Aspects of Knowledge, Attitudes and Practices of Medical Practitioners on Obesity and Weight Management in Three Urban Centres in Kenya.

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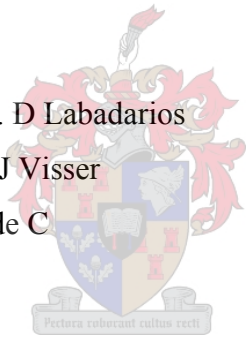
Thesis presented to the Department of Human Nutrition of the University of Stellenbosch in partial fulfilment of the requirements for the degree of Masters of Nutrition



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DECLARATION OF ORIGINAL WORK

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously, in its entirety or in part, submitted it at any university for a degree.

Signature **December 2005**

Abstract

Objectives: To determine aspects of knowledge, attitudes and practices of Medical Practitioners on obesity and weight management in three urban centres in Kenya.

Research methods and procedures: A cross sectional survey of a randomly selected sample of 485 Medical Practitioners (MPs) from three urban centres in Kenya namely Nairobi, Mombasa and Kisumu was carried out. Four hundred and thirty (89% response) questionnaires were fully completed and returned. Data was gathered on the demographics of the study population; knowledge of nutrition and obesity; awareness of obesity as a health problem assessment, management (diet, exercise and pharmacology) and practices regarding obesity as well as if and how the MPs would like their knowledge of obesity improved.

Results: The MPs considered weight management as important and believed they had an important role to play. Despite the fact that some of the MPs had completed training on obesity (15%) and nutrition (53%) and nutrition respectively, they were still not confident enough to give nutrition advice to their patients. Only 2.2% of all the MPs referred their patients to dieticians for weight management. The MPs had poor knowledge of weight loss drugs yet they actively prescribed them drugs. Only 36% and 25% of the MPs actively assessed and managed obesity respectively.

Conclusion: Although the MPs gave patients advice on diet and exercise and prescribed weight loss drugs. However, the outcome of this study indicates that, they were not confident and they did not have the necessary knowledge to manage obese and overweight patients. In view of the current **epidemic** proportions, obesity has attained worldwide, all Medical Practitioners should take the initiative to acquire the necessary skills and knowledge in managing this problem.

Abstrak

Doelwitte: Om aspekte van kennis, houdings en praktyke van mediese praktisyns rakende vetsug en gewigsbeheer in drie stedelike sentra in Kenya te bepaal.

Navorsingsmetodes en –prosedures 'n Dwarssnit opname van 'n ewekansig geselekteerde steekproef van 485 Mediese Praktisyns (MPs) van drie stedelike sentra in Kenya. Vierhonderd-en-dertig (89% respons) vraelyste was volledig voltooi en terugbesorg. Data was verkry rakende die demografie van die studiepopulasie, kennis van voeding en vetsug, bewustheid van vetsug as 'n gesondheidsprobleem, evaluering, hantering (dieet, oefening en farmakologie) en praktyke rakende vetsug sowel as hoe die MPs hul kennis van vetsug wil verbeter.

Resultate: Die MPs beskou gewigsbeheer as belangrik en glo dat hul 'n belangrike rol te speel het. Ten spyte van die feit dat 15% en 53% van die MPs opleiding rakende onderskeidelik vetsug en voeding voltooi het, het hul steeds nie genoeg selfvertroue gehad om voedingsadvies aan hul pasiënte te verskaf nie. Slegs 2.2% van al die MPs het hul pasiënte na dieetkundiges verwys vir gewigsbeheer. Die MPs se kennis rakende gewigsverlies middele was swak, maar ten spyte hiervan skryf hul aktief hierdie middels voor. Slegs 36% en 25% van die MPs evalueer aktief en hanteer vetsug onderskeidelik.

Gevolgtrekking: Die MPs het pasiënte advies gegee rakende dieet en oefening en het gewigsverlies middels voorgeskryf. Die uitkoms van hierdie studie dui nogtans daarop dat hul nie genoeg selfvertroue en die nodige kennis gehad het om vetsugtige en oorgewig pasiënte te hanteer nie. In lig van die huidige wêreldwye vetsug **epidemie** behoort alle MPs die inisiatief te neem om die nodige vaardighede en kennis vir die hantering van vetsug te verkry.

Dedication

To my Mother,

Who spent sleepless nights, trying to make money to educate me. Single-handedly she toiled day and night. She taught me that education is power and a woman's greatest protection. The way I saw her struggle to put food on the table and to take all six of us to school is my motivation to continue and never to give up.

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I cannot forget Nestle Nutrition Institute Africa, for the scholarship award, which helped me finish my thesis and pay part of my fee balance at the University of Stellenbosch.

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ABBREVIATIONS

BED	-	Binge Eating Disorder
BIA	-	Bioelectrical Impedance Analysis
BMI	-	Body Mass Index
BMR	-	Basal Metabolic Rate
BRFSS	-	Behavioural risk factor surveillance system
CDC	-	Centres for Disease Control
CHD	-	Coronary Heart Disease
CT	-	Computerized Tomography
DEXA	-	Dual Energy X-ray Absorptiometry
DHS		Demographic Health Survey
DNA	-	Deoxyribo Nucleic Acid
FDA	-	Food and Drug Administration
GERD	-	Gastro-oesophageal reflux disease
GERD	-	Gastro-oesophageal reflux disease
GNP	-	Gross National Product
GPs	-	General practitioners
GYNA	-	Gynaecologists
HDL-C	-	High Density Lipoprotein Cholesterol
Ht	-	Height
IOTF	-	International Obesity Task Force
KMD	-	Kenya Medical Directory
KMPB	-	Kenya Medical Practitioners board
LDL-C	-	Low Density Lipoprotein Cholesterol
LPL	-	Lipoprotein Lipase
MetSyn	-	Metabolic syndrome
MJ	-	Mega joule
MONICA	-	Monitoring trends and determinants in cardiovascular disease
MPs	-	Medical Practitioners

MRI	-	Magnetic Resonance Imaging
NCEP	-	National cholesterol education program
NES	-	Night Eating Syndrome
NHANES	-	National Health and Nutrition Examination Survey
NHES	-	National Health Examination Survey
NHI	-	National Health Institute
NHMRC	-	National Health and Medical Research Council
NIDDM	-	Non-Insulin Dependant Diabetes Mellitus
NSP	-	Non-starch polysaccharides
PEAD	-	Paediatricians
PHYS	-	Physicians
PNSN	-	National Research on Health and Nutrition
RMR	-	Resting Metabolic Rate
SD	-	Standard deviation
SURG	-	Surgeons
TG	-	Triglycerides
USA	-	United States of America.
VLDL-C	-	Very Low Density Lipoprotein cholesterol
WC	-	Waist circumference
WC	-	Waist circumference
WHO	-	World Health Organization
WHR	-	Waist Hip Ratio
WHR	-	Waist hip ratio

CHAPTER ONE

DEFINING THE PROBLEM OF OVERWEIGHT AND OBESITY

1.1 WHAT IS OBESITY?

Obesity is defined by the World Health Organization (WHO) as a condition of abnormal or excess fat accumulation in adipose tissue, to the extent that health may be impaired. It is important to note that it is not only the degree of excess fat that is important, but also its distribution within the body that determines the health risks associated with the condition [1].

Obesity or overweight may be defined functionally as a maladaptive increase in the mass of somatic fat stores. In children, obesity is present when the fat component of the total body weight is more than 25% and 32% fat in boys and girls respectively [2, 3]. Although childhood obesity is often defined as a weight-for-height in excess of 25% of the ideal weight, skin fold measurements are more accurate determinants of fatness [4]. Not all obese infants become obese children, and not all obese children become obese adults. However, the prevalence of obesity increases with age among both males and females [3] and there is greater likelihood that obesity beginning even in early childhood will persist through the individual's lifespan [5]. Furthermore, children who are at particular risk for the metabolic complications of obesity are those who were underweight at birth and during infancy and later undergo rapid weight gain [6, 7]. Overweight and obesity adversely affects blood pressure, cholesterol, triglycerides and insulin resistance. The risk of coronary hear disease, ischemic stroke and type 2 diabetes mellitus increase steadily with increasing BMI. Type 2 diabetes mellitus previously confined primarily to adults for most part of the 20th century now affects children even before puberty. Modest weight reduction reduces blood pressure and abnormal blood cholesterol and substantially lowers the risk of type 2 diabetes[5].

1.1.1 Measurement of obesity

There are various methods to measure and estimate body composition and the distribution of fat. These range from the simple, useful and practical anthropometric measurements such as weight and height, from which the Body Mass Index (BMI) is derived, waist circumference, waist /hip ratio, skin fold thickness to the more sophisticated measurements such as Hydrodensitometry, Magnetic Resonance Imaging (MRI), Computerized Tomography (CT), Dual Energy X-ray Absorptiometry (DEXA), Bioelectric Impedance Analysis (BIA) and Air Displacement Plethysmography used in research [8, 9].

1.1.1.1 Body mass index (BMI)

The BMI is the most widely used population level measure for the classification of obesity and the risks associated with it (Table1.1) [10]. It provides a more accurate measure of total body fat than assessment of body weight alone. However, it does not address the distribution of fat i.e. android obesity, or abdominal distribution, and gynoid or gluto-femoral fat distribution. BMI is an index of weight for height and is calculated as the weight in kilogramsg divided by the square of the height in metres (Kg/m^2) [6]. It has been long realised that BMI is a predictor of the morbidity and mortality associated with the chronic diseases of lifestyle including type 2 diabetes CVD disease and stroke [8, 11]. Raised BMI also increases the risks of cancer of the breast, colon, prostate, endometrium, kidney and gallbladder. Although mechanisms that trigger these increased cancer risks are not fully understood, they may relate to obesity-induced hormonal changes. Chronic overweight and obesity also contribute significantly to osteoarthritis, a major cause of disability in adults [12].

The National Institute of Health (NIH) guidelines indicate that the health risk increases in a graded fashion when moving from the normal-weight through to obese BMI categories[11], and that within each BMI category men and women with high waist circumference (WC) values are at a greater health risk than are those with normal WC values. Thus, it is assumed that the BMI and WC have independent effects on obesity related co-morbidities [13].

Limitations of the BMI

The BMI does not distinguish between weight associated with fat and weight associated with muscle mass. Hence, factors such as body build and proportions are not taken into account and therefore the same BMI may reflect variations in body composition other than in body fat. Hence, BMI can therefore not be used in a muscular person because as much as the weight of the muscular individual will be high, their fat mass may be low so classifying them as obese would be incorrect. BMI does not address the type of obesity, such as android or gynoid, are known to be better determinants of current and future pathology of co-morbid diseases. Thus, although the BMI is a useful source of primary information, it should best be interpreted in combination with other assessment methods of body composition.

Table 1.1: The classification of overweight and obesity in adults according to BMI

Classification	BMI (kg/m²)	Risk of co-morbidities
Underweight	<18.5	Low; but risk of clinical complications increases
Normal Range	18.5 – 24.9	Average
Overweight	25 – 29.9	Mildly increased
Obese	≥30	
Obese Class I	30 – 34.9	Moderate
Obese class II	35 – 39.9	Severe
Obese class III	>40	Very Severe

(Source: www.iotf.org [10] viewed on 28 January 2004).
Note that these values are age-independent and correspond to the same degree of fatness across different populations.

1.1.1.2 Waist circumference

Abdominal obesity, assessed by waist circumference (WC) predicts obesity related health risks [13, 14]. This is a simple measurement, which correlates closely with the BMI and WHR. WC has been shown to be a good indicator of intra-abdominal fat mass in adults and to be associated with increased risk for chronic diseases of lifestyle (Table 1.2). It is measured at the midpoint between the iliac crest and the lower border of the rib cage. It is an appropriate index of intra-abdominal fat mass and total body fat and is strongly correlated with computerized tomography (CT) scan. The waist circumference is mainly used as an initial screening tool. However, due to difference across populations regarding level of risk associated with waist circumferences, global cut-off points have not yet been developed [10]. Changes in the waist circumference suggest changes in risk factors for chronic disease, especially cardiovascular disease [13, 14, 15]. High WC values have been associated with an increased risk of hypertension, diabetes, dyslipideamia, and metabolic syndrome[13]. The National Institute of Health cut off points for WC help to identify those at increased health risk within the normal weight, and overweight and class I obese BMI categories[11].

1.1.1.3 Waist hip ratio (WHR)

The location of fat in the body is as important as the amount of fat stored. Indeed, abdominal fat mass is considered to be of the essence in relation to the complications of obesity. According to the research conducted in Southern Africa by ARP Walker [12] men have on average twice the amount of abdominal

fat than generally found in pre-menopausal women.

Table 1.2: Waist circumference in men and women associated with increased risk for chronic diseases of lifestyle [15]

Disease Risk	Women	Men
Desired weight	< 80 cm	< 94 cm
Increased health risk, aim to loose weight	80- 87.9	94 – 101.9
High health risk, must loose weight	≥ 88 cm	≥ 102 cm

These figures have been proposed as a guide for health promotion in people of European and Indian descent, who are prone to cardiovascular disease. They have not been validated for use in African populations.

The WHR is an accepted method of identifying individuals at increased risk from obesity-related illness due to abdominal fat accumulation. A high waist–hip ratio of more than 1.0 in males and 0.85 in females predicts cardiovascular mortality in some populations, and to some extent is independent of the degree of obesity as assessed by the BMI [8, 9]. Given the difficulty of using the age adjusted associations in clinical setting, the available evidence[14] suggests that given appropriate cut-off points, WHR is the most useful measure of obesity in the identification of individuals at risk of CVD.

1.1.1.4 Skin-fold thickness

This is a measurement of the subcutaneous fat present in the body. The triceps fat fold, when compared to standard values, provides an indication of total body fat since more than half of total body fat is subcutaneous [8, 9 16,]. This is measured by pinChing a fold of skin in the triceps area using a special spring-loaded calliper. However, skin-fold thickness varies with age, gender, and race and the equations relating to skin fold thickness at several sites to total body fat need to be validated for each population. Measurement requires training since intra and inter observer reliability is poor [15]. The skin-fold thickness is mainly used in Children. A trained technician may obtain skin fold measures relatively easily. The triceps alone, triceps and sub-scapular, triceps and calf, and calf alone have been used with Children and adolescents. When the triceps and calf are used, a sum of skin-folds of 10 - 25mm is considered optimal for boys and 16 - 30mm is optimal for girls [3].

1.1.1.5 Other methods

These methods are more complex and are generally used in research. Examples of these methods include:

1.1.1.5.1 Dual energy x-ray absorptiometry (DEXA)

It offers several advantages over other methods of estimating fat mass and lean mass. This method has proved to be feasible and precise in children. It requires less subject cooperation than underwater weighing. It can provide regional body composition which cannot be determined by total body water, potassium, or nitrogen studies [16].

1.1.1.5.2 Bioelectrical impedance

A less complex method is the measurement of bioelectrical impedance. This method is relatively simple and assesses the total body water, fat mass and lean mass of a subject. Although the results are not as reliable as the gold standard of underwater weighing, it is useful in monitoring individual patient progress through serial measurements provided the equations used are population specific. The measurements may vary with ethnic and hydration status [6, 9-11].

1.1.1.5.3 Computerized tomography

This method is used to measure organ size, fat distribution and bone density. It is not a routinely available test and so it is mostly used in research cases [12, 16].

1.1.1.5.4 Air displacement plethysmography magnetic resonance imaging (MRI), Isotope dilution

These are more sophisticated body composition measurements and they are mainly used in research or to check body composition and not necessarily to measure obesity [12, 16].

1.1.2 Assessing obesity in Children

Body mass index (BMI) is a surrogate measure of body fatness that correlates quite well with direct measure of body fat, within a given population. BMI ranges for adults cannot be used in children [2, 3, 11, 13]. Age specific cut points have been developed for Children from age five to eighteen years [13].

1.2 PREVALENCE AND TRENDS OF OBESITY

1.2.1 The World Health Organization Report

The report of a WHO consultation on obesity in 1997 [17] indicates that the prevalence of overweight and obesity is rising to epidemic proportions world wide in both in the developed and the developing countries, and in both adults and children. It is predicted that the health consequences and costs of this trend will continue to increase as overweight and obesity among children is increasing worldwide. It has been suggested that obesity should be viewed as a chronic disease. Urban populations show a higher prevalence than rural populations with women having higher prevalence of obesity compared to their male counterparts who show a higher prevalence of overweight [10]. The health, economic and

psychosocial consequences of the increasing incidence of obesity are projected to be substantial [7, 8]. In the analyses carried out for this report (WHO), approximately 58% of diabetes mellitus globally, 21% of ischemic heart disease and 8–42% of certain cancers were attributable to BMI above 21 kg/m2. It also accounted for about 13% of deaths in Europe and 9–10% of deaths in America. A high BMI caused 8–15% of deaths in Europe and America, but less than 3% in Africa [5]. The Monitoring of Trends and Determinants in Cardiovascular Disease (MONICA) [18] study is a comprehensive study conducted in 48 countries and has the added advantage that the data was collected in the same period. The data is age standardized and weight and height was measured according to a standard protocol during the period 1983 to 1986. This study concluded that the African rural populations gained little weight with age; however, obesity increased dramatically with the improvement of socio-economic status and increased urbanization in some cases, thus leading to levels of obesity that exceed the prevalence in industrialized countries [9,19 ,20].

1.2.2 Prevalence

1.2.2.1 Global

In 1995, there were an estimated 200 million obese adults worldwide and another 18 million children under-five classified as overweight. As of 2000, the number of obese adults had increased to over 300 million. Contrary to conventional wisdom, the obesity epidemic is not restricted to industrialized societies; in developing countries, it is estimated that over 115 million people suffer from obesity-related disorders. Generally, although men may have higher rates of overweight, women have higher rates of obesity. For both, obesity poses a major risk for serious diet-related non-communicable diseases, including diabetes mellitus, cardiovascular disease, hypertension and stroke, and certain forms of cancer. Its health consequences range from increased risk of premature death to serious chronic conditions that reduce the overall quality of life [21]. The global prevalence of obesity is now estimated to be at 8.2%, significantly higher than the global prevalence of underweight (BMI < 17) at 5.1% [17, 21]. In the adult population, the prevalence of obesity has increased from 14.5% in 1976-1980 to 22.5% in 1994-1998 [13]. The WHO estimates that adult obesity has increased by 50% between 1995 and 2000 and worldwide 300 million people are affected [22]. As economies develop from the "least developed" to "developing" to "economy in transition" to "developed market economy" phase, obesity prevalence has increased from 1.8 to 4.8 to 17.1 to 20.4%. In less developed countries, obesity is usually prevalent among those with higher socio-economic status, is more frequent in urban areas, and is considered a mark of wealth. In developed countries, on the other hand, prevalence of obesity is

high among the poor [22, 23].

1.2.2.2 Europe

Obesity is relatively common in Europe, especially among women in Southern and Eastern European countries. Current prevalence data from national studies suggests that the range of obesity prevalence in European countries is 10 to 20 % for men, and 10 to 25% for women. The prevalence of obesity has increased by about 10-40% in the majority of European countries in the past 10 years [10, 17]. The most dramatic increase has been in the United Kingdom where it has more than doubled since 1980. There is some evidence however, that this increasing trend is levelling off among women, at least in some Scandinavian countries [21].

1.2.2.3 America

Today public health leaders recognize obesity as a "neglected public health problem" [19]. Approximately 126 million adults in the USA are overweight, 60 million obese and 9 million severely obese. The number of adults who are overweight or obese has continued to increase. Currently, 64.5% of USA adults, age 20 years and older, are overweight and 30.5% are obese. The prevalence of severe obesity currently is 4.7%, up from 2.9% reported in the 1988-1994 National Health Nutrition Examination Survey (NHANES) by the Centres for Disease Control and Prevention (CDC) [24].

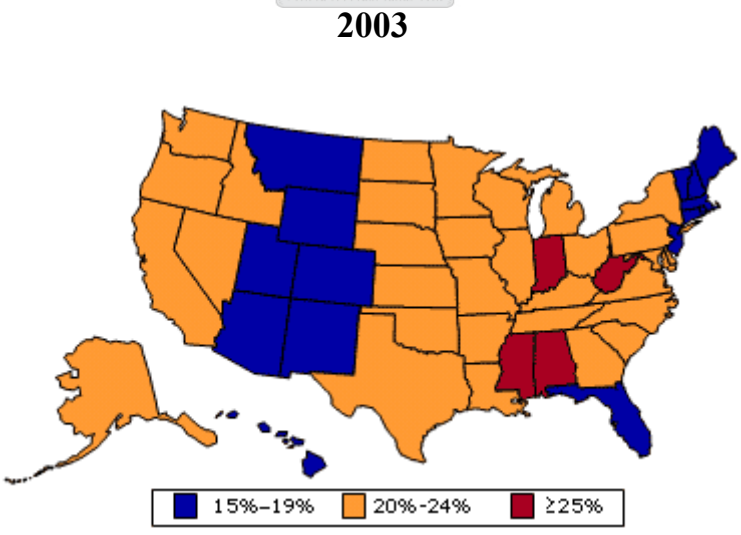


Figure 1.1: The prevalence of obesity in United States of America, BMI ≥30 for 5'4" persons.

During the past 20 years, there has been a dramatic increase in obesity in the United States. I n 1985, only a few states were participating in Centers for disease control (CDC) Behavioural Risk Factor Surveillance System (BRFSS) and were providing obesity data. In 1991, four States had obesity prevalence rates of 15–19 percent and no States had rates at or above 20 percent. However in 2003, 15 States had obesity prevalence rates of 15–19 percent; 31 States had rates of 20–24 percent; and four States had rates higher than 25 percent [25] (Figure 1.1).

Each year, State health departments use standard procedures to collect data through a series of monthly telephone interviews with U.S. adults. Prevalence estimates generated for the maps (Figure 1.1) may vary slightly from those generated for the states by Behavioural Risk Factor Surveillance System (BRFSS) as slightly different analytic methods are used [24, 25, 26].

1.2.2.4 Africa

1.2.2.4.1 Sub-Saharan Africa

In contrast to most western countries, the emphasis in Africa has been on under-nutrition and food security rather than overweight and obesity. Consequently, there is a paucity of data on current prevalence of overweight and obesity in the continent [19, 21].

1.2.2.4.2 The Republic of South Africa

The Demographic and Health Survey (DHS) carried out in 1998, documented a high prevalence of obesity among adults aged 15 years and older. The percentage of overweight in men and women was 29% and 55% respectively and obesity was 9% and 29% respectively [27]. According to the National Food Consumption Survey carried out in 1999 on children between the ages of 1-9 years, the prevalence of overweight and obesity was higher (7.5%) in urban areas than the national average (6%), and this was true for children living in formal urban areas [28].

1.2.2.4.3 Northern Africa

Morocco and Tunisia

In a survey on nutrition-related issues among women of reproductive age (n=2800) and their children (n=1200), data from children under 5 years of age and adolescents (n=500) were combined with the data from four National income and expenditure surveys (dating from 1980) to assess obesity trends and development in Morocco and Tunisia. Overall obesity affected 12.2% of the population in Morocco and 14.4% in Tunisia. Obesity was significantly higher among women than in men in both countries (respectively 22.7% vs. 6.7% respectively in Tunisia and 18% vs. 5.7% in Morocco) with prevalence among women tripling over the past 20 years. Half of all the women were overweight and

obese with 50 % in Tunisia and 51.3% (BMI ≥ 25) in Morocco. Overweight increased with age and seemed to be more prevalent in adolescents, particularly among girls. In Tunisia, 9.1% of adolescents were at risk of being overweight (BMI/age > 85th percentile) [29, 30]. Current data (1997) on Tunisia shows overweight and obesity to be present in 23.3% and 6.7% of adult males, and 28.2% and 22.7% among females respectively. This data was on population aged between 20-60 years and (n=2760) [29,30].

