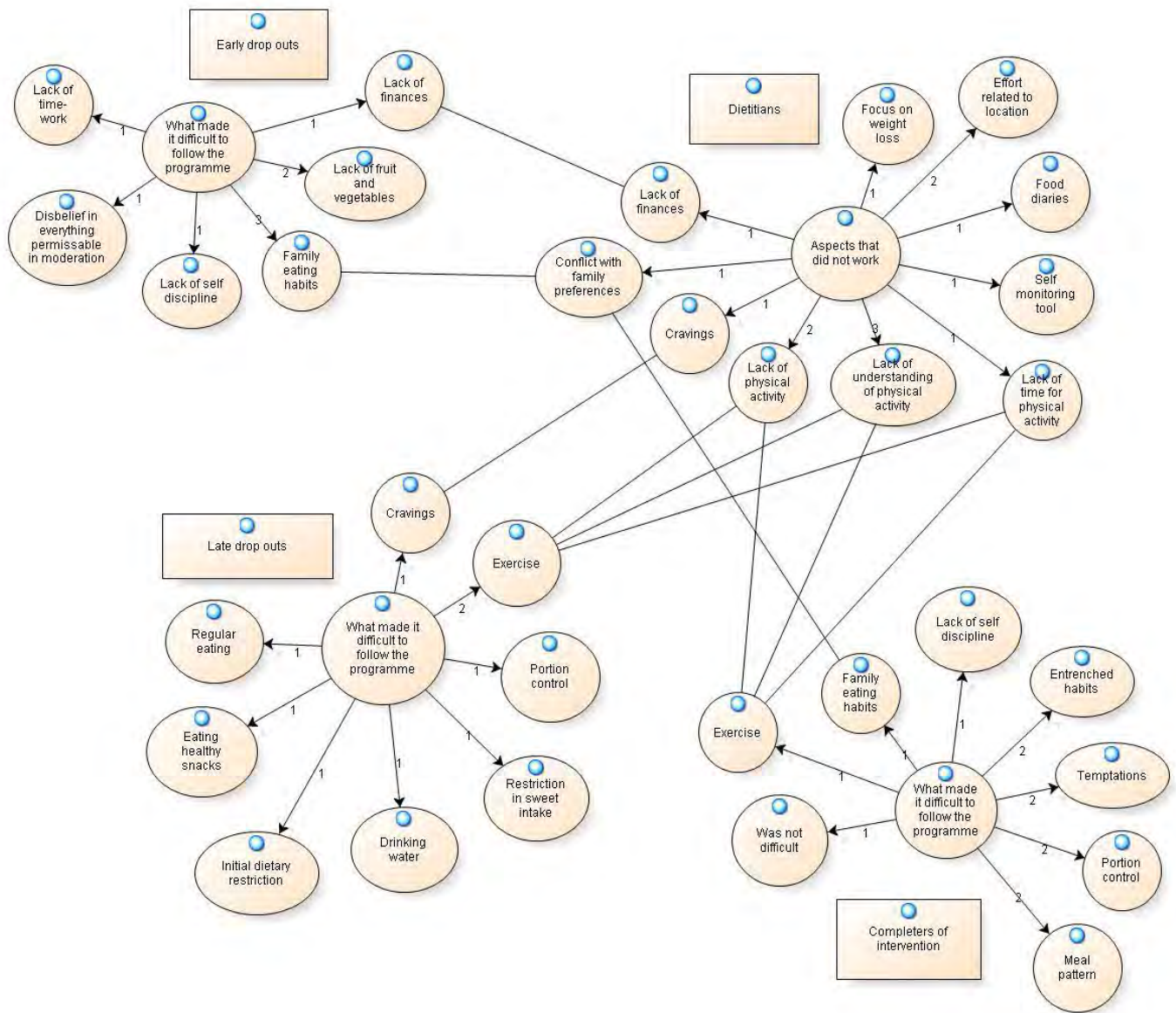


Figure 5.2: Thematic network illustrating the relationship between what made it difficult to follow the intervention by intervention participants, i.e. early and late drop-outs and completers of the intervention and aspects that did not work as was discussed by intervention facilitators.

*Numbers on arrow lines represent number of citing reported by various groups

From the above thematic network it is evident that intervention facilitators and early drop-outs agreed on the following themes that emerged as aspects of the intervention that did not work and aspects that made it difficult to follow it the intervention. These included the following relationships: (i) lack of finances and; (ii) conflict between foods recommended as part of the intervention and family eating habits. In addition, intervention facilitators and late drop-outs identified the following common themes as aspects that did not work and aspects that made it difficult to follow the intervention: (i) cravings and; (ii) lack of physical activity due to time and other constraints as well as an inability to comprehend what an increase in physical activity implies. Common barriers identified by intervention facilitators and subjects that completed the intervention were: (i) lack of physical activity due to time and other constraints as well as an inability to comprehend what is implied by an increase in physical

activity and; (ii) conflict between foods recommended as part of the intervention and family eating habits.

In the thematic network illustrated by Figure 5.3, reasons for intervention drop-out are explored from the intervention facilitators' and drop-out's perspectives.

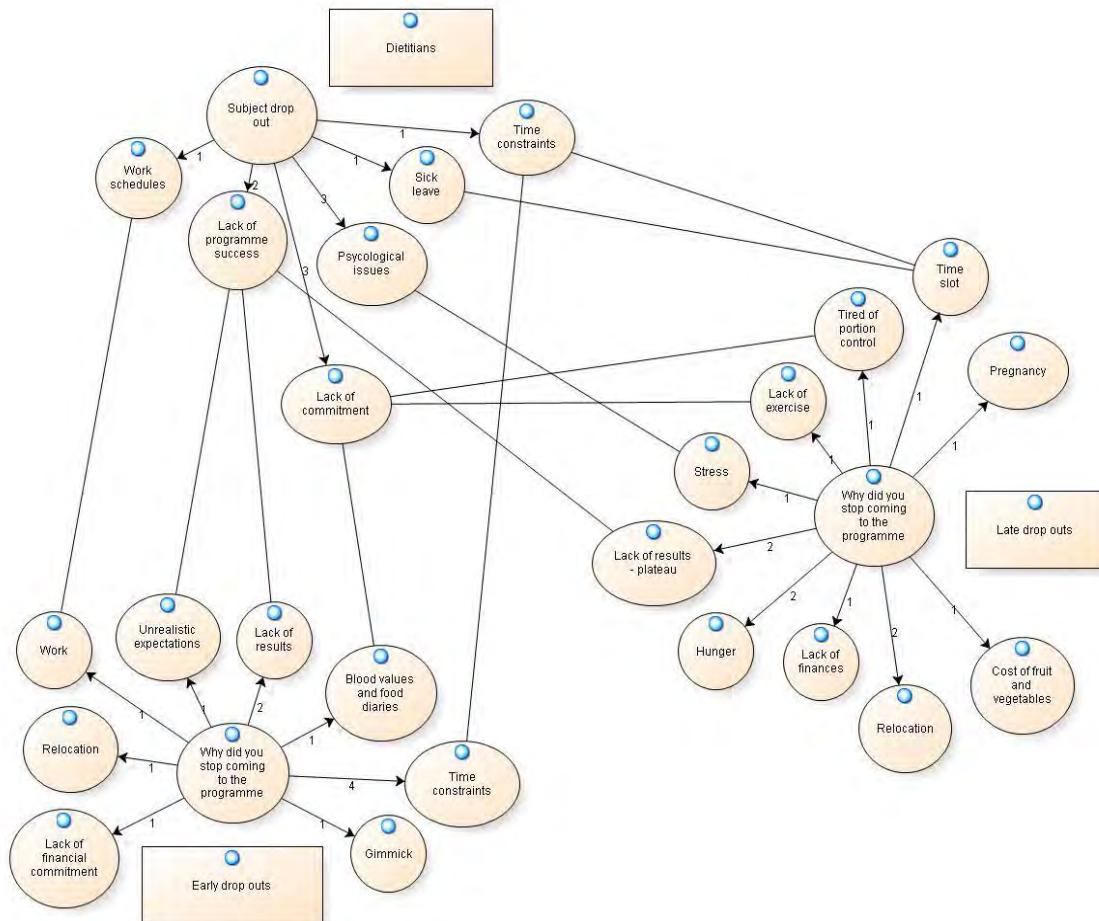


Figure 5.3: Thematic network illustrating the relationship between the reasons for drop-out from the intervention that was reported by intervention facilitators and drop-outs*

*Numbers on arrow lines represent number of citing reported by various groups

The network illustrates that common themes that emerged between intervention facilitators the fact that common themes that emerged between intervention facilitators and early drop-outs included: (i) work commitments; (ii) lack of intervention success (weight loss) with concomitant unrealistic weight loss expectations; (iii) lack of commitment to the intervention as was illustrated by subjects not submitting their food diaries to intervention facilitators and not going to the pathologist to have their baseline blood values screened and; (iv) time constraints.

Common themes linking intervention facilitators and late drop-outs in terms of reasons for intervention drop-out included: (i) psychological problems and stress that interfere with eating habits; (ii) lack of intervention success (weight loss) with concomitant unrealistic weight loss expectations and a lack of weight loss due to reaching a weight loss plateau and; (iii) time constraints, the time slot when the intervention took place and the fact that subjects were often sick on a Monday (when the intervention was scheduled).

Early- and late drop-outs shared the following common themes that could be viewed as factors that illustrate a lack of intervention commitment. These included: (i) being tired of portion control and; (ii) not exercising enough.

As a result, major themes explaining reasons for subject drop-out were: (i) lack of intervention success (weight loss) with concomitant unrealistic weight loss expectations and reaching a weight loss plateau and; (ii) a lack of commitment to the intervention.

Perspectives in salient themes

When viewing the above findings in terms of behavioural change theory, the TTM emphasizes that no single theory can account for all the complexities related to behavioural change (Prochaska et al., 2008; National Cancer Institute 2005; Greene et al., 1999). The subjects that never joined the intervention could be viewed as precontemplators or contemplators, depending on the number of barriers they experienced in preventing them from moving to the preparation or action stage of the model. According to Greene et al. (1999), from a public health perspective, the goal would be to get individuals in these stages of change to think about the problem/create an awareness of the need for change, personalize information about risks and benefits associated with change, reduce the barriers to change, highlight the health risks associated with obesity, continue to use these experiential strategies and start getting subjects to make small dietary adjustments. Should they however be considered to be in the preparation stage, seeing that they enquired about the intervention, their **behavioural goal would be just "to do it"** and to continue experimenting with various dietary and lifestyle strategies until they find what works for them. Group B, C and D subjects are considered to be in the action phase because they changed their behaviour for less than six months (i.e. they were followed up for 16 weeks after the intervention was initiated). If resources are limited, dietitians should focus their efforts on helping individuals in this stage (Greene et al., 1999). However, when reviewing all the efforts that intervention facilitators went to in order to accommodate subjects that were in the action phase and that despite their efforts the attrition rate from the intervention was still very high, it would seem that facilitator and peer (group) support is not sufficient to prevent attrition and that aspects such as social support outside the intervention environment from family, friends, colleagues and the community at large are more likely to provide subjects with the necessary support during the action phase.

Barriers that prevented subjects from joining the intervention varied. However, work commitments (and therefore time) seemed to feature as the most prominent barrier to participation. Ruelaz et al. (2007) and Price et al. (1987) also reported a lack of time as a barrier to intervention success while Fitzgerald and Spaccarotella (2009) explain that at an interpersonal level, a lack of time could prevent changes in diet and physical activity. Despite the fact that the researcher had reservations that a visit to an off-site pathologist for baseline screening of fasting blood values (see Chapter Three) would be a major barrier to subject enrolment, especially due to the stigma associated with HIV/AIDS, it was only mentioned by one subject.

Major reasons why group B and C subjects stopped attending the biweekly group sessions were that they experienced time constraints. Other themes included not losing the desired amount of weight, relocating to areas that were not close to the cities where the intervention was offered and that they were too hungry. Focus group discussions conducted by Talbot and Avery (2011) among slimmers and non-slimmers revealed that common responses to experiencing hunger included eating large amounts of food and selecting convenience foods to curb hunger. For slimmers, these actions were perceived to be detrimental to their weight loss efforts and had the potential to initiate a spiral of emotions that caused them to perceive their weight loss efforts as futile. As a result, the above authors conclude that curbing hunger appears to be an important strategy for slimmers to lose weight. However, in the current study sample it is unclear whether the hunger was perceived due to habitual consumption of large portion sizes or whether the recommended meal plan was insufficient to curb hunger.

In terms of the time constraints reported by subjects, it should be noted that during the intervention phase of the study, a concerted effort was made to accommodate subjects. In an email the researcher sent to the main study supervisor, mention is made of the fact that subjects sometimes arrived for follow up or baseline screening more than two hours late. This meant that the facilitation of group sessions became virtually impossible. Other examples of how subjects were accommodated was that venue-based sessions that were conducted in Pietermaritzburg on Sundays (because Saturdays are often devoted to social events such as weddings and funerals) were changed from 9:00 to 12:00 after subjects indicated that a later time slot would be more suitable due to the fact that church-related activities have finished by then. Once this change in time slot was implemented, subjects still arrived between 12:10 and 13:15. At a venue-based intervention in Durban, the session was due to start at 17:00. However, one subject only arrived at 18:20. Incidents such these made it very difficult to conduct group sessions as it meant that intervention facilitators had to repeat a particular group session because some subjects often only arrived by the time the majority of subjects had already left.

Focus group participants that have never attempted to lose weight were aware of the fact that a weight loss intervention involves a reduced fat intake, exercise and group support, while older focus group participants also mentioned the importance of eating smaller portions and consuming more fruit and vegetables. It is therefore of interest that subjects were aware of what a healthy weight loss intervention entailed, but what possibly prevented them from losing weight was inadequate knowledge regarding the importance of the relationship between BMI and health and that they experienced too many barriers preventing them from going on a weight reducing diet.

The above explanation was echoed by the themes related to what people around them would say if subjects that have never embarked on a weight loss intervention decided to do so. A major theme that emerged amongst older participants was that culture, social norms and social functions will not be conducive to weight loss efforts.

When participants were asked if there are any additional barriers to weight loss that they have not already mentioned, older participants mentioned the cost of eating healthy (despite the fact that they were all employed in administrative positions at a tertiary institution) and the tastiness of fast food. These themes should therefore also be considered when planning a weight loss intervention targeting black women as Fitzgerald and Spaccarotella (2009) refer to a taste preference for high fat foods as an intrapersonal level factor and the convenience related to pre-prepared and take away meals as well as the increased cost of healthier options as interpersonal level factors forming part of an ecological perspective that can serve as barriers to weight loss.

An intervention barrier that emerged as a theme from the focus group with intervention facilitators but was not mentioned by subjects in any of the subject categories, was the effort related to getting to the intervention venue, the food diaries (that were completed by less than half of the subjects screened at baseline) (see Chapter Three) and subject compliance with the self-monitoring tool (tick sheet) (Schreuder et al., 2007) (see **Addendum F**) that was abandoned due to a lack of subject compliance.

Intervention facilitators were of the opinion that intervention aspects that did not work were primarily centred on a lack of physical activity and an inability to comprehend what is implied by becoming physically more active in an attempt to lose weight. The WHO (2004b) sheds light on this observation by explaining that the idea of being physically active during leisure time is not understood in many cultures and communities in which energy conservation has historically been a prime concern. This phenomenon often persists across generations, even though the original rationale for their adoption has long been forgotten. In addition, Wilcox et al. (2002) and Airhihenbuwa et al. (1995) refers to **"the rest ethic" of the African-American culture or the belief that rest is important after a "busy day"**. Both late drop-outs and intervention completers identified an increase in physical activity as a barrier

to intervention success. Fitzgerald and Spaccarotella (2009), explain that intrapersonal level barriers to increasing physical activity include the perception of already being fit, a lack of self-confidence and motivation, a lack of knowledge regarding the health benefits associated with being physically more active while interpersonal level barriers to increasing physical activity included a lack of social support and time constraints.

With reference to aspects that made it challenging to follow the intervention, the most prominent themes that emerged were family eating habits, a lack of fruit and vegetables in the home and a lack of finances (which relates to the fact that fruit and vegetables are expensive commodities) with the largest number of citations by early drop-outs. Fitzgerald and Spaccarotella (2009) also acknowledge the affordability of healthier options as an intrapersonal level aspect of the ecological perspective that **could influence one's ability to lose weight**, while Cortugna et al. (1992) reported that more African-Americans than Caucasians reported that making dietary changes were too costly. It is therefore possible that the home environment of early drop-outs was not conducive to following the weight loss intervention.

During the focus group discussion conducted with intervention facilitators, intervention conflict with family eating habits also emerged as a theme. In addition, early drop-outs also reported time and work commitments as a barrier in addition to disbelief that all foods are permissible in moderation. Major challenges experienced by late drop-outs, included exercise and aspects that were related to changing their eating habits. However, it is of interest that intervention completers also reported the largest number of barriers to weight loss that included having to change their meal pattern, eating habits, experiencing a lack of self-discipline and being tempted by unsuitable food choices as well as having to exercise. It is however possible that the positive social support intervention completers received and subsequently reported, helped them to overcome these barriers to weight loss.

Field notes made by the researcher regarding a Pietermaritzburg subject that was part of an **intervention conducted in a facilitator's home, describes how the subject found it difficult to comply** with the intervention when socializing as she grew up with the norm that you must finish your food/clean your plate. When her friends heard that she was trying to lose weight, they would remark: **"We are all big. Let's just eat".** A work-based subject in Durban that would be classified as an early drop-out reported her friends saying: **"Why bother to lose weight? This is how you are".**

Intervention facilitators showed a lack of insight into the reasons for subject drop-out as they reported that the major reasons for drop-out to be psychological problems that resulted in stress-related eating and a lack of subject commitment. However, they also identified a lack of weight loss as a reason for drop-out. Research conducted by Greener et al. (2010) amongst health professionals that included dietitians, also reported unrealistic weight loss expectation to be a barrier to weight loss

while Withall et al. (2009) documented depression as a barrier to weight loss. Local qualitative research conducted by Puoane et al, (2006b) among Xhosa women reported that some subjects ate more when they were depressed.

At a work-based intervention conducted at a tertiary institution in Durban, the intervention facilitator reported that it became increasingly difficult to conduct lunch hour sessions as subjects first ate their lunch in their respective offices and then attended the session at a central venue on campus. This meant that the facilitator often did not have enough time to facilitate a session adequately, as subjects had to return to their offices by 14:00. The same facilitator also reported that choosing **Mondays as an intervention day proved to be problematic as subject were often "sick" on Mondays.** Stunkard et al. (1989) also found that workplace-based interventions have limited success as was measured by minimal weight loss, poor recruitment and high attrition rates.

5.7.6 Core theme VI: Perceptions of intervention facilitators regarding considerations for success to facilitate the planning of future interventions with a similar target group

Results

Facilitator focus group

The perceptions of intervention facilitators regarding their experience of subject participation and facilitation of the intervention are reported in Table 5.31 and Table 5.32.

Table 5.31: Responses to the question "What was your experience related to subject participation?"

Themes	Citing
Total	14
Initial excitement	4
Thoughts of initial quick fixes	3
Weight loss expectations	3
Office follow up	1
Lack of social support	3

Major themes that emerged were related to initial excitement, the realisation of effort required to facilitate weight loss, unrealistic weight loss expectations and lack of social support. These themes were illustrated by the following quotes:

"Participation initially was really good but as the weeks went by and they saw that they need to be fully dedicated to the programme rather than just if I feel like it then I will count my kilojoules... and forget that if you cheat come the weigh-in session your cheating shows... The level of participation dropped as it became clear that you need to dedicate yourself, it's a lifestyle change. Not just a quick fix". (P1 subject 1)

A lack of social support was evident from comments such as:

"... some were not losing much weight, ja coz they had like other people like telling them that no, it's not gonna work or whatever, discouraging them" (P1 subject 2) and "... if people were committed to coming here every Saturday but are not losing weight, so at home they get asked is this thing of yours working? ...so instead of getting support some people may wonder if it is really worth it? I don't know if ridiculed is a better word." (P1 subject 5)

Table 5.32: Responses to the question "How did you experience the facilitation of the intervention?"

Themes	Citing
Total	19
Informative for subjects	3
Insight into beliefs and backgrounds	10
Positive experience	6

Facilitator experience of the facilitation process was related to gaining significant insight into participant beliefs and backgrounds. Quotes that illustrate the above included the following from a Zulu dietitian:

"Discussing the menus was great too because we heard from them about their preferences too that are consistent with the African culture ... so we got to speak about the correct methods of cooking these foods. One thing I have realized is that it does not matter whether you live in a suburb or township, where one comes from strongly influences how they do things...". (P1 subject 4)

Numerous citings documented the fact that facilitators experienced intervention facilitation as positive. Despite the high prevalence of intervention drop-out (see Chapter Four), none of the facilitators verbalized their facilitation experience as negative.

Perspectives on salient themes

Authors such as Krumeich et al. (2001) explain that the complexity related to the planning and implementation of health promotion interventions is related to the fact that health-related behavioural change is a major challenge for those working in public health, especially when the **intervention's** focus is on individuals whose social, cultural, ethnic or economic circumstances might differ from that of the health **professionals' own background**. **In addition**, health education emphasizes the importance of a systematic analysis of factors that influence health-related behaviours and the subsequent development and evaluation of interventions. Kumanyika et al. (1992) add that mainstream weight loss interventions may not be effective for African-American women because they are based on assumptions and values of the dominant culture which, in the case of the USA are Caucasians and include personal autonomy and self-management. By contrast, African-American culture is centred around interconnectedness and group support. As a result, culturally sensitive

weight loss interventions should build on these findings and include aspects that have been proven to be feasible or effective for African-American women while simultaneously addressing cultural, social and environmental barriers to behavioural change.

When intervention facilitators were guided to discuss how they experienced subject participation, considering the high attrition rate, major themes that emerged were that they perceived subjects to be excited initially, but that they thought the intervention was a quick fix. However, a subject that never enrolled in the intervention as well as an intervention completer, reported that they would prefer to lose weight without gimmicks and when they enquired about the intervention, they knew that it did not involve any gimmicks. Qualitative research involving obese African-American women conducted by Befort et al. (2008c) also found that participants preferred interventions that include lifestyle modifications rather than fad diets or appetite suppressants. Intervention facilitators reported that they perceived subjects to have unrealistic weight loss expectations. According to Jeffery et al. (1998) and Linde et al. (2004), despite the fact that subjects in their respective studies had unrealistic weight loss expectations and that more realistic weight loss goals were more likely to be attained, weight loss goals did not predict short- or long term weight loss.

5.8 CONCLUSION

The following conclusions can be drawn regarding the phenomenon of attrition in black (Zulu) overweight/obese women bearing in mind the identified weight management focus areas (FA, grouped for the purposes of these conclusions):

Treatment seeking (FA 1), weight lost (FA 2), attrition and compliance (FA 3) and appropriateness of the intervention (FA 8)

- Prospective participants had no or a limited idea of what the intervention entailed when they enquired about it, as well as on enrolment into the intervention;
- Financial constraints that reduced accessibility to the intervention (enrolment, compliance and remaining in the intervention) were evident, despite the fact that the intervention was free (the cost of implementation of dietary and physical activity recommendations may be a key consideration here);
- Actual or perceived time constraints to attend intervention sessions and implement the dietary and physical activity recommendations;
- Timing and location of intervention sessions were not always viewed as convenient;
- Work commitments and family responsibilities were barriers in terms of the attendance of the intervention sessions as well as following the recommended intervention components such as dietary aspects and physical activity;
- Effort required to increase physical activity;

- Loss of initial excitement regarding participation in the intervention and the potential for weight loss;
- Unrealistic weight loss expectations;
- Lack of intervention success (weight loss) and reaching a weight loss plateau;
- Insufficient/no support/patronizing attitude from people who are important to the participant such as family, friends, peers, although positive experiences regarding such support were also evident;
- Lack of understanding regarding what was meant with an increase in physical activity and not complying with this recommendation;
- Having to change meal pattern and eating habits and domestic conflict related to recommended foods as part of the intervention and family eating habits;
- Becoming tired of portion control;
- Food cravings, being tempted by unsuitable food choices and being too hungry;
- Lack of self-discipline and commitment.

Cultural factors (FA 4 – body image, FA 5 –dietary intake, FA 6-physical activity), social influences (FA 7) and attrition/compliance (FA 3)

- Perception that cultural norms and values were partially responsible for subject drop-out;
- Focus on food at social events and the fact that subjects used this as an excuse for not adhering to the intervention, were very prevalent;
- Role that food plays at social events, especially over weekends when events such as parties, weddings and funerals take place, complicated dietary compliance and the ability to lose weight and/or maintain losses (may actually be used as an excuse by participants for not adhering to the intervention);
- Cultural beauty norms such as preference for a more curvaceous, larger female form in the overweight/obese range (BMI of between 27,7 and 39, 5kg/m² were indicated as acceptable)

Eating behaviour (FA 9) and psychological well-being (depression) (FA 10)

- Stress-related eating that interfere with eating habits;
- Perception that weight loss reflects having HIV (stigma), having a poor health in general and marital problems;
- Disinhibition as a result of the role that food plays at social events, especially over weekends and at events such as parties, weddings and funerals.