1.2.2.4.4 Eastern Africa

Tanzania

According to Demographic and Health Surveys Comparative Studies (1997), Tanzania has an obesity prevalence of >5% [29, 30]. A study conducted in Morogoro Municipality in Tanzania indicates the prevalence of obesity and overweight at 25 %, with 15.7% of the subjects having a Body Mass Index (BMI) of between 25 and 30, and 9.3% having a BMI of more than 30. Age and occupation of all the subjects, together with marital status of the adults, were significantly related with obesity status. The prevalence of obesity increased with increasing age whereby subjects in the 41-50 years group having the highest rate (45.4%). Similarly, married adults had higher rate of obesity (27.8%) than the single individuals (4.7%). Unlike the older age group (41-50 years), 70% of the youngest subjects were not aware of the harmful effects of obesity. On the other hand, more than two thirds of all the subjects could not associate excess body weight with chronic non-communicable diseases such as coronary heart disease, high blood pressure and respiratory disorders [31].

Kenya

Demographic and Health Surveys comparative studies show that obesity prevalence in Kenya was < 5% [29, 30]. According to recent data (1998) in adults (n=3103) aged between 15- 49 years, 12.1% were overweight, and 2.7% obese among women. This shows a 7% increase in obesity since 1988. There was no data on prevalence of obesity among men [26]. However, the increase in the prevalence of obesity cannot be underestimated and there is an urgent need for data to be collected so that policy guidelines can be established and implemented.

1.2.2.4.5 Central Africa

Prevalence of obesity is growing in all developing countries and West Africa is no exception. Data available in Cameroon in 2000, (n=3669) collected from individuals older than 15 years, 5.1% and 13.8% of males and females respectively were obese. In Ghana, the prevalence of overweight and obesity in men was 17.1% and 4.6% respectively 26.9% and 20.2% in women [26].

1.2.2.5 The Middle East

The limited data available indicates that the prevalence of obesity in Middle Eastern countries is high, particularly among women who appear in general to have a higher prevalence of obesity than women in most western countries [17, 21]. Data available from Saudi Arabia indicates the prevalence of overweight and obesity among men is 42.4% and 26.4% respectively and 31.8% and 44 % among females [26].

1.2.2.6 The Caribbean

Obesity is emerging as an increasingly important problem in the Caribbean, especially among females. A recent population survey in Jamaica found that 34% of women were obese (BMI > 30 Kg/m²) compared with 9% of men, while investigations of Jamaican adolescents revealed that approximately 20% of 11- 12 year olds had a BMI > 85th percentile [32]. Obesity is a significant problem in the Caribbean, particularly in those countries with a higher per capital, (growth National Product (GNP), and affects women more than men.

Brazil is the only South American country to have a national representative survey on health and nutrition conducted in the last 10 years. The National research on Health and Nutrition (PNSN) survey indicated that obesity is prevalent in Brazil and it is rising, especially among lower income groups. The problem of dietary deficit appears to be rapidly shifting to one of dietary excess [23].

1.2.2.7 Western Pacific countries

1.2.2.7.1 Japan and China

In Japan, obesity in men has doubled since 1982, whereas its increase in women has been restricted to the younger age group (20-29 years) in whom the prevalence has increased 1.8 times since 1976. Obesity prevalence is also increasing in China and is more common in urban areas and among men than women. Current data (1998-2000) indicate that 30.2% and 2.4% males respectively are overweight and obese to 28.9% and 5.5% of females are overweight and obese respectively. Obesity is not new to the Pacific and has long been regarded by Polynesian and Micronesian societies of this region as a symbol of high social status and prosperity. Prevalence has risen dramatically however, in the last 20 years. In 1991 for example, over 75% of urban males in Western Samoa were classified as obese [26].

1.2.3 Demographic Trends in the Prevalence of Childhood Obesity

In a study of US adolescents conducted between 1988 and 1991, the prevalence of obesity (defined as BMI> 85th percentile based on data obtained in the NHES 1 survey, 1963- 1970) rose from 15 to 22.5% in 6 to 11 year olds and 15% to 21.5 % in 12- 17 year olds [22, 34]. Using described criteria of BMI (defining obesity in children as BMI> 95th percentile based on NHES 1 survey) the prevalence of obesity among children aged 6 to 11 years has risen from 5% to 10.8% and from 5 to 10.5% in the 12-17 year olds. Thus, while the prevalence of overweight increased by an average of 40 % over this period; the prevalence of obesity has more than doubled. Factors thought to explain this increase in weight is the impact of dietary and environmental changes in a genetically susceptible subgroup within the population [35]. In studies conducted in 50 countries on prevalence of obesity in children, 32 of 50 countries had a prevalence of obesity below 2.3%, the value in the reference population. The prevalence of overweight and obesity were lowest in Asia and in Sub-Saharan Africa. In 17 countries with serial data, no consistent regional trends could be detected. Overweight was more common in urban areas, in children of mothers with higher education, and in girls; these relationships did not differ by GNP, but GNP was related negatively to stunting and positively to overweight [35]. Asia had the highest number of overweight children; 60% (or 10.6 million) of the overweight children from developing countries lived in this region. Within the UN sub regions, the highest rate of overweight children was in North Africa (8.1%), being accounted for mainly by Algeria (9.2%), Egypt (8.6%), and Morocco (6.8%). Southern Africa ranks second in the descending order of prevalence (6.5%), mainly because of the prevalence in South Africa, where a national survey conducted in 1995 showed that 6.7% of preschool children were overweight. The lowest rates of overweight but the highest rates of wasting, respectively, were documented in South-Central Asia (2.1% and 15.4%), followed by South-Eastern Asia (2.4% and 10.4%) and western Africa (2.6% and 15.6%) [36]. Obesity does not appear to be a public health problem among preschool children in Asia and Sub-Saharan Africa. In a number of countries in Latin America and the Caribbean, the Middle East and North Africa, and the region of Central Eastern Europe/Commonwealth of Independent States, levels are as high as in the United States[37].

1.3 FACTORS INFLUENCING THE DEVELOPMENT OF OVERWEIGHT AND OBESITY

Almost all countries (high income and low income alike are experiencing an obesity epidemic, although with great variation between and within countries. In low-income countries, obesity is more

common in middle-aged women, people of high socio-economic status and those living in urban communities [38, 39]. Obesity threatens to become the 21st century's leading health problem, as more nations become industrialized and urbanized, the prevalence of obesity will inevitably rise. The cause of this increasing prevalence is thought to be two-fold. Firstly, food is more available to everyone, and second the physical activity of people decreases with increasing urbanization. Recent breakthroughs leading toward understanding of the genetic basis of obesity in laboratory animals have focused attention on the endogenous causes of weight gain, but powerful socio-economic forces are at work [40, 41]. Obesity is a consequence of an energy imbalance where energy intake has exceeded energy expenditure over a considerable period. The interactions of the major influence on energy balance and weight gain are the powerful societal and environmental forces behind the increasing trend. Advertising, industrialization, urbanization occurring in most countries around the world is associated with changes in diet and behaviour; in particular, diets are becoming richer in fat and high-energy foods accompanied by lifestyles that are more sedentary. All these changes influence energy intake and expenditure, and can overwhelm the physiological regulatory mechanism(s), which control body weight [22, 40].

The susceptibility of individuals to these forces is affected by genetic and other biological factors, such as gender, age, and hormonal status, over which they have no control. Behavioural and environmental patterns are considered the modifiable intermediate factors through which the weight gain promoting forces act [17].

1.3.1 Individual / Biological Susceptibility

Epidemiological, genetic and molecular studies of populations all over the world suggest that some people are more susceptible than others to becoming overweight and obese and those susceptible individuals exist in countries that differ widely in lifestyle and environmental conditions [40, 41, 42]. Biological factors include genetic predisposition, resting energy expenditure and fat cell number.

1.3.1.1 Genetic susceptibility

The role of genetic factors in weight gain is currently the subject of much research [25, 26]. While it is possible that single, or multiple gene effects may directly cause overweight and obesity, and indeed does so in some individuals, this does not appear to be the case in the majority of people. Instead, it is considered that genes involved in weight gain increase the risk or susceptibility of an individual to the development of obesity when exposed to an adverse environment. For instance, a study on adopted children [43], found that adoptees weights correlated most strongly with the biological parents weights

when 540 adult adoptees weights was compared to weights of adoptive and biological parents. In a separate twin, study carried out by Bouchard et al [38] found that weight gain was strongly correlated within twin pairs. Twelve pairs of identical male twins of normal weight in a controlled research environment was overfed by 1000 extra calories per day for 100 days. The assumption was that weight gain would be identical across all subjects, but weight gain was highly variable (4-14 Kg).

1.3.1.1.1 Heredity

The level of heredity is the fraction of population variation in a trait (e.g. BMI) that can be explained by genetic transmission, and a large number studies of twins, adoption and family characteristics on the heredity of different measures of obesity have been studied [27, 28]. Adoption studies tend to generate the lowest estimates and twin studies the highest estimates of weight differences. Recently, however, the application of complex analytical techniques in databases encompassing all types of studies has led to the conclusion that the true heredity of BMI in large sample sizes was likely to be in the ranges 25-40% [41, 43, 44]. On the other hand, similar genetic epidemiological research has shown that the profile of fat distribution was also characterized by a significant heredity level of the order of about 50% of total human variation [43, 44]. Finally, recent studies have shown that the amount of abdominal fat is influenced by a genetic component accounting for 50- 60% of the individual differences [38, 45]. Obesity tends to run in families and obese children frequently have obese parents. However, there is a dearth of data concerning the level of risk of developing obesity for first-degree relatives of an overweight, moderately or severely obese person in comparison with the population prevalence of the condition. One of the first papers on this topic [43] concluded that the relative risk was about 2-fold for overweight, increasing to about 3-4-fold for higher levels of obesity. Heredity has recently been shown to influence fatness, regional fat distribution and response to overfeeding. In addition, infants born to overweight mothers have been found to be less active and to gain more weight by the age of three months when compared with infants of normal weight mothers, suggesting a possible inborn drive to conserve energy[39].

1.3.1.1.2 Environmental interactions

While some individuals are prone to excessive accumulation of fat and find it difficult to lose weight, others do not have these difficulties. Studies in both animals and humans suggest that genetic factors are particularly responsible for differences in their propensity to gain fat when chronically exposed to a positive energy balance. For example, by feeding a high fat diet to different inbreed strains of mice, it has been documented that both sensitive and resistant strains exist [45] in relation to gaining weight.

More recently, a prospective study showed that high fat intake in humans were correlated with subsequent weight gain only in those subjects who were overweight at baseline and had obese parents [38, 46]. It is also quite clear that certain inbred strains of rodents are particularly prone to becoming obese when exposed to overfeeding or to a highly palatable diet [28]. Similarly, in a study on pairs of identical twins, the body weight gained and the proportion of fat in response to controlled overfeeding was significantly more similar within pairs of twins than between them [29, 38, 43]. Studies based on the same design strongly suggest that there are individuals who are more likely than others to gain body mass and body fat when challenged by an energy overload [29, 30]. Thus, the responsiveness to energy intake and dietary composition is partly dependent on specific genetic factors that have yet to be clearly identified.

1.3.1.1.3 Types of genetic effect

A series of genetic studies carried out over the past several years strongly support the view that many genes are involved in causing susceptibility in obesity in response to macronutrient ratio, energy expenditure and hormonal disturbances [44] (Table 1.3). Intensive research currently focuses on the identification of the genes and the specific Deoxyribo Nucleic Acid (DNA) sequence variation responsible for the increasing the risk of obesity [29, 32]. Many more years of research will be needed before the important genes and critical mutations are finally identified for both excess body fat content and upper body and abdominal fat accumulation. At present, a number of possible mechanisms in which genetic susceptibility may occur have been identified and include:

Low resting metabolic rate (RMR): studies on Pima Indians have shown RMR clusters in families and that those individuals with lower RMR have a greater prospective risk of gaining 10kg in the ensuing 5 years [47].

Low fat – free mass*:* a low fat free mass for a given body mass is a risk factor for subsequent weight gain, as it tends to decrease the level of RMR, thus favouring positive energy balance [47].

Low rate of lipid oxidation: a low ratio of fat to carbohydrate oxidation under standardized conditions is a risk factor for subsequent weight gain [47].

Poor appetite control: if satiety is attained at a high level of energy intake, the net result is likely to be a positive energy balance leading to weight gain. Here, many genes and molecules are currently under investigation. For instance, Leptin, the hormone product of the Leptin gene, is an important satiety factor secreted by the adipose tissue in humans. An anomaly in the Leptin receptor gene may

be associated with Leptin resistance in humans. However, the genetic mutations that result in Leptin insufficiency and lead to obesity in mice are not thought to exist in humans. Many other factors (Table 1.3) are currently under intensive investigation [48].

1.3.2 Non- Genetic Biological Susceptibility

A number of other biological factors have shown to influence an individual's susceptibility to weight gain and the development of obesity [48, 49].

1.3.2.1 Gender

A number of physiological processes are believed to contribute to an increased storage of fat in females. Such fat deposits are believed to be essential in ensuring female reproductive capacity. Indeed available evidence indicates that females exhibit a stronger preference for carbohydrates before puberty while males prefer proteins [29]. However, after puberty, both males and females display a marked increase in appetite for fat in response to changes in the gonadal steroid levels. This rise in appetite occurs much earlier and largely in females [29]. Females also appear to have a tendency to channel extra energy into fat storage while males use more of this energy for protein synthesis. This pattern of energy usage or "nutrient partitioning", in females contributes further to positive energy balance and fat deposition [48, 49].

1.3.2.2 Ethnicity

Ethnic groups in many industrialised countries appear to be especially susceptible to the development of obesity and its complications. Available evidence suggests that this may be due to a genetic predisposition to obesity that only becomes apparent when such groups are exposed to a more sedentary lifestyle. For instance:

Puma Indians from Arizona: Members of this tribe, which has a very high prevalence of obesity[50] gained weight after abandoning their traditional lifestyle.

Aboriginal Australians: This ethnic group tends to have a high incidence of central adiposity, hypertension and Type 2 Diabetes [51].

1.3.2.3 Migration

The prevalence of Type 2 Diabetes and mortality from coronary heart diseases (CHD) are higher in people of South Asian (Bangladeshi Indian and Pakistani) descent living in urban industrialized societies than in other ethnic groups. This has been attributed to a greater tendency to accumulate intra-abdominal fat for a given BMI compared with other populations [51]. It appears from the foregoing that a number of ethnic groups are more prone to the risks of obesity when exposed to the lifestyle

common in industrialized countries [49]. For the majority, this problem seems to result from a combination of genetic predisposition and a change from traditional to a more affluent and sedentary lifestyle and its accompanying diet. However, susceptibility to obesity-related co-morbidities is not uniform across population groups. The problem of obesity in ethnic minorities demonstrates the need for targeted prevention and intervention strategies [51, 52].

1.3.3 Energy Balance and the Physiological Regulation of the Body Weight check format

1.3.3.1 The fundamental principle of energy balance: changes in energy stored = energy intake – energy expenditure

A positive energy balance occurs when energy intake is greater than energy expenditure; it promotes an increase in energy stores and body weight. Conversely, a negative energy balance occurs when intake is less than expenditure, promoting a decrease in energy stores and body weight. Under normal circumstances, the energy balance oscillates from meal to meal, day to day and week to week without any lasting change in body fat stores or weight. Multiple physiological mechanisms act within each individual to equate overall energy intake with overall energy expenditure and to keep body weight stable in the long term. Thus, it is only when there has been a positive energy balance for a considerable period of time that obesity is more likely to develop [53, 54].

1.3.3.1.1 Energy intake

Total energy intake refers to all energy consumed as food and drink that can be metabolised in the body. The energy content from different foods determines the amount of total energy intake (Table 1.4). There is convincing evidence that a high intake of energy-dense foods promotes weight gain. In high-income countries (and increasingly in low-income countries) these energy-dense foods are not only highly processed (low non-starch polysaccharides (NSP) but also micronutrient-poor, further diminishing their nutritional value. Energy-dense foods tend to be high in fat (e.g. butter, oils, and fried foods), sugars or starch, while energy-dilute foods have high water content (e.g. fruits and vegetables). Several trials, which have covertly manipulated the fat content and the energy density of diets support the view that "passive over- consumption" of total energy occurs when the energy density of the diet is high and that this is almost always the case in high-fat diets. A meta-analysis of 16 trials of high-fat versus low-fat diets of at least 2 months duration indicate that a reduction in fat content by 10% corresponds to about a 1 Mega Joule (MJ) reduction in energy intake and about a 3 kg in body weight loss [9]. At a population level, 3 kg equates to about one BMI unit or about a 5% difference in obesity prevalence. However, it is difficult to blind such studies and other non-physiological effects

may influence these findings [55]. While energy from fat is no more fattening than the same amount of energy from carbohydrate or protein, diets that are high in fat tend to be more energy-dense. An important exception to this is diets based predominantly on energy-dilute foods (e.g. vegetables, legumes, fruits) but which have a reasonably high percentage of energy as fat from added oils. The effectiveness over the long term of most dietary strategies for weight loss, including low-fat diets, remains uncertain unless accompanied by changes in behaviour affecting physical activity and food habits. These latter changes at a public health level require an environment supportive of healthy food choices and an active lifestyle. High quality trials to address these issues are urgently needed. A variety of popular weight-loss diets that restrict food choices may result in reduced energy intake and short-term weight loss in individuals. However, there is little evidence of the long-term effectiveness of such measures and therefore restriction of food choices cannot be recommended for populations[56].

1.3.3.1.2 Energy Expenditure

Total energy expenditure has the following components; Basal metabolic rate (BMR), dietary thermogenesis (meal induced heat production) and physical activity.

The proportion that each component contributes to the total energy expenditures varies according to the regularity and intensity of physical activity. In sedentary adults, the BMR accounts for nearly 60 % of total energy output the dietary thermogenic response for around 10%, and physical activity for the remaining 30% [1, 47]. In those individuals who engage in heavy manual work, total energy expenditure increases and the proportion of energy expenditure accounted for by physical activity may rise to about 50%; in such individuals, dietary thermogenesis appears to remain constant at 10%, leaving the BMR to account for 40% of the total energy expenditure [57]. Although the BMR may vary intrinsically between individuals of similar weight by SD 25%, it is tightly controlled within each individual. The key variable of energy output in an individual is the degree of physical activity [58].

1.3.4 Physiologic Regulation of Body Weight

Societal and cognitive factors can influence the control of body weight to a certain extent, but it is a series of physiological processes which are primarily responsible for body weight regulation. In traditional societies, where people tend to be more physically active, provided that food supplies are not limited, few adults are either underweight or overweight despite the interaction of seasonal cycles of work, festivities, individual susceptibilities to obesity for physiological or genetic reasons, and a wide range of varying physical demands within a society. Such physiological mechanisms constitute a fundamentally important biological process that can be observed throughout the animal kingdom. It is

thought that the body possesses a better defence mechanism against under-nutrition and weight loss than it does against over-consumption of food and weight gain [58].

Table 1.3: Some factors involved in the development of obesity thought to be genetically determined[1]

Factors	Determining mechanism
Macronutrient-related	Adipose tissue lypolysis Adipose tissue and muscle lipoprotein lipase (LPL) activity Muscle composition and oxidative potential Free fatty acids and ß$_3$-receptor activities in adipose tissue Dietary fat preferences Appetite regulation
Energy expenditure	Metabolic rate Thermogenic response to food Pattern of energy usage (nutrient partitioning) Propensity for spontaneous physical activity
Hormonal	Insulin Sensitivity Growth hormone status Leptin action

The physiological mechanisms responsible for body weight regulation are incompletely understood. However, there is increasing evidence of a range of signalling mechanisms within the intestine, the adipose tissue, brain and other tissues that sense the inflow of dietary nutrients, their distribution metabolism and storage [54, 57, 58]. These mechanisms are coordinated within the brain and lead to changes in eating patterns, physical activity and metabolism so that body energy stores are kept constant. The recent discovery of the hormone Leptin, which is secreted by adipocytes in proportion to their triglyceride stores and binds with receptors in the hypothalamus, provides interesting insights into the possible regulatory signal systems, which act to maintain energy balance. However, more research is needed in this field [54, 57, 58]. Despite the extensive physiological regulation of body weight outlined

above, a positive balance can lead to weight gain if it persists in the long-term. The limitation of a chronic energy balance is due to an increase in energy intake relative to requirements, because of an increase in total energy intake, a decrease in total energy expenditure, or a combination of the two. It is possible that large deviations from energy balance at regular intervals may contribute to weight gain, but it is also believed that a small consistent positive deviation over a long period is also capable of producing large increases in body weight [57, 58].

Table1.4: The energy contents of macronutrients

Macronutrient	Energy Contribution	
	Kcal/gram	KJ/g
Fat	9	37
Alcohol	7	29
Protein	4	17
Cabohydrate	4	16

1.3.4.1 The process of gaining weight you need [57, 58]

Pre obese static phase: when the individual is in long-term energy balance and weight remains constant.

The dynamic phase; during which the individual gains weight as a result of energy intake exceeding energy expenditure over a prolonged period.

The obese static phase; when energy balance is regained but weight is now higher than during the pre-obese static phase [57, 58].

The dynamic phase can last for several years and often involves considerable fluctuations in weight (weight cycling) as a result of conscious efforts by the individual to return to a lower weight. However, in the absence of interventions, the difference between energy intake and energy expenditure progressively diminishes. This is due to an increase in BMR as a result of the larger fat mass (including that in the expanded adipose tissue) as well as to an additional energy cost of activity imposed by the extra weight [59]. There may also be an increase in resting metabolic rate (RMR) with overfeeding. Once the obese static phase is established, the new weight appears to be defended. This

can best be shown by the response of obese individuals to underfeeding; they show a fall in the metabolic rate as the body recognizes the loss of energy and unconsciously physiologically driven increase in energy intake [60, 61].

1.3.5 Dietary factors and physical activity patterns

1.3.5.1 Dietary factors

Experimental and clinical studies have repeatedly shown that dietary factors, particularly the level of fat and energy intake, are strongly and positively associated with excess body weight [28, 39, 40]. In population studies, which pay particular attention to the determinants of obesity, a positive association has been documented between dietary factors and obesity identical with those found in animal models and human clinical studies [41].

1.3.5.1.1 Energy intake

Fat is a major culprit in high-energy intake. This is because of the characteristics of fat which include a high energy density, its "hidden" nature in foods, low satiety ability and the fact that it is tasty, thus making it largely responsible for overeating [57,58]. Although the body compensates for the over-consumption of energy in high fat foods to some extent, the fat induced appetite control signals are thought to be too weak, or delayed, to prevent the rapid intake of the energy from a fatty meal [55, 56]. Several studies have shown that a higher intake of energy from fat than required by the individual, will eventually lead to weight gain. The carbohydrate and protein content of the diet also influences the extent to which excess energy is stored, depending on the storage capacity within the body of the macronutrients consumed. These macronutrients with a low storage capacity within the body are being preferentially oxidized when intakes exceeds the individuals requirements [55, 56, 61].

Alcohol: No storage capacity within the body and so all ingested alcohol is oxidized immediately.

Protein: Limited storage capacity since body protein is accessible through loss of lean body mass. Amino acid metabolism is tightly regulated to ensure the oxidation of any excess [57].

Carbohydrate: Excess carbohydrate can also be converted into fat, but this metabolic pathway is not used by humans to any appreciable extent unless a large excess of a low-fat, high carbohydrate diet is consumed [57]. About 60- 80 % of the excess energy may be stored by carbohydrate overfeeding.

Fat: The capacity for fat storage in the body is theoretically unlimited and excess dietary fat is readily stored in adipose tissue depots with a very high efficiency (about 96%) [55, 56, 57].

Fibre: It limits energy intake by lowering food density and allowing for some appetite control signals

to occur before large amounts of energy have been consumed.

It is becoming clear that weight changes following challenges to body weight are due primarily to alterations in fat intake since fat appears to account for most of the imbalance produced in total energy [59]. In the long-term, fat balance has to be regulated in order to achieve energy and macronutrient balance, but the way in which fat mass and total fat oxidation are linked is not clear. As an example, an increase in dietary fat without rapid change in fat oxidation will produce a positive fat balance and hence lead to increases in body fat mass. Fat mass will increase to the point at which fat oxidation matches fat intake, and the body fat mass will then stabilize at the new, higher level [58].

1.3.5.2 Food palatability and pleasure

The palatability of food has an important influence on behaviour[58]. It tends to promote food consumption and is one of the most powerful influences in inducing a positive rather than a negative energy balance. It increases both the rate of eating and sense of hunger during and between meals. Sweetness is one of the most powerful, easily recognized and pleasurable tastes, so that many foods are sweetened in order to increase their palatability and consumption. Sweetened foods of high fat content are thought to be conducive to excess energy consumption since palatability is enhanced both by sweetness and mouth feel, and fat has a low satiety [54, 55].

1.3.5.3 Eating disorders

Eating disorders, particularly those that result in excess energy intake relative to requirement, have been implicated in the development of obesity. Binge-eating disorders are recognized pathological entities [62], which occur with increased frequency among obese persons. These disorders in particular are associated with severe obesity, a high frequency of weight cycling and pronounced psychiatric co-morbidity. The night eating syndrome (NES) is characterized by consumption at least 25% - 50 % of total energy intake after the evening meal. This syndrome seems to be more common in morbidly obese patients and is related to sleep disturbances such as sleep apnoea. It is thought to be due to alterations in the circadian rhythm affecting both food intake and mood. There is no clear evidence that these disorders are the primary cause of weight gain, but it could be concluded that the excess energy intake associated with these conditions increases the risk of weight gain [52, 57, 59].

1.3.6 Physical Activity Patterns

Physical activity is a key determinant of energy expenditure, and thus fundamental to energy balance and weight control. Physical activity reduces the risk for cardiovascular disease and diabetes and has substantial benefits for many conditions, not only those associated with obesity. Low and decreasing

levels of activity are thought to be responsible for the increasing prevalence of obesity; for instance, obesity is not common among elite athletes whereas those athletes who give up sports frequently experience an increase in body weight and fatness [60]. Most epidemiological studies show smaller risk of weight gain, overweight and obesity among persons who currently engage regularly in moderate to high amounts of physical activity.

1.3.7 Causes of Obesity in Children

All factors that cause obesity in adults also predispose children to obesity. As with adults-onset obesity, childhood obesity has multiple causes centering on an imbalance between energy in (calories obtained from food) and energy out (calories expended in the basal metabolic rate and physical activity). Childhood obesity most likely results from an interaction of nutritional, psychological, familial and physiologic factors.

1.3.7.1 The family

The risk of becoming obese is greatest among children who have two obese parents [4]. This maybe due to powerful genetic factors or to parental modelling of both eating and exercise behaviour, indirectly affecting the child's energy balance. One-half of parents of elementary school children never exercise vigorously [63].

1.3.7.2 Low-energy expenditure

The average American child spends several hours each day watching television and playing video games; time which in previous years might have been devoted to physical pursuits. Obesity is greater among children and adolescents who frequently watch television [64] not only because little energy is expended while being sedentary but also because of concurrent consumption of high-energy snacks. Only about one third of elementary school children have daily physical activity education, and less than one-fifth have extracurricular physical activity programs a their schools[63].

1.4 CO-MORBIDITIES OF OBESITY

Overweight and obesity increases the risk for the two of the world's leading causes of death, diabetes and cardiovascular diseases. The underlying causes of obesity also predispose to several metabolic abnormalities that are the precursors of chronic diseases and morbidity [65, 66, 67, 68]. In the future, it is projected medical complications arising from obesity will impose a heavier burden on the already fragile health care system of many nations [1]. Although the complications of obesity are not as dramatic

as those of HIV and other infectious diseases, these complications affect more people and will demand more long-term care for affected persons than those of infectious diseases [1]. In addition to increasing the risk of obesity in adulthood, childhood obesity is the leading cause of paediatric hypertension, is associated with type 2 diabetes, increases the risk of coronary heart disease, increases stress on the weight bearing joints, lowers self-esteem, and affects relationships with peers. Some authorities maintain that the social and psychological problems are the most significant consequences of obesity.

1.4.1 Chronic Diseases

1.4.1.1 Vascular diseases

Underlying causes of obesity also predispose to chronic diseases like cardiovascular disease, which includes coronary heart disease, stroke, congestive heart failure and peripheral vascular diseases [7,13,14,17]. Obesity has been identified as an independent risk factor for coronary heart disease in men and contributes towards the risk of heart disease in women. This association applies especially to the abdominal obesity pattern. Obesity further predisposes to a number of other cardiovascular risk factors including hypertension, raised cholesterol, impaired glucose tolerance and hyperuricaemia[22,52].

1.4.1.2 Hypertension

There is a well-known association between hypertension and obesity. It appears that there is a higher prevalence of hypertension in obese people versus non-obese and that there is increase in both systolic and diastolic blood pressure. The reason for the association between weight and hypertension is unclear. The risk of developing hypertension increases with the duration of obesity especially in women [52].

1.4.1.3 Type 2 Diabetes

Both cross sectional and prospective studies have shown a higher risk for the development of type 2 diabetes in obese populations [50, 53]. In a study conducted over 14 years, it was found that obesity in women between the ages of 30-55 years resulted in a 40 times higher risk for developing type 2 diabetes mellitus [68]. Other factors that seem to play a significant role regarding the risk of developing type 2 diabetes are obesity in childhood, progressive weight gain from the age of 18 years, and intra-abdominal fat accumulation, which is more important than generalised weight increase. Type 2 diabetes is often under-diagnosed in obese or overweight patients, and is reaching epidemic proportions in the world, "right behind this obesity epidemic is a diabetes epidemic" [14]. An estimated 30 million people worldwide had diabetes in 1985. By 1995, this number increased to 135 million. The latest WHO estimate for the number of people with diabetes, world wide, in 2000 is 177 million. This is

projected to increase to at least 300 million by 2025 [22].

1.4.1.4 Malignancy

There is evidence that certain types of malignancies have a higher prevalence in obese/ overweight subjects. Central fat distribution appears to be an important factor. Malignancies with a higher incidence reported among obese individuals includes the following:

- Hormone dependent, endometrial, ovarian, breast, cervical prostate in men
- Gastrointestinal malignancies: colorectal, gall bladder, pancreatic, liver and renal.

Although the association of malignancies and obesity is not clear and remains to be defined, the available evidence indicates that the listed malignancies are in effect more common in obese/overweight persons [65].

1.4.1.5 Gallbladder disease

There is a 3-4-fold higher incidence of gallstones in obese when compared to lean individuals [66]. The risk is even higher with central fat deposition. Super-saturation of the bile and reduced motility of the gall bladder are thought to be underlying factors that promote gallstone formation. Increased gall bladder pressure due to gallstones is thought to be associated with a higher tendency to develop gallbladder inflammation and therefore with a higher incidence of acute and chronic cholescystitis in obese individuals. Morbidity in gallbladder surgery has been documented to be higher in obese subjects [66]. In men, hyperinsulinemia and dyslipideamia may have a big role in the aetiology of gallbladder disease beyond their association with obesity, whereas in women, increased body size, central adiposity, and hormone replacement therapy may be more important determinants of gallbladder disease [69].

1.4.1.6 Gastro-oesophageal reflux disease

Frequent symptoms of gastroesophageal reflux disease (GERD) affect between 10% and 20% of adults in the United States. The prevalence of GERD-related complications, including erosive esophagitis, Barrett's oesophagus, and oesophageal adenocarcinoma[70.] The reasons for the increase in GERD and its complications are not known. Changes in diet, prescription medication use, smoking, alcohol intake and the declining prevalence of *Helicobacter pylori* infection have been proposed [71, 72, 73, 74]. Studies have also hypothesized that the increasing trend of obesity in western populations has paralleled the increase in oesophageal adenocarcinoma and may be an important factor in this change. This could be either due to increased intra-abdominal pressure or often to a co-existing hiatus hernia. An unhealthy

diet and physical inactivity could also be contributing factor. Obesity is associated with a statistically significant increase in the risk for GERD symptoms, erosive esophagitis, and oesophageal adenocarcinoma. The risk for these disorders seems to progressively increase with increasing weight[75].

1.4.2 Endocrine and Metabolic Disturbances Associated with Obesity

Fat cells produce hormones that act locally and distally. They also act as target cells for many other hormones. Common hormonal abnormalities associated with intra-abdominal fat accumulation are discussed below.

1.4.2.1 Metabolic syndrome

The metabolic syndrome (MetSyn) is characterized by hyperinsulinemia with underlying insulin resistance, and a cluster of other cardiovascular risk factors including impaired glucose tolerance, elevated levels of triglycerides, decreased levels of high density lipoprotein cholesterol (HDL-C) raised blood pressure (BP), and centrally distributed obesity[76]. Insulin resistance is frequently associated with obesity, especially in the case of severe increase in intra-abdominal fat. Insulin inhibits fat mobilisation from adipose tissue and activates lipoprotein lipase. It appears that in obesity both these processes become insulin resistant. The extent of insulin resistance is not the same in all organs or tissues and this may account for regional fat accumulation [49]. Central adiposity and insulin resistance are the two of the hallmarks. Over the years since its first description, it has become clear that the Metabolic Syndrome encompasses more than just insulin resistance and its associated consequences [77]. Although obesity is a powerful risk factor for type 2 diabetes and cardiovascular disease across populations, substantial heterogeneity exists in the relationship between metabolic and cardiovascular abnormalities and the degree of obesity [78]. A significant minority of subjects who are defined as obese by current guidelines do not develop resistance; conversely, insulin resistance can be present in lean individuals [79]. Genetic and environmental factors may have a major impact on the metabolic and cardiovascular consequences of obesity, although the mechanisms by which genetic factors modify the effects of obesity are largely unknown.

Clinical and epidemiological research has been hampered by the lack of agreement on the definition of the syndrome and on the cut-off points defining its components. To resolve this problem, the WHO consultation for the diabetes and its complications and the Nation cholesterol Education program (NCEP) Expert panel, have recently formulated definitions for the metabolic syndrome. The WHO definition was primarily given as a working definition, to be improved in due course, to facilitate

research, in particular comparisons between studies. The Metabolic syndrome was defined as an insulin resistance (glucose uptake in the euglycemic clamp below the lowest quartile for the general population) or impaired glucose regulation (impaired fasting glycaemia, impaired glucose tolerance or type 2 diabetes), with 2 or more of the following: [7].

(1). BP of 140/90 mmHg or higher, (2) Triglyceride levels of 150mg/dl (1.7mmol/l0 or higher) and or HDL-C less than 35mg/dl (0.9mmmol/l) in men and less than 39m/dl (1.0 mmol/l) in women, and (3) Waist hip ratio greater than 0.9 in men and 0.85 in women , and or BMI greater than 30 [76]. A major challenge for metabolic syndrome research remains the identification of features of adiposity that best reflect increased risk of developing it[78].

1.4.2.2 Dyslipidaemia

The following metabolic profile is often seen in obese patients with high intra-abdominal fat accumulation. Decrease in protective high-density lipoprotein (HDL-C), increase in total cholesterol, increase in triglycerides (TG), increase in low-density lipoprotein (LDL-C) with an accumulation of atherogenic small dense LDL particles. Increase in very low-density lipoproteins (VLDL-C) and impaired glucose tolerance or type 2 diabetes. There is a significant correlation between dyslipideamia and MetSyn which is characterized by increased TG and low levels of HDL-C. The increase in TG is thought to be due to the increased flux of free fatty acids from the periphery to the liver in the insulin resistant state, which drives hepatic TG synthesis and in turn promotes the assembly and secretion of TG-containing VLDL[78].

1.4.3 Effects on Reproductive Function

Obesity is, unfortunately, a condition in which the disease as well as the available treatments have the potential to cause serious alterations in health status. As a result of almost continual physiologic instability, these individuals typically are subject to a wide range of hormonal imbalances. Since the majority of persons who are obese, and those seeking bariatric surgery, are women, it is important for healthcare providers to understand how these hormonal fluctuations can have a devastating impact on sexual and reproductive function. Although the research to date has been limited, studies have demonstrated changes in fertility, contraceptive response, and pregnancy outcomes in obese women, as well as obese men [80]. Concentrations of androstenedione and testosterone are commonly elevated and sex hormone binding globulin is reduced in obese women [9, 17]. It is the changes in the concentrations of sex hormones that appear to be responsible for the ovulatory dysfunction, hyperandrogenism and the prevalence of hormone sensitive malignancies. Polycystic ovarian syndrome and infertility are often

associated with obesity. Conversely in men, testosterone is known to be decreased [9, 17].

1.4.3.1 Adrenocortical dysfunction

The proposed hypothesis for this dysfunction suggests that elevated level of stress leads to increased production of cortisol [9, 67]. Adipocytes in intra-abdominal fat are thought to contain a higher concentration of cortisol receptors than those in peripheral fat. Thus, stress related increases in cortisol may contribute to intra-abdominal fat accumulation. Cortisol hormone production is increased in obese patients to compensate for the higher rate of cortisol breakdown[67].

1.4.4 Debilitating Health Problems Associated with Obesity

1.4.4.1 Osteoarthritis and gout

Obesity is associated with musculoskeletal pain and osteoarthritis [81, 82]. Possible contributing mechanisms include mechanical stress, metabolic changes found in overweight and obese, and other dietary elements that are related to the development of obesity. The increased risk of gout associated with obesity could be due to the accompanying hyperuricaemia associated most often with central obesity [9].

1.4.4.2 Hypoventilation/ Pickwickian Syndrome

In obese patients, obstructive sleep apnea syndrome (OSAS) is attributed to a reduction in the pharyngeal cross-sectional area due to peripharyngeal fat deposition [83]. Sleep apnoea / obesity hyperventilation syndrome occurs in 10 % of men and women with BMI > 30, and according to the WHO, 65- 75% of individuals with obstructive sleep apnoea are obese. This disruption of sleep is associated with morning headaches, daytime sleepiness, hypercapnia and eventually right ventricular failure due to pulmonary hypertension. Breathing in obese patients is difficult due to the stiffness of the thoracic cage, resulting from the accumulation of fat tissue in and around the ribs, abdomen and the diaphragm. The functional residual capacity is also lower in obese than in individuals with normal weight, especially in the supine position [9, 17]. It has been reported that a weight reduction of about 15% of baseline body weight may substantially increase the pharyngeal cross-sectional area and substantially improve the severity of OSAS in morbidly obese subjects with sleep apnea [83, 84].

1.4.5 Psychosocial Problems Associated with Obesity

1.4.5.1 Social bias, prejudice and discrimination

In the USA, several studies have shown that overweight and obese people are less likely to complete as many years at school or to enter “desirable” professions. Women in particular, earn significantly less wages than their leaner counterparts[17]. Even in the health care professions, negative stereotypes and

attitudes are rife. Obese people are wrongly thought of as being lazy and there is often a lot of discrimination[17].

1.4.5.2 Psychological effects and body shape dissatisfaction

Although there is a relative paucity of data on this association [85], overweight and obese people tend to view their body in a negative light and report that others wish to exclude them from social interactions. Predictably, obese individuals also often report more childhood teasing which may explain the adverse effect early onset obesity is thought to have on body image, which is independent of current BMI. The possible direction of causal effects between body dissatisfaction and self-esteem has been also debated, with the suggestion that early onset of obesity increases the risk of body dissatisfaction, which in turn impairs self-esteem [85, 86, 87].

1.5 MANAGEMENT OF OBESITY

Obesity is a particularly challenging medical condition to treat because of its complex aetiology. Body weight represents the integration of many biological and environmental components, social and cultural influences. The environmental components can be modulated through behavioural changes such as healthy eating and physical activity. It is however much more complex to address the biological components of obesity as changes in body weight is resisted by many physiological mechanisms. Traditionally, the efficacy of obesity treatment has been assessed by its effect on body weight. By this criterion, treatment is considered successful if it [8,9,10]:

- Prevents further weight gain
- Induces a 5 to 10% weight loss from the initial body weight
- Allows long-term maintenance of the weight loss once it is achieved

This approach has however changed in recent years. Rather than focusing primarily on body weight, body fat or body mass index, the focus has shifted on "metabolic fitness". Metabolic fitness is defined as the absence of metabolic and cardiovascular risks associated with obesity such as [8, 9,10].

- Elevated fasting lipid profile, glucose or insulin
- Impaired glucose tolerance
- Elevated blood pressure

The consensus of the available indicates that during periods of weight loss, there is a uniform

improvement in the profile of risk factors [45]. It has also been documented that reductions in biochemical risk factors may not always be dependent on weight loss e.g. insulin sensitivity and cholesterol levels can be improved with physical activity in the absence of weight loss [87].

1.5.1 Approaches to Obesity Management

In the approach to obesity management, it is recommended that each patient should be seen as a unique individual and the strategy and management program should be individualized to address the individual's specific situation [9]. The family practitioner is in the unique position to achieve this aim since he/she sees the patient in the family environment. He is also able to assess the type of treatment for different individuals and whether the patients will benefit from the treatment. The basic principles of an effective weight management protocol involve five stages [87, 88, 89].

1.5.1.1 Identification of the at-risk individuals

An essential element of a focused and effective weight management program is the recruitment of at-risk groups and individuals. Three key methods of recruitment and referral are:

- Public awareness campaigns highlighting the dangers of excess weight
- Opportunistic screening (BMI and waist circumference) when patients visit the medical practitioner for reasons other than those associated with obesity
- Screening within a medical practice or primary health care facility, where weight management is offered to all overweight individuals, but especially those groups of individuals who are at risk of obesity related co-morbidities e.g. established hypertension, established diabetes mellitus, history of myocardial infarction or, a relevant family history [90, 91].

1.5.1.2 Comprehensive health assessment

It is important to obtain appropriate baseline information such as weight, BMI, waist circumference and body fat percentage. The results should be used to point out the associated health risks and consequences as well as the benefits to be derived from the management thereof. This assessment should include the following [90, 91]:

1.5.1.2.1 Personal history

- General medical background
- Family history of obesity
- Waist circumference, weight and height to establish BMI, body fat percentage

- Physical activity patterns
- Dietary patterns

1.5.1.2.2 Assessment of health and other associated risk factors and co-existing illness

- Psychosocial and behavioural assessment
- Physical examination
- Additional laboratory tests such as blood glucose and lipid profile

1.5.1.3 Goal setting

There is common agreement among the health care community that the goals for obesity treatment are to decrease body weight, prevent relapse and develop supportive eating and physical activity behaviour. It is important to set realistic goals. This should be done in terms of a period that can be understood by the individual and by assessing the individual's commitment to the weight loss programme. The individual must also take ownership of the process and not be overwhelmed by the practitioner's enthusiasm. The right goals should incorporate both the BMI or waist circumference and modification of other risk factors within the constraints of the individual's social and personal circumstances [91].

1.5.1.3.1 Guidelines for goal setting

- A 5-10 % weight reduction
- A realistic and practical goal for most patients with a BMI > 30 is a target BMI that is 2 BMI units below the current measurement.

1.5.1.4 Selection and implementation of a weight loss program

The low success rate of the long-term results of rigorous approaches to dieting has led the way to a more multi-factorial approach that has its emphasis on moderation. It is essential to tailor each program to the individual's needs and to approach the problem with longer-term benefits in mind. This also prevents weight cycling, i.e. experiencing repeated losses and gains, which is more dangerous to health than sustained obesity [92]. Most of the obese or overweight individuals have typically tried various diets and have lowered their BMR. Therefore, when they return to their "normal" eating patterns the weight gain relapses. This situation must be explained to the individual, namely that unless the weight loss (or at least a 5 % thereof) is maintained then it is almost better not to diet at all [45]. Involvement in the decision-making process regarding the lifestyle changes and the pace of the

program lies firmly in the hands of the individual. This ownership of the process needs the support of the practitioner. Then the individual can initiate the lifestyle modifications required within a supportive framework of pharmacological treatment and surgery, when indicated [9, 92].

1.5.2 Components of Weight Loss Management Programmes

1.5.2.1 Dietary management

The energy density and the fat content of food supply have been identified as the major factors implicated in the development of obesity [91]. A suggested diet in obesity management programmes is one that is, in addition to restricted energy intake, low in fat, high in complex carbohydrates and plentiful in fruit and vegetables. Food is an essential component in addressing obesity. Patients must be educated regarding eating habits and special attention should be given to analysing eating habits with a focus on nutritional adequacy, meal size, meal frequency and meal timing. The energy restricted diet plan should suit the individual's lifestyle and should be palatable. The assistance of a dietician is invaluable. Levels of energy intake should be individualised based on energy expenditure associated with physical activity, as well as, family history, body shape and nutrient intake. Additional strategies include consumer education regarding food labelling and the implementation of dietary guidelines. The most conventional treatment for overweight and obese subjects is dietary energy restriction. The long-term effectiveness of dietary management is poor, especially when used in isolation. Behavioural changes are also necessary. Success is more likely when advice is based on healthy eating principles with modest energy deficit diets and less overall fat intake.

Very low calorie diets (VLCD) and low carbohydrate diets lead to greater initial weight loss, but long-term results are no better than those of moderately energy restricted diets. A program using meal replacement appears to lead to slightly greater weight loss than energy-restricted diets and offers one option to treat obesity. Dietary patterns low in glycemic index and energy density has potential in treating obesity and should be studied further. Clearly, a dietary pattern that prescribes a lower total energy intake is necessary for weight loss, and this pattern should be sustained to maintain weight loss. Although many dietary programmes can achieve short-term loss of weight, the dietary treatment recommended should emphasizes lifestyle changes and should be consistent with other dietary guidelines to promote long-term health. Features consistent with this approach include dietary patterns low in total energy, saturated fat and refined carbohydrates, moderate in whole grains, and high in low energy dense vegetable, and fruits. Future studies should explore dietary strategies and combination

therapies that contribute to weight loss, long-term weight maintenance, and improved health [93]. Thermodynamics dictate that a calorie is a calorie regardless of the macronutrient composition of the diet. Further research on differences in the composition of weight loss and on the influence of satiety on compliance with energy-restricted diets is needed to explain the observed, albeit inconsistently so, increases in weight loss with diets high in protein and fat and/or low in carbohydrates [94, 95].

1.5.2.2 Physical activity

Physical activity patterns have an important influence on the physiological regulation of body weight. It is commonly accepted that the combination of exercise and diet is often more effective than either method alone in promoting fat loss. Long term, low intensity exercise such as walking is as effective as high intensity exercise [88, 89]. This is important since most obese people are unaccustomed to sporting activities and will drop out of such vigorous regiments. The primary goal of treatment is not circulatory fitness, but metabolic fitness. Exercise limits the proportion of lean tissue lost in weight loss regimens and limits weight regain. Benefits of engaging in moderate exercise include a reduction in the risk of developing type 2 diabetes mellitus, cardiovascular diseases and hip fractures, even those whose BMI remain constant [45, 46]. Certainly, the messages as to how much exercise is enough must reflect a more flexible approach. For an obese person, it may be difficult to exercise sufficiently or intensely to raise the metabolic rate. Furthermore, the risk of injury is higher, with increasing intensity, particularly at the start of a weight bearing exercise program for obese persons [90]. The WHO recommends that individuals should engage in adequate levels throughout their lives. Different types and amounts of activity are required for different health outcomes. At least 30 minutes of regular, moderate intensity physical activity on most days, reduces the risk of cardiovascular diseases, cancer and helps in weight loss and prevention of weight gain [89]. The choice of physical activity will depend on the choice of the individual. If an individual has a low self-esteem and feels incapable, it may be better to offer the message that any physical activity is better than none[88, 90].

1.5.2.2.1 Mechanism underlying weight loss through physical activity

Exercise contributes to weight loss through [91, 92, 95, 96]:

- Increased energy expenditure
- Improved body composition (fat loss, preservation of lean body mass and reduction of visceral fat deposit)
- Increase capacity for fat mobilization and oxidation

- Control of food intake (short term reduction of appetite, reduction of food intake and choice of food)
- Stimulation of thermogenic response (increase in resting metabolic rate, and diet induced thermogenesis)
- Change in muscle morphology and biochemical capacity
- Increased insulin sensitivity
- Improved plasma lipid and lipoprotein profile
- Positive psychological effect

1.5.2.2.2 Approaches to physical activity

- An increase in modest daily physical activity involving 30 – 45 minutes of moderate intensity exercise e.g. walking or cycling can result in an additional energy expenditure of up to 300 Kcal/ day.

Physical activity strategies should focus on encouraging increased levels of low intensity activity (around 50 % of maximum heart rate) and reducing the amount of leisure time spent in sedentary pursuits [91]. Better results have been reported when low intensity exercise is promoted as a healthy lifestyle approach.