Bearing in mind the identified barriers and further perspectives that emerged from the results, we posit that addressing the following points/strategies in the development of weight loss interventions

for black overweight/obese women may contribute to promotion of treatment-seeking and successful weight loss and maintenance in these women:

Intervention content, focus and approach (FA 4-body image, FA 5-diet, FA 6-physical activity and FA 8-appropriateness of intervention)

- Ensure that treatment-seeking black overweight/obese women perceive/understand/acknowledge that healthy weight loss interventions that are culturally sensitive have the potential to increase relevant knowledge and behaviour change that could translate into a healthy lifestyle (healthy eating habits and increased levels of physical activity) and as a result, achieving weight loss and maintenance goals, emotional wellbeing, good self-esteem and decreased risk for NCDs;
- Provide specific clarity on and insights into the various forms of physical activity, the role of physical activity in weight loss, maintenance and health, as well as how to increase the different types of physical activity in such a way that compliance is feasible;
- Provide insights into and perspectives on the management/handling of cultural norms regarding female beauty ideals within the context of aspiring to and achieving a healthy weight;
- Provide insights into and perspectives on the management/handling of cultural norms relating to the serving of large amounts of food at social events, including parties, weddings and funerals, as well as the expectation that all guests should partake in enjoyment of the food served;
- Ensure appropriate support, encouragement and understanding from people who are important to the participant in terms of body shape and size expectations, dietary changes, increasing physical activity and avoidance of being judgemental, patronizing, cynical and obstructive.

Intervention delivery approach (F2-weight loss and FA 8-appropriateness of intervention)

- Emphasize appropriate matching between intervention facilitators and intervention participants, as well as respectful and constructive engagement between facilitators and participants (facilitator inputs were identified as important in the process);
- Consider the use of a group approach in some or other form as group weigh-in sessions were experienced to facilitate peer learning and weight loss by group participants and contributed to mutual motivation and goal setting;
- Emphasize appropriate matching between individual participants and recommended lifestyle changes for weight loss and management, even if a group approach is used;
- Emphasize that a weight loss diet does not need to be very restrictive in terms of food **choices** (“that everything was permissible in moderation”) and that social events, family eating habits etc. can be accommodated by planning ahead;

- **Ensure that the participants do not fall into the trap of considering the intervention as “just another diet and it is stuff I have been doing anyways” that will most probably not work;**
- Consider appropriate strategies to ensure early weight loss as this may contribute considerably to motivation to comply with and remain in the intervention;
- Provision of clear guidance on the various strategies included in the intervention for example in the form of an appropriate and user friendly weight loss manual as was used in this study;
- Facilitate involvement of people who are important to the participant to contribute to motivation, compliance, prevent drop-out and long-term maintenance of healthy lifestyle behaviours;
- Include practical activities such as supermarket visits, a more convenient intervention location and a monetary contribution paid by participants to enhance attendance of group sessions;
- Negotiate the most appropriate time and venue for intervention sessions with participants;
- Consideration of an entry and participation fee, as well as a compliance contract, possibly including a financial component, to facilitate commitment, compliance and remaining in the intervention.

CHAPTER 6

Conclusion and recommendation

6.1 INTRODUCTION

The 1998 SADHS indicated that urban black women had the highest prevalence of overweight/obesity across all population and gender groups, while central obesity was prevalent among 43.4% of the study sample (Puoane et al., 2002). The above trend was subsequently confirmed by 2003 SADHS [Department of Health (DoH) 2007], while the SANHANES-1 data showed that 24.9% of black women are overweight and that the prevalence of obesity has increased to 39.9% (Shisana et al., 2013). As obesity is associated with numerous NCDs (Lysen & Israel 2012; Swinburn et al., 2011; WHO 2011), it is therefore a matter of course that overweight/obesity and central obesity amongst urban black South African women needs to be addressed through targeted weight loss interventions.

However, as there is a serious paucity of published data and information on weight loss interventions targeting overweight/obesity in urban black South African women, the aim of this research was to investigate weight management-related focus areas in overweight/obese black (Zulu) women residing in an urban area in South Africa. This information is essential to advise the development of healthy weight loss interventions and appropriate messaging to promote weight loss and maintenance in black South African women.

In order to achieve the above aim, the researcher set out to answer the following research questions: (i) What is the weight status profile and associated factors of overweight/obese treatment-seeking black women; (ii) What is the outcome of a culturally sensitive healthy weight loss intervention in terms of weight loss, compliance (attendance of intervention sessions, lifestyle changes) and attrition in overweight/obese black women; and (iii) Which factors may explain the outcomes (weight loss, compliance and attrition) of the culturally sensitive healthy weight loss intervention in overweight/obese black women.

To guide the investigation of these research questions, the researcher first set out to identify weight management-related focus areas (FA) for overweight/obese black women from the literature. Ten succinct focus areas emerged and included the following: 1) treatment seeking behaviour; 2) weight loss success; 3) compliance to and attrition from a weight loss intervention; 4) cultural influences on body shape and size perception and satisfaction; 5) cultural influences on food choices and eating patterns; 6) cultural influences on physical activity; 7) environmental factors and social support; 8) appropriateness of the weight loss intervention for the target population; 9) dietary restraint, disinhibition, perceived hunger and bingeing and 10) psychological well-being (depression). Findings related to the three research questions were integrated to highlight pertinent insights gained in each

of the 10 weight management-related focus areas (FAs) in order to identify critical factors that need to be considered in the development and implementation of weight management initiatives that target black South African women.

The weight status profile and associated factors of overweight/obese, treatment-seeking black women that were recruited for the research at baseline (Chapter 3), indicated that subjects may have the necessary motivation to embark on a weight loss intervention due to their weight status and the fact that they had the intention of enrolling in a weight loss intervention (FA 1). In addition, they seemed to have a history of being overweight/obese and had an increased risk for MetS, although they may not have been aware of the latter (FA 1). The high prevalence of those who were somewhat/very dissatisfied with their weight, stomach and thigh areas, as well as those who feared the prospect of weight gain, could have also contributed to their motivation to lose weight (FAs 1 and 4). Motivation may also have been strengthened by the negative social experience(s) they had as a result of their weight status, and may reflect changes in social/cultural views of overweight/obese black women (FA 7). Potential promoters for weight loss success included reasonable weight loss goals (FA 1), the fact that the majority co-habitated either with a partner or family who may provide a supportive environment (FA 7), as well as their low levels of disinhibition and perceived hunger (FA 9) and general psychological well-being (FA 10).

Potential barriers to enrolment, compliance with and remaining in a healthy weight loss intervention included the age of the group (relatively young at 31) (FA 1); having a history of prior, seemingly unsuccessful weight loss attempts (FA 2); an age of 24 at first diet attempt (despite indications of being overweight/obese during childhood and adolescence) (FA 2); the presence of a distorted body image, with underestimation of body weight being the norm (FA 4); low levels of physical activity in the form of sport and during leisure time, which may be linked to cultural perceptions and/or environmental factors (FA 5 and FA 7); and very frequent consumption of high fat foods (including meat) and energy dense snacks, insufficient fiber intake and increased energy intake over weekends, which may be linked to actual food preferences, cultural eating habits, social/family events and environmental factors such as availability and affordability of poor food choices (FA 6 and FA 7). Although eating behaviour indicators seemed to be positive in this treatment-seeking group, these may have changed during the intervention, bearing in mind the culture of socialising (with eating as a core feature) and exposure to poor food choices (FA 7 and FA 9). Finally, the presence of low-self-esteem, but especially depression found in our sample may be viewed as barriers to successful engagement with a weight loss intervention (FA 10).

Although the small sample size that completed the intervention was a key limitation in determining the effectiveness of the 16 week intervention that involved bi-weekly group sessions, in terms of weight loss per se, the results provided important insights in the 10 identified weight management areas

(Chapter 4). Despite the apparent readiness of participants to lose weight and the apparent appropriateness of the intervention (FA 8), attrition (FA 3) was very high, reflecting local and international experiences in this regard. The only characteristics that distinguished completers from drop-outs were being older (a positive characteristic) and having a prior history of seemingly unsuccessful weight loss attempts (a negative characteristic) at baseline (FA 1).

Completion of the intervention did not result in successful weight loss (FA 2), also reflecting international experiences in this regard. Poor weight loss outcomes were evident despite (i) the intensity of the programme and indications that it was appropriate (FA 7 and FA 8) in terms of the delivery approach (group and work based), intervention facilitators (similar socio-demographic profile) and creation of a secure, motivational and supportive environment, as well as the lifestyle manual used (FA 5 and FA 6); (ii) the improvement in eating behaviours (cognitive restraint, disinhibition and perceived hunger) (FA 9); and (iii) the increase in leisure time physical activity (not sport, possibility because sport during leisure time may be viewed as inappropriate) (FA 6). Contrary to expectations, indicators of psychological well-being and self-esteem did not change (deteriorate) as could be expected in a scenario where weight loss was not successful (FA 10).

The pertinent question, namely whether the outcomes of the weight loss intervention (no significant weight loss and very high attrition) can be explained by cultural influences on beauty ideals, eating habits and views on the importance of physical activity, as well as other potential influences were further investigated using qualitative research methods (Chapter 5). These investigations focused on factors that may promote successful weight loss on the one hand, and those that may act as barriers to successful weight loss and maintenance on the other, providing insights in the elusive aspects that need to be considered in the development and implementation of weight loss interventions targeting black (Zulu) South African women.

Insights gained from the qualitative investigations in the treatment seeking (FA 1), weight loss (FA 2), attrition and compliance (FA 3) and appropriateness of the intervention (FA 8) focus areas show that prospective participants had no or a limited idea of what the intervention entailed when they enquired about it, as well as on enrolment into the intervention; financial constraints may have reduced accessibility to the intervention; so also actual or perceived time constraints to attend intervention sessions and implement the dietary and physical activity recommendations; timing and location of intervention sessions were not necessarily convenient; work commitments and family responsibilities were barriers in terms of the attendance of sessions, as well as following the recommended intervention components such as dietary aspects and physical activity; insufficient/no support/patronizing attitude from people who are important to the participant such as family, friends and peers, although positive experiences regarding such support may have barriers; effort required to increase physical activity was too much, while a lack of understanding regarding what was meant

with an increase in physical activity and not complying with this recommendation may have been a problem; and loss of initial excitement regarding participation in the intervention and the potential for weight loss; unrealistic weight loss expectations; lack of intervention success (weight loss) and reaching a weight loss plateau; having to change meal patterns, eating habits and family eating habits; becoming tired of portion control; food cravings, thus being tempted by unsuitable food choices, being too hungry and lack of self-discipline and commitment may all have contributed to attrition. The group based sessions and printed weight management manual were viewed very positively and may have contributed to retention in the programme and weight loss in some subjects.

More specific insights gained in cultural influences (FA 4: body image, FA 5: dietary intake, FA 6: physical activity), social influences (FA 7) and attrition/compliance (FA 3) include the perception that cultural norms and values were partially responsible for subject drop-out; the role food plays at social events, especially over weekends when events such as parties, weddings and funerals seems to be a strong barrier and may be used by subjects as an excuse for not adhering to the intervention and then, very importantly the cultural beauty norm of a more curvaceous, larger female form in the overweight/obese range (BMI of between 27,7 and 39, 5kg/m²).

Eating behaviour (FA 9) and psychological well-being (depression) (FA 10) related findings point to stress-related eating that may interfere with eating habits; the perception that weight loss reflects having HIV (stigma); and disinhibition as a result of the role that food plays at social events, especially over weekends and at events such as parties, weddings and funerals, may be barriers to consider.

6.2 RECOMMENDATIONS FOR THE DEVELOPMENT AND IMPLEMENTATION OF FUTURE WEIGHT LOSS INTERVENTIONS

Based on an integration of the results of and insights gained in the 10 weight management-related focus areas and expert insights of the researcher, the following recommendations are made to advise the development of healthy weight loss interventions and appropriate messaging to promote weight loss and maintenance in black South African women.

6.2.1 Focus area 1: Treatment seeking behaviour

When recruiting black women for a weight loss intervention, ensure that prospective participants have a clear understanding of what the intervention entails, even if recruitment takes place via newspaper advertisements and e-mails. In addition, ensure that treatment-seeking black overweight/obese women perceive/understand/acknowledge that healthy weight loss interventions that are culturally sensitive have the potential to increase relevant knowledge and behaviour change that could translate

into a healthy lifestyle (healthy eating habits and increased levels of physical activity) and as a result, achieving weight loss and maintenance goals, emotional wellbeing, good self-esteem and decreased risk for NCDs.

6.2.2 Focus area 2: Weight loss success

Consider appropriate strategies to ensure early weight loss, as this may contribute significantly to participant motivation to comply with and remain in the intervention, as well as the initial sense of excitement regarding the prospect of weight loss that some may experience on enrolment into a weight loss intervention. It is also important that participants have a clear understanding of what realistic weight loss goals are, that weight should be lost gradually and that the emphasis should rather be on striving for a healthier weight as opposed to unrealistic weight loss goals for purely aesthetic reasons. This could translate into modest losses of 5 to 10% of body weight with the emphasis on sustaining this weight loss.

6.2.3 Focus area 3: Compliance to and attrition from weight loss intervention

Emphasize that a weight loss diet does not need to be very restrictive in terms of food choices i.e. that everything is permissible in moderation and that social events, family eating habits etc. can be accommodated by planning ahead.

Include practical activities such as supermarket visits, cooking demonstrations, the exchange of recipes and using participant recipes as examples to demonstrate how they could be adapted to reduce the energy density and enhance the nutrient content.

Provide clarity on and insights into the various forms of physical activity, the role of physical activity in weight loss, maintenance and health, as well as how to increase different types of physical activity in such a way that compliance is feasible and enjoyable. In order to motivate subjects to exercise regularly, a form of exercise that is agreeable to the majority of the intervention group, e.g. dancing or aerobics should form part of each group session. The latter may also address concerns about neighbourhood safety when exercising or that the neighbourhood is not conducive to exercise.

Participants should be involved in negotiating a more convenient intervention location as well as a suitable time for group sessions. Venues for group sessions could include church halls, school halls or community centres as these might be in closer proximity to the **participant's neighbourhood**. The latter could curb time and expense related to travelling.

Consideration could be given to the payment of a monetary contribution on enrolment as it may enhance intervention commitment and therefore the attendance of group sessions and remaining in the intervention. Other aspects that could curb attrition could be a compliance contract.

Facilitate the involvement of people who are important to the participant to ensure that they contribute to participant motivation, compliance, prevention of drop-out and long-term maintenance of healthy lifestyle behaviours.

6.2.4 Focus area 4: Cultural influences on body shape and size perception and satisfaction

Conduct public health campaigns by means of Social Marketing strategies among members of the target community in order to create public awareness of the health risks associated with overweight/obesity, even though it is not frowned upon from a cultural perspective. In addition, mass media could be used to dispel the myth and stigma associated with weight loss being an indicator of poor health, an HIV positive status or relationship problems. Should the most affected groups require direct targeting, i.e. women with obesity class II and III who have the greatest risk for developing NCDs but have never attempted weight loss, they should be the focus of educational campaigns, weight loss interventions or "weight neutral outcomes" described by Bacon and Aphramor (2011) where the focus is on cultivating a healthier lifestyle that can result in a lower NCD risk, but not necessarily weight loss.

6.2.5 Focus area 5: Cultural influences on food choices and eating patterns

Educate participants on the energy density of food items consumed as a result of urbanisation and acculturation, especially fast foods, fatty meat, energy dense drinks and snacks. In addition, creation of awareness that the type of foods and portion sizes of the foods served at social events such as parties, weddings and funerals can contribute to weight gain and sabotage weight loss efforts by acting as diinhibitors, in the target community is important.

6.2.6 Focus area 6: Cultural influences on physical activity

Raising an awareness of the importance of increased levels of physical activity for improved health and the promotion of weight loss, may moderate cultural norms that may not be conducive to increasing levels of physical activity. Guidelines on the level of physical activity required to enhance weight loss should be stipulated, as well as various forms of exercise that is not only enjoyable, but sustainable. These include dancing, actively playing with children or getting an exercise buddy for jogging, aerobics or going to the gym.

6.2.7 Focus area 7: Environmental factors and social support

Consider of a group approach for weight loss interventions in overweight/obese black women, as group weigh-in sessions and the peer support associated with it can enhance compliance, weight loss and curb attrition. The role that intervention facilitators play as a source of social support and motivation should not be overlooked. Facilitate the involvement of people who are important to the participant such as family, friends and peers as they can also serve as an important source of social support. Place emphasis on the value of social support outside the formal intervention environment, as participants may not be aware of the importance of having support in this sphere. Involve participants in identifying environmental factors that serve as barriers to weight loss and assist them with the necessary knowledge and skills to overcome the obesogenic environment they may find themselves in, as this too may prove to be effective in facilitating compliance with all components of the weight loss intervention.

6.2.8 Focus area 8: Appropriateness of the weight loss intervention for the target population

Involve the target population/prospective participants in intervention development such as decisions regarding a suitable venue, barriers to weight loss foreseen and e.g. the types of physical activity that will be more likely to be adhered to once the intervention is implemented. Other aspects that need to be considered are matching of intervention facilitators and intervention participants in terms of race and ethnicity, as it is likely to enhance respectful and constructive engagement between facilitators and participants. As mentioned above, consider the use of a group approach in some or other form as group sessions were viewed as facilitating peer learning and weight loss by group participants and contributed to mutual motivation. Ensure appropriate matching between individual participants and recommended lifestyle changes for weight loss and management, even if a group approach is used. This includes financial constraints that may hamper the attendance of the intervention, as well as access and affordability of food recommended as part of the intervention. Provide clear guidance on the various strategies included in the intervention, for example in the form of an appropriate and user friendly weight loss manual as was used in this study.

6.2.9 Focus area 9: Dietary restraint, disinhibition, perceived hunger and bingeing

Include coverage of cognitive behavioural skills as part of the intervention to give participants the necessary knowledge and skills to identify stress-related eating, factors that may trigger binge eating as well as the ability to differentiate between hunger and perceived hunger. The identification of disinhibitors is an especially important skill that participants need to acquire, as these stimuli, such as exposure to large amounts of unhealthy foods at social events, can sabotage weight loss efforts.

6.2.10 Focus area 10: Psychological wellbeing (depression)

Consider pre-screening of subjects to detect the presence of depression as the presence of psychopathology could serve as a barrier to healthy eating habits and weight loss. Should depression be present among prospective participants, they could benefit from a multidisciplinary approach to weight loss that includes a psychologist.

6.3 STUDY LIMITATIONS

The researcher embarked on this research to investigate weight management related focus areas in overweight/obese black women to gain insights in barriers and promoters for successful weight loss and maintenance. For these purposes, it was deemed necessary to follow up a group of women from the point of treatment-seeking to drop-out from or success with the intervention they chose to enroll in. A limitation that became evident, but was expected, was the high attrition rate from the intervention. As a result, the statistical power to investigate the null hypothesis of no significant weight loss on the healthy, culturally sensitive weight loss intervention in our study was very low. However, the fact that the actual outcome of the intervention, namely no weight loss, is in line with expectations based on weight loss trends documented for African-American women, supports the possibility that the intervention outcome found for the 20 completers may be true. It must further be borne in mind that the expected high drop-out provided the opportunity to conduct in depth investigations into the phenomenon of attrition, which is one of the most prominent weight management-related focus areas that emerged from the literature.

As the study sample comprised of volunteers from the target population (overweight/obese black Zulu women), results cannot be generalized to all overweight/obese black South African women. However, as this is the first research of its kind conducted within the South African context, insights gained and recommendations made may be of value for the National Obesity Prevention Strategy Task team in the development of the strategy, as well as weight management intervention developers as such.

6.4 RECOMMENDATIONS FOR FUTURE RESEARCH

Future research should focus on development and testing of public awareness campaigns to inform and educate the public on the various factors identified in this research that are essential in the creation of a supportive environment for those attempting weight loss. At the same time, awareness campaigns to ensure appropriate understanding of overweight/obese black women of the need to, and opportunities for weight loss in a manner that accommodates cultural nuances, should be developed and tested. Once these campaigns have been rolled out, weight loss/management interventions that address the recommendations of this research regarding specific aspects that need to be considered

for the target population should be developed, implemented and assessed. Development and testing of more generic obesity prevention messages based on the insights gained in this research, for possible inclusion in the National Obesity Prevention Strategy, should also be considered.

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ADDENDA

ADDENDUM A: Newspaper advertisement used to recruit participants

Weight Reduction Program
Invitation to participate in a research project: UCT and UKZN
<p>This research aims to investigate the association between genes and weight reduction success. To do this according to international standards, we have to ensure that we select subjects who most probably have similar genes. As a result subjects with a Zulu family history on both the mother and father's side are targeted as well as subjects with a European family (white) history on both sides. Investigating these groups separately and then comparing them will help us to develop more specific guidelines for the treatment of obesity among South Africans in general. Subjects with a Zulu family history will be recruited in and around Durban and Pietermaritzburg from the Zulu speaking population, and those with a European background will be recruited in and around Cape Town. This study has been ethically approved by the Human Ethics Committee of the Universities of Cape Town and Stellenbosch.</p>
This ad relates to the KZN part of the research
<p>Participants from Durban, Pietermaritzburg and surrounding areas with a Zulu family history on both the mother and father's side will be required to:</p> <ul style="list-style-type: none">• Attend a recruitment interview• Be very overweight/obese and non-diabetic• Be male or female, aged 23 – 40 years• Be very motivated to lose weight• Complete questionnaires that will take about 30-45 minutes on entry into the programme• Provide a small amount of blood for tests on entry into the programme• Follow the prescribed 4 month weight loss program that includes diet, exercise, and behavioural components;• Attend group sessions every 2 weeks for 4 months• Provide their own transport to and from the research centres where the programme is offered <p>Participant benefits:</p> <ul style="list-style-type: none">• Possible weight loss, a published weight management manual, participation in a programme run by registered dietitians and exercise educationalists free of charge
Phone Pride at 072 845 7298 or email her at kassiers@ukzn.ac.za

ADDENDUM B: Informed Consent Form

PARTICIPANT INFORMATION AND INFORMED CONSENT FORM FOR RESEARCH INVOLVING GENETIC STUDY

TITLE OF RESEARCH PROJECT: Association between conventional (dietary, physical activity and behavioural) treatment outcome (weight loss) in overweight/obese Zulu adults and genotype: An exploratory study.

REFERENCE NUMBER: UCT- 464/2006; US – N05/08/141

PRINCIPAL INVESTIGATOR: Ms Suna Kassier
ADDRESS: Dietetics and Human Nutrition
School of Agricultural, Earth and Environmental
Sciences
College of Agriculture, Engineering and Science
University of KwaZulu-Natal

CONTACT DEATAILS: Phone - (033) 260 5431
Cell – 083 6588 349
Email: kassiers@ukzn.ac.za

I would like to invite you to participate in a research study that involves DNA (genetic) analysis and possible long-term storage of blood specimens. Please take some time to read the information presented here which will explain the details of this project. Please ask myself or the study staff any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied and that you clearly understand what this research entails and how you could be involved. Also, your participation is entirely voluntary and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part initially.

This research study has been approved by the ethics Committee for Human Research at the University of Cape Town (UCT) and the Committee for Human Research at the University of Stellenbosch (US) and it will be conducted according to international and locally accepted ethical guidelines for research, namely the Declaration of Helsinki, Guidelines on Ethics for Medical and Genetic Research of the Medical Research Council of South Africa (MRC). If you have any complaints or concerns about your rights and welfare as a research participant, please contact Professor Marc Blockman, Chairperson of the Human Research Ethics Committee in the Faculty of Health Sciences at the University of Cape Town (021 4066496).

What is DNA Analysis or Genetic research?

Genetic material, also called DNA, is usually obtained from a small blood sample. Occasionally other tissues may be used. DNA consists of numerous genes, strung together in long strands and found in every cell in the human body. Research involving our genotype may provide us with new information that may benefit people who suffer from particular diseases or conditions and this may also be of great benefit to future generations.

What does this particular research study involve?

The aim of this research is to look at the success (=weight loss) of treatment of overweight adults with a conventional weight reduction program (including dietary, physical activity and behavioural components) and their genotype (the genes you inherited from your parents). I also want to identify appropriate predictors of long-term success of such conventional treatment. This will help to improve the matching of patients with treatment and possibly success with treatment. As part of this project genetic material (blood) will be collected and analysed for the presence of certain genetic alterations that have previously been studied in overweight adults. These genetic alterations are most probably not associated with any negative effect(s) when present on their own, which means that they will only have an effect when combined with other genetic alterations and/or specific lifestyle patterns.

Why have you been invited to participate?

You fit the criteria for this study and were therefore invited to participate.

What procedures will be involved in this research?

You will be requested to:

- **Provide information about your medical history, weight history, family's weight history, eating behaviour, dietary intake, physical activity, mental health and brief socio-demographic information** by completing questionnaires, which will take 30-45 minutes to complete;
- Keep record of everything that you eat and drink for 3 days (2 week days and one weekend day) on dietary record forms that will be provided to you (at the beginning of the project);
- Keep a simple daily record (tick off activities as you did it) of your physical activity and eating habits for a four month (16 week) period;
- Give consent for the drawing of blood (15ml, about 3 teaspoonfuls) for the determination of a fasting (after 12-14 hours fast) blood HDL, triglyceride and glucose levels and for DNA-analysis;
- Be available for the assessment of the following anthropometric measurements: weight, height, waist circumference and hip circumference;
- Have your blood pressure monitored on entrance into the study and after four months (16 weeks);
- Place a piece of blotting paper (3 cm diameter), which is saturated with a chemical compound that can have a bitter taste for some, on your tongue so that your taste sensitivity can be tested;
- Follow an individualized weight loss program, including a group session every two weeks for a period of four months (16 weeks) that will include dietary, exercise, behavioural and cognitive restructuring components;
- Be available to be weighed 2 months after completion of the programme (24 weeks after you entered the study).

Are there any risks involved in genetic research?