- Physiological fitness training with moderate to vigorous exercise e.g. 3 – 4 sessions of aerobics exercise per week of between 45 to 60 minutes. This fitness training may be difficult to implement and sustain, since people frequently struggle with breathlessness or musculo-skeletal injuries [81, 82].

1.5.2.3 Behaviour modification

Behaviour modification supports the changes in diet and physical activity [67, 68, 95]. It is therefore an essential component in the management of obesity so to ensure effective and lasting weight reduction. The following factors could be included in behaviour modification programmes.

1.5.2.3.1 Self-monitoring

This strategy involves a systematic observation and recording of target behaviour. This includes keeping a record of food and activity diary. By evaluating this process, one can make modifications to certain eating practices. Its primary purpose is to make patients more aware of their obesity related behaviour and the factors that influence their behaviour [74].

1.5.2.3.2 Stimulus control

Identifying and limiting those circumstances that promote over eating at times when one is not hungry is particularly important [62]. Moreover, by modifying these circumstances and the individual's micro-environment, one can assist the individual to be more successful in sustaining weight control behaviour e.g. limiting the availability of snack foods in the house and making healthier choices when snacking.

1.5.2.3.3 Interpersonal relationships

The objective of this approach is to address specific triggers for over eating (e.g. stress, boredom) and to mobilize support for weight loss and control. This could include mobilizing the individual's family and other support groups to assist in this objective. The individual needs to develop skills to address the stigma and other social reactions normally associated with overweight or obese individuals you need a reference here.

1.5.2.3.4 Stress management

Stress is a common cause of relapse and overeating. Stress management involves teaching the patient methods on how to reduce stress and tension, including muscle relaxation, diaphragmatic breathing and problem solving strategies to reduce or cope with stressful events. Encourage patients to exercise and to join a support group [91].

1.5.2.3.5 Cognitive restructuring

The aim is to develop skills to modify and deal with those negative thoughts and beliefs an individual may have regarding self-esteem and weight. One should teach the individual to actively challenge and change those aspects of his/hers internal dialogue which may adversely impact on psychological well being. This is particularly important since many obese individuals have an unrealistic belief of the amount of weight they can loose and the benefits that may accrue there from, it is important for the clinician to refer these individuals to the psychologist/psychiatrist should this aspect be a barrier in the weight management program [91, 92].

1.5.3 Pharmacological Treatment

The pharmacological treatment of obesity is a rapidly evolving field. It has, however, been surrounded by much controversy in the past [96, 97]. Pharmacological agents are useful in combination with the required changes in eating patterns and physical activity. There is a growing view that long-term intermittent prescription of anti-obesity drugs in conjunction with lifestyle modifications could be the preferred choice of obesity management [97]. The availability of new evidence showing long-term efficacy and safety of several such drugs makes the use of such an approach helpful in the management

of obesity. When prescribing pharmacological treatment to obese individuals, it is important to consider the effect of the drug on weight loss (and weight maintenance) as well as other co-morbidities and any other detrimental side effects[96, 97, 98].

1.5.3.1 Principles of pharmacological intervention

Currently approved drug therapy should be seen as an addition and not as a replacement of diet and lifestyle management. Drugs for weight management assist patient adherence to dietary, exercise and behaviour change regimens. The following important concepts should be born in mind when considering pharmacotherapy [98, 99]:

- Weight management drugs do not cure obesity. When treatment is discontinued and other treatment, such as diet and exercise are not continued, weight regain occurs.
- Drugs for weight management should be used under medical supervision and according to prescribed guidelines to ensure efficacy.
- Drug therapy should be considered as part of a long-term management strategy for obesity that is tailored to the individual's needs. Risks associated with drug treatment should be balanced against the risk of persistent obesity.
- Drug treatment should be maintained if it is considered to be safe and effective for a given patient.
- Drug therapy cannot be used as a short-term treatment in those individuals who cannot initiate a diet.

1.5.3.2 Criteria for drug therapy

- A BMI of ≥30 when other management approaches such as diet, exercise and behavioural change, have not been successful on their own [98].
- A BMI of ≥ 25, with associated co-morbidities that have persisted in spite of diet, exercise and behaviour change [98].
- Patients who are compliant on their correct diets and physical activity programmes but are not losing weight [98].

1.5.3.3 Contraindications for drug use

Contraindications for the use of each drug must be considered for each individual. General contraindications include: patient under age 16 years of age, pregnancy, lactation, current or previous depression or eating disorders, known alcoholism, pulmonary hypertension and persons with secondary

mal-absorption due t o underlying disease [99-105].

1.5.3.4 Evaluation of pharmacological treatment

Treatment must be evaluated during the first 4-6 weeks following commencement of treatment. This is to determine whether there has been significant weight loss, while on pharmacological treatment, i.e. weight loss of 1 –2 kg in the first 4-6 weeks of treatment. If not, treatment should be discontinued. Pharmacological treatment can induce a weight loss of approximately 400- 500 grams per week. Weight loss tends to plateau after 6- 8 months of treatment. Pharmacological treatment can also help in the maintenance of weight loss [101, 102, 106, 107].

1.5.3.5 Anti- obesity drugs

Pharmacotherapy for the management of obesity is primarily aimed at weight loss maintenance and risk reduction, and includs thyroid hormone, phentermine, amfepramne (dietthylpropion), phenylpropanolamine, mazindol, fenfluramines and more recently, sibutramine and Orlistat [98, 107]. These agents decrease appetitive, reduce absorption of fat, or increase energy expenditure. Primary end-points used to evaluate anti-obesity drugs most frequently included mean weight loss, percentage weight loss and proportion of patients losing ≥ 5% and ≥ 10% of initial body weight. Secondary end-points may include reduction in body fat, risk factors for cardiovascular disease and the incidence of disease such as type 2 diabetes. Most of the pharmacological agents used have demonstrated significantly greater weight loss in patients on active treatment than those receiving placebo (≤ 1 year). All randomised control trials of pharmacological treatment have been conducted in conjunction with an energy controlled diet and/or lifestyle intervention. The evidence of long-term efficacy is limited to Sibutramine (1years) and Orlistat (4 years). These drugs appear beneficial for the treatment of adults with obesity [99]. Both drugs appear modestly effective in promoting weight loss, especially Orlistat. Orlistat in conjunction with a low-energy diet produces greater and more frequent significant weight loss than placebo during 1 year of treatment. One third of the Orlistat treated patients achieved clinically relevant weight loss (≥ 5% of initial body weight). There was also an improvement in relevant serum profile parameters. Fat-soluble vitamin supplements maybe required during chronic therapy. Orlistat was well tolerated and offers a promising new approach to long-term management of obesity [108]. Sibutramine 15mg once daily with a customized, reduced energy diet significantly reduced weight compared with placebo in overweight and obese patients (BMI >26 kg/m2) with type 2 diabetes. Sibutramine was well tolerated, and significant improvement in diabetic control was seen in conjunction with weight reduction[101]. Sibutramine and Orlistat are the two most studied drugs in terms

of safety and efficacy. Invariably, all of the available drugs used to promote weight loss (Table1.5) [104, 105,106] are associated with adverse effects which include primary pulmonary hypertension with fenfluramine and dexfenfluramine, valvular heart disease with dexfenfluramine and fenfluramine [61] and increases in blood pressure and pulse with sibutramine[101,]. With Orlistat, there is a possible decrease in the absorption of fat-soluble vitamins; overcoming this may require vitamin supplementation [97]. People with a history of high blood pressure, CHD, congestive heart failure, arrhythmias, or history of stroke should not take sibutramine (Table 1.6) and all patients taking the medication should have their blood pressure monitored on a regular basis [103]. Depression has been described with the serotonergic drugs but it is generally not clinically significant. Neurotoxic effects with neuronal atrophy have been described with high doses of dexfenfluramine in rats and primates, but not in humans. The risk for using appetite suppressant drugs during pregnancy is unknown.

1.5.4 Surgical Treatment

Weight loss surgery is one option for weight reduction for some patients with severe and resistant obesity (BMI ≥ 40 or ≥ 35 with co-morbid conditions), in whom efforts at other therapy have failed, and who are suffering from the complications of obesity [109, 110]. The aim of surgery is to modify the gastrointestinal tract to reduce net food intake. Considerable progress has been made in developing safer and more effective surgical procedures for promoting weight loss. Surgical interventions commonly used include gastroplasty, gastric partitioning, and gastric bypass. These procedures are designed primarily to reduce food consumption. They have replaced previous procedures that were designed to promote mal-absorption of nutrients. Some of the surgeries reduce the progression and mortality of type 2 diabetics [111, 112].

1.5.4.1 Follow up after surgery

Since surgical procedures result in some loss of absorptive function, the long-term consequences of potential nutrient deficiencies must be recognized and adequate monitoring must be performed, particularly with regard to vitamin B12, folate, and iron. Some patients may develop other gastrointestinal symptoms such as "dumping syndrome" or gallstones [111, 113]. Occasionally, patients may have postoperative mood changes or their pre-surgical depression symptoms may not be improved by the achieved weight loss. Thus, surveillance should include monitoring of indices of inadequate nutrition and modification of any preoperative disorders [113].

Table 1.5: Classification of weight loss drugs, mechanism of actions and adverse effects[+]

Category	Drug	Action	Adverse effects
Central acting	Dexfenfluramine* Fenfluramine*	Serotonin reuptake inhibitor Serotonin releaser	Valvular heart disease Primary pulmonary hypertension Neurotoxicity [103]
Central acting	Sibutramine	Norepinephrine, dopamine, and serotonin reuptake inhibitor	Increase in heart rate and blood pressure Tachycardia [106]
Non-systemic acting	Orlistat	Inhibits pancreatic lipase, Decreases fat absorption	Decrease in absorption of fat-soluble vitamins; soft stools and anal leakage [102]

+ Ephedrine and caffeine, and fluoxetine have also been tested for weight loss, but are not approved for use in the treatment of obesity. Mazindol, phentermine, benzphetamine, and phendimetrazine are approved for only short-term use for the treatment of obesity.
* FDA approval withdrawn

1.5.5 Monitoring and Evaluation

This is critical to ensure the success of any obesity management programme. There should be regular monitoring of patients' weight and waist circumference to see if the patient is making any progress. When there is reduction in theses measurements, the patients are always encouraged and the put more effort on all aspects of weight loss. Continuous monitoring helps the health professional to evaluate the effectiveness of the weight management strategy and to be able to identify barriers to the weight loss programme [91, 92, 95].

1.5.6 Managing Obesity in Special Circumstances

1.5.6.1 Management of obesity in Childhood and adolescence

The major goal of obesity treatment in these groups of the population should be to diminish morbidity risk rather than to achieve a cosmetically endorsed body shape. The presence of concurrent morbidity in any child at risk for overweight (BMI of 85th percentile for age or a BMI of 19.2 – 25.2 kg/m^2) and a high risk for future adiposity-related morbidity (e.g. family history) should be identified and treatment

should be instituted [2, 4, 5, 115, 116]. In an otherwise healthy overweight child/adolescent with no evidence of adiposity-related morbidity, clinicians and parents should be concerned that the child/adolescent may become an obese adult and should encourage weight reduction. Initial therapy in such instance should be directed towards decreasing weight gain while allowing growth to continue according to age and gender appropriate percentiles [17]. The avoidance of energy dense foods together with the substitution of fruit and vegetables snacks for sugared sodas, juices and cookies without restricting access to such snacks will, in most cases, result in significant slowing of weight velocity. The child with hypertension, diabetes or other co-morbidities should endeavour to reduce weight or alter body composition within 1 year to the point where the associated morbidity is no longer evident [2].

1.5.6.2 Diet and exercise

Restriction should never be presented as a punitive measure and, if possible, the obese child and family should adhere to a similar diet [2]. The composition of the diet should be in accordance with dietary recommendations and contain at least the minimum recommended amounts of proteins, essential fatty acids, vitamins, mineral and carbohydrates [115]. Regular exercise will promote increase in muscles mass, thereby raising total metabolic rate and the child should be encouraged to walk and become get active at school. Exercise must be planned and the planned activity must be achieved. The child should be helped to avoid sedentary lifestyles like playing video games, watching TV, reading or working at a computer [70, 116].

1.5.6.3 Pharmacological treatment

While there are no pharmacological agents currently approved for the treatment of paediatric obesity, there is hope that agents approved for use in adults will prove useful in adolescents and children. Therapeutic trials are currently under way to evaluate some agents, e.g. Orlistat and sibutramine [102]. In cases of severely obese children, pharmacotherapy or surgery may be necessary[116].

1.6 THE ECONOMIC ASPECTS OF OVERWEIGHT AND OBESITY

Excess weight is a major public health problem with a rising prevalence world wide and attendant substantial health care costs [117, 119]. The increasing prevalence of overweight and obesity is associated with both direct and indirect health care costs (Table 1.6). Direct health care costs refer to the preventive, diagnostic, and therapeutic services, whereas indirect costs refer to loss of productivity, due to illness or disability, and loss of future earnings due to premature death [120, 121]. In the Swedish Obese

Study, the frequency of long-term sick leave (over 6 months) was reported to be 1.4 times in obese men and 2.4 times higher in obese women, when compared to the general population. In addition, the rates of premature disability pensions were reported to be between 1.5 and 2.8 times higher.

1.6.3 The cost of obesity in developed countries

In the USA in 1995, the total (direct and indirect) costs attributable to obesity amounted to an estimated $99 billion [118]. In 2000, the total cost of obesity was estimated to be $117 billion ($61 billion direct and $56 billion indirect). Most of the cost associated with obesity is due to type 2 diabetes, coronary heart disease, and hypertension [118]. Additionally, estimates of the amount of money spent by overweight or obese individuals on special foods, diet clubs and over the counter remedies in the USA range between 30$ -50$ billion annually [118]. Data from other developed countries (Table 1.6) indicate that the economic costs of obesity range from 2% to 7% of the total health costs, making the management of overweight and obesity one of the largest expenditures in national health care budgets [119, 120].

1.6.4 Policy Implications

The experience of the developed world in terms of the projected health care costs should serve as an example in developing countries and obesity prevention should be a priority when deciding on health care policy. A large proportion of obesity related costs could be avoided by implementing early prevention and intervention strategies.

1.6.5 Potential cost savings associated with reduction in the prevalence of obesity

Unfortunately, only a few studies have been conducted in this area. In the USA [118] a prescription saving cost from the treatment of type 2 diabetes was projected to US $ 442.80 per subject per year, following a reduction in weight. Unfortunately, the sample size employed in this study was very small and therefore such results cannot be generalized.

1.6.4 Economic cost and benefits of obesity treatment in developing countries

Despite the fact that no analysis have been made of the economic costs of obesity treatment in developing countries, studies of other health interventions concur that prevention is more cost-effective than treatment. Currently, most overweight and obese individuals in developing countries are not treated and demand for medical and dietetic help is expected to rise rapidly. The WHO estimates that the health burdens attributable to excess weight in transitional societies are likely to be very significant due to the absolute numbers at risk, the large loss in life expectancy and because obesity affects, in particular, individuals with a key role in promoting economic development [117, 120].

Table 1.6: Estimated economic costs of obesity

Country	Year	Study	Obesity definition (BMI)	Estimated direct costs	% National health care costs
Australia	1989/1990	NHMRC REPORT [1]	>30	Aus $ 464 million	>2
France	1992	Levy et al [121]	≥ 27	FF 12,000 Billion	2
Netherlands	1981-89	Seidell & Deerenberg [122]	>25	Guilders 1000 million	4
USA	1998	Wolf & Colditz [118]	≥29	US $ 45,800 billion	6.8

Notes: USA: United States of America. HMRS: National Health and Medical Research Council [1]
FF: French francs. S$: United States Dollars. AUD: Australian Dollars

1.7 THE ROLE OF PRACTITIONERS IN OBESITY MANAGEMENT

With the increasing prevalence of obesity in both developed and developing countries, the number of patients seeking advice for weight management in primary health care settings is likely to parallel this trend [123]. It is therefore necessary that an awareness of obesity as a medically relevant issue among Medical Practitioners as well as a willingness to view weight management as an appropriate part of their responsibilities and an interest in further skills training should be created. It is also important for Medical Practitioners to have essential knowledge to manage obesity.

1.7.1 Physicians

Many primary care physicians are reluctant to treat overweight and obese patients. It would appear that lack of time, poor patient compliance, inadequate teaching materials, lack of counselling and training skills, inadequate reimbursement and low physician confidence are barriers to treatment [124, 125, 126,]. Among those practitioners who do address dietary issues with their patients, the time spent discussing weight management has been reported to be five minutes or less [124].

However, primary health care physicians reach most segments of the population, and their expertise is highly regarded by their patients [124], placing them in a unique position to provide nutrition information. Traditionally, physicians refer their patients for dietary counselling, although there are those who express interest in counselling their patients for weight management themselves. In this regard, the available evidence indicates that fewer than one-half of overweight and obese patients are advised to lose weight by their doctors [125] and only a small percentage of these patients believe that the advice that they receive is positive or useful. At the same time, the perception among patients is that physicians have a high degree of expertise and, therefore, do have the ability to influence the lifestyles and eating habits of their patients. Because of their high-perceived expertise and their ability to reach nearly all segments of the population, primary health care physicians are in a unique position to provide nutrition information to patients, when compared with other health care professionals such as dieticians [126]. Patients with productive interactions with clinicians have improved nutritional care and are more likely to report receiving help with eating problems [82]. As such, advice from a physician to make lifestyle changes may prime patients to become more aware of and attentive to health care information. However, although there are many educational materials available to physicians, establishing a link between written materials and physician advice is an important first step in establishing an office-based system for weight management and disease prevention. Patients who receive physician advice for lifestyle changes within a coordinated system of support and information delivery perceive this advice as individualized, and are more likely to attempt behaviour change [128]. Physician training, therefore, in the effective sharing of information and continuous involvement of the patient in such interactions over the more traditional prescriptive approach to medical management of weight would appear to be of the essence. Physicians need brief, direct encounters with their patients regarding weight, since such brief, yet direct, interactions have been shown to be effective [129]. However, physician training in counselling techniques alone seems to be insufficient in comparison with training in nutritional counselling coupled with a structured environment for nutrition management. Appropriate training in counselling skills can, at least theoretically increase physician confidence and self-efficacy [127, 129, 130].

1.7.2 General Practitioners

MPs view weight management as important and feel they have an important role to play. Although they consider themselves to be well prepared to treat overweight patients, they believe that they have limited success in weight management and find it professionally unrewarding [66]. However, MPs view the

assessment of a patient's dietary and physical activity habits and the provision of dietary and physical activity advice as very important. Nevertheless, the approaches least likely to be considered important and/or least likely to be practiced were those that would support the patient in achieving and maintaining lifestyle change [123, 128]. There are also data showing that MPs in Australia rate themselves as "quite effective" as weight loss practitioners [123] and those who consider themselves influential in getting patients to change their diets. Although collectively these findings suggest that MPs can provide an environment that supports high-quality weight management interventions, there are a range of factors that limit the Medical Practitioners' capacity to deliver such interventions. Obesity management is significantly hampered, in the first instance, by low levels of obesity identification [128, 131] and reluctance to manage weight when there are no co-morbidities, or when the patient is overweight as opposed to obese [123]. Furthermore, health professionals, including MPs, hold negative attitudes toward their overweight and obese patients. It has been suggested that such attitudes can significantly impede the practitioner's levels of involvement and interaction. Other studies [130, 131, 132, have shown that MPs see their low level of relevant knowledge and skills as an impediment to more effective weight management practices. In this regard, it has been documented [78] that a range of predictors for improved treatment success feature poorly in MPs' training and practice. It is also interesting to note that levels of nutrition knowledge among GPs is low [87] and that current practices in the promotion of exercise is significantly different from those considered as desirable practices. Thus, although MPs are potentially well placed to play a key role in the prevention and management of obesity, the available data suggest that MPs' practice in this area may be constrained by lack of appropriate skills [87]. However, at present there exists only limited information regarding MPs' attitudes and practices regarding the prevention and management of overweight and obesity. A more detailed understanding of these issues is necessary to determine how best to facilitate MPs' contribution to addressing the epidemic of obesity.

1.7.3 Paediatricians

The obesity review [19] of the International Obesity Task Force of the World Health Organization estimated that about 10% of young people aged 5-17 years are overweight, of whom 2-3% were obese, corresponding to 30 – 45 million obese children worldwide. In view of these alarming statistics, the paediatrician needs to be equipped with training and skills for weight management. Paediatricians therefore also have an important role to play in the prevention of obesity. By learning how to optimize the health care of obese children and adolescents and integrating obesity prevention and advocacy into

their practice, paediatricians have the opportunity to offer the beginning of an answer to the obesity epidemic and to contribute to the prevention of this global public health priority [19, 115].

1.7.4 Other practitioners

Other health care practitioners should also be equipped with the necessary skills and knowledge to deal with this epidemic. For instance, although a patient may never get to see a MPs or a physician, overweight and obese patients may see other medical Specialists, such as a dermatologist or a gynaecologist. All health practitioners, therefore, at all levels of health care should theoretically possess the skills and knowledge and use the available opportunities to increase awareness and promote the prevention of overweight and obesity [19, 133, 134, 135, 136]. Obesity is every ones responsibility.

1.8 MOTIVATION FOR THE STUDY

Overweight and obesity represent a significant and growing public health concern, which requires both prevention and treatment and focuses on individual behaviour as well as environmental and structural lifestyle modifications. Although Medical Practitioners view their role in weight management as important and feel they have an important role to play, they appear to believe that they have limited efficacy in weight management and find it professionally unrewarding [78, 81]. In this regard in Kenya, the Xenihealth Annual report of 2002 indicates that of the 730 overweight or obese patients seen in that year only 30% (n=219) of these patients were referred for dietary counselling by their Medical Practitioners while the majority [70%; (n=511)] of the patients either sought advice on their own or were referred by friends or through the public obesity awareness programme [21]. What is of even greater concern is that of the Medical Practitioners' referred patients (30%), the majority of these patients [75%; (n=164)] were referred by only 2 Medical Practitioners. In view of these findings as well as the apparent increasing prevalence of overweight and obesity in Kenya, it was deemed necessary and appropriate to investigate defined aspects of the knowledge, attitudes and practices of Medical Practitioners regarding obesity and weight management in 3 urban centres in Kenya.

CHAPTER TWO

STUDY AIMS AND OBJECTIVES

2.1 AIM OF THE STUDY

To determine defined aspects of the knowledge, attitudes and practices of Medical Practitioners regarding obesity and weight management

2.1.1 Objectives

2.1.1.1 Primary Objectives

- To assess doctors' basic knowledge on assessment of obesity and the health implications thereof.
- To assess the basic knowledge of doctors on weight loss drugs and their level of confidence in prescribing such or any other form of treatment.
- To assess doctors' attitudes towards obesity and the need for early diagnosis in addition to treatment.
- To assess the difference in aspects of knowledge, attitudes and practices among the Medical Practitioners.
- To determine doctors' interests and willingness to learn and get involved in the prevention and treatment of obesity.

2.1.1.2 Secondary Objectives

- To find out whether MPs know when patients are obese and what associated morbidities for their patients are.
- To determine the training needs of the doctors for the implementation of successful prevention and treatment programmes for overweight and obesity

2.1.2 Hypothesis

Doctors recognize obesity as a problem of public health importance and manage their patients with diet, exercise and /or pharmacologic treatment in their practices.

2.2 STUDY DESIGN

2.2.1 Type of Study

This was a descriptive, analytical cross sectional study design, which describes the defined aspects of

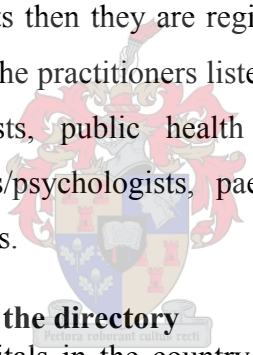
knowledge, attitudes and practices of Medical Practitioners regarding the prevention and treatment of obesity in Kenya.