- You may experience minor pain or bruising at the site where blood is taken;
- You may feel some discomfort when tasting the piece of paper, which is saturated with a harmless chemical compound that may taste bitter for some people;
- You may feel very slight discomfort during the assessment of the anthropometric measurements;
- Some insurance companies may mistakenly assume that taking part in genetic research indicates a higher risk for disease. Thus no information about you or your family will be shared with such companies;

Are there any benefits to your taking part in this study and will you get told your results?

You will gain scientific knowledge about weight management, you will receive a published weight management manual and will lose weight if you follow the program. After all the results of all the

tests from all the study participants are known, a study conclusion written in layman terms will be provided to you.

How long will your blood be stored and where will it be stored?

Your blood will be stored for a period of 5 years at the Department of Human Biology, University of Cape Town.

If your blood is to be stored is there a chance that it will be used for other research?

Your blood and DNA will only be used for genetic research that is directly related to the treatment of overweight or obesity. Also if the researchers wish to use your stored blood for additional research in this field they will be required to apply for permission to do so from the Human Research Ethics Committee at the University of Cape Town.

If you do not wish your blood specimen to be stored after this research study is completed you will have an opportunity to request that it be discarded when you sign the consent form.

How will your confidentiality be protected?

Your identity will be kept confidential throughout and information will not be associated with your name. The research staff will use only a coded number, access will be limited to authorized scientists and any scientific publications, lectures or reports resulting from the study will not identify you by name.

Will you or the researchers benefit financially from this research?

You will not be paid to take part in this study and will not be compensated for travelling costs to attend the initial assessments and group sessions every two weeks .

In the unlikely event that the research leads to the development of a commercial application or patent you or your family will not receive any profits or royalties. However profits will be reinvested to support the cause of further research, which may bring benefits to your family or community in the future.

Declaration by participant

By signing below, I agree to take part in a genetic research study entitled: Association between conventional (dietary, physical activity and behavioural) treatment outcome (weight loss) in overweight/obese Zulu adults and genotype: An exploratory study.

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable. I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is voluntary and I have not been pressurised to take part.

I agree that my blood or tissue sample can be stored, but I can choose to request at any time that my stored sample be destroyed. I have the right to receive confirmation that my request has been carried out.

OR

Please destroy my blood sample as soon as the current research project has been completed. (Tick the option you choose)

Signed at (place) on (date) 2008.

.....
Signature of participant

.....
Signature of witness

Declaration by investigator/field worker

I (name) declare that:

- I explained the information in this document to
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research as discussed above.

Signature of investigator Signature of witness.....

ADDENDUM C: Main survey questionnaire

Sociodemographic & weight questionnaire

Date

		/			/	2	0	0	7
<i>d</i>	<i>d</i>		<i>m</i>	<i>m</i>		<i>y</i>	<i>y</i>	<i>y</i>	<i>y</i>

Code

--	--	--	--

Name & Surname

.....

- | | | | |
|----|--------|-----------|--------------------------|
| 1. | Gender | 1. Male | <input type="checkbox"/> |
| | | 2. Female | <input type="checkbox"/> |

- | | | | |
|----|----------------|--------------------|--------------------------|
| 2. | Marital status | 1. Unmarried | <input type="checkbox"/> |
| | | 2. Married | <input type="checkbox"/> |
| | | 3. Divorced | <input type="checkbox"/> |
| | | 4. Separated | <input type="checkbox"/> |
| | | 5. Widowed | <input type="checkbox"/> |
| | | 6. Living together | <input type="checkbox"/> |

- | | | | |
|----|---------------|---------------------|--------------------------|
| 3. | Home language | 1. Afrikaans | <input type="checkbox"/> |
| | | 2. English | <input type="checkbox"/> |
| | | 3. Zulu | <input type="checkbox"/> |
| | | 4. Other, specify : | <input type="checkbox"/> |

.....

- | | | | |
|----|--------------------------------------|---------------------------------|--------------------------|
| 4. | Highest level of education completed | 1. Matric | <input type="checkbox"/> |
| | | 2. College certificate/ diploma | <input type="checkbox"/> |
| | | 3. Technikon diploma/ degree | <input type="checkbox"/> |
| | | 4. University degree | <input type="checkbox"/> |
| | | 5. Other, specify : | <input type="checkbox"/> |

.....

- | | | | |
|----|-------------|--|--------------------------|
| 5. | Do you live | 1. alone | <input type="checkbox"/> |
| | | 2. with friends | <input type="checkbox"/> |
| | | 3. with your husband/ wife/ partner | <input type="checkbox"/> |
| | | 4. with your husband/ wife/ partner and children | <input type="checkbox"/> |
| | | 5. With your parents | <input type="checkbox"/> |
| | | 6. Other, please specify: | <input type="checkbox"/> |

.....

- | | | | |
|----|--|----------------------------------|--------------------------|
| 6. | In which of the following areas do you stay? | 1. Central Pietermaritzburg..... | <input type="checkbox"/> |
| | | 2. Hilton | <input type="checkbox"/> |
| | | 3. Central Durban | <input type="checkbox"/> |
| | | 4. Durban South | <input type="checkbox"/> |

- 5. Durban North
- 6. South Coast
- 7. Highway Area
- 8. Other, please specify

.....

7. Do you smoke cigarettes 1. Yes
2. No

If YES, please continue with question 9

If NO, please continue with question 10

8. If yes, how many cigarettes do you smoke per day/ week/ month

- | | | Yes | No |
|--|-----------------------------|--------------------------|--------------------------|
| 9. Do you suffer from any of the following conditions? | 9.1. Heart disease | <input type="checkbox"/> | <input type="checkbox"/> |
| | 9.2. Diabetes Mellitus | <input type="checkbox"/> | <input type="checkbox"/> |
| | 9.3. High blood pressure | <input type="checkbox"/> | <input type="checkbox"/> |
| | 9.4. High blood cholesterol | <input type="checkbox"/> | <input type="checkbox"/> |
| | 9.5. Arthritis | <input type="checkbox"/> | <input type="checkbox"/> |
| | 9.6. Any other, please name | <input type="checkbox"/> | <input type="checkbox"/> |

.....

10. Write down the medications, supplements, vitamins, minerals that you are currently using.

.....

11. Are you currently seeing a psychologist for any problems? 1. Yes
2. No

12. What is the most that you have ever weighed (excluding during pregnancy)/ largest dress sizesize/kg
 you have ever had?

13. How long did you stay at the above (maximum) weight? 1. <1 month
2. 1-6 months
3. >6 months
4. don't know

14. How old were you when you were at this maximum weight?years

15. After the age of 20 years what was the minimum weight that you ever weighed/dress size/kg

dress size you had?

Don't know

16. How long did you maintain this minimum weight?

- 1. <1 month
- 2. 1-6 months
- 3. >6 months
- 4. don't know

17. After the age of 20 years what was the weight that you were able to retain for the longest period of time

.....kg

Don't know

18. How long was this period?

- 1. <6 months
- 2. 6-12 months
- 3. 1-2 years
- 4. 2-5 years
- 5. >5 years
- 6. Never maintained a stable weight
- 7. Don't know

19. Would you describe your weight during most of your childhood years (ages 2 to 10) as:

- 1. Underweight
- 2. Normal weight
- 3. Overweight
- 4. Obese
- 5. Just right

20. Would you describe your weight during most of your adolescent years (ages 11 to 19) as:

- 1. Underweight
- 2. Normal weight
- 3. Overweight
- 4. Obese
- 5. Just right

21. When you were between the ages of 20 to 25 years would you describe your weight as:

- 1. Underweight
- 2. Normal weight
- 3. Overweight
- 4. Obese
- 5. Not applicable
- 6. Just right

22. When you were between the ages of 25 to 30 years would you describe your weight as:

- 1. Underweight
- 2. Normal weight
- 3. Overweight
- 4. Obese
- 5. Not applicable
- 6. Just right

23. When you were between the ages of 30 to 35 years would you describe your weight as:

- 1. Underweight
- 2. Normal weight
- 3. Overweight
- 4. Obese
- 5. Not applicable
- 6. Just right

24. When you were an adolescent, in comparison with your friends did you always weigh

- 1. More than them
- 2. The same as them

- 3. Less than them
- 4. Don't know
- 5. Just right

25. Would you classify these friends as
- 1. Underweight
 - 2. Normal weight
 - 3. Overweight
 - 4. Obese
 - 5. Just right

26. Would you consider your mother for most of your adolescent years to be:
- 1. Underweight
 - 2. Normal weight
 - 3. Overweight
 - 4. Obese
 - 5. Did not know her
 - 6. Just right

27. Would you consider your father for most of your adolescent years to be:
- 1. Underweight
 - 2. Normal weight
 - 3. Overweight
 - 4. Obese
 - 5. Did not know him
 - 6. Just right

28. How would you describe the weight of your biological parents at present
- 28.1 Your father is/was
- 1. Underweight
 - 2. Normal weight
 - 3. Overweight
 - 4. Obese
 - 5. Did not know him
 - 6. Just right

- 28.2 Your mother is/was
- 1. Underweight
 - 2. Normal weight
 - 3. Overweight
 - 4. Obese
 - 5. Did not know her
 - 6. Just right

29. How many biological children do you have?children

30. Would you describe your current weight as:
- 1. Underweight
 - 2. Normal weight
 - 3. Overweight
 - 4. Obese
 - 5. Just right

31. How satisfied are you with your current weight
- 1. Very much dissatisfied
 - 2. Somewhat dissatisfied
 - 3. Completely satisfied

32. How afraid are you of becoming fat OR gaining weight
- 1. Very much afraid
 - 2. Somewhat afraid
 - 3. Not afraid at all

33. Has anyone ever made a negative comment about your weight? 1. Yes
2. No
Not that I am aware of

34. What do you think about your height 1. definitely too short
2. maybe too short
3. about the right height
4. maybe too tall
5. definitely too tall

35. How often do you weigh yourself 1. at least once a day
2. 1-2 times a week
3. 3-6 times a week
4. 1-3 times a month
5. a few times per year
6. rarely, if ever

36. Which of the following describes you the best at this moment? 1. I am completely satisfied with my present weight
2. I would like to gain some weight
3. I would like to lose 1-5 kg
4. I would like to lose 6-10 kg
5. I would like to lose 11-15 kg
6. I would like to lose 16-20 kg
7. I would like to lose >20 kg

37. Are you critical about overweight people 1. always
2. often
3. sometimes
4. rarely/ never

		Yes	No
38. Which of the following do you think initiated/ contributed to your weight gain and becoming overweight	41.1. The year after leaving school	<input type="checkbox"/>	<input type="checkbox"/>
	41.2. After a pregnancy	<input type="checkbox"/>	<input type="checkbox"/>
	41.3. After getting married	<input type="checkbox"/>	<input type="checkbox"/>
	41.4. After a tragedy e.g. death, divorce, job	<input type="checkbox"/>	<input type="checkbox"/>
	41.5. Always weigh too much	<input type="checkbox"/>	<input type="checkbox"/>
	41.6. Never had a problem with my weight	<input type="checkbox"/>	<input type="checkbox"/>
	41.7. Other, specify	<input type="checkbox"/>	<input type="checkbox"/>

.....

		Yes	No
39. Are you dissatisfied with the sizes and/or shapes of the following body parts?	42.1. Arms	<input type="checkbox"/>	<input type="checkbox"/>
	42.2. Stomach	<input type="checkbox"/>	<input type="checkbox"/>
	42.3. Waist	<input type="checkbox"/>	<input type="checkbox"/>
	42.4. Hips	<input type="checkbox"/>	<input type="checkbox"/>
	42.5. Buttocks	<input type="checkbox"/>	<input type="checkbox"/>
	42.6. Thighs	<input type="checkbox"/>	<input type="checkbox"/>
	42.7. Calves	<input type="checkbox"/>	<input type="checkbox"/>

40. Have you tried to lose weight previously 1. Yes
2. No

41. How old were you when you went on your first weight loss diet? 1.years 2. Did not diet previously

42. What is the maximum length of time that you have been on a weight loss diet continuously 1. <2 weeks
 2. 2-4 weeks
 3. 1 month
 4. 2-6 months
 5. >6 months
 6. never diet before

43. What is the most weight you have ever lost on a diet? 1.kg 2. Did not diet previously

44. For your **MOST** successful weight loss diet did you 1. keep the weight off for at least 1 year
 2. gain some of it before a year passed
 3. gain all of it before a year passed
 4. I have never lost weight on a diet
 5. Not applicable

		Yes	No
45. Indicate which of the following methods you used to lose weight in the past, even if you used it only once or very briefly.	48.1. Balanced slimming diet	<input type="checkbox"/>	<input type="checkbox"/>
	48.2. Moderate calorie restriction	<input type="checkbox"/>	<input type="checkbox"/>
	48.3. Increase in physical activity	<input type="checkbox"/>	<input type="checkbox"/>
	48.4. Skip one or more meals	<input type="checkbox"/>	<input type="checkbox"/>
	48.5. Eat less or nothing between meals	<input type="checkbox"/>	<input type="checkbox"/>
	48.6. Fasting/ starvation (one or more days)	<input type="checkbox"/>	<input type="checkbox"/>
	48.7. Weigh-less	<input type="checkbox"/>	<input type="checkbox"/>
	48.8. Weight watchers	<input type="checkbox"/>	<input type="checkbox"/>
	48.9. Low carbohydrate and high protein diet e.g Dr Atkin's, The Zone diet, Sugar busters, The Pharmacy diet etc.	<input type="checkbox"/>	<input type="checkbox"/>
	48.10. Fast diets e.g. lose >2kg in 3 days.	<input type="checkbox"/>	<input type="checkbox"/>
	48.11. Diuretics (e.g. Lasix)	<input type="checkbox"/>	<input type="checkbox"/>
	48.12. Appetite suppressants	<input type="checkbox"/>	<input type="checkbox"/>
	48.13. Laxatives	<input type="checkbox"/>	<input type="checkbox"/>
	48.14. Vomiting	<input type="checkbox"/>	<input type="checkbox"/>
	48.15. Diet formulas, milkshakes, powders e.g. Herbalife	<input type="checkbox"/>	<input type="checkbox"/>
	48.16. Herb mixtures/traditional medicine	<input type="checkbox"/>	<input type="checkbox"/>
	48.17. Machines/apparatus which break down fat.	<input type="checkbox"/>	<input type="checkbox"/>
	48.18. Injections which help break down fat.	<input type="checkbox"/>	<input type="checkbox"/>
	48.19. Surgery	<input type="checkbox"/>	<input type="checkbox"/>
	48.20. Enema	<input type="checkbox"/>	<input type="checkbox"/>
	48.21. Detox (please specify)		
		
	48.22. Other (please specify)		
.....			

46. With which **ONE** of the above methods were you most

successful?

47. What would you like your current weight to be? kg

Weight loss programme questionnaires

1. Write down the medications, supplements, vitamins, minerals that you use currently.

.....

2. Which of the following describes you the best at this moment?

- 8. I am completely satisfied with my present weight
- 9. I would like to gain some weight
- 10. I would like to lose 1-5 kg
- 11. I would like to lose 6-10 kg
- 12. I would like to lose 11-15 kg
- 13. I would like to lose 16-20 kg
- 14. I would like to lose >20 kg

3. Do you think the content of and discussions in the group sessions were applicable and helpful for you to lose weight ...

3.1 Yes 3.2 No ; Please write any suggestions or comments:

.....

.....

4. Do you think the format and style of the group sessions were acceptable and applicable for you to lose weight

..... 4.1 Yes 4.2 No ; Please write any suggestions or comments:

.....

.....

5. Do you think the group sessions are necessary and helpful for you to lose

weight..... 5.1 Yes 5.2 No ; Please write any suggestions or comments:

.....

.....

6. Make a cross on the line with a scale of 0 to 10 to indicate how much of the book, "Love my body, love myself" did you read



7. Do you think the content of the book "Love my body, love myself" was applicable and helpful for you to lose weight

7.1 Yes 7.2 No ; Please write any suggestions or comments:

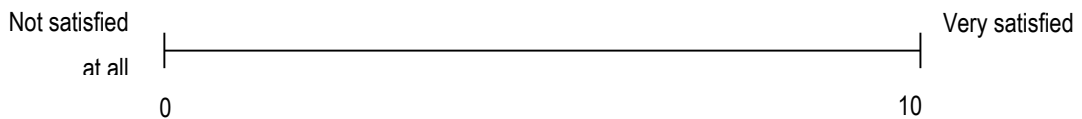
.....
.....

8. Were you satisfied with the weight loss programme and the services that we provided:8.1 Yes 8.2 No

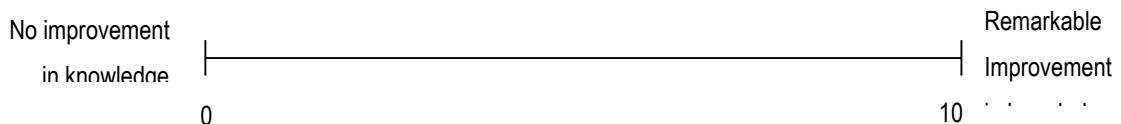
Please write any suggestions or comments:

.....
.....

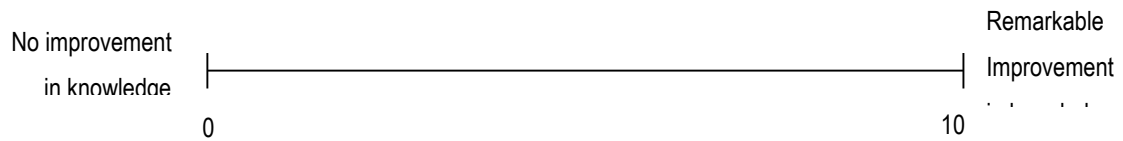
9. Make a cross on the line with a scale of 0 to 10 to indicate how satisfied you were with the weight loss programme in general.



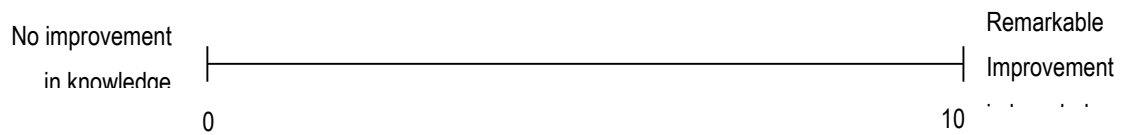
10. Make a cross on the line with a scale of 0 to 10 to indicate how much did this weight loss programme improved your knowledge of food, healthy eating for weight loss and portion sizes.



11. Make a cross on the line with a scale of 0 to 10 to indicate how much did this weight loss programme improved your knowledge of physical activity for weight loss.



12. Make a cross on the line with a scale of 0 to 10 to indicate how much did this weight loss programme improved your knowledge of the behavioural and psychological aspects that influence your weight and weight loss efforts.



Baecke Questionnaire of Habitual Physical Activity

Instructions

- Make a cross (X) in the block which best applies to each question
- Think of the past month when you complete this questionnaire.**
- Mark only one option per question and **please answer all the questions**

1. What is your main occupation?

2. At work I sit

- 1) never ; 2) seldom ; 3) sometimes ; 4) often ; 5) always

3. At work I stand

- 1) never ; 2) seldom ; 3) sometimes ; 4) often ; 5) always

4. At work I walk

- 1) never ; 2) seldom ; 3) sometimes ; 4) often ; 5) always
-

5. At work I lift heavy loads

- 1) never ; 2) seldom ; 3) sometimes ; 4) often ; 5) always
-

6. After working I am tired

- 1) very often ; 2) often ; 3) sometimes ; 4) seldom ; 5) never
-

7. At work I sweat

- 1) very often ; 2) often ; 3) sometimes ; 4) seldom ; 5) never
-

8. In comparison with others my own age I think my work is physically

- 1) much heavier ; 2) heavier ; 3) as heavy ; 4) lighter ; 5) much lighter
-

9. Do you play sport or do exercise?

- 1) Yes ; 2) No

If **Yes**, continue with question 9.1

If **No**, continue with question 10

9.1 If yes, which sport/ exercise do you play/ do most frequently?

9.2 How many hours a week do you play this sport or do this exercise?

- 1) <1 hour ; 2) 1-2 hours ; 3) 2-3 hours ; 4) 3-4 hours ; 5) >4 hours
-

9.3 How many months a year do you play this sport or do this exercise?

- 1) <1 month ; 2) 1-3 months ; 3) 4-6 months ; 4) 7-9 months ; 5) >9 months
-

If you play a second sport or do another type of exercise, please continue with question 9.4, if not, please continue with question 10.

9.4 Which sport/ exercise do you play/ do second most frequently?

9.5 How many hours a week do you play this sport or do this exercise?

1) <1 hour ; 2) 1-2 hours ; 3) 2-3 hours ; 4) 3-4 hours ; 5) >4 hours

9.6 How many months a year do you play this sport or do this exercise?

1) <1 month ; 2) 1-3 months ; 3) 4-6 months ; 4) 7-9 months ; 5) >9 months

10. In comparison with others my own age I think my physical activity during leisure time is

1) much more ; 2) more ; 3) the same ; 4) less ; 5) much less .

11. During leisure time I sweat

1) very often ; 2) often ; 3) sometimes ; 4) seldom ; 5) never

12. During leisure time I play sport

1) never ; 2) seldom ; 3) sometimes ; 4) often ; 5) very often

13. During leisure time I watch television

1) never ; 2) seldom ; 3) sometimes ; 4) often ; 5) very often

14. During leisure time I walk

1) never ; 2) seldom ; 3) sometimes ; 4) often ; 5) very often

15. During leisure time I cycle

1) never ; 2) seldom ; 3) sometimes ; 4) often ; 5) very often

16. How many minutes do you walk and/or cycle per day to and from work, school, and shopping?

- 1) <5 minutes ; 2) 5-15 min ; 3) 15-30 min ; 4) 30-45 min ; 5) >45 minutes

Beck Depression Inventory (BDI)

Instructions:

- This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite)

1. Sadness

- 0 I do not feel sad.
1 I feel sad much of the time.
2 I am sad all the time.
3 I am so sad or unhappy that I can't stand it.

2. Pessimism

- 0 I am not discouraged about my future.
1 I feel more discouraged about the future than I used to be.
2 I do not expect things to work out for me.
3 I feel my future is hopeless and will only get worse.

3. Past Failure

- 0 I do not feel like a failure.
1 I have failed more than I should have.
2 As I look back, I see a lot of failures.
3 I feel I am a total failure as a person.

6. Punishment Feelings

- 0 I don't feel I am being punished.
1 I feel I may be punished.
2 I expect to be punished.
3 I feel I am being punished.

7. Self-Dislike

- 0 I feel the same about myself as ever.
1 I have lost confidence in myself.
2 I am disappointed in myself.
3 I dislike myself.

8. Self-Criticalness

- 0 I don't criticize or blame myself more than usual.
1 I am more critical of myself than I used to be.
2 I criticize myself for all of my faults.
3 I blame myself for everything bad that happens.

4. Loss of Pleasure

- 0 I get as much pleasure as I ever did from the things I enjoy.
- 1 I don't enjoy things as much as I used to.
- 2 I get very little pleasure from the things I used to enjoy.
- 3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

- 0 I don't feel particularly guilty.
- 1 I feel guilty over many things I have done or should have done.
- 2 I feel quite guilty most of the time.
- 3 I feel guilty all of the time.

11. Agitation

- 0 I am no more restless or wound up than usual.
- 1 I feel more restless or wound up than usual.
- 2 I am so restless or agitated that it's hard to stay still.
- 3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of interest

- 0 I have not lost interest in other people or activities.
- 1 I am less interested in other people or things than before.
- 2 I have lost most of my interest in other people or things.
- 3 It's hard to get interested in anything.

9. Suicidal Thoughts or Wishes

- 0 I don't have any thoughts of killing myself.
- 1 I have thoughts of killing myself, but I would not carry them out.
- 2 I would like to kill myself.
- 3 I would kill myself if I had the chance.

10. Crying

- 0 I don't cry anymore than I used to.
- 1 I cry more than I used to.
- 2 I cry over every little thing.
- 3 I feel like crying, but I can't.

17. Irritability

- 0 I am no more irritable than usual.
- 1 I am more irritable than usual.
- 2 I am much more irritable than usual.
- 3 I am irritable all the time

18. Changes in Appetite

- 0 I have not experienced any change in my appetite.
- 1a My appetite is somewhat less than usual.
- 1b My appetite is somewhat greater than usual.
- 2a My appetite is much less than before.
- 2b My appetite is much greater than usual.
- 3a I have no appetite at all.
- 3b I crave food all the time.

13. Indecisiveness

- 0 I make decisions about as well as ever.
- 1 I find it more difficult to make decisions than usual.
- 2 I have much greater difficulty in making decisions than I used to.
- 3 I have trouble making any decisions

14. Worthlessness

- 0 I don't feel I am worthless.
- 2 I don't consider myself as worthwhile and useful as I used to.
- 3 I feel more worthless as compared to other people.
- 4 I feel utterly worthless.

15. Loss of Energy

- 0 I have as much energy as ever.
- 1 I have less energy than I used to have.
- 2 I don't have enough energy to do very much.
- 3 I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

- 0 I have not experienced any change in my sleeping pattern.
- 1a I sleep somewhat more than usual.
- 1b I sleep somewhat less than usual.
- 2a I sleep a lot more than usual.
- 2b I sleep a lot less than usual
- 3a I sleep most of the day
- 3b I wake up 1-2 hours early and can't get back to sleep.

19. Concentration Difficulty

- 0 I can concentrate as well as ever.
- 1 I can't concentrate as well as usual.
- 2 It's hard to keep my mind on anything for very long.
- 3 I find I can't concentrate on anything.

20. Tiredness or Fatigue

- 0 I am no more tired or fatigued than usual.
- 1 I get more tired or fatigued more easily than usual.
- 2 I am too tired or fatigued to do a lot of the things I used to do.
- 3 I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

- 0 I have not noticed any recent change in my interest in sex.
- 1 I am less interested in sex than I used to be.
- 2 I am much less interested in sex now.
- 3 I have lost interest in sex completely.

General Health Questionnaire (GHQ)

Instructions

- We would like to know how your general health has been over the **past few weeks**.
- Please answer **ALL** the questions by making a cross (X) in the column, which applies best to each question.
- Remember that we want to know about present and recent complaints, not those you had in the past.

HAVE YOU RECENTLY?

		Not at all	No more than usual	Rather more than usual	Much more than usual
1.	- been able to concentrate on whatever you're doing?				
2.	- lost much sleep over worry?				
3.	- been having restless, disturbed nights				
4.	- been managing to keep yourself busy and occupied				
5.	- been getting out of the house as much as usual				
6.	- been managing as well as most people would in your shoes?				
7.	- felt on the whole you were doing things well?				
8.	- been satisfied with the way you've carried out your task?				
9.	- been able to feel warmth and affection for those near to you?				
10.	- been finding it easy to get on with other people?				
11.	- spent much time chatting with people?				
12.	- felt that you are playing a useful part in things?				
13.	- felt capable of making decisions about things?				

HAVE YOU RECENTLY?

		Not at all	No more than usual	Rather more than usual	Much more than usual
14.	- felt constantly under strain?				
15.	- felt you couldn't overcome your difficulties?				
16.	- been finding life a struggle all the time?				
17.	- been able to enjoy your normal day-to-day activities				
18.	- been taking things hard?				
19.	- been getting scared or panicky for no good reason?				
20.	- been able to face up to your problems?				
21.	- found everything getting on top of you?				
22.	- been feeling unhappy and depressed?				
23.	- been losing confidence in yourself?				
24.	- been thinking of yourself as a worthless person?				
25.	- felt that life is entirely hopeless?				
26.	- been feeling hopeful about your own future?				
27.	- been feeling reasonable happy, all things considered?				
28.	- been feeling nervous and strung-up all the time?				
29.	- felt that life isn't worth living?				
30.	- found that time you couldn't do anything because				

	your nerves were too bad?				
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Rosenberg Self-Esteem Scale (RSE)

Instructions

- Below is a list of statements dealing with your self-esteem.
- Please answer **ALL** the questions by making a cross (X) in the column, which applies best to each question.
- Remember that we want to know about present and recent feelings, not those you had in the past.

	Strongly Agree	Agree	Disagree	Strongly Disagree
1. I feel that I am a person of worth, at least on an equal plane with others.				
2. I feel that I have a number of good qualities.				
3. All in all, I am inclined to feel that I am a failure.				
4. I am able to do things as well as most other people.				
5. I feel I do not have much to be proud of.				
6. I take a positive attitude toward myself.				
7. On the whole, I am satisfied with myself.				
8. I wish I could have more respect for myself.				
9. I certainly feel useless at times.				
10. At times I think I am no good at all.				

Three-Factor Eating Questionnaire

Instructions

- Please answer **ALL** the questions by making a cross (X) in the block next to your choice for each question.
- Think of the past few weeks when you complete this questionnaire.**
- Remember that we want to know about present and recent habits, not those you had in the past.

1.	When I smell a sizzling steak or see a juicy piece of meat, I find it very difficult to keep from eating, even if I have just finished a meal	True <input type="checkbox"/> False <input type="checkbox"/>
2.	I usually eat too much at social occasions, like parties and picnics.	True <input type="checkbox"/> False <input type="checkbox"/>
3.	I am usually so hungry that I eat more than three times a day.	True <input type="checkbox"/> False <input type="checkbox"/>
4.	When I have eaten my quota of kilojoules, I am usually good about not eating any more.	True <input type="checkbox"/> False <input type="checkbox"/>
5.	Dieting is so hard for me because I just get too hungry.	True <input type="checkbox"/> False <input type="checkbox"/>
6.	I deliberately take small helpings as a means of controlling my weight.	True <input type="checkbox"/> False <input type="checkbox"/>
7.	Sometimes things just taste so good that I keep on eating even when I am no longer hungry.	True <input type="checkbox"/> False <input type="checkbox"/>
8.	Since I am often hungry, I sometimes wish that while I am eating, an expert would tell me that I have had enough or that I can have something more to eat.	True <input type="checkbox"/> False <input type="checkbox"/>
9.	When I feel anxious, I find myself eating.	True <input type="checkbox"/> False <input type="checkbox"/>
10.	Life is too short to worry about dieting.	True <input type="checkbox"/> False <input type="checkbox"/>
11.	Since my weight goes up and down, I have gone on reducing diets more than once.	True <input type="checkbox"/> False <input type="checkbox"/>
12.	I often feel so hungry that I just have to eat something.	True <input type="checkbox"/> False <input type="checkbox"/>
13.	When I am with someone who is overeating, I usually overeat too.	True <input type="checkbox"/>

	False <input type="checkbox"/>
14. I have a pretty good idea of the number of kilojoules in common food.	True <input type="checkbox"/> False <input type="checkbox"/>
15. Sometimes when I start eating, I just can't seem to stop.	True <input type="checkbox"/> False <input type="checkbox"/>
16. It is not difficult for me to leave something on my plate.	True <input type="checkbox"/> False <input type="checkbox"/>
17. At certain times of the day, I get hungry because I have gotten used to eating then.	True <input type="checkbox"/> False <input type="checkbox"/>
18. While on a diet, if I eat food that is not allowed, I consciously eat less for a period of time to make up for it.	True <input type="checkbox"/> False <input type="checkbox"/>
19. Being with someone who is eating often makes me hungry enough to eat also.	True <input type="checkbox"/> False <input type="checkbox"/>
20. When I feel blue, I often overeat.	True <input type="checkbox"/> False <input type="checkbox"/>
21. I enjoy eating too much to spoil it by counting kilojoules or watching my weight	True <input type="checkbox"/> False <input type="checkbox"/>
22. When I see a real delicacy, I often get so hungry that I have to eat right away.	True <input type="checkbox"/> False <input type="checkbox"/>
23. I often stop eating when I am not really full as a conscious means of limiting the amount that I eat.	True <input type="checkbox"/> False <input type="checkbox"/>
24. I get so hungry that my stomach often seems like a bottomless pit.	True <input type="checkbox"/> False <input type="checkbox"/>
25. My weight has hardly changed at all in the last ten years.	True <input type="checkbox"/> False <input type="checkbox"/>
26. I am always hungry so it is hard for me to stop eating before I finish the food on my plate.	True <input type="checkbox"/> False <input type="checkbox"/>
27. When I feel lonely, I console myself by eating.	True <input type="checkbox"/> False <input type="checkbox"/>
28. I consciously hold back at meals in order not to gain weight.	True <input type="checkbox"/> False <input type="checkbox"/>

29.	I sometimes get very hungry late in the evening or at night.	True <input type="checkbox"/> False <input type="checkbox"/>
30.	I eat anything I want, any time I want.	True <input type="checkbox"/> False <input type="checkbox"/>
31.	Without even thinking about it, I take a long time to eat.	True <input type="checkbox"/> False <input type="checkbox"/>
32.	I count kilojoules as a conscious means of controlling my weight.	True <input type="checkbox"/> False <input type="checkbox"/>
33.	I do not eat some foods because they make me fat.	True <input type="checkbox"/> False <input type="checkbox"/>
34.	I am always hungry enough to eat at any time.	True <input type="checkbox"/> False <input type="checkbox"/>
35.	I pay a great deal of attention to changes in my figure.	True <input type="checkbox"/> False <input type="checkbox"/>
36.	While on a diet, if I eat a food that is not allowed, I often then splurge and eat other high kilojoule foods.	True <input type="checkbox"/> False <input type="checkbox"/>
37.	How often are you dieting in a conscious effort to control your weight? 1) Rarely <input type="checkbox"/> ; 2) Sometimes <input type="checkbox"/> ; 3) Usually <input type="checkbox"/> ; 4) Always <input type="checkbox"/>	
38.	Would a weight fluctuation of 2 kg affect the way you live your life? 1) Not at all <input type="checkbox"/> ; 2) Slightly <input type="checkbox"/> ; 3) Moderately <input type="checkbox"/> ; 4) Very much <input type="checkbox"/>	
39.	How often do you feel hungry? 1) Only at mealtimes <input type="checkbox"/> ; 2) Sometimes between meals <input type="checkbox"/> ; 3) Often between meals <input type="checkbox"/> ; 4) Almost always <input type="checkbox"/>	
40.	Do your feelings of guilt about overeating help you to control your food intake? 1) Never <input type="checkbox"/> ; 2) Rarely <input type="checkbox"/> ; 3) Often <input type="checkbox"/> ; 4) Always <input type="checkbox"/>	
41.	How difficult would it be for you to stop eating halfway through dinner and not eat for the next four hours? 1) Easy <input type="checkbox"/> ; 2) Slightly difficult <input type="checkbox"/> ; 3) Moderately difficult <input type="checkbox"/> ; 4) Very difficult <input type="checkbox"/>	
42.	How conscious are you of what you are eating? 1) Not at all <input type="checkbox"/> ; 2) Slightly <input type="checkbox"/> ; 3) Moderately <input type="checkbox"/> ; 4) Extremely <input type="checkbox"/>	

43.	How frequently do you avoid 'stocking up' on tempting foods? 1) Almost never <input type="checkbox"/> ; 2) Seldom <input type="checkbox"/> ; 3) Usually <input type="checkbox"/> ; 4) Almost always <input type="checkbox"/>
44.	How likely are you to shop for low kilojoules foods? 1) Unlikely <input type="checkbox"/> ; 2) Slightly unlikely <input type="checkbox"/> ; 3) Moderately likely <input type="checkbox"/> ; 4) Very likely <input type="checkbox"/>
45.	Do you eat sensibly in front of others and splurge alone? 1) Never <input type="checkbox"/> ; 2) Rarely <input type="checkbox"/> ; 3) Often <input type="checkbox"/> ; 4) Always <input type="checkbox"/>
46.	How likely are you to consciously eat slowly in order to cut down on how much you eat? 1) Never <input type="checkbox"/> ; 2) Rarely <input type="checkbox"/> ; 3) Often <input type="checkbox"/> ; 4) Always <input type="checkbox"/>
47.	How frequently do you skip dessert because you are no longer hungry? 1) Almost never <input type="checkbox"/> ; 2) Seldom <input type="checkbox"/> ; 3) At least once a week <input type="checkbox"/> ; 4) Almost every day <input type="checkbox"/>
48.	How likely are you to consciously eat less than you want? 1) Unlikely <input type="checkbox"/> ; 2) Slightly likely <input type="checkbox"/> ; 3) Moderately likely <input type="checkbox"/> ; 4) Very likely <input type="checkbox"/>
49.	Do you go on eating binges though you are not hungry? 1) Never <input type="checkbox"/> ; 2) Rarely <input type="checkbox"/> ; 3) Sometimes <input type="checkbox"/> ; 4) At least once a week <input type="checkbox"/>
50.	On a scale of 0 to 5, where 0 means no restraint in eating (eating whatever you want, whenever you want it) and 5 means total restraint (constantly limiting food intake and never 'giving in') what number would you give yourself (choose only one statement of the following five by make a cross (X) in only one block <input type="checkbox"/>)? 0 eat whatever you want, whenever you want it <input type="checkbox"/> 1 usually eat whatever you want, whenever you want it <input type="checkbox"/> 2 often eat whatever you want, whenever you want it <input type="checkbox"/> 3 often limit food intake, but often 'give in' <input type="checkbox"/> 4 usually limit food intake, rarely 'give in' <input type="checkbox"/> 5 constantly limiting food intake, never 'giving in' <input type="checkbox"/>
51.	To what extent does this statement describe your eating behaviour? 'I start dieting in the morning, but because of any number of things that happen during the day, by evening I have given up and eat what I want, promising myself to start dieting again tomorrow'. 1) Not like me <input type="checkbox"/> ; 2) Little like me <input type="checkbox"/> ; 3) Pretty good description of me <input type="checkbox"/> ; 4) Describes me perfectly <input type="checkbox"/>

Food Frequency Questionnaire

Instructions

- Look at the food item list (column 1)
- Think back carefully over the past month and determine how often you ate each item
- If you eat/drink a specific item less than once a month, mark the Never/<1/ month column.
- If you do eat/drink it more regularly, decide how often you eat it per month, OR per week, OR per day and make a cross (X) in the column which best applies to each item in the food list.
- Only make one cross (X) for each item in the list e.g. for each row in the table.

	Never/ <1/ month	1-3/ month	1/ week	2-4/ week	5-6/ week	1/ day	2-3/ day	4-5/ day	6+/ day
STARCHES									
White or brown bread and/or buns/ rolls									
Whole wheat, health, Low GI, seed bread and/or rolls etc.									
Breakfast cereals or porridge such as All Bran, High Bulk Bran, Muesli, Weet-bix, Pronutro, Oats, etc.									
Breakfast cereals such as Rice Crispies, Cornflakes, Coco Pops, Fruit Loops, Maize meal porridge, Morevite etc.									
Rice, mealie rice, samp, phutu, pap, jeqe (steamed bread)									
Pasta: macaroni, spaghetti, noodles									
Potato: cooked, baked, mashed									
Potato: cooked, baked, mashed with fat e.g. margarine added or potato salad									

Legumes e.g. baked beans, lentils, dahl, harricot beans, split peas, broad beans, kidney beans, sugar beans, dried bean salad/soup, soya mince etc.									
VEGETABLES									
Cooked vegetables: any type. (no sugar/ fat/ sauce added)									
Vegetables: any type prepared with sugar/ fat/ sauces e.g. white sauce.									
Mixed salad: lettuce, cucumber, tomato, peppers, onions, mushrooms, carrots in any combination or alone.									
FRUIT									
Fresh fruit (any type)									
Dried fruit (any type)									
Fruit juice									
Fruit salad: fresh or tinned									
MILK, YOGHURT AND CHEESE									
Full cream: milk, yogurt, sour milk (maas), powdered milk (e.g. Nespray, Klim)									
Skimmed/ low fat/2%: milk, yogurt, sour milk (maas)									
Coffee creamer: in tea/coffee e.g. cremora									
Milk drinks: Milo, Nesquik, Horlicks									
Cheese: gouda, cheddar, camembert, brie, edam (except low fat/ fat-free cottage cheese), cheese spread									
MEAT, FISH, CHICKEN									
Schnitzels, Cordon Bleu									

Red meat e.g. beef, mutton, pork. (Eat meat and visible fat)									
Red meat e.g. beef, mutton, pork. (Eat meat, but remove visible fat)									
Red meat e.g. venison & ostrich									
Chicken/turkey: with skin									
Chicken/turkey: without skin									
Fried fish in any fat or oil, with or without batter/crumbs.									
Fish: steamed, grilled, braaiied (fire)									
Fish: tinned sardines, pilchards, salmon, tuna									
Sausages: Vienna's, Russians, frankfurter									
Cold meat: polony, salami, etc. & bacon									
Organ meat e.g. liver, kidney, tripe									
Eggs: cooked or poached									
Eggs: scrambled, baked, omelettes									
FATS									
Soft margarine (in a tub)									
Butter/hard margarine, ghee									
Cooking oil e.g. sunflower oil									
Dripping									
Fat e.g. Holsum									
Salad dressing, mayonnaise: normal fat									
Salad dressing, mayonnaise: lite/ low fat									
FAST FOODS AND TAKE AWAYS									
Pizza									
Pies & Sausage rolls									
Potato chips (French fries)									
Kentucky Fried Chicken									

Nando's									
Chickin Lickin, Chicken King									
Fried fish									
Bunny chow									
Hot dogs									
Hamburgers (= bun and meat or chicken patty) e.g. McDonalds, Steers, Wimpy, Spur, other restaurants etc.									
OTHER									
Vetkoek (amagwinya), samoosas, koeksister, doughnuts									
Muffin, scones, cake, tart									
Rusks: commercial or homemade e.g. bran, buttermilk, white, whole wheat etc.									
Cookies: commercial or homemade: e.g. oat, crunchies, shortbread									
Chips: Nik naks, Lays, Simba etc.									
Energy bars, health bars, breakfast bars									
Chocolate									
Ice cream									
Cheese sauce, white sauce, meat sauces									
Tomato sauce, chutney, mustard, sweet chilli sauce									
Sweets e.g. jelly tots, sour worms, super-C's etc.									
Nuts and peanuts									
Peanut butter									
Chocolate spread									
Jam, syrup, honey									
DRINKS									
Wine: red or white									

Port, sherry, liqueur									
Beer, cider, coolers e.g. castle, black label, hunters dry, Savanna, Smirnoff etc.									
Beer, cider, cooler diet/ light e.g. Savanna light									
Spirits: e.g. brandy, whisky, rum, vodka, gin.									
Cocktails									
Shooters									
Fizzy soft drinks: e.g. Coke, Fanta									
Fizzy diet soft drinks: e.g. Coke lite etc.									
Energy drinks e.g. Energade, Powerade									
Milkshake									
Drinking yoghurt									
EATING PLACE									
In general, how often do you eat out e.g. restaurant, take-aways, hotel, prepared food/ meals from Spar, Checkers etc.									
If you work during the day (away from your home), how often do you take food from your home with you to eat during the day.									
If you work during the day (away from home), how often do you buy food to eat during the day.									

ADDENDUM D: Three day food record booklet

GUIDELINES

- Please read through the following guidelines and then complete this food diary for 2 weekdays and 1 weekend day.
- It is important to record the food intake as it occurs. It serves no purpose to sit down at night and attempt to remember everything you consumed during the day. It is, thus, essential that you carry this booklet with you on the days that you record your food- and drink intake. For this purpose, the booklet can be folded to fit into a pocket/purse.
- The data recorded in this book will be analysed by computer to evaluate the adequacy of dietary intake. The usefulness of this exercise depends on the accuracy of your records. You are therefore urged to follow all the guidelines in this booklet to ensure optimal results. Honesty (usually with oneself), accuracy and detail will ensure good results.
- Please give as much detail as you can
- Where applicable, brand names of food items, as well as method of preparation of specific dishes must be specified.
- Many foods or drinks in packets/containers have weights or volumes printed on them, so please write down these amounts to show how much you consumed. Also, be specific on the brand names of the product. Please feel free to hand in the empty containers/paper/labels of the items you consumed in a bag with your food diary. This will help us analyze your food intake.
- Each day is marked in sections, beginning with the first thing in the morning and ending with bedtime. For each part of the day, write down everything you consumed and specify amounts and descriptions. If nothing has been consumed during a part of the day, draw a line through that section.
- At the end of each day there is a list of snacks and drinks that can easily be forgotten. Please write any extra items in here if you have not already recorded them during the day.
- It is very important that you do not change your normal eating pattern or adjust what you eat and drink on the days that you record your intake.
- Please read carefully through the next section concerning the estimation of portion sizes, as this has a profound influence on the reliability of your data.

At first, the recording of your food intake will take some time but as you become more familiar with the portion sizes, it will take up very little of your time.

DURING DAY 3: if not already written in before				Office use	
Food/ Drink	Time	Description & Preparation	Amount	Code	g
Chocolate, toffee, sweets					
Health/ energy breakfast bars					
Crisps, Peanuts, Other snacks					
Beer, Wine, Spirits, other					
Cold drinks, juice					
Tea, Coffee, other hot drinks					
Ice cream					
Anything else?					
Space to write in the recipe or ingredients of any homemade dishes, take away meals etc. that you mentioned but not describe above.					

THANK YOU – END OF DAY 3

12

FOOD DAIRY: DAY 1							
DATE:		/	/	20	00	DAY OF WEEK:	
BEFORE BREAKFAST					Office use		
Time	Food/ Drink	Description & Preparation	Amount	Code	g		
BREAKFAST					Office use		
Time	Food/ Drink	Description & Preparation	Amount	Code	g		
MORNING SNACK(S) – between breakfast and lunch					Office use		
Time	Food/ Drink	Description & Preparation	Amount	Code	g		

FOOD DAIRY: DAY 1 <i>continue</i>						
LUNCH					Office use	
Time	Food/ Drink	Description & Preparation	Amount	Code	g	
AFTERNOON SNACK(S) - between lunch and supper					Office use	
Time	Food/ Drink	Description & Preparation	Amount	Code	g	

2

SUPPER - evening meal					Office use	
Time	Food/ Drink	Description & Preparation	Amount	Code	g	
EVENING SNACK(S) - after supper to last thing at night					Office use	
Time	Food/ Drink	Description & Preparation	Amount	Code	g	

11

DURING DAY 1: If not already written in before				Office use	
Food/Drink	Time	Description & Preparation	Amount	Code	g
Chocolate, coffee, sweets					
Health/energy breakfast bars					
Crisps, Peanuts, Other snacks					
Beer, Wine, Spirits, other					
Cold drinks, juice					
Tea, Coffee, other hot drinks					
Ice cream					
Anything else?					
Space to write in the recipe or ingredients of any homemade dishes, take away meals etc. that you mentioned but not describe above.					
THANK YOU - END OF DAY 1					

4

FOOD DAIRY: DAY 3					
DATE: / / 2 0 0			DAY OF WEEK:		
BEFORE BREAKFAST				Office use	
Time	Food/Drink	Description & Preparation	Amount	Code	g
BREAKFAST				Office use	
Time	Food/Drink	Description & Preparation	Amount	Code	g
MORNING SNACK(S) - between breakfast and lunch				Office use	
Time	Food/Drink	Description & Preparation	Amount	Code	g

9

FOOD DAIRY: DAY 2 <i>continue</i>						
LUNCH					Office use	
Time	Food/Drink	Description & Preparation	Amount	Code	g	
AFTERNOON SNACK(S) – between lunch and supper					Office use	
Time	Food/Drink	Description & Preparation	Amount	Code	g	

6

SUPPER – evening meal					Office use	
Time	Food/Drink	Description & Preparation	Amount	Code	g	
EVENING SNACK(S) – after supper to last thing at night					Office use	
Time	Food/Drink	Description & Preparation	Amount	Code	g	

7

DURING DAY 2: if not already written in before				Office use	
Food/ Drink	Time	Description & Preparation	Amount	Code	g
Chocolate, toffee, sweets					
Health/ energy breakfast bars					
Crisps, Peanuts, Other snacks					
Beer, Wine, Spirits, other					
Cold drinks, juice					
Tea, Coffee, other hot drinks					
Ice cream					
Anything else?					
Space to write in the recipe or ingredients of any homemade dishes, take away meals etc. that you mentioned but not describe above.					
THANK YOU - END OF DAY 2					

8

FOOD DAIRY: DAY 2					
DATE: / / 2 0 0			DAY OF WEEK: / /		
BEFORE BREAKFAST					Office use
Time	Food/ Drink	Description & Preparation	Amount	Code	g
BREAKFAST					Office use
Time	Food/ Drink	Description & Preparation	Amount	Code	g
MORNING SNACK(S) - between breakfast and lunch					Office use
Time	Food/ Drink	Description & Preparation	Amount	Code	g

5

FOOD DAIRY: DAY 3 <i>continue</i>							
LUNCH						Office use	
Time	Food/Drink	Description & Preparation	Amount	Code	g		
AFTERNOON SNACK(S) – between lunch and supper						Office use	
Time	Food/Drink	Description & Preparation	Amount	Code	g		

10

SUPPER – evening meal						Office use	
Time	Food/Drink	Description & Preparation	Amount	Code	g		
EVENING SNACK(S) – after supper to last thing at night						Office use	
Time	Food/Drink	Description & Preparation	Amount	Code	g		

3

DURING DAY 3: if not already written in before				Office use	
Food/ Drink	Time	Description & Preparation	Amount	Code	g
Chocolate, toffee, sweets					
Health/ energy breakfast bars					
Crisps, Peanuts, Other snacks					
Beer, Wine, Spirits, other					
Cold drinks, juice					
Tea, Coffee, other hot drinks					
Ice cream					
Anything else?					
Space to write in the recipe or ingredients of any homemade dishes, take away meals etc. that you mentioned but not describe above.					
THANK YOU – END OF DAY 3					