2.2.2 Study Population

The sample was selected using a Medical Practitioner's (MP) directory for 2002-2003. A copy of the directory for the Kenya Medical Practitioners Board (KMPB) was obtained for that purpose. The Kenya medical directory (KMD) is updated every two years by the KMPB and valid for only two years. The directory has information regarding:

2.2.2.1 Medical Practitioners and health professionals

Medical Practitioners in Kenya hold a diploma or degree in Medicine offered in or outside the country. In Kenya to be registered as a medical practitioner, you must first present your certificate and be assessed by a team in the Kenya Medical Practitioners Board (KMPB). The practitioner is supposed to be on attachment or internship for at least 6 – 12 months before they can be assessed by the KMPB. If the practitioner meets all the requirements then they are registered as a medical practitioner and their names appear in the medical directory. The practitioners listed in the KMD include: nurses, dieticians, nutritionists, physiotherapist, radiologists, public health doctors, gynaecologists, anaesthetists, physicians, dermatologists, psychiatrists/psychologists, paediatricians, general practitioners, ENT Specialists, ophthalmologists and surgeons.



2.2.2.1.1 Other information included in the directory

The directory also includes all the hospitals in the country, dental and other surgeries, pharmacies, medical supplies, laboratories, diet and nutrition clinics and all non-governmental organizations dealing with health and nutrition.

2.2.3 Medical Practitioners Participating in the Study

The Medical Practitioners included in this study were required to have an MB ChB or equivalent degree. They must have practiced for at least 2 years or more in Kenya and were able to speak and understand English. All these practitioners were currently registered with the Kenya Medical Practitioner's Board.

Fifty percent of all listed MP's irrespective of gender were randomly selected from the major urban centres in Kenya namely; Nairobi, Mombasa and Kisumu since most MPs practice in these areas. In total, they were 606 MP's from the various branches of medicine who were included in the study (Table 2.1).

2.2.4 Inclusion criteria

The MPs had to be registered and be in possession of the MB ChB-degree or an equivalent qualification considered by the Kenyan Medical Practitioners Board. Practitioners should have been practicing their profession for a minimum of 2 or more years in Kenya.

For the purposes of selection, the registration number of the MPs in the order that was entered in the medical register was used and an odd number from the directory was selected until a 50% sample size of all MPs was selected.

Table 2.1: The number of medical practitioners MB ChB registered with the Kenyan Medical Practitioners Board by speciality, area of urban practice and the number of medical practitioners included in the study as a percentage of the total number of registered.

Specialists	Registered practitioners	Nairobi	Mombasa	Kisumu	50% of registered practitioners
Anaesthetists	50	22	2	1	25
Dermatologists	24	11	1	0	12
ENT specialists*	28	10	3	1	14
General practitioners	466	173	46	14	233
Gynaecologists	152	64	9	4	76+
Ophthalmologists	38	12	5	2	19
Paediatricians	120	52	6	3	60+
Psychiatrists	32	12	4	0	16
Physicians	158	69	6	4	79
Surgeons	144	61	9	2	72
Total	**1212**	**486**	**88**	**32**	**606**

* ENT: Ear Nose Throat
+ Figure has been rounded to the nearest; hence, it affects the total numbering.

2.3 ETHICS

The study was approved by the Human Research Committee of the Faculty of Health Sciences of the University of Stellenbosch, Tygerberg, South Africa, (Project number: 03/120/N) (Addendum 1) as

well as the Ministry of Education in Kenya. The permit to carry out the study in Kenya was obtained from Ministry of Education, Department of Science and Technology (Research permit no: 13/001/33C 237) (Addendum 2).

The investigator, who received a fellowship grant from Roche products and the Nestle Nutrition Institute Africa, covered all the costs incurred in the study. The subjects did not receive any incentives or remuneration of any nature.

2.3.1 Written consent

The investigator/research assistant provided each participant with an informed consent form (Addendum 3). An adapted consent form was utilized, based on the standard informed consent used by the Faculty of Health Sciences, Stellenbosch University. The consent form was available in English.

Prior to the interview, all MP's were informed of the nature and importance of the study. MPs were informed of the length of the questionnaire, the time it would take to complete it, that they would remain anonymous and that all the information that would be provided would be treated as confidential. Those MPs who agreed to participate in the study were not required to sign the consent form for maintaining confidentiality.

2.4 QUESTIONNAIRE

2.4.1 Setting and Design

It was a one-off self-administered questionnaire available only in English (Addendum 4). The design and setting of the questionnaire was adapted from several relevant Knowledge, Attitude and Practices (KAP) surveys in the literature [123, 126, 127, 128]. These guided the investigator regarding the content and structure of the questions include in the questionnaire. The investigator had prior knowledge, training and experience on several aspects of obesity including, assessment, aetiology, co-morbidities and approach to its prevention and management.

The questionnaire consisted of four sections, namely socio-demographic information, knowledge, attitudes and practices. The response of the KAP survey was obtained by pre-designed set of questions and responses. The respondent was provided with a list of options to select the choice applicable to the respondent. Provision was also made for specific comments that the respondent might have had to

make. The questionnaires were validated for content validity only.

2.4.1.1 Section 1: Demographic survey

Comprised of 10 questions aimed at gathering basic and background information on the MPs. Apart from socio-demographic information such as age and gender, the aim of the section was also to find out if the MPs had any formal education and training in nutrition as well as obesity and where they had acquired it. The section also aimed to enquire whether the practitioners considered the knowledge that they had acquired either from medical school or from a different level of education was adequate for them to manage overweight and obese patients.

2.4.1.2 Section 2: Knowledge

This section contained 11 questions and was aimed at assessing the awareness of Medical Practitioners of obesity as a major public health problem and the practitioners' knowledge on the need for long-term management of obese patients. To manage obesity, the practitioners need to have the basic knowledge of assessment of obesity. The questions in this section, therefore, aimed to assess the level of knowledge that the Medical Practitioners had on different methods of assessing and classifying obesity and the different treatment options.

2.4.1.3 Section 3: Attitudes

This section contained 10 questions. It assessed the attitudes of Medical Practitioners towards the management of obesity and the difficulties practitioners experienced as well as their concerns while managing the overweight and obese patient. All the responses included were correct and the MPS could choose more than one correct choice.

2.4.1.4 Section 4: Practices

This section comprised of 15 questions. The aim was to assess the practices of the practitioners. The questions were chosen so as to obtain information on the time allocation in their practices to the treatment of obesity, the nutrition assessment tools used in their surgery, the type of assessment used to diagnose and classify overweight and obesity, the number of overweight and obese patients they saw on average per month and the number of patients treated by dietary, exercise and pharmacologic intervention. This section also aimed to assess how often the practitioners assessed and managed overweight and obesity patients, and whether they would like to improve their knowledge and skills on weight management.

2.5 PILOT STUDY

The investigator conducted a pilot study to test the questionnaires for comprehension and clarity after ethics approval from the Committee for Human Research of the Faculty of Health Sciences of the University of Stellenbosch, South Africa on 25 July 2003.

2.5.1 Pilot Study Participants

The pilot study participants comprised of a convenience sample including two physicians, 2 surgeons and one each of the categories of practitioners listed (Table 2.1). This included paediatrician, psychiatrist, gynaecologist, MPs and one anaesthetist. There were 10 practitioners in total. The chosen participants for the pilot study had a prior interest in obesity and were willing to give their input on the content and comprehension of the questions. They all had more than five years of experience. Each pilot study participant completed the questionnaire and made written comments independently on the existing questions.

The investigator integrated and incorporated all the suggestions made and the revised questionnaire was then returned to all the participants for a second review. All the final suggestions made were used for the improvement of the content and comprehension of the questionnaire and were incorporated in the final questionnaire used in this study.

The purpose of the pilot study was to test the questionnaire's content for all Medical Practitioners. The participants were to ensure that the questions were addressing obesity problems in all the sectors of different Specialists.

2.6 DATA COLLECTION PROCEDURE

The questionnaires were self-administered. The latter approach was adopted because during the pilot study, MPs indicated that their colleagues would be more likely to participate and complete the questionnaire more accurately and honestly, if they were allowed the choice of filling in the questionnaire at their own free time.

2.6.1 Instructions to Subjects

The questionnaire together with a covering letter explaining the purpose of the study and assuring the participant of the confidential and anonymous management of the data was hand delivered to the study participants at their practices by research assistants. The consent forms and the introduction letter

attached to the questionnaires had a telephone number where the investigator could be contacted in case of any questions or clarification.

2.6.2 Research Assistants

The investigator had 5 research assistants. These were University graduates [Bachelor of Science (BSc) (n = 3) and Dietetic (n = 2)]. They all attended a training session that was delivered by the investigator on the 5th of September 2003.

2.6.2.1 Training

The purpose of the training was to ensure good quality and standardization of data collection.

The following topics were discussed:

- Nature of the research and the reason why the research was being done.
- Objectives of the study were clearly explained to the research assistants.
- The areas where the research was being carried out and the need to travel to a different town. One of the research assistants was residing in one of the towns where the data was to be collected.
- Responsibility of each research assistant was explained.
- The inclusion and exclusion criteria was explained to each research assistant.
- The research assistants were carefully informed on how the consent form was to be administered. The MPs were not to sign the form because they were to remain anonymous. However, the research assistants were to have the form with them at all times which they were to constantly read and understand the contents.
- The emphasizing of the questionnaires was realised through repetitive reading to ensure proper understanding of the content and the need for the research assistants to ensure that the participants filled in all the questions before handing it to the investigator.
- Other topics included; importance of being very responsible and accountable, conditions for the temporary employment, allowances expected, rules of work, and deadlines.

2.6.2.2 Duties of the research assistants

The research assistants collected questionnaires from the investigator and proceeded to distribute them to the specific MPs. The Kenya Medical Directory had all the details of names and locations of the MPs. Each research assistant had a copy of the directory and location where the practitioners practiced. Territories were divided among the research assistants.

The research assistants and the investigator explained the requirements of the study and arranged a convenient time for the collection of the completed questionnaire. Some practitioners completed the questionnaires on the spot while the questionnaires from other practitioners were collected at a later convenient time after the MP had completed the questionnaire. The research assistant had to inspect the questionnaire to ensure that all the questionnaires had been fully completed. If there was, any question that was not answered, the MP was kindly requested to complete it.

2.6.3 Data Analysis

The data was analyzed by Statistical Packages for Social Sciences© (SPSS) version 11.5 program. The statistician entered all the data in this program and double-checked by checking that the entries on the hard copy questionnaires matched those entered in the software. A qualified statistician carried out the data analysis with the assistance of the investigator.

To compare means for age of the males and females, indefinite samples *student's t-test was* used, *one-way ANOVA test* used to compare the means for age of the different Specialists interviewed *

Foe categorical results, a *Pearsons Chi-square(χ^2-test)* was used to compare difference between proportions for independent variables. Since the sample size was larger than 30, we assumed normality in all analysis a *P-value of <0.05* was considered statistically significant*

* Campbell Mj, David M, Medical Statistics; A common sense approach. Third Edition. 1991; 85-89

* Martin Bland. Medical Statistics, Low price Edition, 1993; 241-261

* David SM, Gearge PM. Introduction to the Practice Statistics, Third edition, 1999.

CHAPTER THREE

SAMPLE CHARACTERISTICS AND FINDINGS

The study was conducted between September and November 2003. The data was collected from Nairobi in September and October, and Kisumu and Mombasa in November. A total of 485 participants were interviewed. Fifty-five (11%) of the questionnaires were completed wrongly and were discarded. Four hundred and thirty questionnaires had complete data, representing an 89% response rate, and were therefore used for data analysis. The proportion of responding practitioners differed among the Specialists with the lowest response occurring among the "other" category(anaesthetists,dermatologist,ENTspecialists, ophthalmologists, psychiatrists/psychologist) (Table 3.1).

The percentage of participating respondents from Kisumu, Mombasa and Nairobi was 5.3, 16.3 and 78 .4 percent respectively. Even though the questionnaires had been hand-delivered to all the study centres, the data collected from Kisumu and Mombasa accounted for a small percentage of the total number of respondents, and therefore no statistical comparisons were made on the data between the three urban centres.

3.1 SECTION A: SOCIO-DEMOGRAPHIC INFORMATION

Of the total respondents, 338 (79%) and 92 (21%) were males and females respectively. The mean age of all respondents was 43.9 years (yrs) (SD 11.2), with the youngest practitioner being 26 and the oldest 90 yrs of age. The mean age of male and female participants was 44.6 (SD 11.1, range 26-77 yrs) and 41.7 (SD 11.0, range 26-90 yrs) respectively.

The physicians were generally older than the other specialists, mean 50.2 yrs (SD 9.8), the GPs were the youngest, mean 40.4 yrs (SD 11.9), the rest ranged from a mean of 45.0 yrs to 47.4 yrs). There was a statistical significant difference in the mean ages of GPs and Physicians (40.4 yrs vs 50.2 respectively, $p<0.001$), GPs and surgeons (40.4 yrs vs 47.4 yrs respectively, $p=0.001$) and GPs and paediatricians (40.4 yrs vs 46.5 yrs, $p <0.011$). There was no statistical difference in the comparisons amongst the "other specialists.

The remainder of the results is presented by "question" in the questionnaire.

3.1.1 Type of Practice

The purpose of the question "What is your practice in the medical field?" was to find out the different specialists who completed the questionnaire. General practitioners were the most frequent specialists (48%) with the remainder of the practitioners being equally represented in the sample (Figure 3.1)

3.1.2 Formal Nutrition Training

This question "**Did you undergo any formal Nutrition training at medical school?"** intended to establish the general formal nutrition-training practitioners had received. Two hundred and twenty-seven (53%) practitioners received formal training in nutrition at medical school.

There was a statistically significant difference in formal nutrition training among the different specialists, (Chi-square, p=0.039) (Figure 3.2). The majority of the physicians had not received formal training (65%), while an almost equal proportion of the GPs had received formal nutrition training (60%). The rest of the specialists had almost equal proportions of those who received and those who did not receive formal training.

3.1.2.1 "If the answer to question 3.1.2 was "yes", did it prepare you well to deal with obese and overweight patients?"

This question was to establish whether the practitioners considered this training to have prepared them well for patient management in nutrition (Figure 3.3). Forty percent (91/227) of the respondents felt that the training was adequate and prepared them well to deal with overweight and obese patients. Physicians were the most well prepared (65%) while the surgeons were the least prepared (17%) to deal with patients after the formal nutrition training at medical school. This was statistically significant (Chi-square, p=0.041).

3.1.3 Formal Training on Obesity and Weight Management?

The question **"Have you had any formal training on obesity and weight management**?" was to find out if the practitioners had received any formal training on obesity management in the form of a course on its own. Only 15%, (n=64) of respondents had received such formal training in obesity and weight management (Figure 3.4). More of the physicians (29%) received such training in obesity and weight management, followed by "others" category (18%), then GPs (16%) with the least being the surgeons and gynaecologists (6%). These differences were statistically significant (Chi-square p=0.009).

The medical practitioners (MPs) who had received such obesity and weight management training were asked if they considered the training appropriate to manage their patients. Fifty-seven percent (n=36)

considered the training adequate and that it prepared them well enough to deal with the obese and overweight patients However, the difference in adequacy of the training among the specialists was not statistically significant (Figure 3.4). The majority (68%) of practitioners had received their training from graduate school, while the remaining 32 % received their training from other centres (Figure 3.5).

Table 3.1: The proportion of all the data collected from different specialists in the study

Specialists	Data expected (n=606)	Data collected and analysed [n =430; n (%)]
General Practitioner	233	206 (88)
Physicians	79	48 (60)
Surgeons	72	49 (68)
Paediatricians	60	42 (70)
Gynaecologists	76	51 (61)
Other*	86	34 (36)

* Anaesthetist, dermatologists, ENT specialist, ophthalmologists, psychiatrists/psychologists

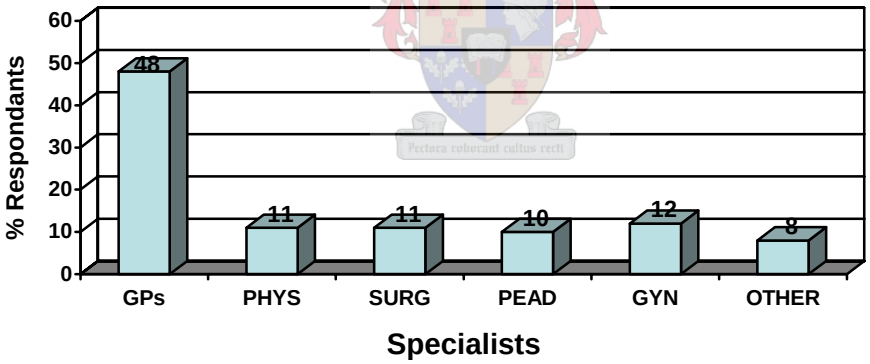


Figure 3.1: The types of speciality among the study participants (GPs- General practitioners, PHYS-Physicians, SURG-Surgeons, PEAD-Paediatricians, GYN-Gynaecologists, Other-Psychiatrists/psychologists, Dermatologists, ENT Specialists).

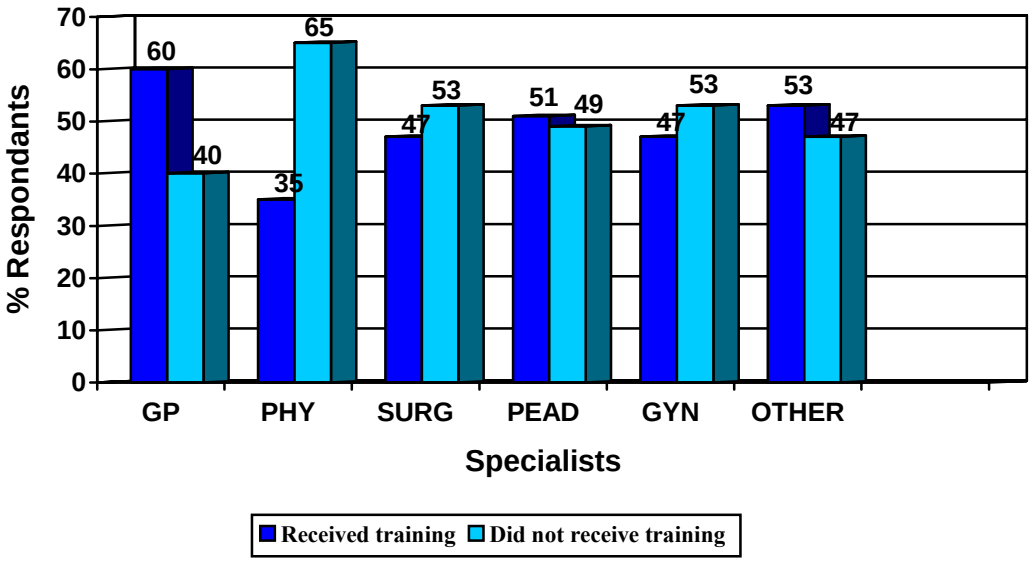


Figure 3.2: Different specialists who did or did not received formal nutrition training at medical school

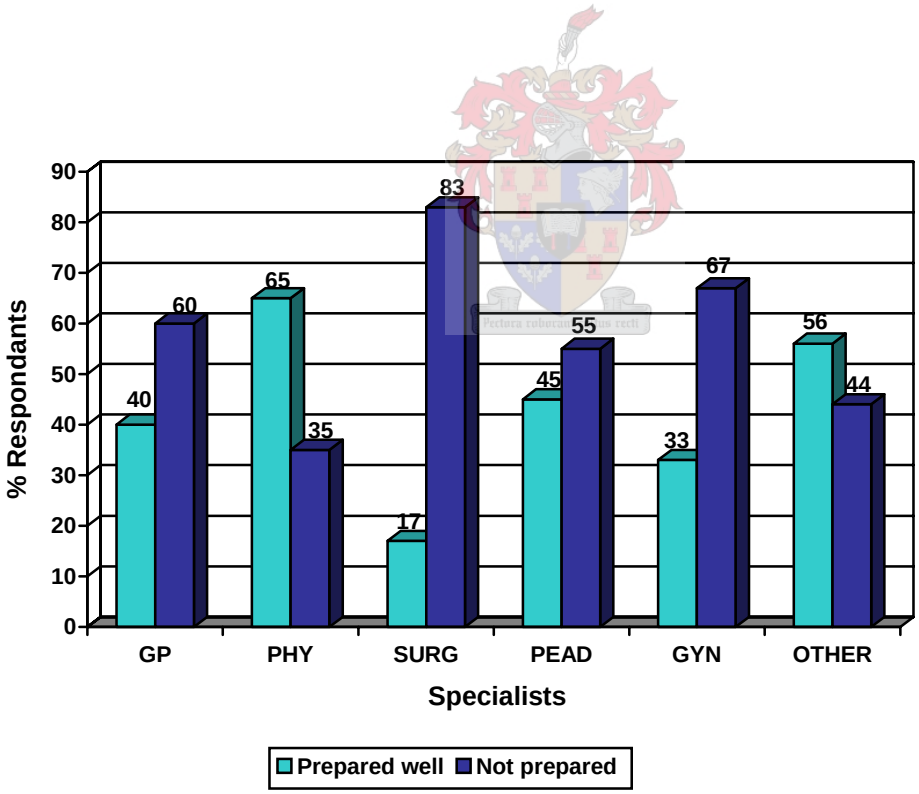


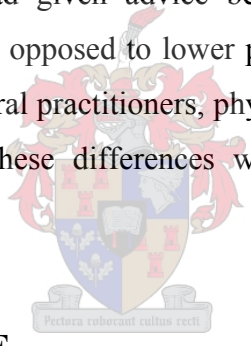
Figure 3.3: The proportion of specialists responses as to how well their training prepared them to manage obese and overweight patients

3.1.4 Preferred Methods of Training

The MPs who had not received formal training on obesity (n = 365) were asked for their opinion on how they would like to be better equipped in managing obesity and overweight patients (Table 3.2, Table 3.2,). The majority (62.2%) of the specialists indicated that they preferred certificate courses, 57.3% wanted readily available information on obesity e.g. guidelines on diet, 53.6% suggested local obesity seminars and updates, 37% suggested literature on pharmacological management modalities on obesity to equip themselves to manage the condition. Others methods suggested by the MPs (1.4%) included, regular updates, mass media, education of the public and further training for those already trained (Table 3.2).

3.1.5 Advice to Patients

This question "Have you ever given advice to a patient on nutrition for weight loss management?" was to establish if the MPs had given nutrition advice for weight loss management to patients. Ninety-two percent (n=390) of the practitioners had given advice before (Figure 3.6). The majority of the paediatricians (98%) had given advice as opposed to lower proportion of the "other" category (76%). For the remainder of the specialists (general practitioners, physicians, surgeons and gynaecologists) the proportion ranged from 83 to 96%. These differences were statistically significant (Chi-square; p=0.001).



3.2 SECTION B: KNOWLEDGE

3.2.1 Awareness of Obesity as a Health Problem in Kenya

The significance of this statement "Obesity is a health problem in Kenya today" was to find out if the MPs were aware of the fact that obesity is a problem in Kenya. Eighty percent (n=372) strongly agreed or agreed that obesity was a health problem in Kenya today, whereas 11% (n=45) strongly disagreed or disagreed, and 3% (n=13) were not aware that obesity was a problem (Table 3.3). The highest number of agreement came from gynaecologists, surgeons and general practitioners, 71%, 69% and 67% respectively. However, this difference among the different specialists did not reach statistical significance.

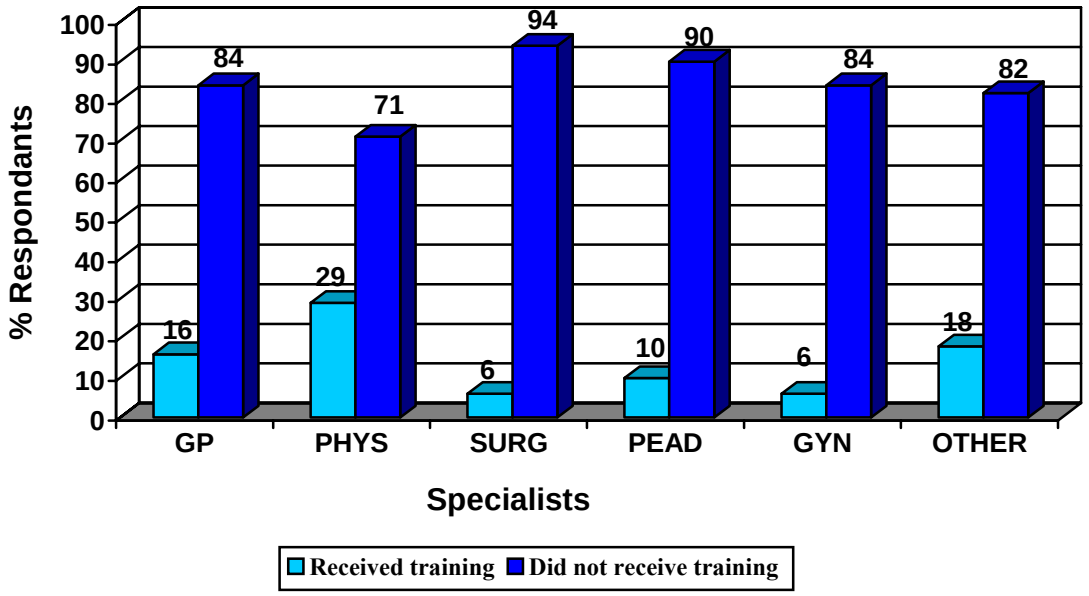


Figure 3.4: Proportion of medical practitioners who had formal training in obesity and weight management by speciality.

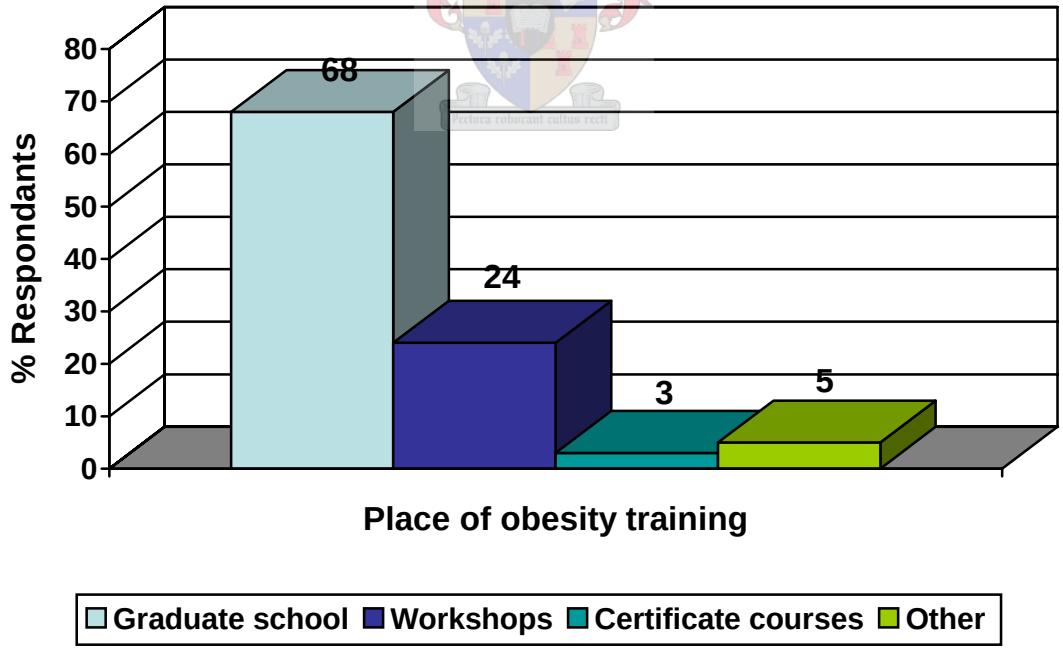


Figure 3.5: Proportion of medical practitioners who received training on obesity by the place of tuition

Table 3.2: The type of tuition medical practitioners received on obesity and weight management training outside the medical school

Preferred modes of training	Number of responses (n)	Percentage (%)
Certificates	217	62.2
Readily available information on obesity	200	57.3
Local obesity seminars and updates	187	53.6
Literature on pharmacology and treatment modalities	129	37.0
Other methods	5	1.4
Don't know	1	0.3

* Number of missing cases = 16

3.2.2 Obesity as a Long-term Management Medical Problem The significance of this question was to find out if the practitioners appreciated that obesity is a medical problem requiring long-term management. Ninety-two percent (n=397), agreed with the fact that obesity is problem requiring long-term management, 3% (n=14) did not agree, 4% (n=16) were not sure if obesity required long-term management, 1% (n=3) did not know. There was no statistically significant differences among the different specialists on obesity being a health problem requiring long-term management.

3.2.3 Major Factors Contributing to Obesity in Kenya

This question "In your opinion, what are the major factors contributing to obesity in Kenya today?" was to find out from the MPs what they thought was the major factor contributing to obesity in Kenya today. Eighty-one percent attributed causes of obesity to sedentary lifestyle, 71% to high fat intake, 51% high sugar intake, 44% to genetic factors, 5% attributed it to other factors and 0.5% did not know the factors contributing to obesity in Kenya (Table 3.4). There was no statistically significant difference among the different specialists on their opinion on this question.

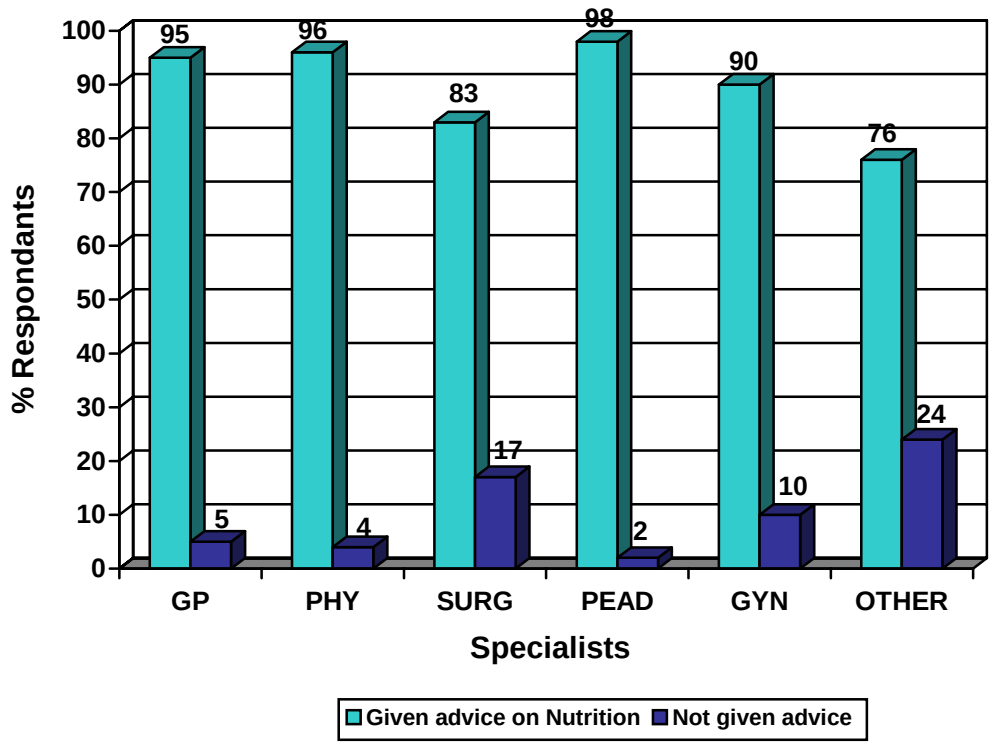


Figure 3.6: The proportion of different types of specialists who responded affirmatively to having previously given nutrition advice to patients

3.2.4 Definition of Obesity

This aim of the question "What is the classification of obesity?" was to find out if the MPs were able to define obesity when they assessed their patients (Table 3.5). The question provided the classification of obesity for both children and adults. Fifteen percent of the respondents classified obesity as a BMI of 19.3 kg/m^2 – 26.7 kg/m^2 in Children aged 5-12 years, 74% defined obesity as a BMI ≥30 kg/m^2, 22% classified obesity as a waist circumference more than 88 cm in females and 102 cm in males, and 18% did not know how to classify obesity.

The majority of the physicians (88%) classified obesity as a BMI ≥30 kg/m^2. Of the remainder specialists, 77% of the GPs, 70% of the gynaecologists, 59% surgeons, and only 19% of the "other" category (anaesthetists, dermatologists, ENT specialists, ophthalmologists, psychiatrists/psychologists) classified obesity using this criterion. There was a statistical significance difference amongst the different specialists who correctly classified obesity as a BMI ≥ 30 Kg/m^2 (Chi-square, p=0.003).

Table 3.3: The proportion of Medical Practitioners who are aware of obesity as a health problem in Kenya today

Response	**n (/%)**
Strongly agree	89 (21)
Agree	283 (66)
Disagree	43(10)
Strongly disagree	2(1)
Don't know	13(3)
Total	**430**

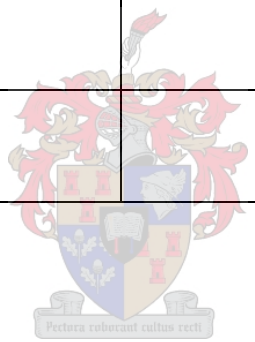


Table 3.4: The major factors contributing to obesity in Kenya today

Factors contributing to obesity	**Number of responses (n)**	**Percentage (%)**
Sedentary lifestyle	344	81.1
High fat intake	301	71
High sugar intake	215	50.7
Other	22	5.2
Genetic factors	185	43.6
Do not know	2	0.5

Table 3.5: Proportion of medical practitioners who classified obesity correctly

Classification of obesity	Number of responses (n)	Percentage (%)
BMI ≥ 30 kg/m^2 in adults	310	73.8
Waist circumference more than 88 cm in females and 102 cm in males	92	21.9
Don't know	76	18.1
BMI of 19.3 kg/m^2 – 26.7 kg/m^2 in Children aged 5-12 years,	63	15
None of the above	7	1.7

* 10 missing cases

3.2.5 Obesity Associated Morbidity

This aim of the question "What morbid conditions are associated with obesity?" was to find out if the MPs had knowledge of the conditions associated with overweight and obesity (Table 3.6). The majority of the practitioners (96%) associated such conditions with obesity as diabetes, 95%, high blood pressure (92%) and cardiovascular disease (89%). A smaller proportion of MPs (67% and 66%) associated obesity with immobility and respiratory conditions respectively.

Forty-five percent of the paediatricians and gynaecologists, 31% of "other" category, 21% of physicians, 23% of general practitioners and 12% of surgeons attributed miscarriages as being associated with obesity (Chi-square, P>0.001) (Table 3.7). Furthermore, 72% of gynaecologists, 69% surgeons, 67% of physicians, 62% of paediatricians, 52% GPs and 50% of the "other" category classified anaesthetic complications as a condition associated with obesity (Chi-square, P=0.032).

3.2.6 Timing of Weight Management

The significance of the question "When should you initiate weight management?" was to find out when the different types of specialists initiated weight management in their patients (Table 3.8). Thirty-seven percent of the respondents initiated weight management when patients complained about their weight. Fifty-nine percent initiated weight management when there was an increase in the weight of the patients who were being monitored, 59% initiated weight management when the patient presented with co-morbidities, 31% on patients' request and 13% initiated weight management when the patient

had dyslipideamia, was clinically obese or was experiencing problems associated with excess weight. About 1% of the respondents did not know when to initiate weight management.

Table 3.6: The proportion of medical practitioners associating morbid conditions with obesity

Conditions associated with obesity	Number of responses (n)	Percentage (%)
Diabetes	409	95.8
High blood pressure	395	92.5
Cardiovascular conditions	381	89.2
Immobility	284	66.5
Respiratory problems	282	66.0
Anaesthesia complications	254	59.5
Miscarriages	118	27.6
Other	55	12.9
Don't know	2	0.5

3.2.7 Recommendations for Weight Management by Type of Patient

This question "To whom do you recommend weight management?" was intended to establish the type of patient for whom the doctors recommended weight management (Table 3.10). The MPs recommended weight management primarily to patients who had co-morbidities (73%), were obese 43%, or had dyslipidaemia (42%). Seven per cent of respondents had no criteria for recommending weight loss. There was no significant difference among the different specialists**,** on the type of patients' weight loss management was recommended. The majority of the gynaecologists (53%) initiated weight management on patients' request when compared with GPs (24%). This was the only significant difference among the different type of specialists in relation to the timing of the initiation of weight management (Table 3.9).

3.2.8 Criteria for Implementing Pharmacological Intervention

This question "What is the accepted criterion for implementing pharmacological intervention?" was to find out if the doctors had any knowledge of the criteria used for initiating pharmacological intervention in obese patients (Table 3.11). Sixty-three percent of the different specialists initiated pharmacological intervention at a BMI $\geq$ 30 kg/m^2, 56% initiated pharmacological intervention at a BMI of 27 kg/m^2 with co-morbidities, 10% initiated such treatment to patients who wanted to loose weight, and 8% did not use any criteria.

There was a significant difference among the different specialists as to when they initiated pharmacological intervention at BMI $\geq$ 30 kg/m^2 and BMI of 27 kg/m^2 with co-morbidities, (Chi-square p=0.000 and p=0.001 respectively) (Table 3.12). For both criteria the majority of the physicians (52%) initiated pharmacological intervention and surgeons were the least (16%) likely to initiate pharmacological intervention using the two criteria.

3.2.9 Medications for Pharmacological Weight Reduction

This purpose of this question "Do you know any types of medications for pharmacological weight reduction?" was to find out if the different specialists had knowledge of weight loss drugs. Sixty percent (n=252) of the practitioners had knowledge of weight loss drugs. There was a statistically significant difference amongst the different specialists on knowledge of the types of medication for pharmacological weight medication (Chi-square, p=0.013). The majority of the physicians (76%) had some knowledge as compared with the majority of surgeons (58%) who had no knowledge on the use of weight loss drugs.

The MPs who had knowledge of weight loss drugs (n=252), were in addition asked to list the drugs used in the management of obesity (Figure 3.7). The drugs were classified into four categories; appetite suppressants, Xenical, herbal drugs and others. Sixty-nine percent listed appetite suppressants, 54% Xenical, 9% herbal drugs and 31% listed other weight loss medications.

The greater percentage of specialists quoted Xenical as a weight loss drug (Figure 3.8). This ranged from 80% amongst the physicians, 75% gynaecologists with significantly less frequent listing of the drug by other specialists, (Chi-square, p=0.004).

The MPs who did not have any knowledge of weight loss medication (n=169), were asked if they were interested in getting more information. The majority of them, 95% (n=149) replied in the affirmative with no significant difference among the various specialists.

Table 3.7: The proportion of Medical Practitioners who responded on complications associated with obesity

Conditions associated with obesity	**GPs n (%)**	**PHYS n (%)**	**SURG n (%)**	**PEAD n (%)**	**GYN n (%)**	**OTHER n (%)**	**CHI-SQUARE p=VALUE**
Diabetes	199 (97)	47 (98)	46(94)	41(98)	47(92)	29(85)	0.061
High blood pressure	196(95)	44(92)	44(90)	38(91)	44(86)	29(85)	0.189
Miscarriages	48(23)	15(31)	6(12)	19(45)	23(45)	7(21)	0.000
Anaesthesia complications	108(52)	32(67)	34(69)	26(62)	37(73)	17(50)	0.032
Immobility	128(62)	31(65)	32(65)	34(81)	36(71)	23(68)	0.294
Cardiovascular conditions	183(89)	44(92)	43(88)	34(81)	47(92)	30(88)	0.613
Respiratory problems	130(63)	35(73)	32(65)	30(71)	36(71)	19(56)	0.504
Other	22(11)	5(10)	10(20)	6(14)	5(10)	7(21)	0.310

Table 3.8: The number of times the Medical Practitioners responded on when they initiated weight managament

Criteria for Initiation of weight management	Number of responses (n)	Percentage (%)
Weight increase in patient being monitored	249	59.4
When a patient is presented with co-morbidities	245	58.5
When patient complained of their weight	153	36.5
Patients request	129	30.8
Others	54	12.9
Don't know	3	0.7

3.3 SECTION C: ATTITUDES

3.3.1 Need for Early Diagnosis and Treatment of Obesity

This question "Do you feel there is need for early diagnosis and treatment of obesity?" aimed to find out the MPs' attitude on the diagnosis and treatment of obesity. One percent (n=4) did not think it was necessary, 95% (n=404) thought it was necessary and 4% (n=17) thought it was maybe necessary to diagnose and treat obesity early. There was no significant difference among the different specialists concerning this question.

3.3.2 Concerns Regarding Obesity?

This question was to find out from the MPs what their concerns were when managing the obese patients (Table 3.13). Ninety-eight percent (n=415) of the MPs were concerned with the underlying co-morbid conditions, 53% were concerned with the psychological impact on the patient and 13% were concerned about the increased insurance cover for obese patients or lack of it. Only two percent had other concerns. However, there was no significant difference among the different specialists.

Table 3.9: Proportions of Medical Practitioners initiating weight management on defined criteria in their patients by speciality

Initiation of weight management	GPs n (%)	PHYS n (%)	SURG n (%)	PEAD n (%)	GYN n (%)	OTHER n (%)	Chi-square p=value
When patient complained of their weight	67 (33)	20(42)	16 33)	11(26)	25 (49)	14 (41)	0.162
Weight increase in patient being monitored	120 (58)	31(65)	20(41)	27(64)	32(63)	19(56)	0.156
When a patient is presented with co-morbidities	115(56)	32(67)	30(61)	20(48)	27(53)	21(62)	0.484
Patients request	49(24)	15(31)	14(29)	13(31)	27(53)	11(32)	0.005

3.3.3 Difficulties in Managing Obese and Overweight Patients

The purpose of the question "What are the major difficulties you encounter while managing obese and overweight patients?" was to find out the difficulties practitioners experience while managing obesity in their patients (Table 3.14). Compliance with the type of management (68%) was the major difficulty with lack of monitoring and follow up and lack of patient motivation being the other major problem among the different specialists. The different specialists had other difficulties that included, cost of treatment, cultural values attached to big size and other issues such as HIV stigma, lack of support network, lack of adequate information and ignorance.

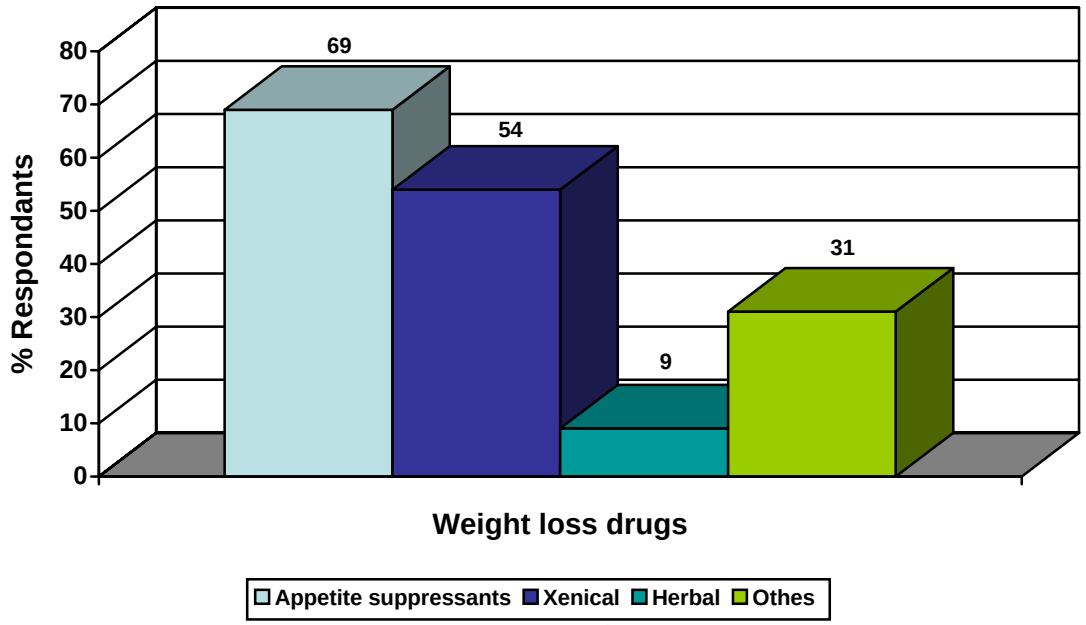


Figure 3.7: Weight loss drugs listed by different specialists

Table 3.11: The percentage of medical practitioners who initiated pharmacological intervention for the management of obesity according to the defined criteria.

Criteria for initiating pharmacological intervention	Number of responses (n)	Percentage (%)
BMI ≥ 30 Kg/m2	168	63.2
BMI of 27 kg/m2 with co-morbidities	149	56.0
Any patient who wanted to loose weight	29	10.9
Did not use any criteria	21	7.9

Table 3.10: Types of patients to whom medical practitioners recommended weight loss

Recommended weight loss	Number of responses (n)	Percentage (%)
Patient with co-morbidities	326	76.5
Patient who is obese	310	72.8
No criteria	31	7.3
Patient with dyslipideamia	181	42.5

*4 missing cases

Table 3.12: Proportions of different Specialists on how they responded on criteria they used for implementing pharmacological intervention

Criteria for implementing pharmacological weight reduction	GPs n (%)	PHYS n (%)	SURG n (%)	PEAD n (%)	GYN n (%)	OTHER n (%)	Chi-square p=value
Patient with a BMI $\geq$ 30 kg/m^2	95(46)	25(52)	8(16)	12(29)	21(41)	7(21)	0.000
Patient with BMI $\geq$ 27 kg/m^2 With co-morbidities	77(37)	25(52)	8(16)	9(21)	22(43)	8(23)	0.001
Patients who want to loose weight	14(7)	3(6)	2(4)	1(2)	7(14)	2(6)	0.323

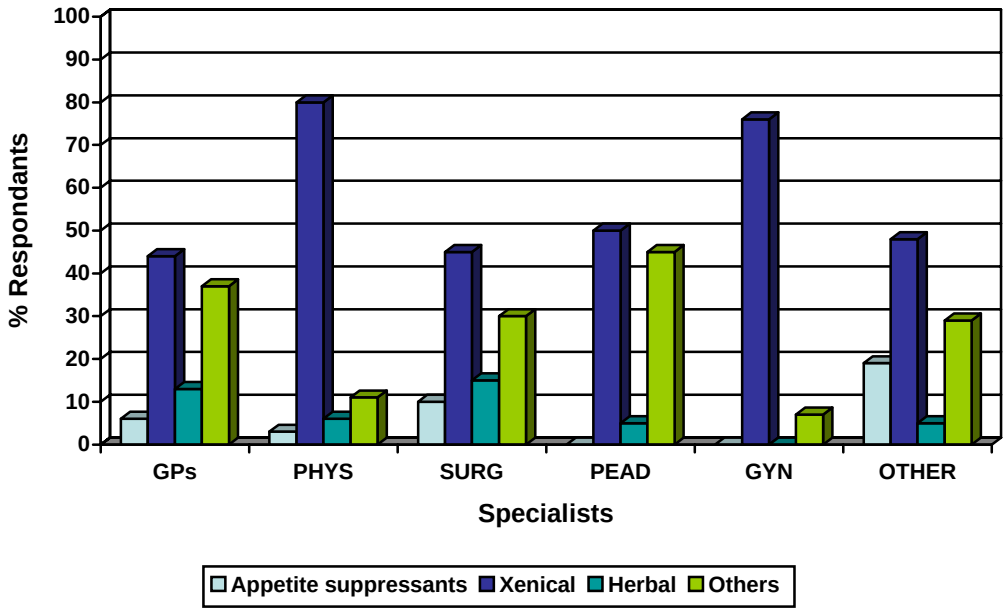


Figure 3.8: The proportion of different weight loss drugs listed by different specialists

Table 3.13: The major concerns of medical Practitioners regarding obesity

Major concerns	**Number of responses (n)**	**percentage (%)**
Underlying co-morbid condition	415	98.1
Psychological impact on patient	223	52.7
Increased insurance cover for obese patients or lack of	55	13.0
Others	9	2.1

There was a statistically significant difference among the different specialists who considered lack of monitoring and follow-ups as a major difficulty encountered while managing obesity and overweight patients (Chi-square; p=0.001), with the majority being GPs (62%) being the most concerned, the least concerned being the surgeons (33%) with such concern among the other different specialists ranging from 42 to 51%.