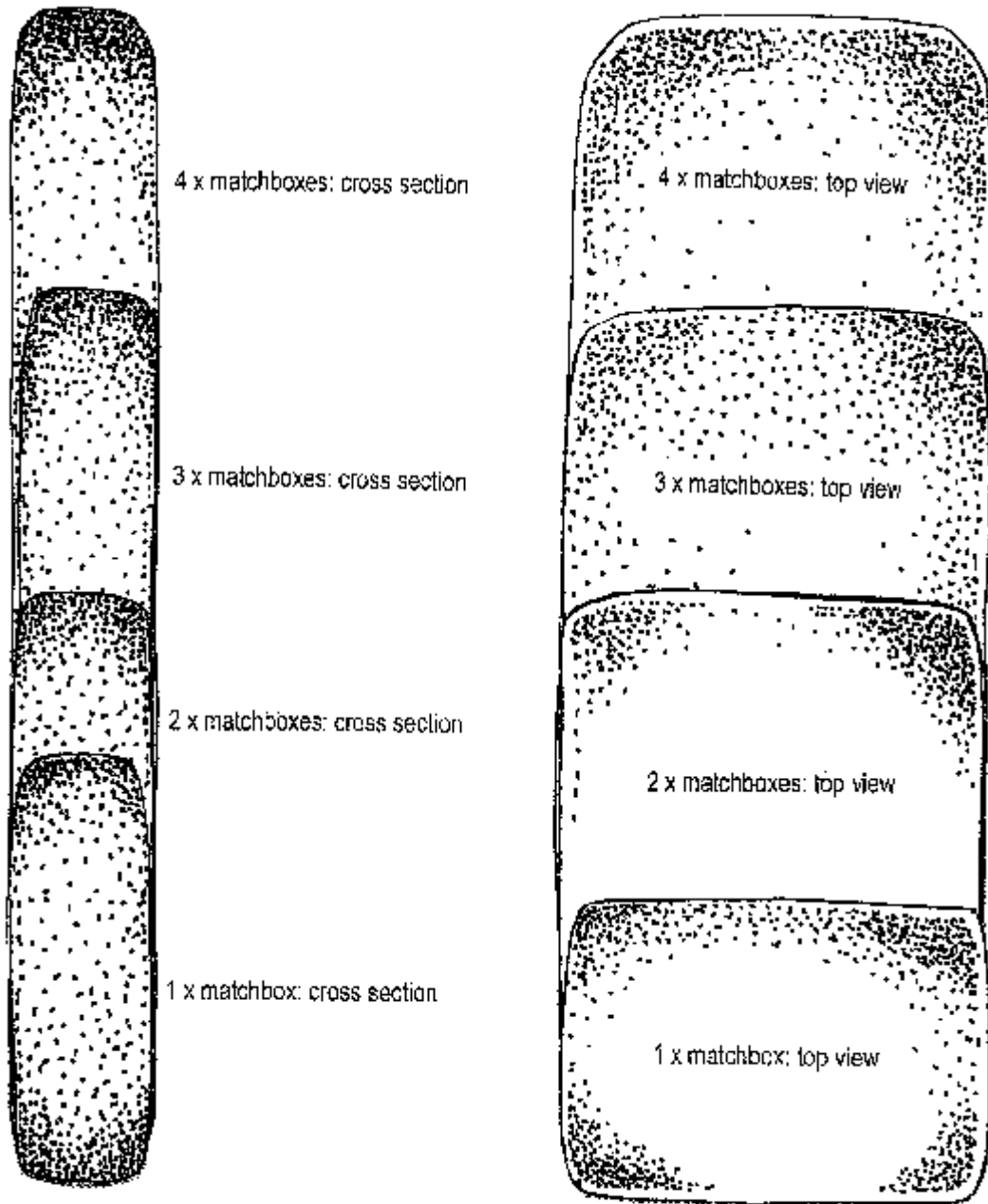
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FOOD DAIRY: DAY 1					
DATE: / / 2 0 0			DAY OF WEEK: _____		
BEFORE BREAKFAST				Office use	
Time	Food/ Drink	Description & Preparation	Amount	Code	g
BREAKFAST				Office use	
Time	Food/ Drink	Description & Preparation	Amount	Code	g
MORNING SNACK(S) – between breakfast and lunch				Office use	
Time	Food/ Drink	Description & Preparation	Amount	Code	g

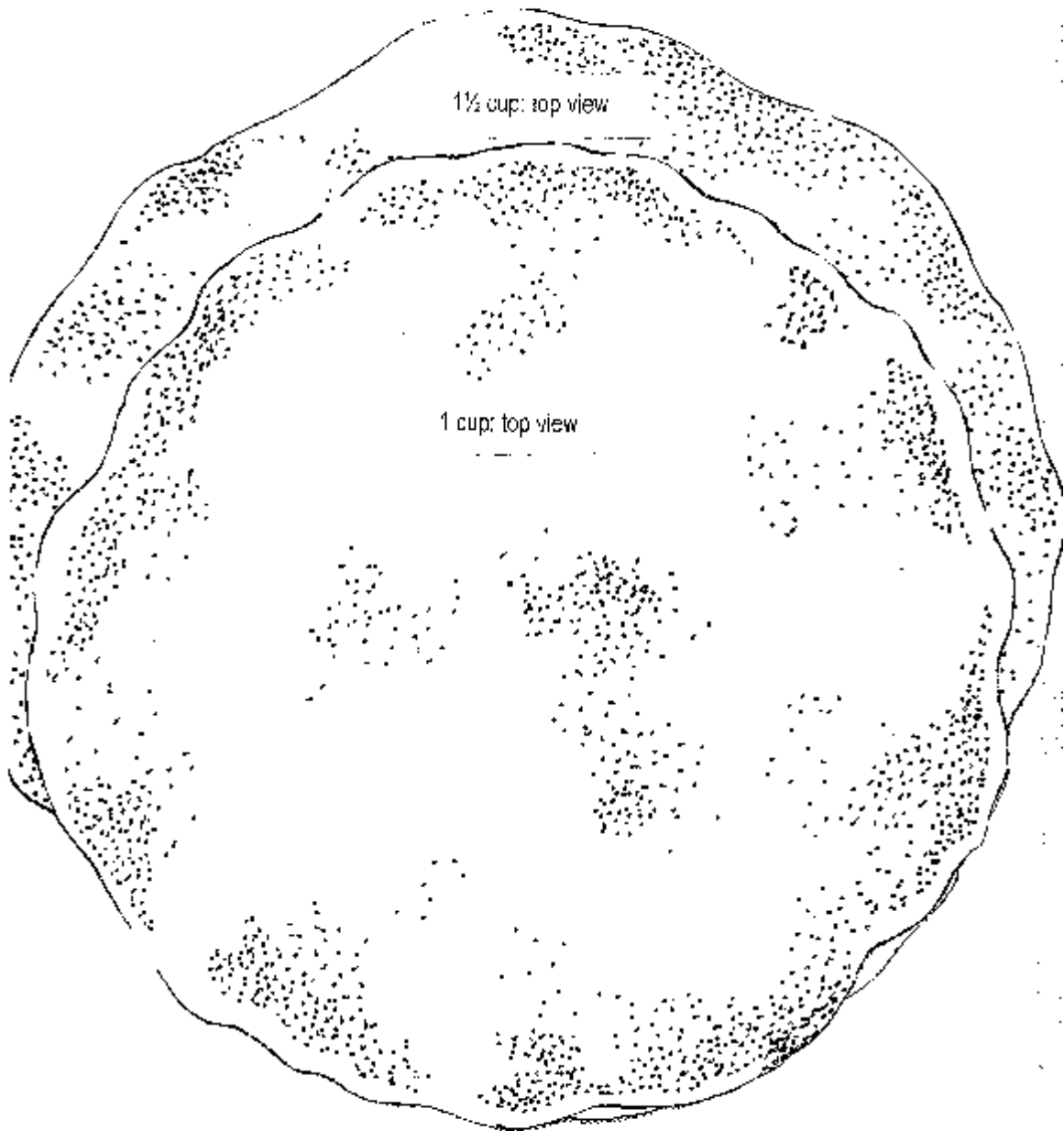
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ADDENDUM E: Food portion size guide

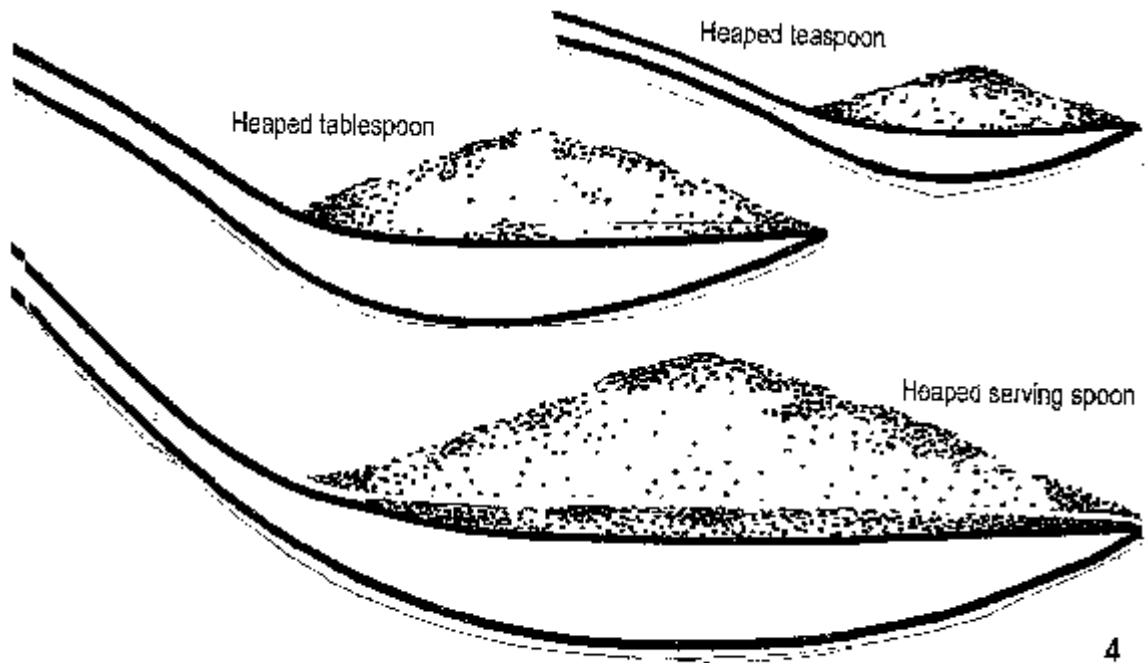
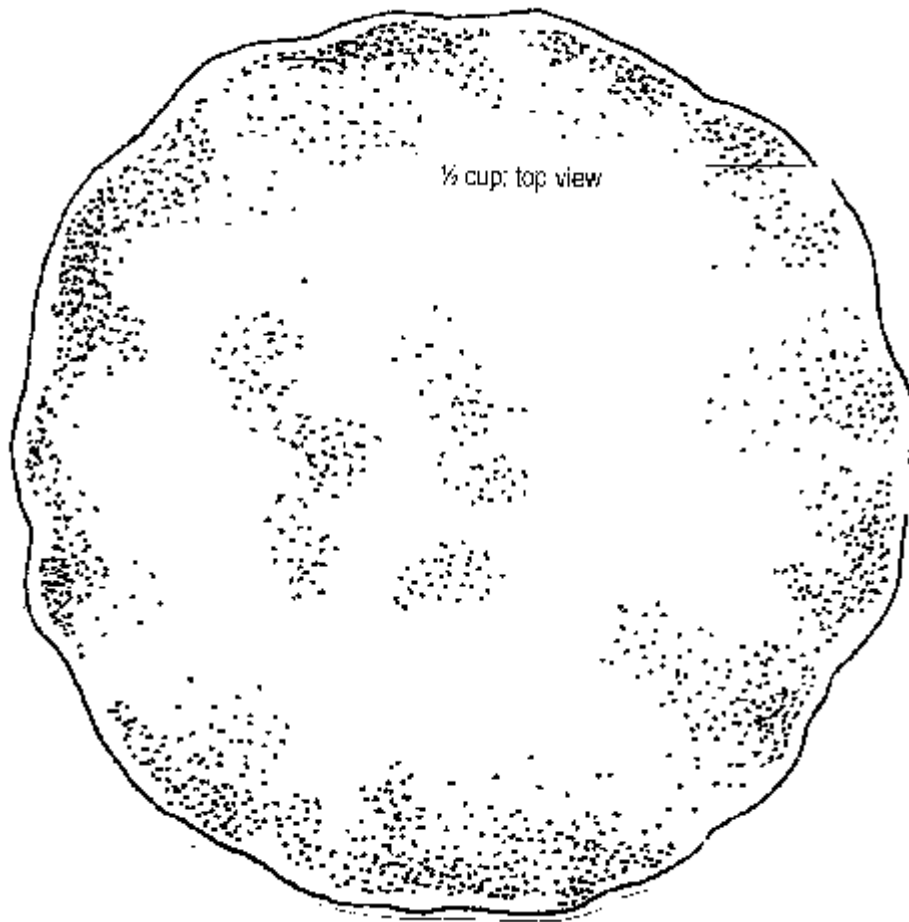
Food model: Matchbox



Dough model



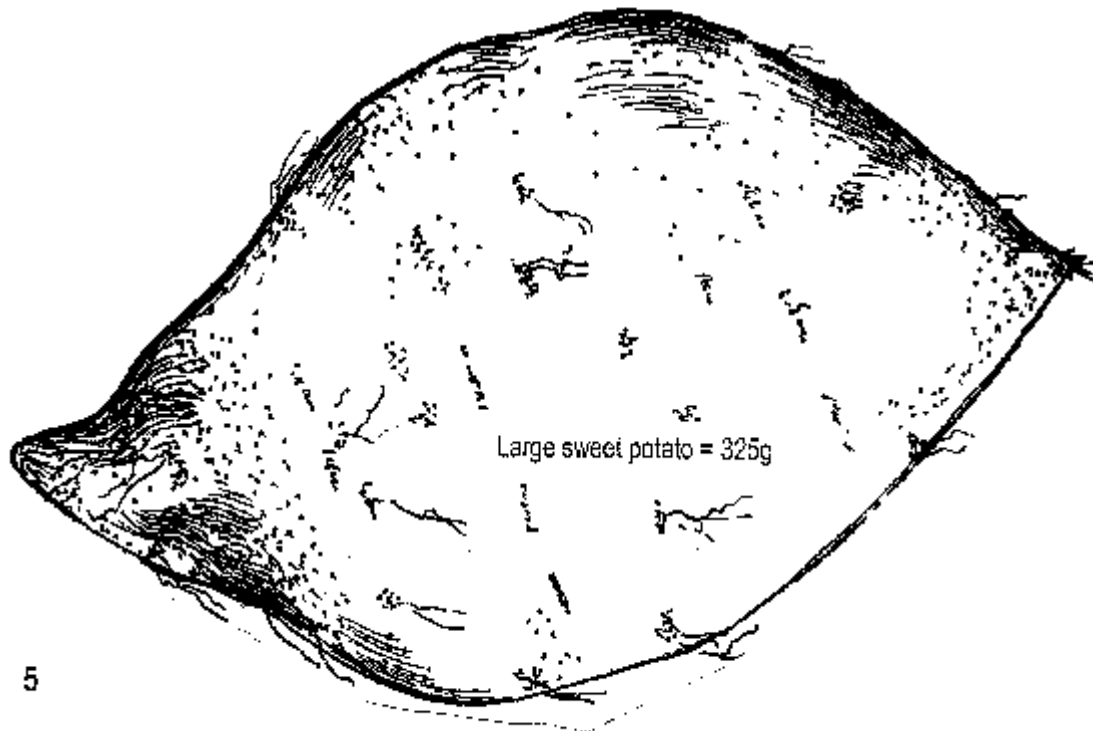
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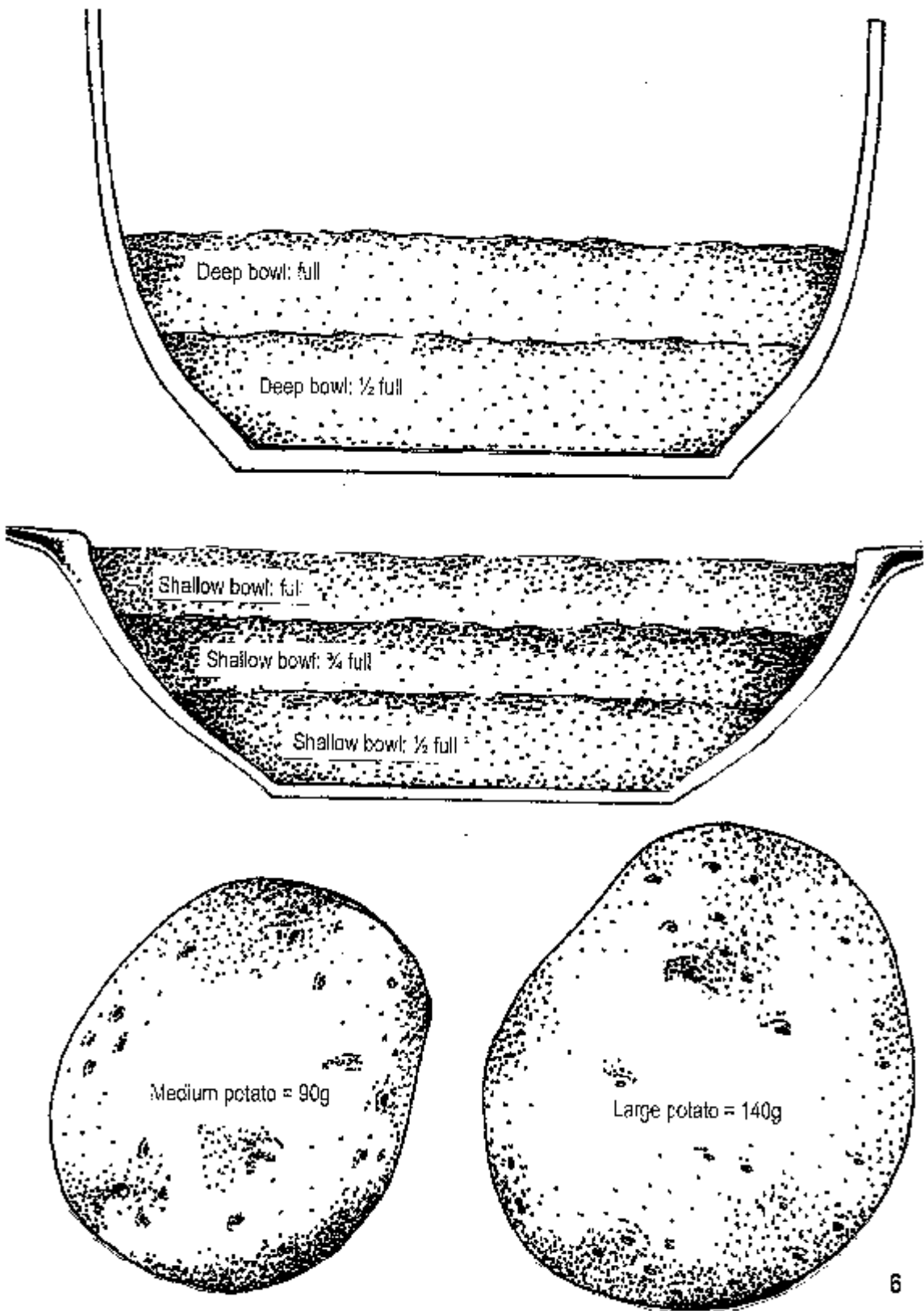


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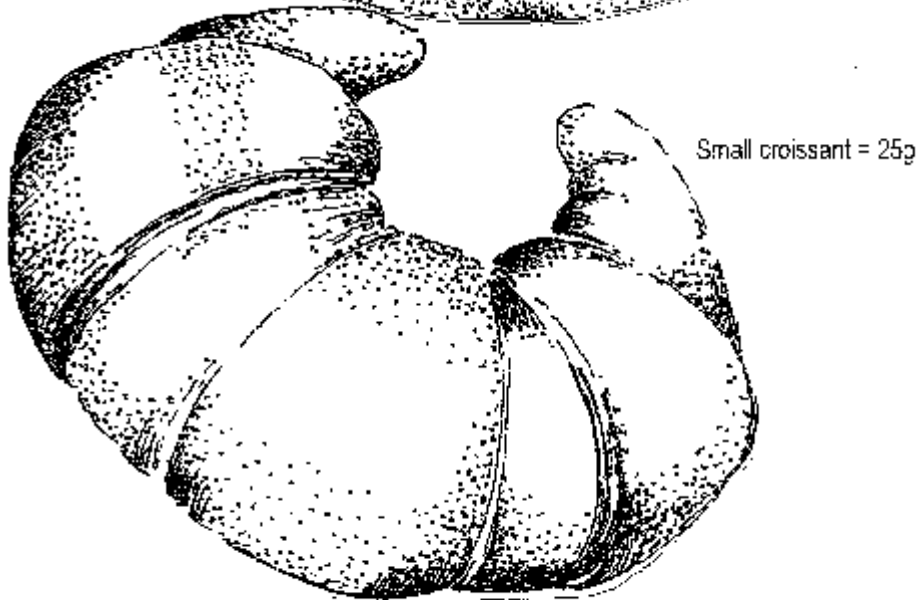
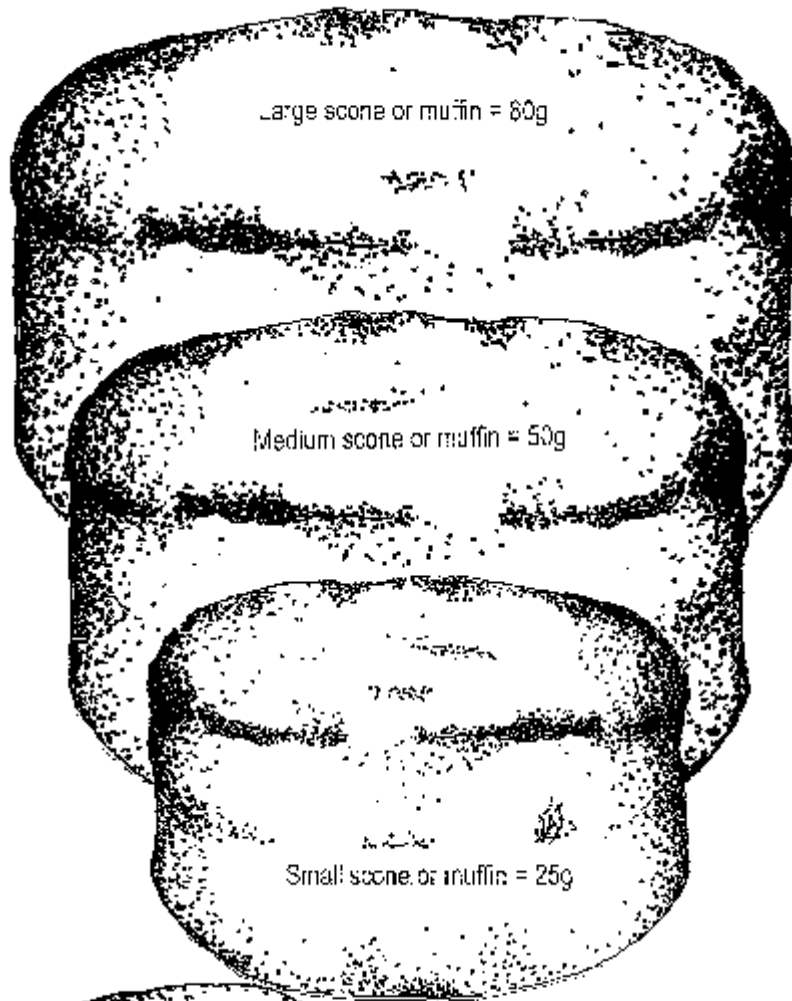
Starch food group

Food/ Drink	Description / Preparation	Portion size estimation
Bread & rolls	Type: white/ brown/ seed/ LGI/ whole-wheat etc.	Measure thickness & length & width of slice.
Pita bread, bagel	Type: white/ whole-wheat etc.	Surface of dough model/ measure diameter in cm.
Porridge, breakfast cereals	Type: All Bran/ Weetbix etc. Sugar/fat/milk added.	See bowl sketches. Spoons / ml.
Rice & Noodles	Type. Amount of fat added.	Cups / ml / dough model.
Potatoes, French fries & Sweet potatoes	Preparation method used. Margarine/ butter / other fat/ sugar added.	See sketches. Estimate size in terms of small/ medium /large or in terms of cups/ dough model.
Legumes: dried peas/ beans, baked beans	Type.	Cups/ ml/ dough model.
Provita & other snack bread	Type: Ryvita, Provita etc.	Record number.
Muffins & scones	Type e.g. chocolate, blue berry, whole-wheat etc.	Measure diameter & height. If bought in packet, record grams.
Pancake & crumpets	Type.	Measure thickness in cm & estimate size in terms of surface of dough model/ measure diameter in cm.
Biscuits, cookies, rusks	Commercial: specify brand & amount. Homemade: specify type & diameter.	Measure size in cm: Cookies: diameter & thickness. Rusks: rectangular/ square piece = e.g. 2cm x2cmx8cm.