3.3.4 Benefits of Treating and Managing Obesity

The purpose of this statement "Do you feel that treating and managing obesity is beneficial?" was to find out from the MPs what their feelings were about treating and managing the obese patients (Table 3.15). Fifty-four percent felt that treating and managing obesity reduced patient hospitalization, 64% felt it reduced the cost of medical care, 66% felt that it improved metabolic conditions, and 92% felt it improved quality of life.

Table 3.14: Difficulties encountered while managing obese and overweight patients among different specialists

Difficulties encountered	GPs n (%)	PHYS n (%)	SURG n (%)	PEAD n (%)	GYN n (%)	OTHER n (%)	p=VALUE n (%)
Lack of time	58(28)	19(40)	15(31)	12(29)	18(35)	12(35)	0.658
Compliance with type of management	134(65)	35(73)	32(65)	28(67)	32(63)	20(59)	0.843
Lack of monitoring and follow up	128(62)	20(42)	16(33)	19(45)	22(43)	14(41)	0.001
Lack of patient motivation	97(47)	26(54)	19(39)	26(62)	23(45)	17(50)	0.314
Increased cost of treatment	70(34)	14(29)	13(26)	5(12)	12(23)	11(32)	0.091
Cultural values attached to big size	45(22)	11(23)	14(29)	10(24)	9(18)	7(21)	0.863
Other	10(5)	2(4)	2(4)	2(5)	3(6)	2(6)	0.998

* 15 missing cases

3.3.5 Provision of Nutrition Advice to Patients

The purpose of the question "Do you feel adequately informed to give nutrition advice to patients?" was to find out if the MPs felt that they were adequately informed to give nutrition advice to their patients (Figure 3.9). Only 37% (n=158) felt they were adequately informed to give nutrition advice to patients. Significantly, more of the physicians (57%) felt they were adequately informed to give nutrition advice while the least informed to give nutrition advice were the surgeons (22%), and gynaecologist (27%), (Chi-square p=0.006).

Table 3.15: Proportion of medical practitioners reporting that treating and managing obesity was beneficial

Benefits of treating obesity	Number of responses (n)	Percentage (%)
Improve quality of life	389	91.7
Improve metabolic conditions	278	65.6
Reduces cost of medical care	272	64.2
Reduces patient hospitalization	230	54.2
No impact on health	8	1.9
Other	3	0.7
Don't know	1	0.2

* 6 missing cases

The specialists who thought they were adequately informed about nutrition (n=158) were asked how often they gave nutrition advice to their patients (Figure 3.10). Fourteen percent always advised their patients, 31% advised their patients most of the time, 16% sometimes and 39% only when nutrition advice was indicated. This difference was not statistically significant (Chi-square, p=0.153).

The MPs who felt inadequately informed were further asked why they felt that way (n=269). Seventy-six percent felt they did not have adequate knowledge, 23% lacked time to give nutrition advice, 55% referred obese subjects to dieticians/nutritionist, 4% did not consider nutrition management important and 2% did not find a reason to give nutrition advice.

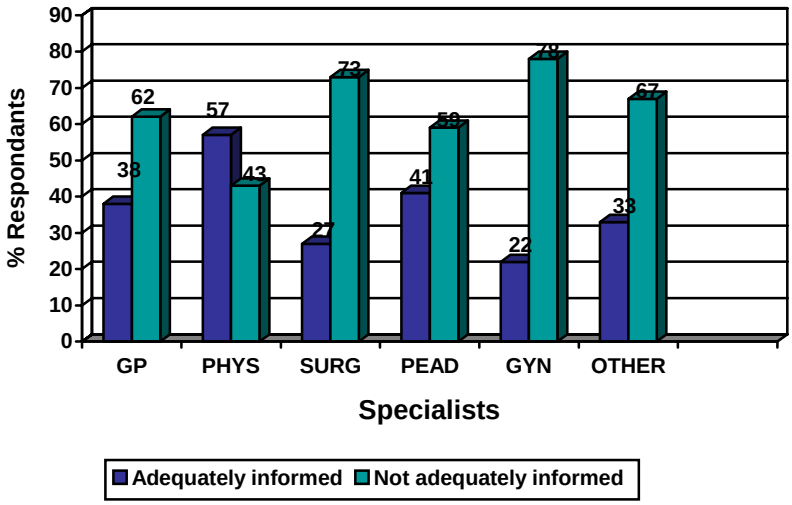


Figure 3.9: Proportion of medical practitioners who thought they were adequately informed to give nutrition advice to patients

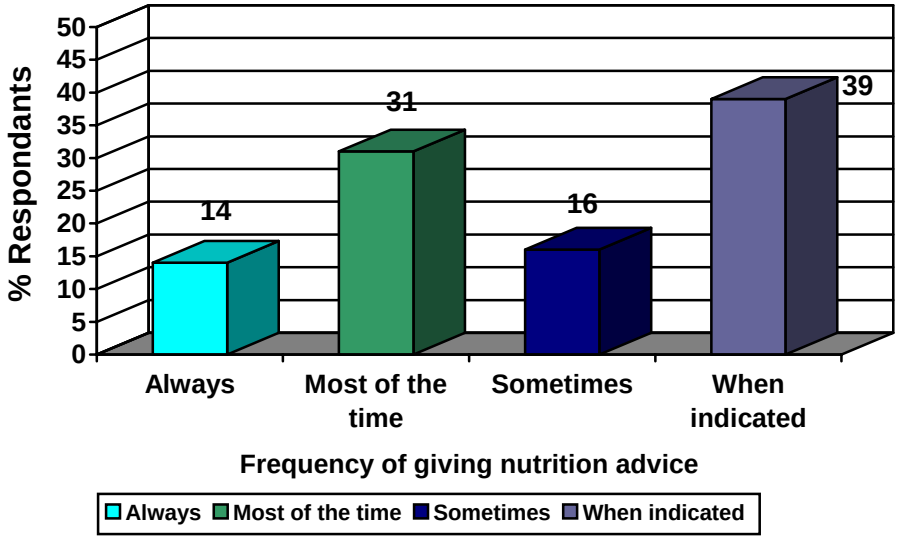


Figure 3.10: The proportion of medical practitioners who reported on how often they gave nutrition advice to their overweight and obese patients

There was a significant difference among the different specialists who did not consider nutrition management important (Table 3.16). Most (22%) of the practitioners (anaesthetists, dermatologist, ENT specialist, psychiatrist/psychologist) did not consider nutrition management important as compared to only 10% of physicians, 3% of the gynaecologists and 2% of GPs. All of the surgeons and paediatricians considered nutrition management important, (Chi-square; $p<0.001$). The majority of the physicians (45%) felt they lacked time to give nutrition advice, and 31% of the surgeons, 28% of the paediatricians, 18% of the "Other" category (anaesthetists, dermatologists, ENT Specialists, ophthalmologists psychiatrists/psychologists) and 13% of the gynaecologists shared this feeling (Chi-square; $p=0.043$).

3.3.6 Prescription of Weight Loss Medication

The purpose of question "Do you feel adequately informed to prescribe weight loss medication?" was to find out if the practitioners felt they were adequately informed to prescribe weight loss medication (Figure 3.11). The majority of the MPs 77% (n=325) did not feel adequately informed to prescribe weight loss medication. Physicians (53%) had the most confidence in prescribing weight loss medication while paediatricians (8%) had the least confidence. This was statistically significant (Chi-square, $p<0.001$).

The MPs who felt inadequately informed to prescribe weight loss medication (n=325) were further asked what they would like to be done about their lack of knowledge. Eighty-nine percent (n=260) wanted more information as opposed to 14% of the respondents who were not interested in getting information on weight loss medication. There was no significant difference amongst the different specialists in this regard.

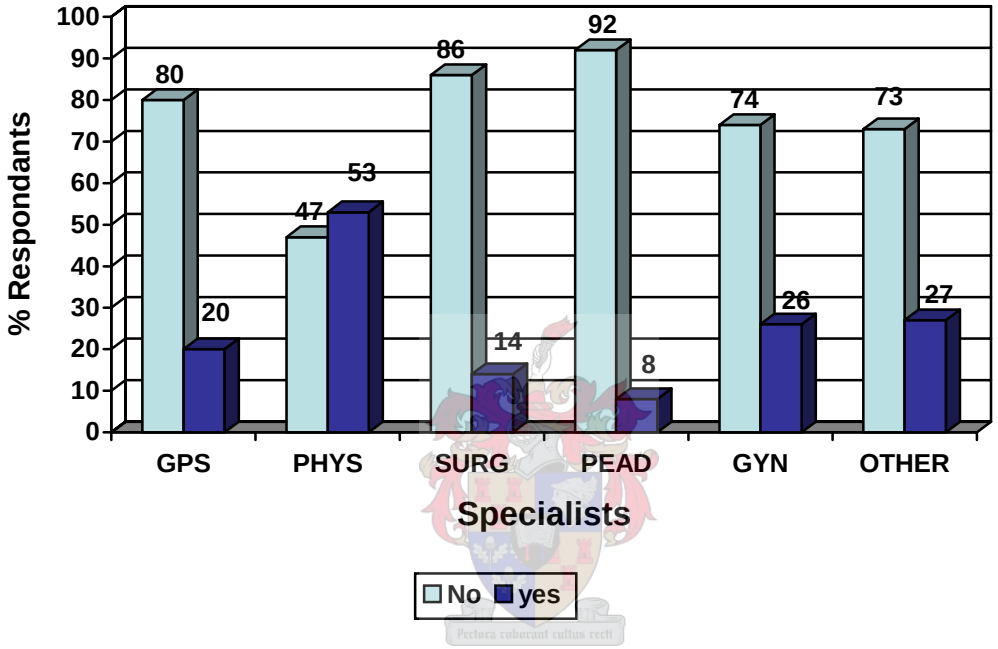


Figure 3.11: The proportion of different medical specialists who thought they were adequately informed in prescribing weight loss medication

3.3.7 Competence Needs

The purpose of the statement "I would like to be more competent in…"was to get the specialists to list areas in obesity management they wanted to be more competent in. The majority of MPs (89%), were interested in dietary management guidelines, 75% in exercise management, 74% in pharmacological intervention and 35% in surgical management. A negligible percentage of respondents (1.4%) were interested in other areas and 2% were not interested in any issues with regards to weight management (Figure3.12).

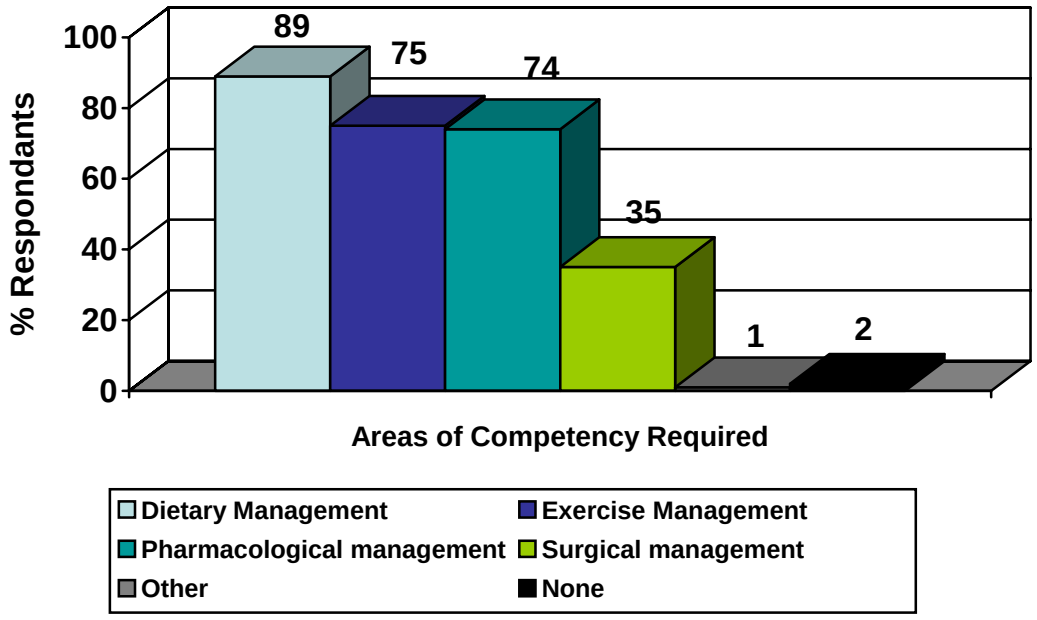


Figure 3.12: Areas of competency in obesity management requested by medical practitioners

Most of GPs and gynaecologists (78%) and the least of surgeons (57%) required competency in pharmacological intervention (Table 3.17) (Chi-square, p=0.013). There was also a significance difference among the MPs who required competency in surgical management of obesity with the majority being surgeons (69%) and the least being paediatricians (19%) in this regard (Chi-square; p<0.001).

3.4 SECTION D: PRACTICES

3.4.1 Place of Practice

The purpose of this question was to find out where and how the doctors practiced. The MPs had more than one option to choose from. Seventy-one per cent of the MPs had their own private practice, 15% practiced in academic institutions, 35% practiced in tertiary care institutions, and 3% practiced in other institutions like community pharmacy, mission hospital and corporate health care systems (Figure 3.13).

Paediatricians and Gynaecologists spend more of their time in own private practice (86%), 81% of the physicians, 67% of the surgeons and 59% of the GPs, 32% of the other category (Chi-square; p<0.001). Twenty five percent of the physicians, 78% of the gynaecologists spend their time in academic institutions (Chi-square, p<0.005).

Table 3.16: The statistical significance of Medical Practitioners who gave their reasons for feeling inadequate to give nutrition advice

Reasons for not giving nutrition advice	GPs n (%)	PHYS n (%)	SURG n (%)	PEAD n (%)	GYN n (%)	OTHER n (%)	Chi-square p=value
Lacked Adequate knowledge	96(76)	17(85)	27(75)	16(64)	28(72)	15(68)	0.665
Lacked time to give the nutrition advice	23(18)	9(45)	11(31)	7(28)	5(13)	4(18)	0.043
Referred to dietician/nutritionist	64(50)	10(50)	24(67)	15(60)	17(44)	13(59)	0.378
Did not consider nutrition management important	2(1.6)	2(10.0)	0(0)	0(0)	1(2.6)	5(22.7)	0.000
Did not find a reason to give nutrition advice	2(1.6)	0(0)	0(0)	0(0)	1(2.6)	1(4.5)	0.709

8 missing cases

3.4.2 Main Place of Practice

This purpose of the question "Where do you spend more than 50% of your practice time?" was to find out where the MPs spent more than 50% of their practice time (Figure 3.14). Most of the practitioners spent >50% of their time in their own practice 60% (n=254), academic institutions, 11% (n=47), tertiary care institutions 26% (n=109),, and 4% (n=15) spent their time in other areas such as community clinics and mission health centres, community pharmacies and corporate health care systems. Paediatricians (70%) and gynaecologists (71%) spent most of their practice time in their own private practice as compared to the other specialists (Figure 3.15). Surgeons (35%) and GPs (31%) spent more time in tertiary care institutions as compared with other Specialists.

Table 3.17: Areas of competency required among the different Specialists required for successful management of obesity

Desired areas of competency	GPs n (%)	PHYS n (%)	SURG n (%)	PEAD n (%)	GYN n (%)	OTHER n (%)	p=value
Dietary management	182(88.3)	40(83.3)	37(75.5)	37(88.1)	47(92.2)	(27(79.4)	0.121
Pharmacological management	161(78.2)	33(68.8)	28(57.1)	26(61.9)	40(78.4)	21(61.8)	0.013
Exercise management	148(71.8)	34(70.8)	31(63.3)	28(66.7)	42(82.4)	27(79.4)	0.294
Surgical management	61(29.6)	11(22.9)	34(69.4)	8(19.0)	20(39.2)	12(35.3)	<0.001
Total	**206**	**48**	**49**	**42**	**51**	**34**	

* 14 missing cases

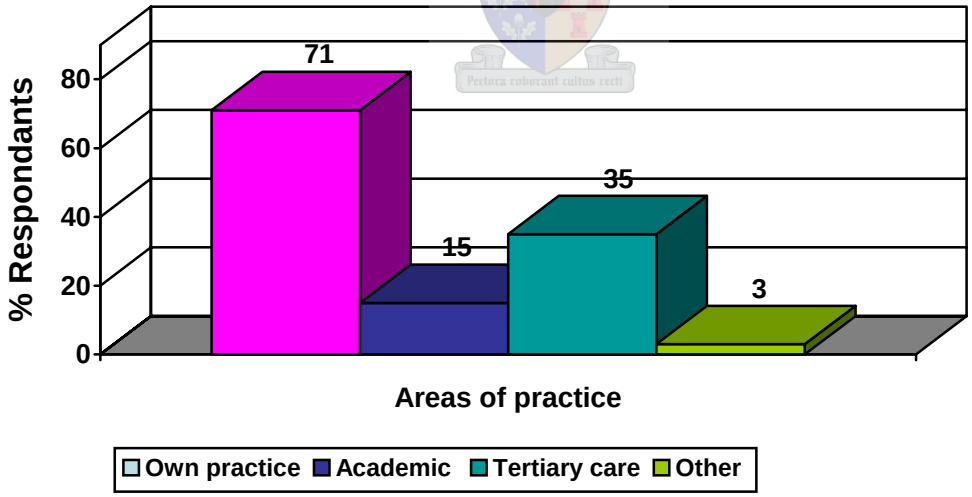


Figure 3.13: The proportion of medical practitioners who responded in relation to their place of practice

3.4.3 Frequency of Patient Consultation

The purpose of the question "In the last three months, how many obese patients did you see on average per month?" was to find out how many patients did MPs see on average per month in the last three months (Table 3.18). Thirty eight percent of all the MPs did not take note of the numbers of subjects seen, 46% saw between 0-5 patients, 10% saw between (6-10) patients, 3% saw between (11-15) patients, and 3% saw an average of more than fifteen patients. A higher percentage of the surgeons (57%) did not take note of the numbers of patients seen as compared to "other" specialists category (anaesthetists, dermatologists, ENT specialists, psychiatrists/psychologists) (Figure 3.16). Gynaecologists saw the higher proportion of "0-5" patients (65%). Physicians observed a higher proportion of "6-10" patients (15%). This difference was statistically significant (Chi-square, p=0.02).

3.4.4 "Diet and Exercise" Management of Obesity

The purpose of the question "In the last three months how obese patients did you managed on diet and exercise on average per month?" was to establish how many patients were managed on diet and exercise in the period mentioned (Table 3.19). Most of the specialists (56%) managed between 0-6 patients on diet and exercise. Gynaecologists accounted for 71%, "other" MPs (anaesthetists, dermatologists, ENT Specialists, psychiatrists/psychologist) (71%) and paediatricians 70%) managed the most patients on diet and exercise. For the remainder of the practitioners who adopted diet and exercise in the management of their obese patients ranged from 43% - 52%. There was no significant difference among the specialists in this regard.

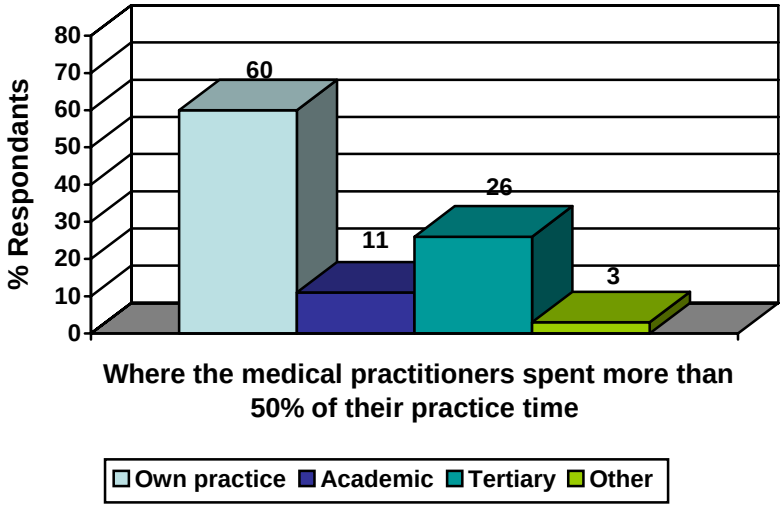


Figure 3.14: The proportion of medical practitioners in relation to their main place of practice time

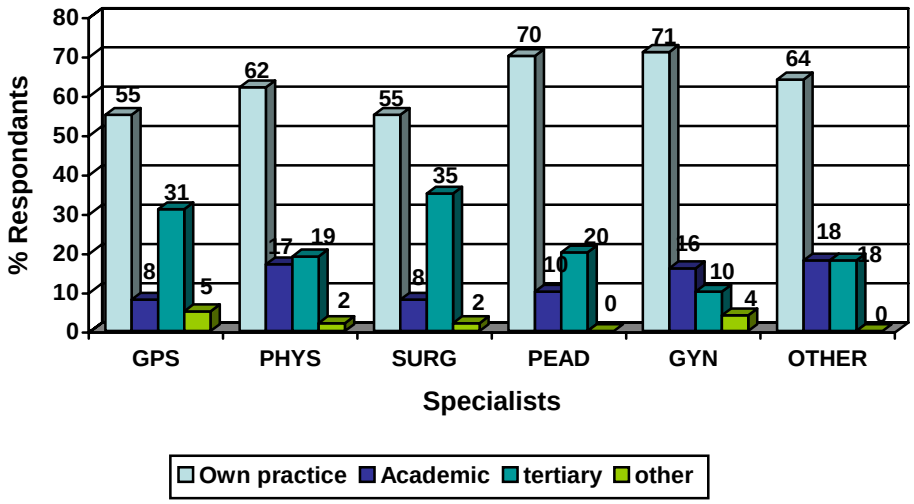


Figure 3.15: The proportion of medical practitioners in relation to their main place of practice according to speciality

Table 3.18: The number of obese patients seen on average per month for the last three months by the respondents in the study

Category	Number of responses (n)	Percentage (%)
0-5 patients	196	46
No of patients seen but no records kept	158	37
6-10 patients	40	10
>15 patients	16	4
11-15 patients	12	3

* 8 missing cases

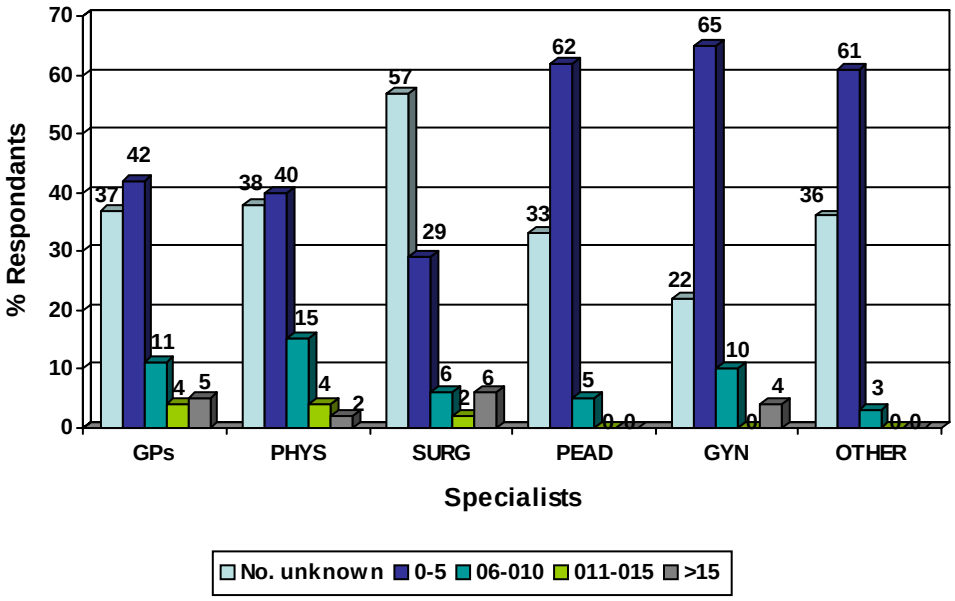


Figure 3.16: The number of patients seen on average per month for the last three months by different Specialists

Table 3.19: The number of obese patients managed on diet and exercise on average per month for the last three months by medical practitioners

Category	Number of responses (n)	Percentage (%)
0-5 patients	243	56
Patient seen but no records kept	164	35
6-10 patients	28	7
11-15 patients	4	1
>15 patients	6	1
Total	418	100

* 12 missing cases

3.4.5 Pharmacological Management of Obesity

The purpose of this question "In the last three months how many patients did you manage on pharmacological intervention on average per month?" was to establish how many obese patients were managed on pharmacological intervention on average per month for the last three months by the specialists categories (Table 3.20). Most of the MPs (69%) managed only between 0-5 patients on pharmacological intervention, 30% did not keep records and 1% managed more than 6 patients with pharmacotherapy. Paediatricians managed the most patients with pharmacotherapy (83%) followed by "other" practitioner (anaesthetists, dermatologists, ENT specialists, psychiatrists/psychologist) (77%), gynaecologists (71%) and physicians (70%). There was however no statistically significant difference among the specialists.