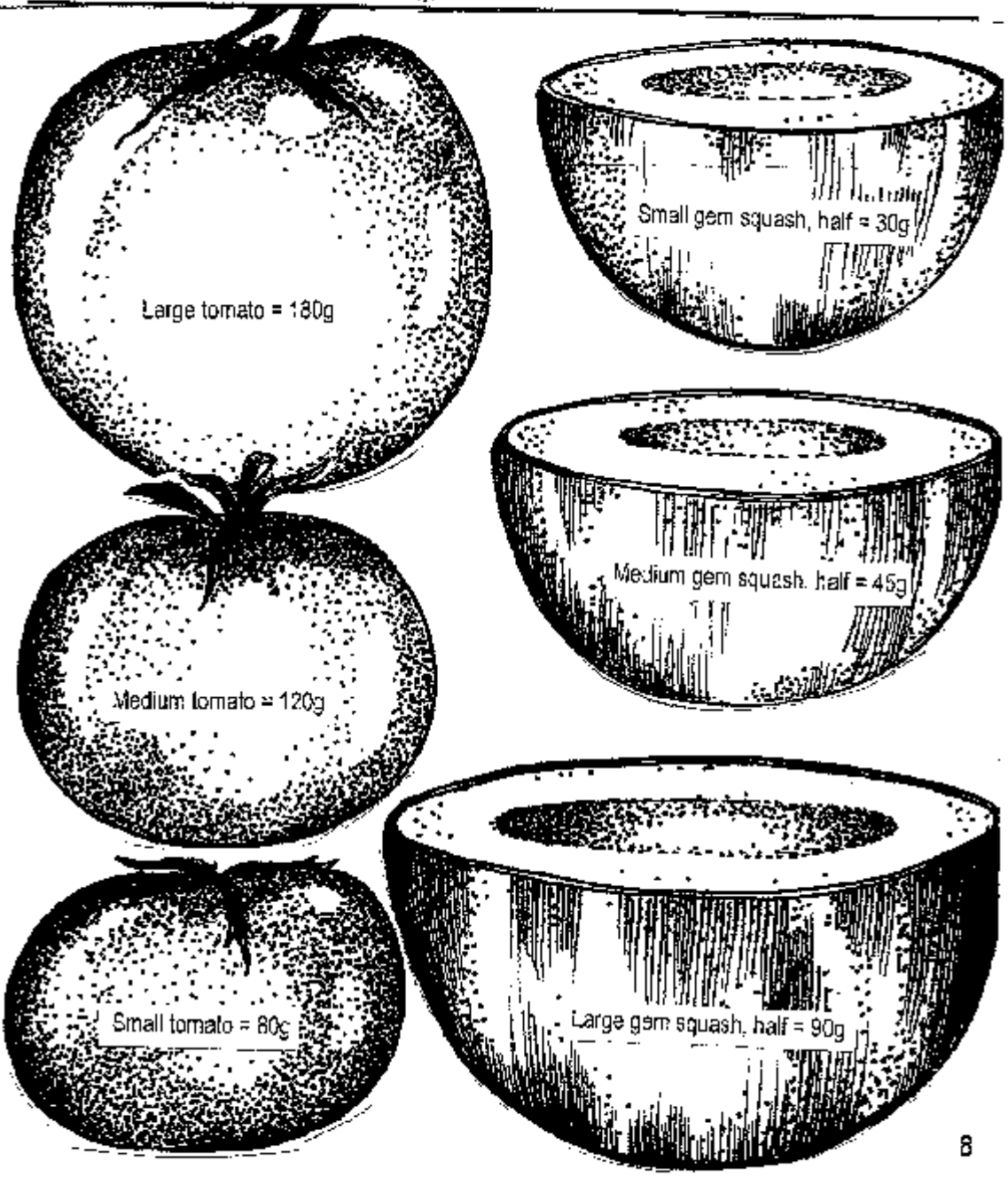




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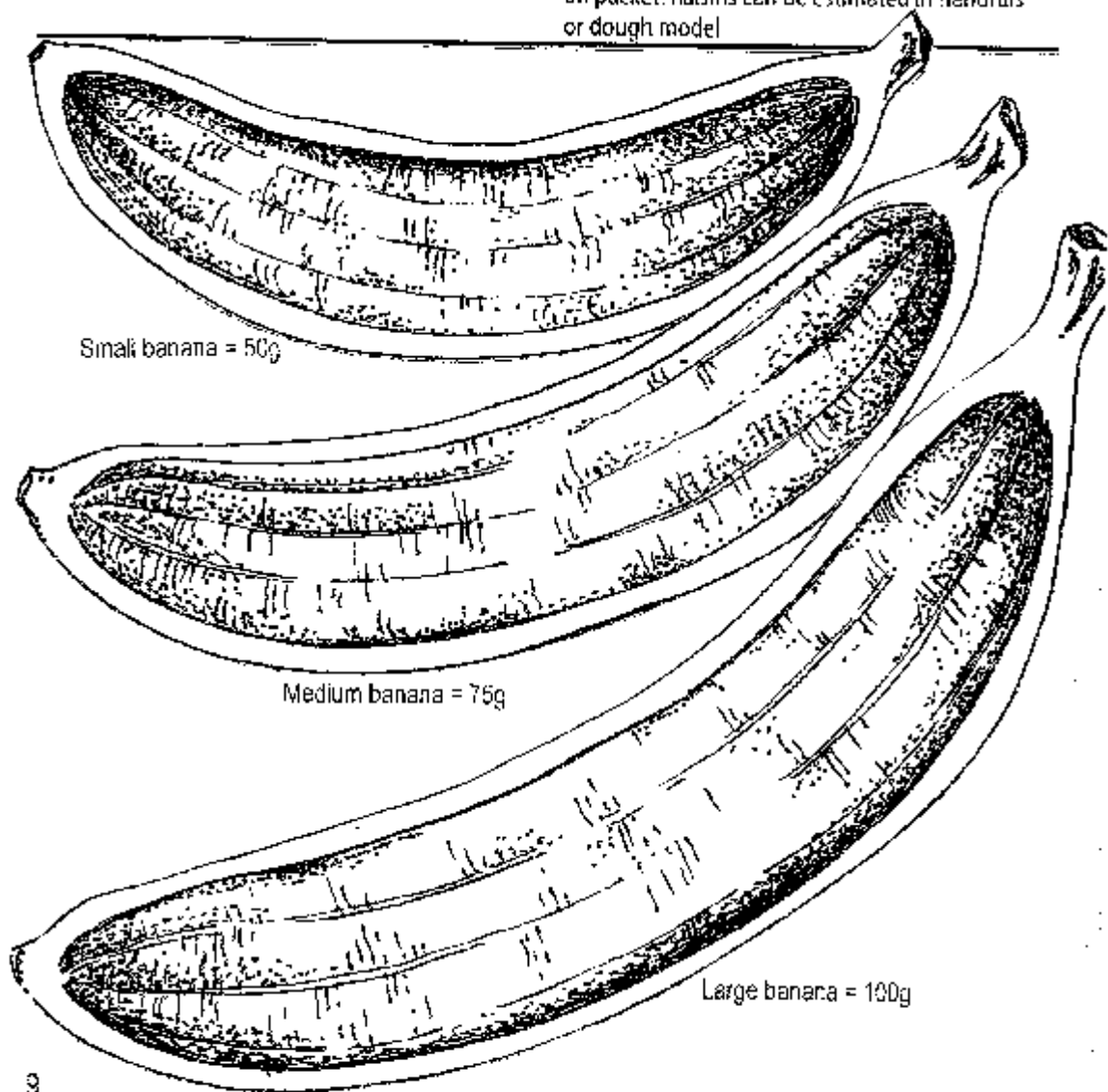


Food/Drink	Description & preparation	Portion size estimation
All vegetables	Preparation method used Specify sauces/ margarine/ butter/ other fat/ sugar added.	Estimate in terms of cups/ dough model/ spoons/ ml.
Salads	Specify all ingredients, type of salad dressing (brand name & low fat/ normal fat etc).	Cups/ dough model/ Spoons.

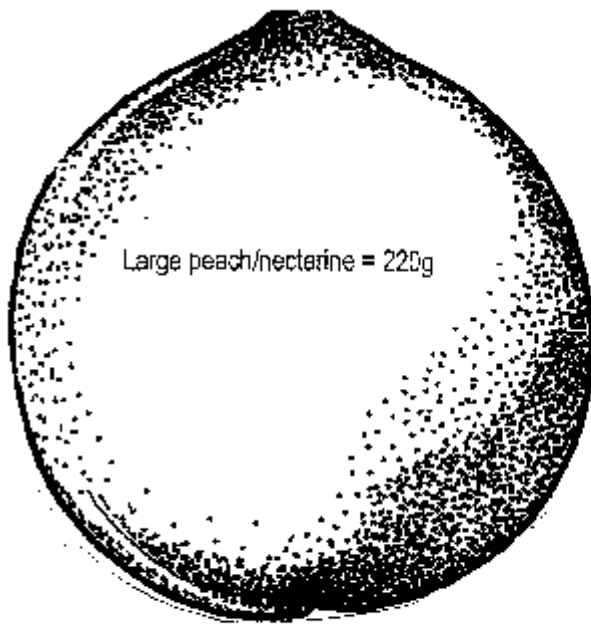


Fruit food group

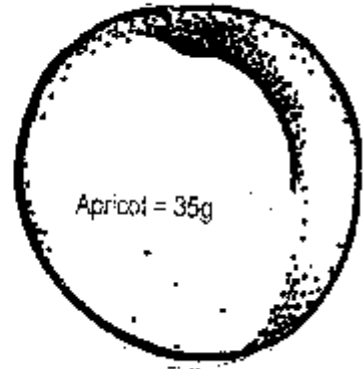
Food/Drink	Description & preparation	Portion size estimation
Fruit	Type	Specify in terms of small, medium, large (see sketches) or estimate in terms of dough model/ cups.
Fruit salad	Fresh or canned Sugar added Cream or ice-cream added.	Estimate in terms of cups/ bowl/ tablespoons.
Fruit juice	Type, brand name, sweetened or not	Record volume of container or Estimate in terms of glasses (see sketches)
Dried fruit	Type, sugared coated or not.	Count amount/ record grams amount indicated on packet. Raisins can be estimated in handfuls or dough model



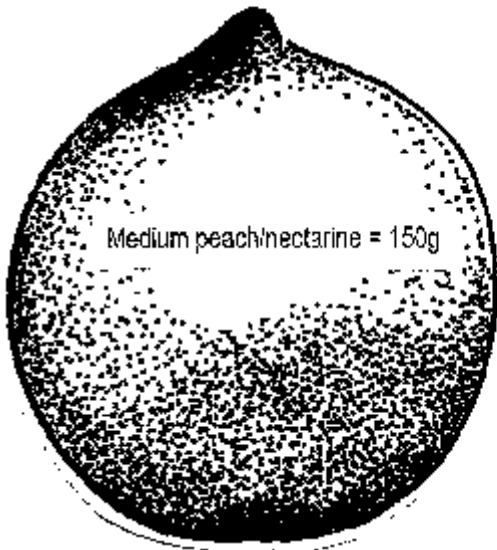
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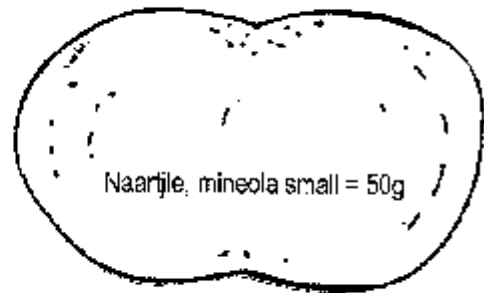
Large peach/nectarine = 220g



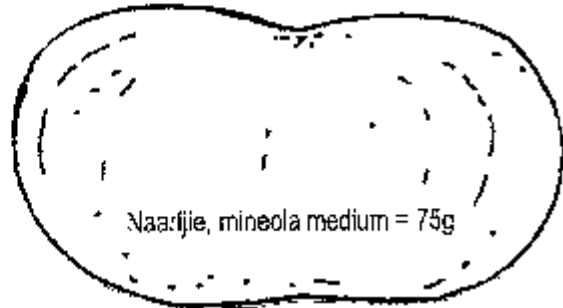
Apricot = 35g



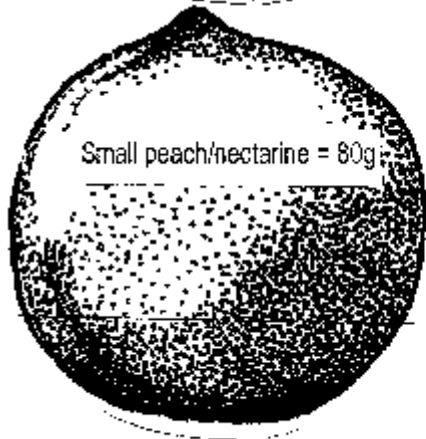
Medium peach/nectarine = 150g



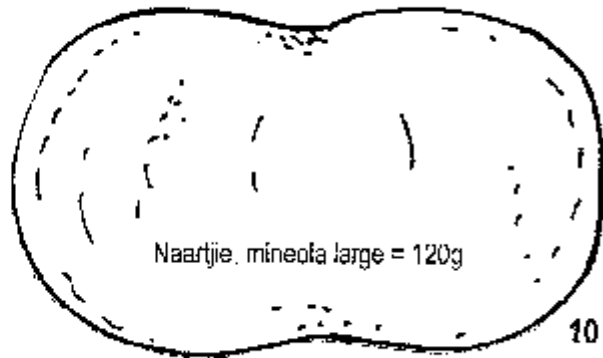
Naartjie, mineola small = 50g



Naartjie, mineola medium = 75g

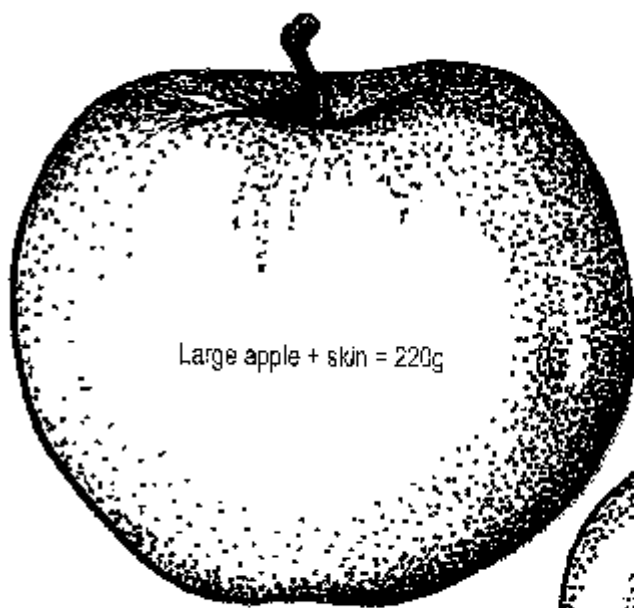


Small peach/nectarine = 80g

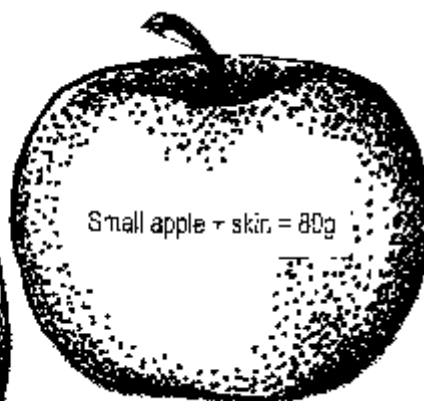


Naartjie, mineola large = 120g

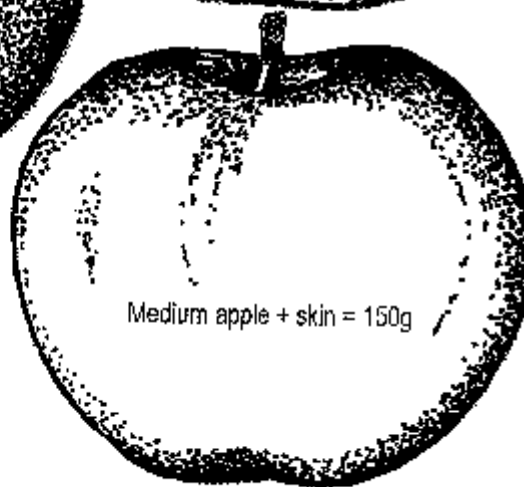
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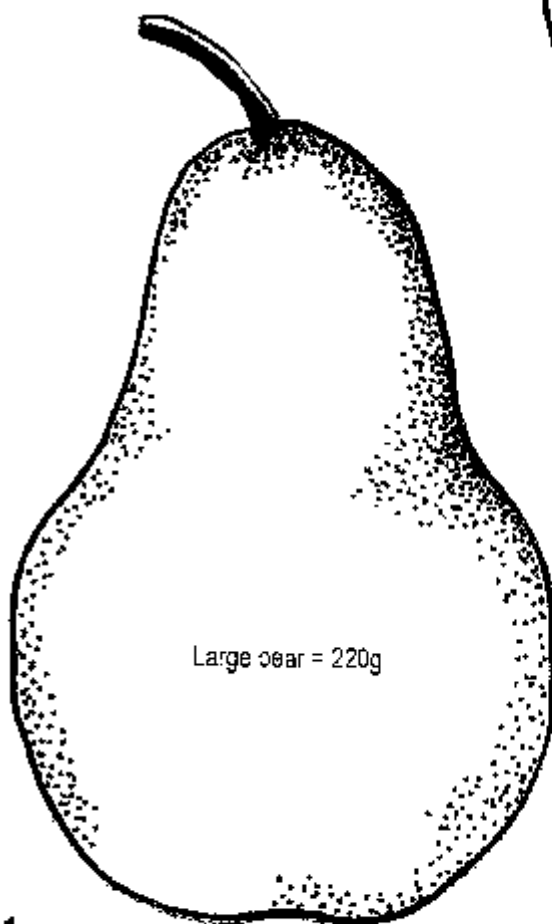
Large apple + skin = 220g



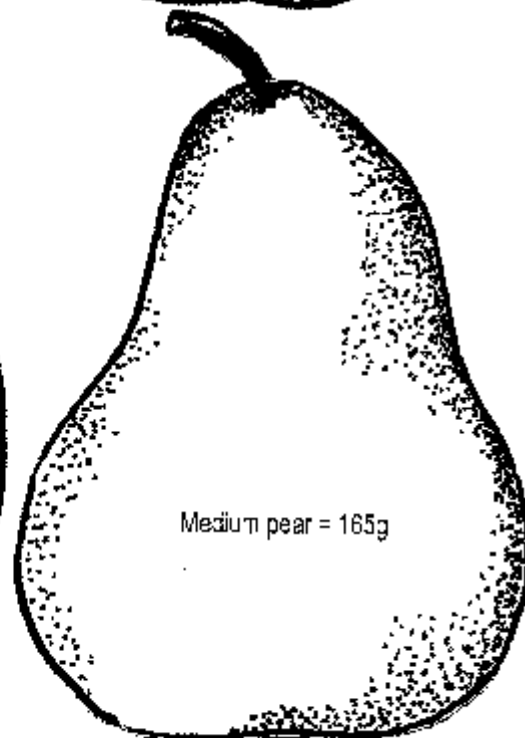
Small apple + skin = 80g



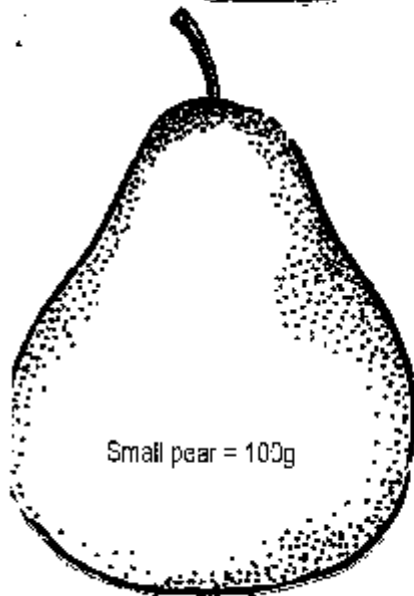
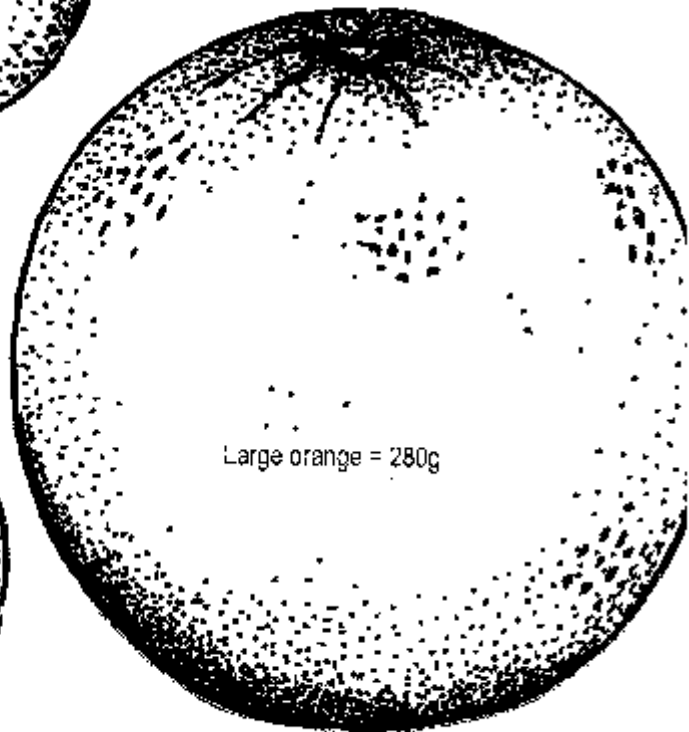
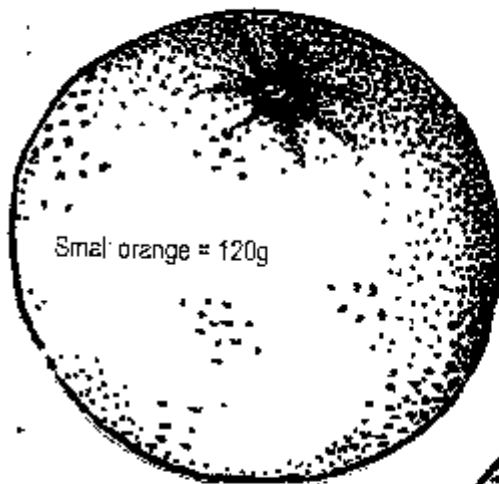
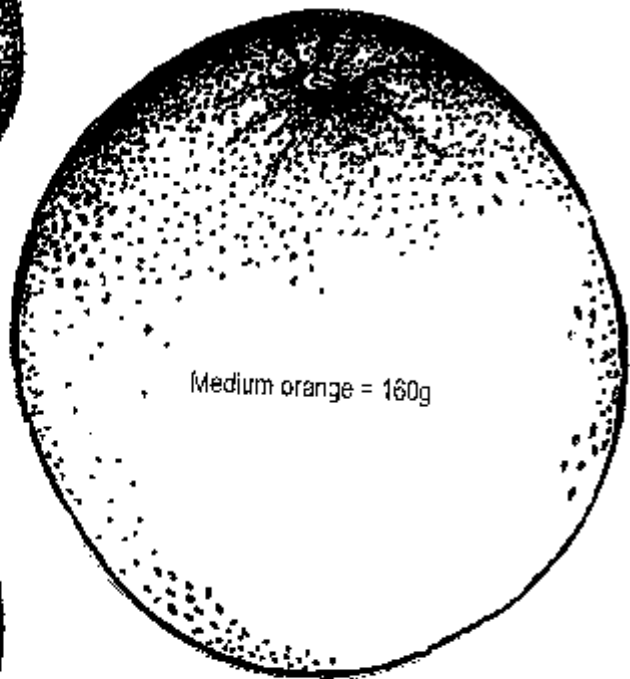
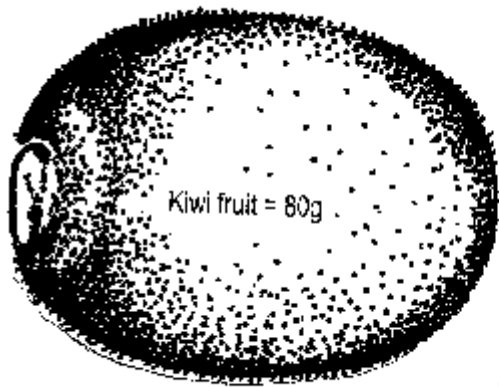
Medium apple + skin = 150g

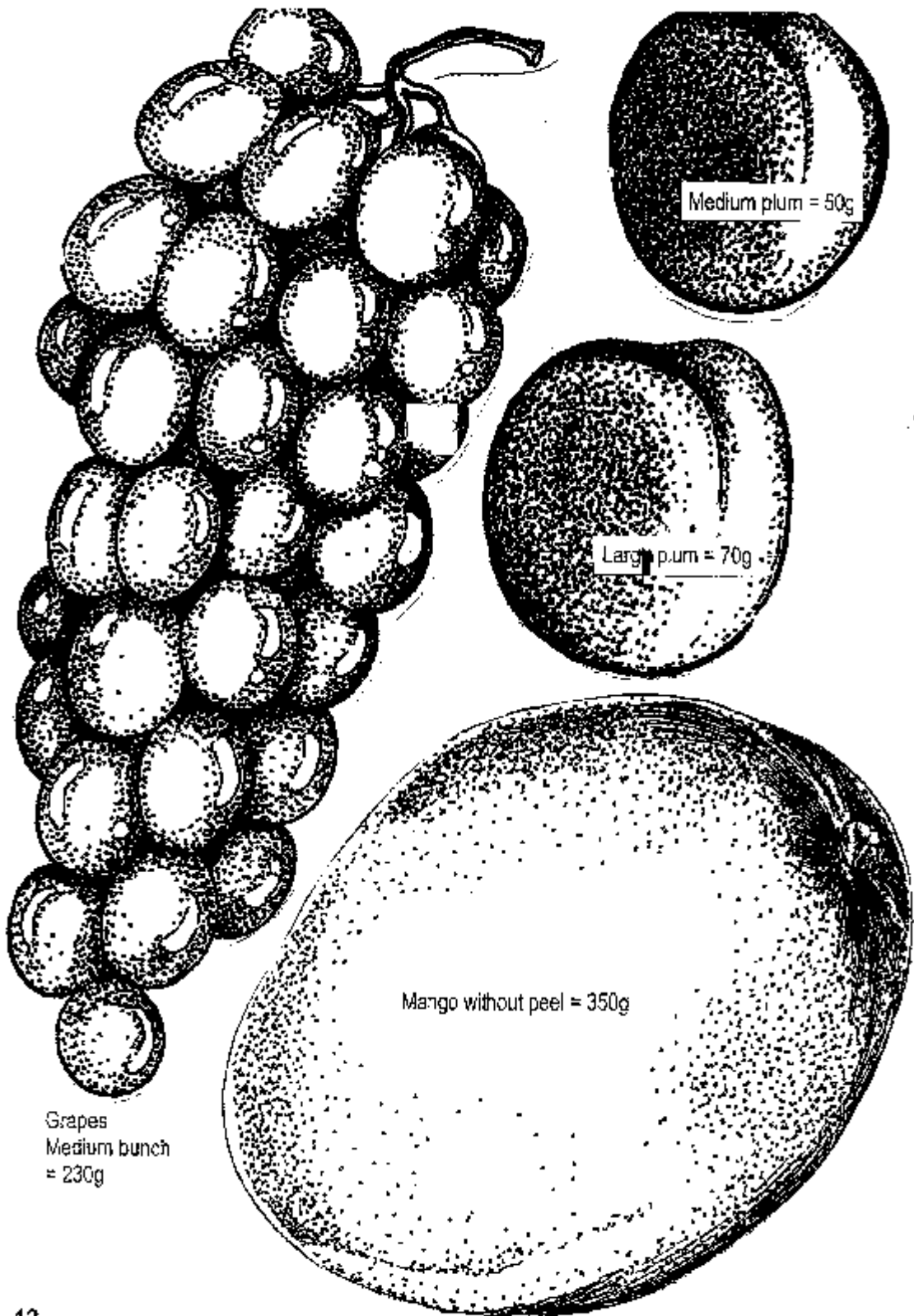


Large pear = 220g



Medium pear = 165g



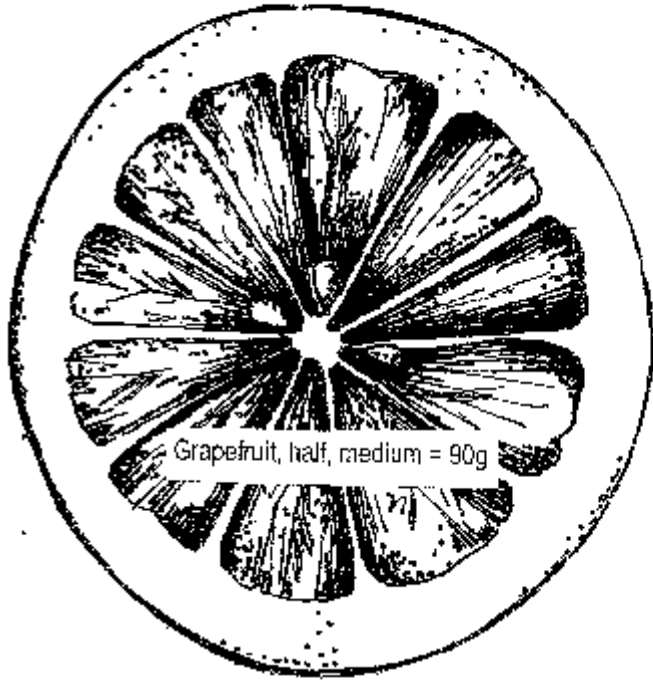


Grapes
Medium bunch
= 230g

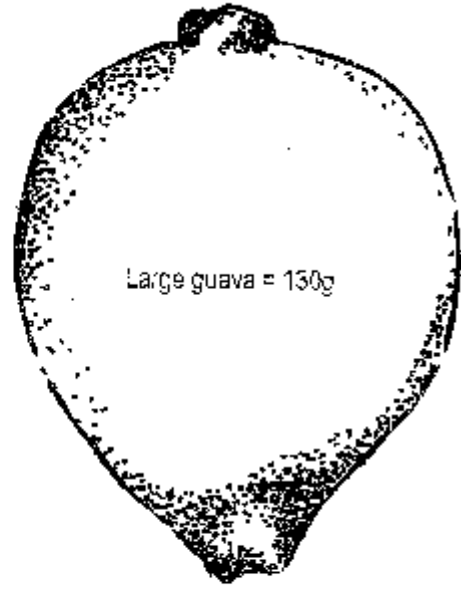
Medium plum = 50g

Large plum = 70g

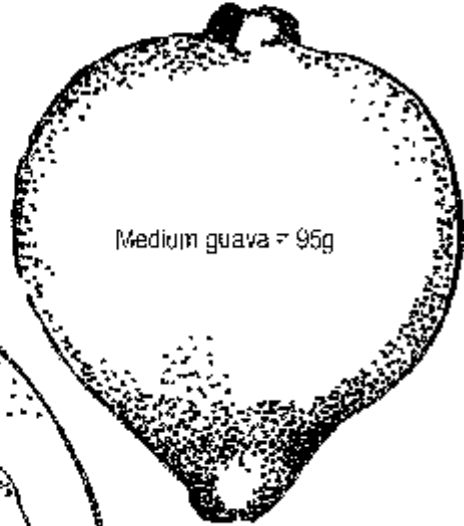
Mango without peel = 350g



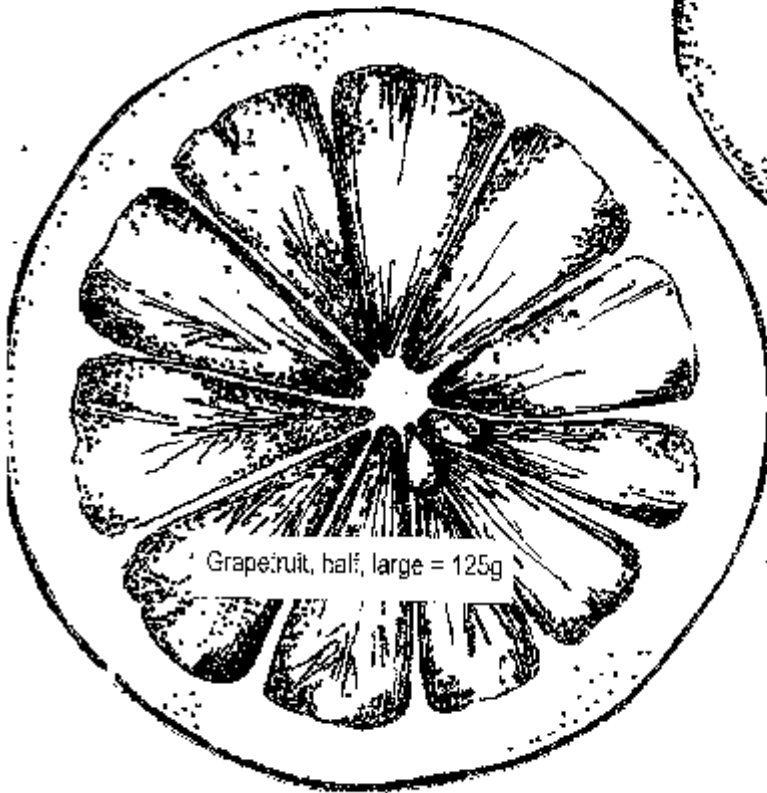
Grapefruit, half, medium = 90g



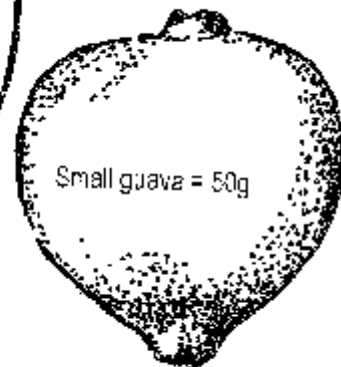
Large guava = 130g



Medium guava = 95g



Grapefruit, half, large = 125g



Small guava = 50g

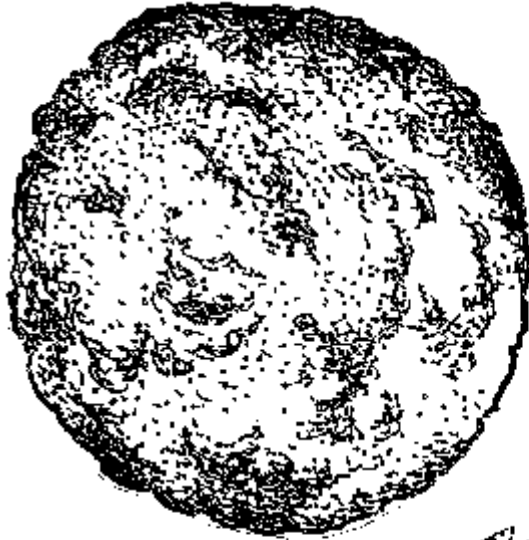
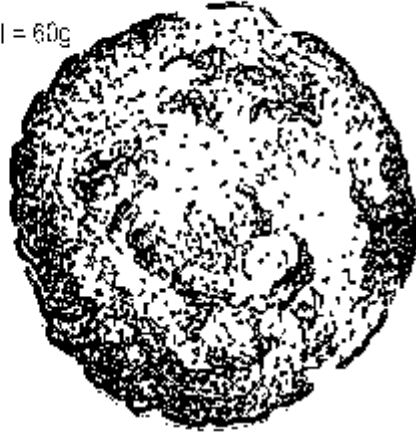
Dairy food group

Food/Drink	Description & preparation	Portion size estimation
Milk or milk products	Type: full cream, low fat, 2%, skimmed, flavoured, powdered, soya, goat etc.	ml/grams/ glasses. For powder: spoons.
Yoghurt	Type: Plain, flavoured, with fruit, sweetened. Brand name. Amount of fat: Full fat, low-fat or fat free.	Cups/ ml/ spoons.

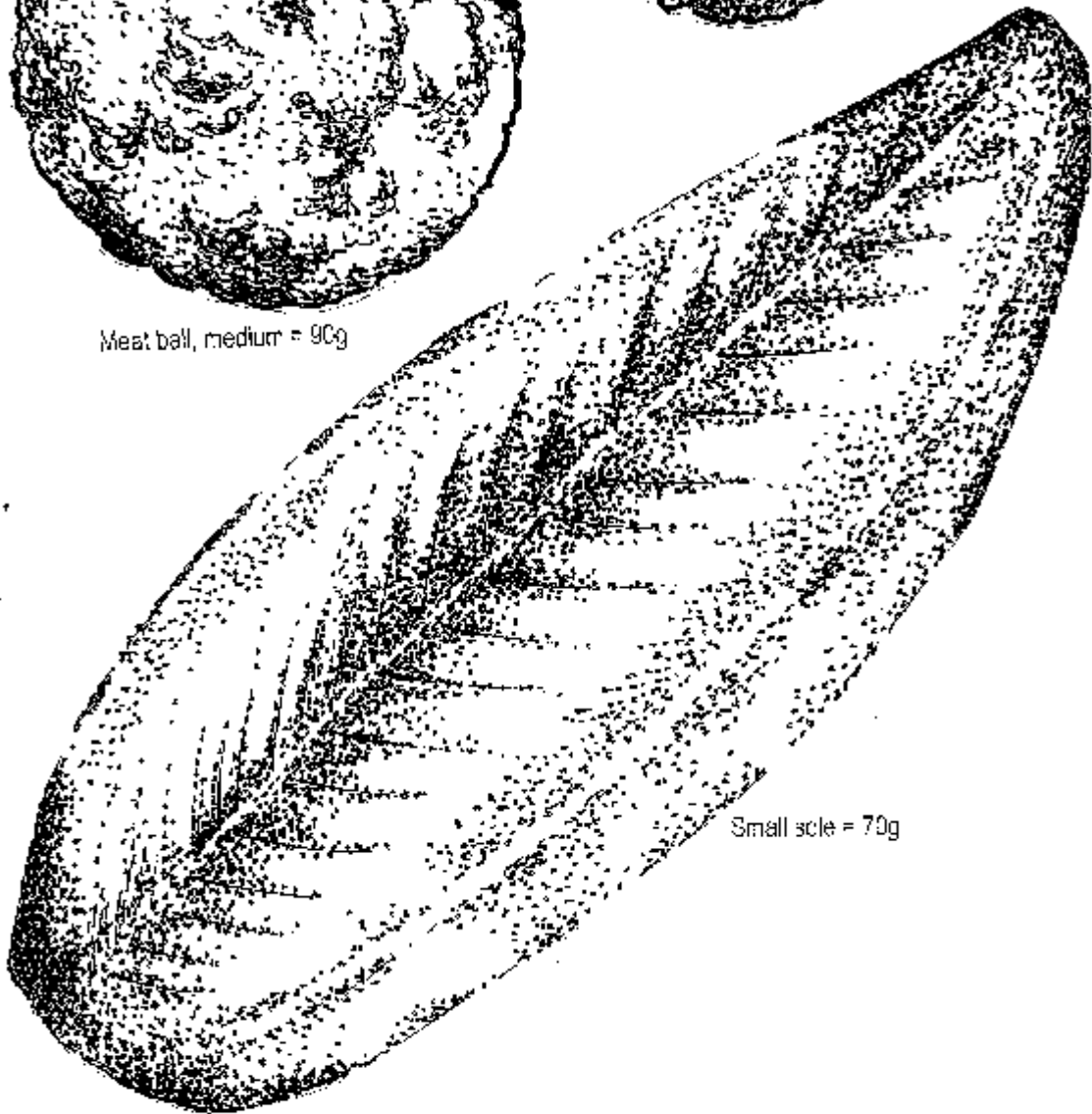
Protein food group: Meat, Fish, Poultry & Cheese

Food/Drink	Description & preparation	Portion size estimation
All meats, and poultry (see also next page).	With or without fat/ skin. With or without gravy/ sauce. Cuts/ piece. Lean or fatty. Preparation: fried, microwaved, grilled, roasted, barbequed etc.	Matchbox. Sketches. Grams.
Minced meat	Type: beef, ostrich etc. Regular, lean, extra lean.	Dough model/ grams/ matchbox/ cups.
Bredies/ Stews	Type.	Dough model or spoons (table spoon/ ladle).
Fish	Specify type of fish. Grilled, fried (with/ without batter). Covered with a sauce, specify the sauce.	See sketch/ matchbox/ measure size of piece. Canned tuna can be specified in terms of tablespoons /tins (e.g. 1/2 tin, 1/4 tin etc.).
Cold meats	Type.	Sliced thin (1mm), medium (2mm) or thick (4mm). Estimate size: surface area of dough model.
Sausages	Specify type e.g. viennas, russians, frankfurters, boerewors (thick/ thin) etc.	Measure length and diameter in cm e.g. 10cm x 2cm.
Meatpies/ Sausage rolls.	Commercial / homemade. Individual pie/ helping from dish Type: chicken, feta & spinach etc.	Measure size of piece in cm e.g. 10cm x 5cm x 5cm. If round: specify thickness, and diameter in cm.
Samosas	Type.	Measure length of sides in cm e.g. 5cm x 5cm x 8cm.
Bacon		Number of rashers.
Eggs	Preparation: fried/ boiled/ scrambled/ poached/ omelet etc. Specify type & amount of fat used.	Number & size of eggs. Spoons/ ml.
Cheese	Specify type: Cream, cottage, hard, soft, low fat; write in the name e.g. cheddar, tussers etc. and brand names.	Matchbox/ slices (specify thickness & lengths in cm). If grated: spoons/ml/ cups.

Meat bal, small = 60g

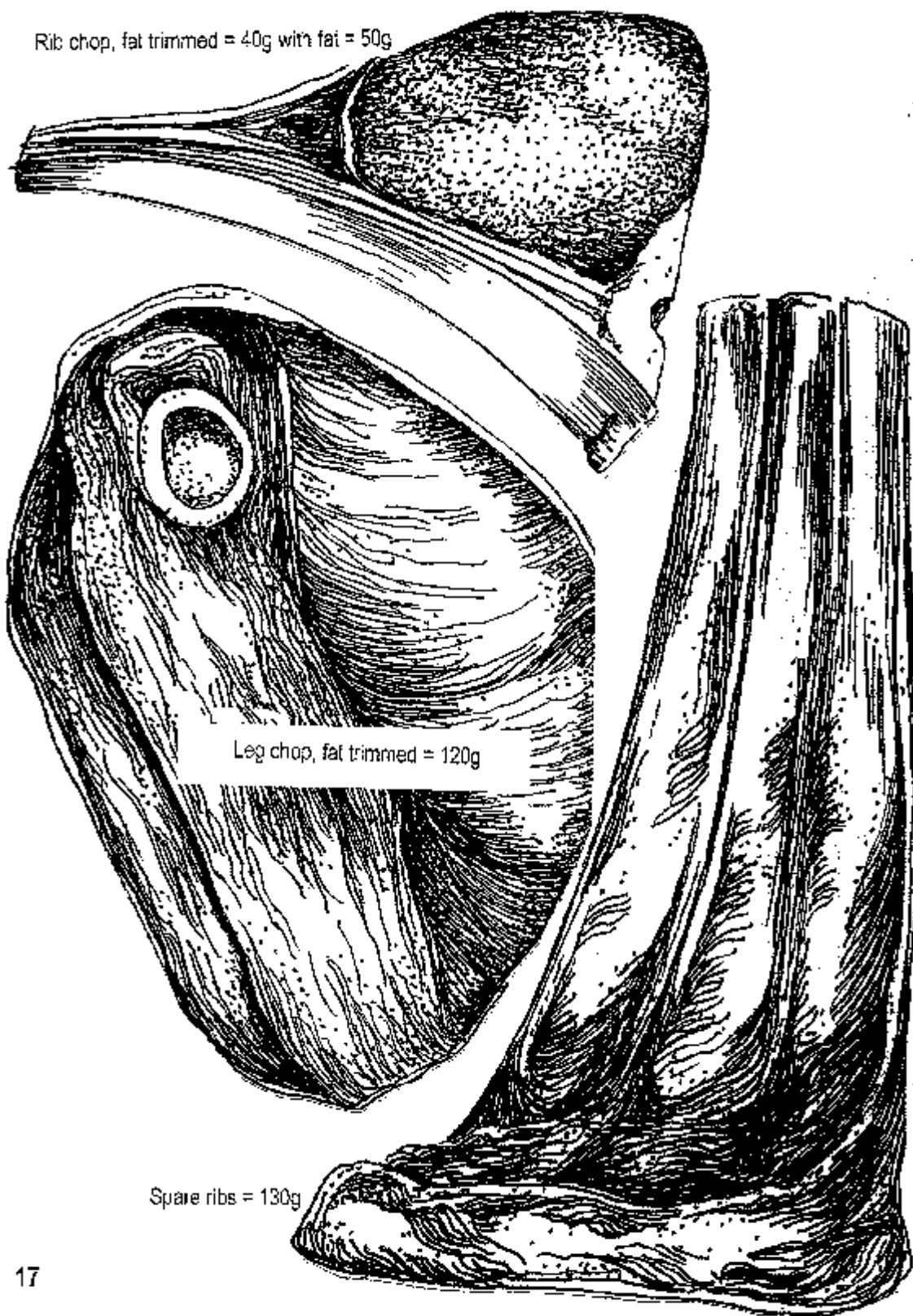


Meat ball, medium = 90g

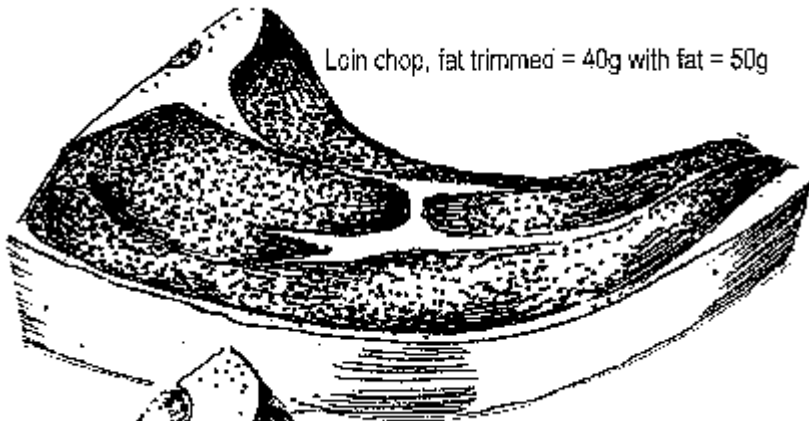


Small sole = 70g

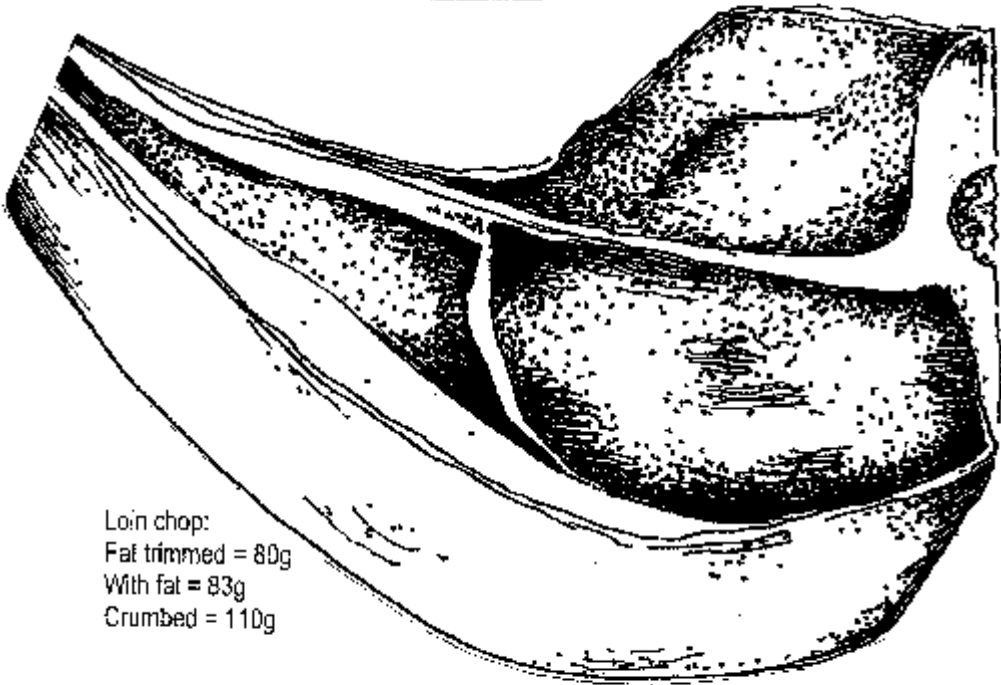
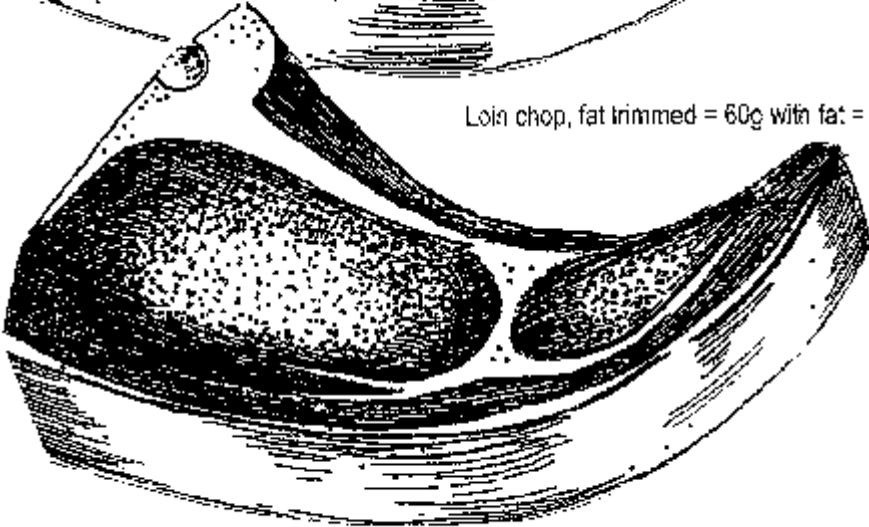
Rib chop, fat trimmed = 40g with fat = 50g



Loin chop, fat trimmed = 40g with fat = 50g

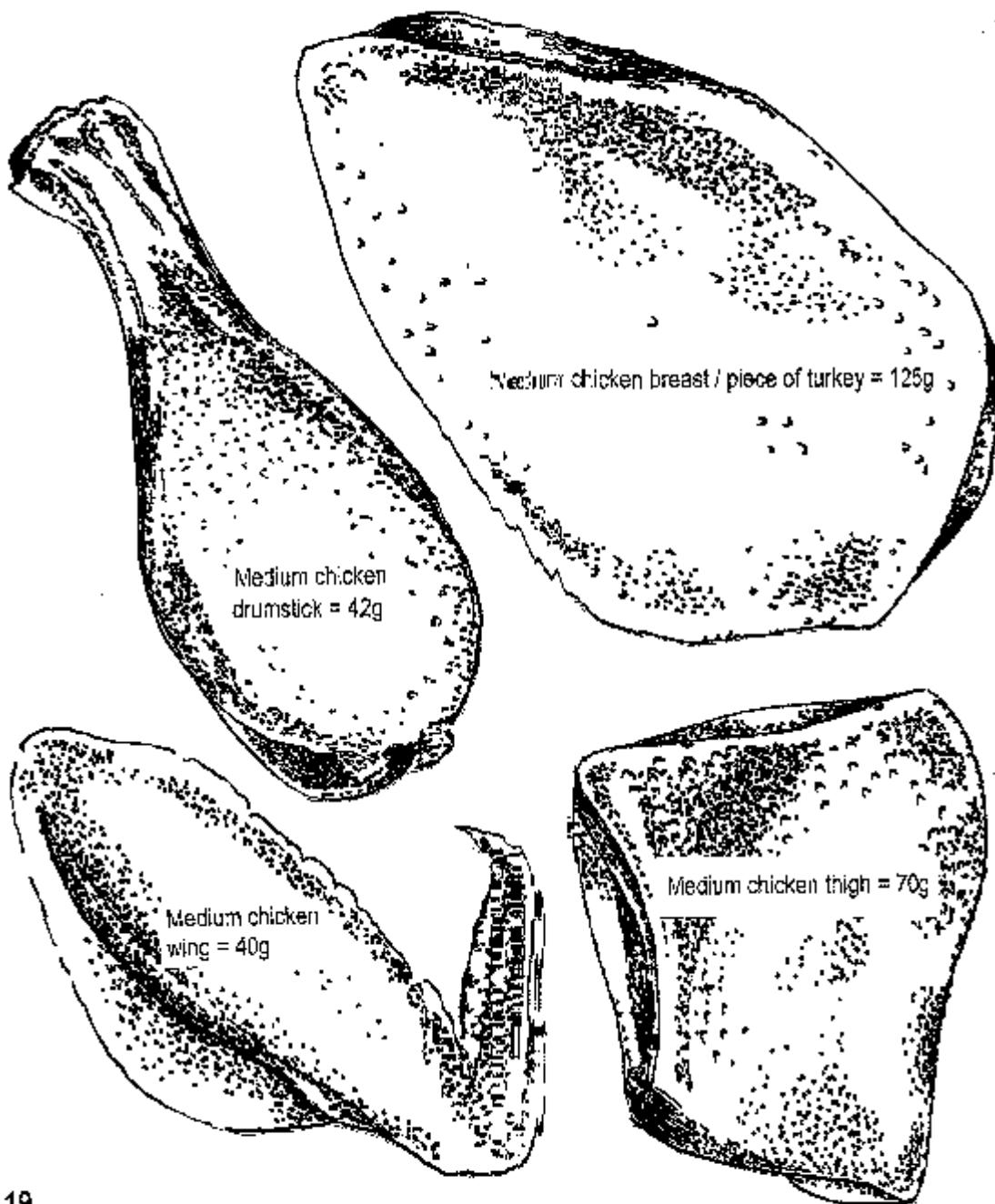


Loin chop, fat trimmed = 60g with fat = 70g



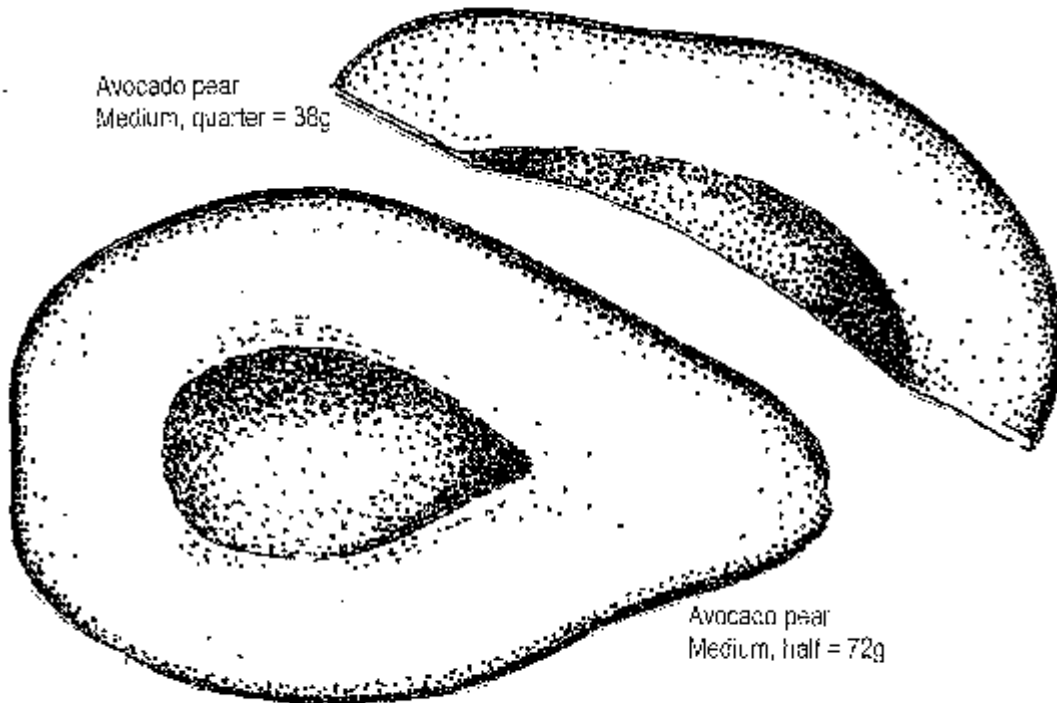
Loin chop:
Fat trimmed = 80g
With fat = 83g
Crumbed = 110g

Food/Drink	Description & preparation	Portion size estimation
Chicken	Specify cut: drumstick, wing, thigh, breast, etc. With or without skin. Preparation method: grilled, fried, etc. Commercial e.g. Kentucky	See sketches.



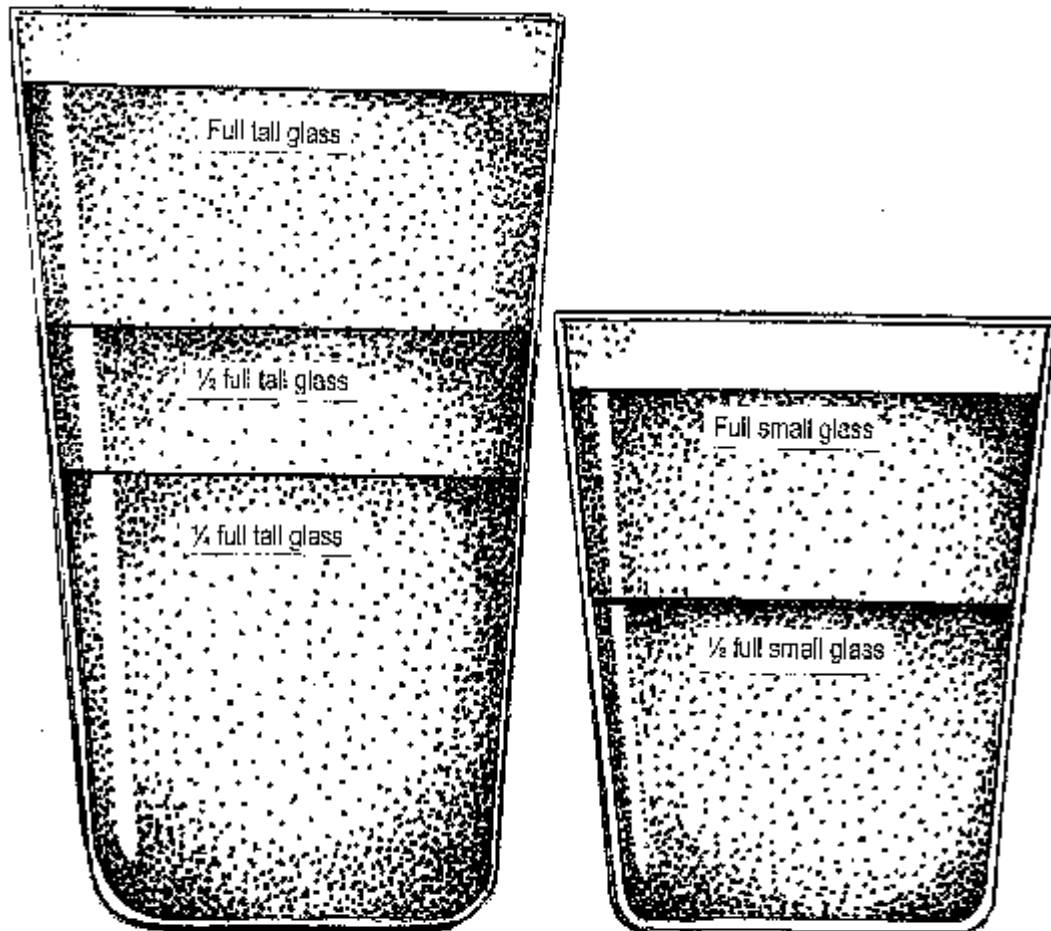
Fats/ Extras

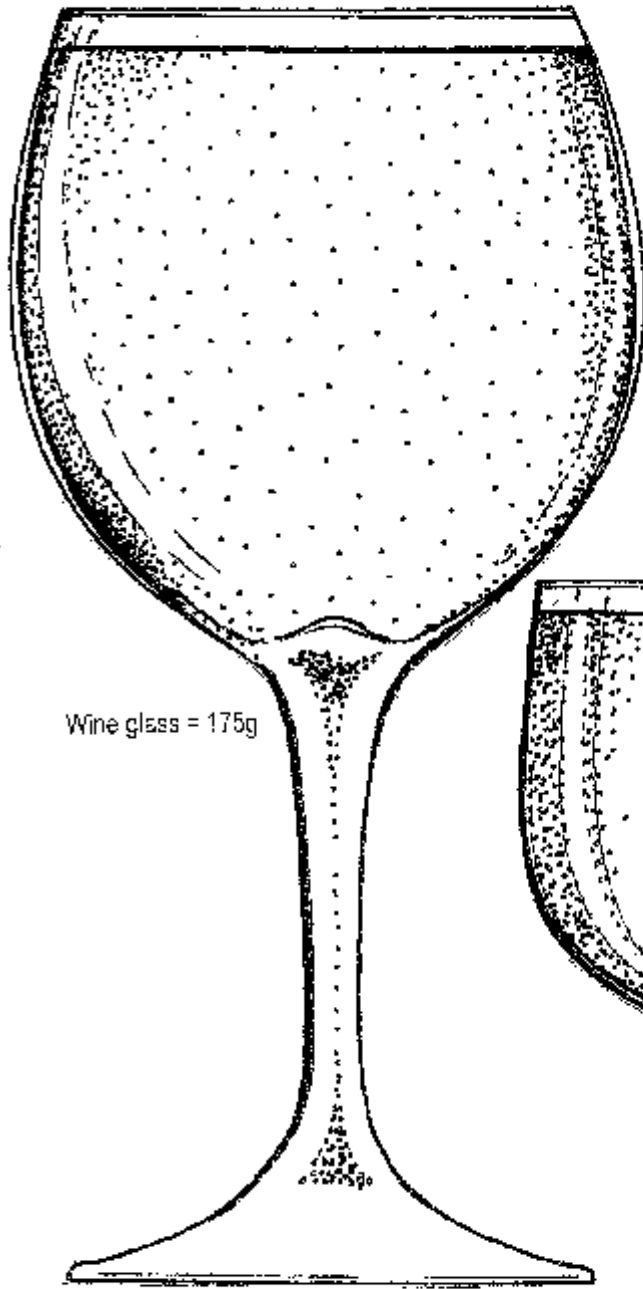
Food/Drink	Description & preparation	Portion size estimation
Avocado pear		Estimate in terms of ¼ of an avo (see sketches)
Olives		Record number.
Oil	Type: sunflower, olive etc.	ml/ spoons.
Margarine & butter	Type & brand name	ml/ spoons.
Mayonnaise	Type & brand name	ml/ spoons.
Chips	Type	Record weight as indicated on packet or estimate in terms of handfuls/ dough model
Peanuts/ nuts	Type	Record weight as indicated on packet or estimate in terms of handfuls/ dough model
Jelly, ice-cream, custard	Type	Dough model/ caps/ ml.
Sweets & chocolates	Type	Record weight as indicated on bar or measure in cm. Number of sweets.
Spreads: jam, honey, peanut butter	Type	Teaspoons/ ml.
Cakes & tarts	Specify type e.g. chocolate (with or without icing), waffles (with cream or ice cream) date loaf, jam rolls, cheese cake, fat cakes (vetkoeke) etc.	Measure size in cm e.g. rectangular/ square piece = 2cm x 10cm x 10cm. Wedge = length in cm & measure widest part



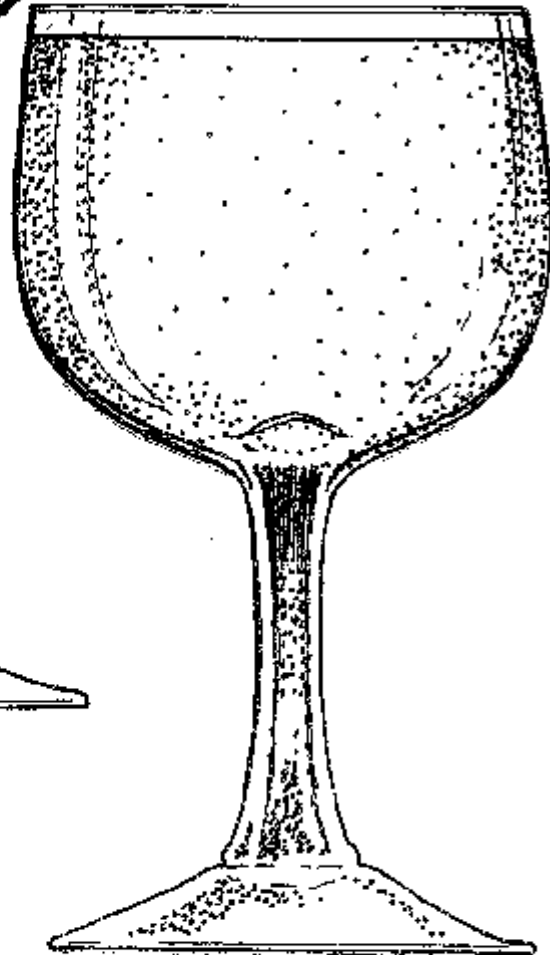
GLASSES

Food/Drink	Description (e.g. preparation)	Portion/size estimation
Coffee / tea	Sugar, milk (skimmed, low fat or full cream milk), creamer (e.g. Cremora), whitener added.	Amount of milk or powder or sugar can be estimated in terms of teaspoons or tablespoons.
Cold drinks, energy drinks etc.	Type & brand name.	Glasses (see sketches)/ Record volumes of containers.
Wine	Type: red, white, dry, sweet etc.	Wine glass (see sketches).
Sherry, port, dessert wines	Type.	Standard sherry glass.
Spirits (whiskey, brandy, vodka etc.)	Type. Mixed with water/ soda/ juice etc.	Number of tots. If mixer used, specify size of glass.
Beer, ciders, coolers	Type & brand names. Normal/ lite.	Write down volume of cans, bottles or glasses.
Liqueurs	Type.	Standard liqueur glass.





Wine glass = 175g



Wine glass = 120g



**Ms J Cilliers
Dr M Senekal**

Food Group Examples of Serving Sizes		Visual Comparison to Serving Sizes
Starch Group	<ul style="list-style-type: none"> • ½ cup ready to eat cereal • 1 slice of bread • ½ hamburger roll • 1 ½ cups popcorn • ½ cup cooked porridge • ½ cup rice, mealie rice, samp or pasta • 1 ½ potato/sweet potato • ½ cup mashed potato 	<ul style="list-style-type: none"> • ½ cup of pasta or rice is about the size of a small fist, cup cake wrapper or ice cream scoop • 1 ½ potato/sweet potato is about the size of a tennis ball
Vegetable Group	<ul style="list-style-type: none"> • 1 cup raw leafy vegetables • ½ other vegetables, cooked or chopped raw • ¾ cup vegetable juice 	<ul style="list-style-type: none"> • 1 cup chopped fresh greens is about the size of a small hand holding a tennis ball • ½ cup of vegetables is the size of a light bulb
Fruit Group	<ul style="list-style-type: none"> • 1 medium apple, banana, orange, peach • ½ grape fruit, mango or small pawpaw • ½ cup chopped cooked canned fruit • ¾ cup fruit juice • ¼ cup dried fruit 	<ul style="list-style-type: none"> • 1 fruit is about the size of a tennis ball or two golf balls
Milk Group	<ul style="list-style-type: none"> • 1 cup milk, yoghurt or buttermilk 	
Protein Group (Meat, Fish, Poultry and Cheese)	<ul style="list-style-type: none"> • 60-90g cooked, lean meat, poultry or fish • 60-90g lean sliced meat such as ham or beef • 1 medium pork chop • 1 chicken breast • ¾ cup cooked dry beans, peas or lentils • ½ cup soy products • 2 tablespoons of peanut butter (count as 30g of meat) • 45g cheese, e.g. cheddar, mozzarella • 45g cottage cheese is a ¼ of a tub • 1/3 cup of nuts • 1 egg 	<ul style="list-style-type: none"> • 90g of meat, poultry or fish is about the size of a deck of playing cards or the palm of a woman's hand • 30g of meat is about the size of a match box • 2 tablespoons of peanut butter is the size of a ping-pong/table tennis ball • 30g of cheese is about the size of a thumb or about 4 dice • A serving of nuts is about 1 tight hand full

ADDENDUM F: Interview guide for the semi-structured, in-depth interviews

Topic	Discussion		
Introduction	Interviewer's name		
Topic of interview	I would like to talk to you today about the weight loss intervention you enquired about/participated in.		
Aim of interview and responses	There are no right or wrong answers to any of the questions. I am merely trying to get some information about the experience you had with this weight loss intervention in order to improve future interventions of this nature.		
Explaining note-taking and tape recording (interviewer's name) will be taking notes during our discussion to help with the understanding of the information you will be giving me. I would also like to use a tape recorder to ensure that your answers are recorded accurately. Are you happy with that?		
Confidentiality	This discussion is confidential and I will not use any names in the research report or any subsequent publication of the results.		
Check understanding	Do you understand?		
Clarification needed	Do you have any questions?		
Group A: Those who enquired about the programme but never arrived for baseline screening (despite being found eligible)	Group B & C: Those who entered the programme but stopped attending sessions by week 2 (B) and 14 (C)	Group D: Those who completed the programme and returned for the 14-16 week follow-up	
1. Why were you interested in the intervention?	1. Why were you interested in the intervention?	1. Why were you interested in the intervention?	
2. What would it mean to you if you lost weight?	2. What would it mean to you if you lost weight?	2. What would it mean to you if you lost weight?	
3. What did you think the intervention involved when you contacted us?	3. What did you think the intervention involved when you contacted us?	3. What did you think the intervention involved when you contacted us?	
4. Why did you not join the intervention?	4. Why did you stop coming to the intervention?	4. Why did you keep on coming to the intervention?	
5. What did the people around you (e.g. family, friends, colleagues) think about trying to lose weight?	5. What did the people around you (e.g. family, friends, colleagues) think about trying to lose weight?	5. What did the people around you (e.g. family, friends, colleagues) think about trying to lose weight?	

6. What type of weight loss intervention will work best for you?	6. What made it easy to follow the intervention?	6. What made it easy to follow the intervention?
7. Is there anything else you would like to say?	7. What made it difficult to follow the intervention?*	7. What made it difficult to follow the intervention?*
	8. What type of weight loss intervention will work best for you?	8. What type of weight loss intervention will work best for you?
	9. Is there anything else you would like to say?	9. Is there anything else you would like to say?

*specific prompts related to logistics e.g. time and venue, food around you at home/work, culture

ADDENDUM G: Focus group discussion guide for intervention facilitators

Topic	Discussion
Introduction	Facilitator and scribe's names
Topic of interview	We would like to talk to you today about your experiences with the weight loss programme you facilitated for overweight and obese Zulu women in Durban and Pietermaritzburg
Aim of focus group and responses	There are no right or wrong answers to any of the questions. We are merely trying to document your experience with the programme in order to determine perspectives on the reason/s for the high attrition rate from the program and make recommendations for planning future programmes of this nature
Talking to one another	As we will be discussing a few concepts it will be important that only one person speaks at a time so that your responses and opinions can be documented accurately
Explaining note-taking and tape recording (scribe's name) will be taking notes during our discussion to facilitate analysis of the content of our discussion. A tape recorder will be used to ensure that your responses are recorded accurately.
Confidentiality	This discussion is confidential and we will not use any names in the research report or any subsequent publication of the results.
Check understanding	Does everyone understand?
Clarification needed	Do you have any questions?
Discussion topics	
<ol style="list-style-type: none"> 1. Please tell us a bit about your work. 2. Why were subjects interested in the program? (probe: motivating factors) 3. How did you experience subject participation? (probe: enthusiasm, apathy) 4. Why did subjects stay in the program? (probe: motivating factors) 5. Why did subjects drop out of the program? (probe: culture) 6. Which program aspects worked? 	

7. Which program aspects did not work?
8. What would you do differently if you were to develop a weight loss programme for a similar target group?
9. So in summary you are saying....
10. All things considered, how did you experience the facilitation of the programme?
11. Thank you for your time. Do you have any questions you would like to ask?

**FOCUS GROUP PARTICIPANT INFORMATION AND INFORMED CONSENT FORM:
DIETITIANS**

TITLE OF RESEARCH PROJECT:

Barriers to entry into a structured weight loss program and reason for attrition from the program in urban overweight/obese Zulu women: A qualitative study

PRINCIPAL INVESTIGATOR:

Suna Kassier
Dietetics and Human Nutrition
School of Agricultural, Earth and Environmental Sciences
College of Agriculture, Engineering and Science
University of KwaZulu-Natal
Pietermaritzburg

CONTACT DETAILS:

Phone: (033) 260 - 5431
Cell: 083 6588 349
Email: kassiers@ukzn.ac.za

I would like to invite you to participate in a research project that involves an investigation into the barriers to entry into a structured weight loss program and reasons for attrition from the program.

Why have you been invited to participate?

Your role as facilitator of the intervention related to the main study (weight loss project) makes you eligible for participation in the current study.

What procedures will be involved in this research?

You will be part of a focus group discussion where the aim would be to document your experience with the programme in order to determine perspectives on the reason/s for the high attrition rate

from the program. The focus group discussion with an approximate duration of 90 minutes will be tape recorded to ensure that your answers are recorded accurately. Notes will also be taken during the discussion to ensure that your opinion is interpreted accurately.

Will you benefit financially from this research?

On participation in this study you will receive a gift voucher to the value of R100 to compensate for your time and effort.

There are a few further things we would like you to know:

- This research project was approved by the UCT Research Ethics Committee to ensure that the research is acceptable and safe.
- Your information will be confidential as we identify you with a code number only.
- You have the right to withdraw from the study at any stage without providing a reason.
- You will not benefit directly if you participate in this research, but the information generated can be used in the development of weight management programmes.
- If you have any questions or concerns regarding the research, please feel free to contact Prof M Senekal (021 4066784) or Prof Mark Blockman (021-406 6626).

Declaration by participant

By signing below, I agree to take part in this study entitled:
Barriers to entry into a structured weight loss program and reason for attrition from the program in urban overweight/obese Zulu women: A qualitative study

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable. I have had a chance to ask questions and all my questions have been adequately answered
- I understand that taking part in this study is voluntary and I have not been pressurised to take part

Signed at (place) on (date)2010

.....

Signature of participant

Signature of witness

ADDENDUM H: Focus group discussion guide for newly recruited urban overweight/obese Zulu women

Topic	Discussion
Introduction	Facilitator and scribe's names
Topic of interview	We would like to talk to you today about your opinion on aspects such as the association between weight and health, what is considered to be a healthy weight and your opinion on weight loss.
Aim of focus group and responses	There are no right or wrong answers to any of the questions. We are merely trying to document your opinion on aspects related to weight and weight loss. This could assist us with the planning of future weight loss programs.
Talking to one another	As we will be discussing a few concepts it will be important that only one person speaks at a time so that your responses and opinions can be documented accurately
Explaining note-taking and tape recording (scribe's name) will be taking notes during our discussion to help analyse the content of our discussion. A tape recorder will be used to ensure that your responses are recorded accurately.
Confidentiality	This discussion is confidential and we will not use any names in the research report or any subsequent publication of the results.
Check understanding	Does everyone understand?
Clarification needed	Do you have any questions?
Discussion topics	
<ol style="list-style-type: none"> 1. Please tell us about yourself. 2. What do you feel is an acceptable weight? 3. What do you think is the association between weight and health? 4. What would you do if a health worker (e.g. nurse or doctor) told you that your weight can cause health problems such as heart disease, hypertension or diabetes because it is too high? 	

5. What do you think about the option/possibility to lose weight to make sure that you remain healthy?
6. What type of weight loss method do you think will work best for you?
7. What would people around you say if you decided to lose weight?
8. So in summary you are saying...
9. Thank you for your time. Do you have any questions you would like to ask?

Prompts to encourage all the focus group discussions included the following phrases:

"Why do you feel that way?"

"Tell me more..."

"In what way...?"

"I don't understand what you are saying"

"Tell me more about your thoughts on..."

"I would like to hear from each of you on..."

"Would you explain further?"

"Can you give me an example?"

Source: Morrison-Beedy et al., (2001) and Greenbaum (2000)

FOCUS GROUP PARTICIPANT INFORMATION AND INFORMED CONSENT FOR NEW SUBJECTS

TITLE OF RESEARCH PROJECT:

Barriers to entry into a structured weight loss program and reason for attrition from the program in urban overweight/obese Zulu women: A qualitative study

PRINCIPAL INVESTIGATOR:

Suna Kassier

Dietetics and Human Nutrition

School of Agricultural, Earth and Environmental Sciences

College of Agriculture, Engineering and Science

University of KwaZulu-Natal

Pietermaritzburg

CONTACT DETAILS:

Phone: (033) 260 - 5431

Cell: 083 6588 349

Email: kassiers@ukzn.ac.za

I would like to invite you to participate in a research project that involves an investigation into the barriers to participation in a structured weight loss program.

Why have you been invited to participate?

Due to the fact that you have seldom/never tried to lose weight you have been found eligible to participate in the current study.

What procedures will be involved in this research?

You will be part of a focus group discussion where the aim would be to get your opinion on aspects such as the association between weight and health, what is considered to be a healthy weight and your opinion on weight loss. The focus group discussion with an approximate duration of 90 minutes will be tape recorded to ensure that your answers are recorded accurately. Notes will also be taken during the discussion to ensure that your opinion is interpreted accurately.

Will you benefit financially from this research?

On participation in this study you will receive a gift voucher to the value of R100 to compensate for your time and effort.

There are a few further things we would like you to know:

- This research project was approved by the UCT Research Ethics Committee to ensure that the research is acceptable and safe.
- Your information will be confidential as we identify you with a code number only.
- You have the right to withdraw from the study at any stage without providing a reason.
- You will not benefit directly if you participate in this research, but the information generated can be used in the development of weight management programmes.
- If you have any questions or concerns regarding the research, please feel free to contact Prof M Senekal (021 4066784) or Prof Mark Blockman (021-406 6626).

Declaration by participant

By signing below, I agree to take part in this study entitled:
Barriers to entry into a structured weight loss program and reason for attrition from the program in urban overweight/obese Zulu women: A qualitative study

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable. I have had a chance to ask questions and all my questions have been adequately answered
- I understand that taking part in this study is voluntary and I have not been pressurised to take part

Signed at (place) on (date)2010

.....

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Signature of participant

Signature of witness