3.4.6 Use of Anthropometric Tools

The purpose of the question "Which of the following anthropometric tools do you have in your practice?" was to find out if the practitioners had any anthropometric tools in their surgery (Table 3.21). Ninety-seven percent of the practitioners had weighing scales, 64% had stadiometes, 57% had waist circumference tapes, 3% had a Bioelectrical Impedance instrument and 3% had other types of assessment tools e.g. BMI wheels and body fat monitors.

Table 3.20: The number of obese patients managed on pharmacological intervention on average per month for the last three months by medical practitioners

Category	Number of responses (n)	Percentage (%)
0-5 patients	280	69
Subjects seen but no records kept	121	30
6-10 patients	1	0.5
>15 patients	1	0.5
11-15 patients	0	0
Total	403	100

*27 missing cases

Table 3.21: The proportion of different types of anthropometric assessment tools found in medical practitioners' surgery

Anthropometric tools found the surgery	Number of responses (n)	Percentage (%)
Weighing Scale	383	96.7
Stadiometer	255	64.4
Waist circumference	225	56.8
Bio-impedance analysis	10	2.5
Others	11	2.8

It is interesting to note almost most MPs had weighing scales as compared with other assessment tools. One hundred percent of paediatricians had scales and the least number of practitioners with scales were found in the "other" category of specialists (anaesthetist, dermatologists, ENT specialist, psychiatrists/psychologists) (62%) (Table 3.22), (Chi-square, $p<0.001$). When comparing the presence of other anthropometric assessment tools in the place of practice, the possession of stadiometers, waist circumference tapes and other assessment tools was significantly different among all specialists (Table 3.22).

3.4.5 Frequency of Use of Anthropometric Assessment Tools

The purpose of the question "How often do you use the anthropometric assessment tools?" was to find out if and how often the MPs used the assessment tools, they owned. Thirty-seven percent used their tools frequently, 31% once in a while, 22% sometimes, 4% rarely used these tools and 6% did not use them at all (Figure 3.17).

Most of the physicians (54%) always used their tools (Table 3.23), as opposed to the "other" specialists (anaesthetist, dermatologists, ENT specialist, psychiatrists/psychologists) (12%) who used their anthropometric tools less frequently. The differences were significant (Chi-square, $p<0.000$).

Table3.22: Proportion of medical practitioners who had different anthropometric tools in their surgery

Anthropometric tools found in the surgery	GPS n (%)	PHYS n (%)	SURG n (%)	PEAD n (%)	GYNA n (%)	OTHER n (%)	Chi-square p=value
Weighing Scale	189(92)	45(94)	39(80)	42(100)	47(92)	21(62)	<0.001
Height Metre/Stadiometer	130(63)	35(73)	22(45)	31(74)	25(49)	12(35)	<0.001
Waist circumference	108(52)	32(67)	24(49)	25(59)	28(55)	8(23)	0.006
BIA	5(2)	3(6)	(0)	1(2)	(0)	1(3)	0.336
Others	2(1)	2(4)	2(4)	(0)	1(2)	4(12)	0.008
Total	**206**	**48**	**49**	**42**	**51**	**34**	**430**

3.4.6. Assessment of the Degree of Overweight and Obesity

The purpose of the question "How do you assess the degree of overweight and obesity in your patients?" was to find out how the MPs assessed for obesity in their patients (Figure 3.18). Sixty-two percent of the MPs used BMI, 21% used waist circumference, 30% used weight alone, 7% used waist and hip circumference ratio (Chi-square, p=0.152), 5% used other methods of assessments.(Chi-square, p=0.017). The latter included clinical assessments, co-morbid factors and general appearance. BMI was the most popular form of assessing obesity among the MPs. However, there was no statistical significance difference in this regard among the specialists.

The BMI was most commonly used by Physicians (88%), GPs (69%), gynaecologists 63%, paediatricians 45%, surgeons 41%. The "other" category (anaesthetists, dermatologist, ENT Specialists, psychiatrist/psychologist) were the least users of the BMI as compared with the other Specialists (Chi-square, p<0.001). The weight alone method was used more by the paediatricians (45%), as compared with the rest of specialists; 32% by GPs, 31% by gynaecologists, 29% by surgeons and 18% by the "other" category (anaesthetists, dermatologist, ENT Specialists, psychiatrist/psychologist). The most infrequent use of weight alone as a means of assessment was by the physicians (13%). There was statistically significant difference in the use of other forms of

assessment amongst the different specialists (Chi-square, p=0.022).

3.4.7 Patient Management

The purpose of the question "How do you manage the weight of your overweight and obese patients?" was to find out how the MPs managed the weight of their patients (Table 3.24) All MPs could choose more than one of the options provided in the questionnaire. Most of the MPs (76%) actually provided advice on diet and exercise to their patients, the most being physicians (83%) and the least being the "other" specialists (anaesthetists, dermatologists, ENT specialists, psychiatrists/psychologist) (53%). This difference was statistically significant (Chi-square, p<0.001).

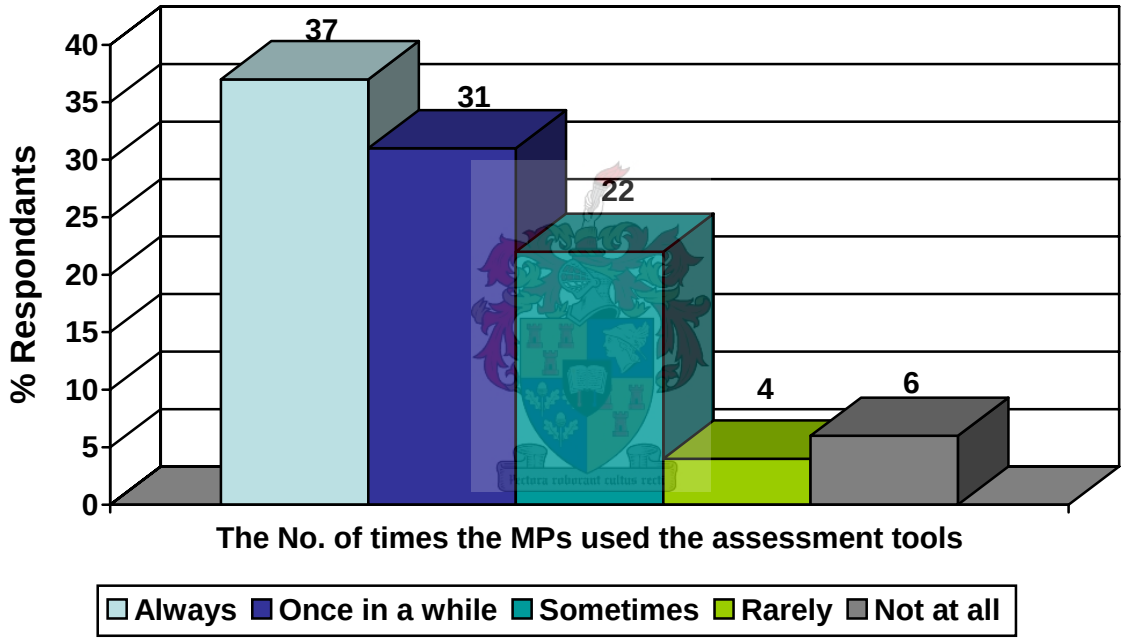


Figure 3.17: The frequency of use of the anthropometric assessment tools by medical practitioners found in their surgery

Fifty-four percent of the practitioners referred patients to dieticians/nutritionists with surgeons (62%) making the most frequent use of this option whereas paediatricians (48%) accounted for the least number of such referrals (Table 3.25). However, there was no statistical significance difference among the MPs. Other MPs managed patient on pharmacological intervention with physicians (38%) being the most and paediatricians are being the least frequent users of this approach. There was a significant difference with regard to the approach to management among the practitioners (Chi-square, p=0.001).

Table 3.23: The frequency of use of anthropometric assessment tools by speciality

Frequency of use of anthropometric tools	GPS n (%)	PHYS n (%)	SURG n (%)	PEAD n (%)	GYNA n (%)	OTHER n (%)	Chi-square p=value
Always	72(36)	25(54)	10(21)	20(49)	23(46)	4(12)	
Once in a while	62(31)	9(20)	19(40)	12(29)	16(32)	10(31)	
Sometimes	52(26)	11(24)	8(17)	7(17)	9(18)	6(19)	p<0.001
Rarely	4(2)	0	5(10)	2(5)	0	4(12)	
Not at all	1(1)	0	2(4)	0	1(2)	2(6)	
Not applicable	9(5)	1(2)	4(8)	0	1(2)	6(19)	
Total	206	46	48	42	51	32	

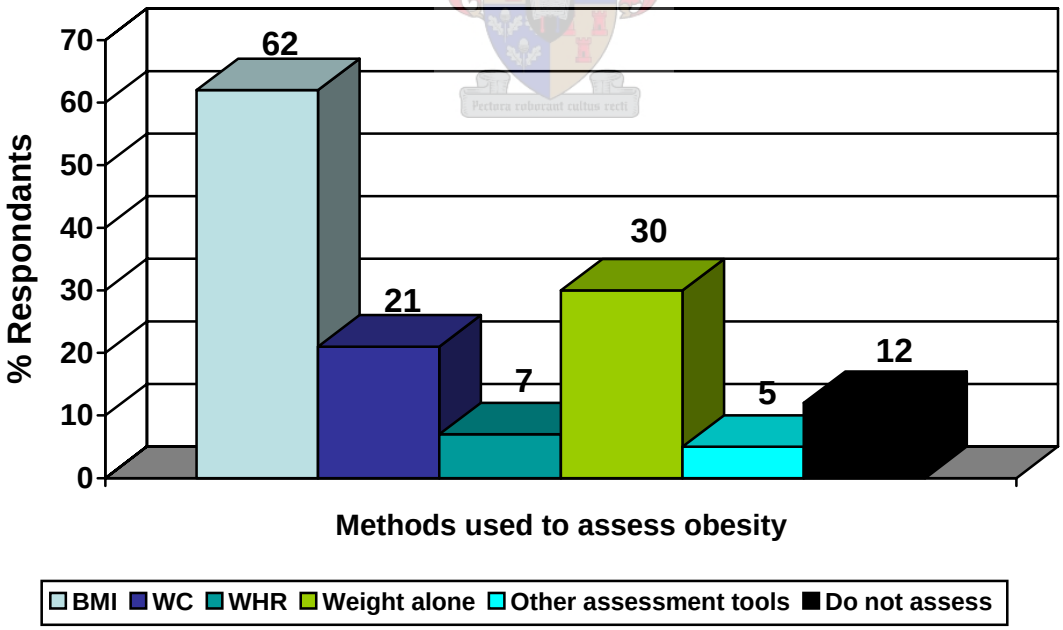


Figure 3.18: Proportions of medical practitioners using various anthropometric tools to assess overweight and obesity in their patients.

Table 3.24: The proportion of medical practitioners using different methods in management of their overweight and obese patients

Patient management	Number of responses (n)	Percentage (%)
Provided advice on diet and exercise	319	75.8
Referred to dieticians	227	53.9
Do not address	23	5.5
Pharmacological intervention	72	17.1
Obesity	6	1.1
Surgical intervention	0	0

Table 3.25: The proportion of the specialists choosing various different approaches to manage the weight of their obese and overweight patients

Management of patients	GPS n (%)	PHYS n (%)	SURG N (%)	PEAD n (%)	GYNA n (%)	OTHER n (%)	Chi-square p=value
Referral to dieticians	105(51)	23(48)	30(61)	20(48)	29(57)	20(59)	0.636
Provided advice on diet	162(79)	40(83)	27(55)	33(79)	39(77)	18(53)	0.000
Pharmacological intervention	32(16)	18(38)	5(10)	3(7)	10(20)	4(12)	0.001

3.4.8 Confidence in Prescribing Weight Loss Medication

The purpose of the question "Do you feel confident in prescribing weight loss medication?" was to note whether the MPs had confidence in prescribing weight loss medication (Table 3.2, Figure 3.19). Seventy percent of the practitioners did not have confidence in prescribing weight loss medication, 17% were confident and 13% were confident only on certain occasions. Physicians (46%) had the most confidence in prescribing weight loss medication with paediatricians (25%) being the least confident. This difference was significant (Chi-square, P<0.000).

The MPs who had no confidence in prescribing weight loss medication were further asked what their concern for lack of confidence was (Table 3.27). The major concern for not prescribing weight loss medication was lack of adequate knowledge (77%). Moreover, 46% of respondents were concerned about the side effects of the medication, 30% were concerned about the cost of the medication, 26% were concerned about a long-term solution and 13 % were concerned about the efficacy of the weight loss drugs. There was no significant difference amongst the different specialists on their reasons for not prescribing weight loss medications.

Those who had confidence in prescribing weight loss medication were further asked which drugs they prescribed most frequently (Table 3.28). The respondents were given a list of weight loss drugs, from which they were to choose. On analysis, 84% prescribed Orlistat, 8% prescribed Meridia, 21% prescribed herbal weight loss drugs, and 7% used other drugs like Duromine and other appetite suppressants as well as other approaches such as diet, exercise and support group therapy. There was no significant difference among the specialists on the type of drugs prescribed.

3.4.9 Active Obesity assessment

The significance of the question "Would you say that "I actively assess" obesity and overweight in my patients?" was to document if the practitioners actively assessed their patients for obesity. Sixty-four percent (n=275) did not actively assess obesity (Figure 3.20). There was a statistically significant difference in the way the different MPs assessed obesity in their patients. A greater percentage of the physicians 64% actively assessed for obesity as compared to 37% of gynaecologists, 36% of GPs, 34% of paediatricians, and 24% of the other category (anaesthetists, dermatologists, ENT specialists, and psychiatrists/psychologist). Surgeons were the least likely to assess their patients (15%), (Chi-square p<0.001).

Table 3.26: The proportion of specialists who felt confident in prescribing weight loss medication

Confidence in prescribing weight loss medication	Number of responses (n)	Percentage (%)
No	294	70
Yes	70	16
Sometimes	58	14
Total	422	100

*8 missing cases

3.4.10 Active Management of Obesity

The significance of the question "Would you say that "I actively manage obesity and overweight in my patients?" was to assess if the practitioners actively managed obesity in their patients (Figure 3.21). Only 25% (n=107) of the MPs actively managed obesity in their patients. The majority of the GPs (77%) did not actively manage obesity while the majority of the physicians (57%) managed obesity more actively than all the rest of the specialists, with the least likely to manage obesity being the surgeons (15%), (Chi-square, $p<0.001$).

3.4.11 Improvement of Management

The purpose of the question "How do you think the management of obesity by doctors can be improved?" was to get suggestions from the MPs on how they would like their knowledge on the management of obesity to be improved (Figure 3.22). The suggestions received were coded into five categories namely; seminars/conferences/workshops, continuous medical education (CME), training, research, and others. When suggestions were requested on how they would like the management of obesity to be improved, 32% suggested CME's, 30% suggested other methods, 12% suggested seminars, conferences and workshops, less than 1% suggested research, and 9% of practitioners did not give any suggestions. About 50% of practitioners (n=219) gave a second suggestion on how they would like obesity management to be improved. Thirty percent suggested other methods, 10% suggested training, 8% suggested seminars, conferences and workshops, 4% CME and less than 1% research. There was no significant difference between the different specialists on their choices as to how obesity management could be improved.

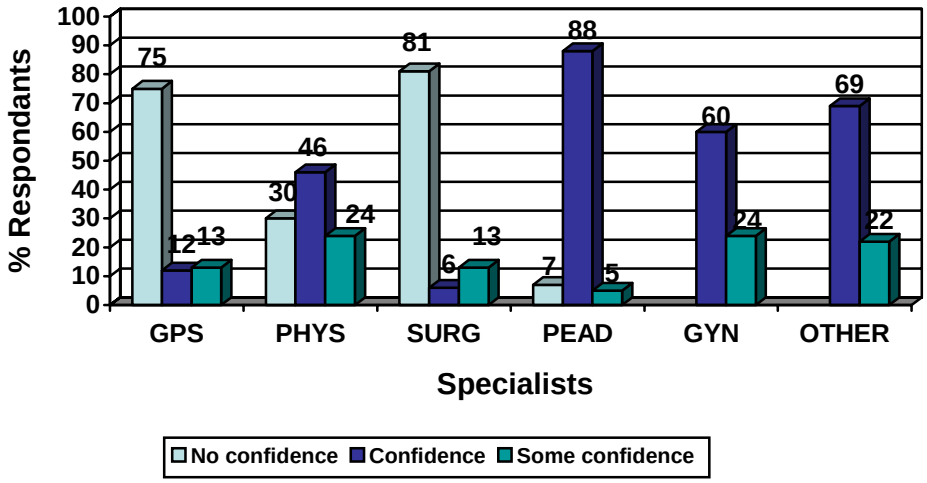


Figure 3.19: Confidence in prescribing weight loss medication by different specialists

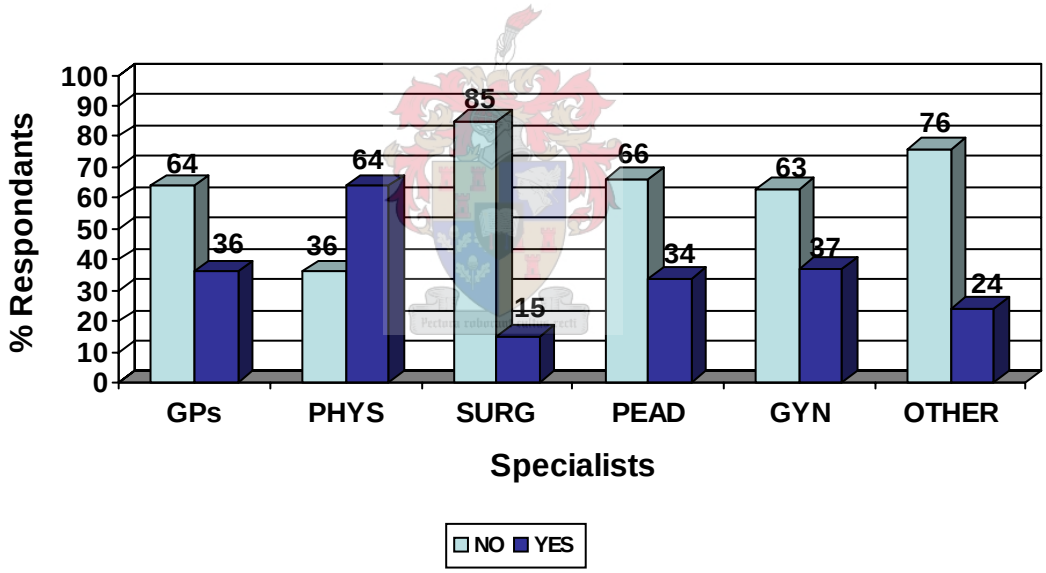


Figure 3.20: The proportion of Medical Practitioners who actively assessed for overweight and obesity in their patients

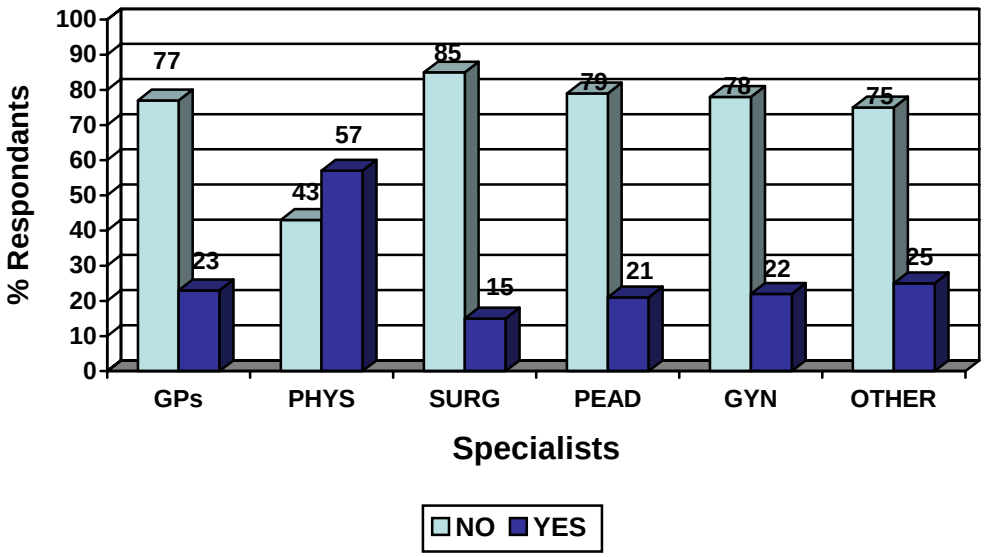


Figure 3.21: The proportion of medical practitioners who actively managed overweight and obesity in their patients

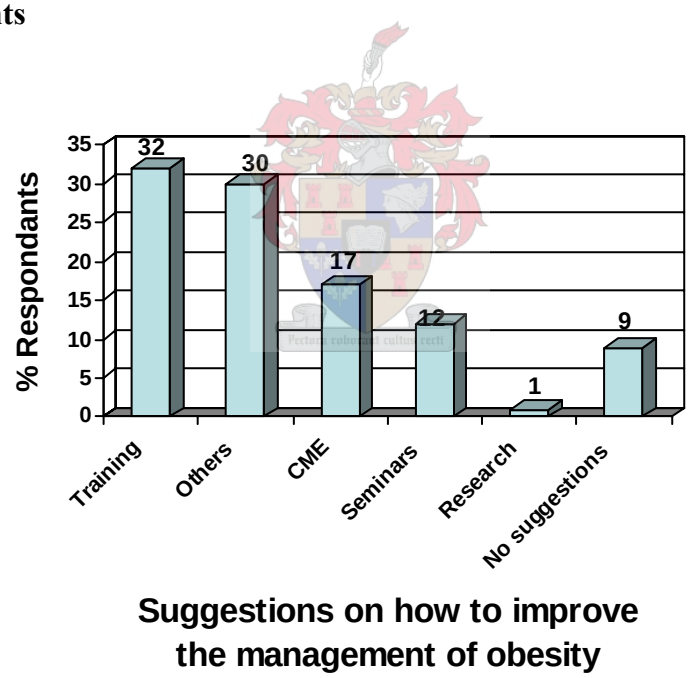


Figure 3.22: Medical Practitioners' suggestions on how to improve the management of obesity

Table 3.27: Concerns regarding medical practitioners' lack of confidence in prescribing weight loss medication

Prescribing concerns	Number of responses (n)	Percentage (%)
Lack of adequate knowledge	220	76.9
Fear of side effects	132	46.2
Cost of medication	87	30.4
Long term solution	75	26.2
Lack of efficacy	39	13.6
Others	18	6.3
Total	422	

* 8 missing cases

Table 3.28: The proportion of the medical practitioners who prescribed weight loss drugs confidently

Drugs prescribed	Number of responses (n)	Percentage (%)
Orlistat	52	83.9
Meridia	5	8.1
Herbal	13	21
Others	4	6.5

CHAPTER FOUR

4.1 DISCUSSION

The most urgent challenge to nutritional health for the 21st century is addressing the epidemic of obesity[13, 17, 21-23]. Reversal of the rising prevalence of obesity will require multifaceted community partnerships and interventions directed at health care settings, schools, communities, and the environment. Health care professionals have a critical role to play in both prevention and treatment efforts. The prevalence of obesity in populations of most developed countries has increased to such an extent that the health care and social security/disability system will accumulate direct and indirect costs related to obesity, which will be more substantial than those for any other primary disease in this generation [117-119].

The treatment of obesity is challenging under any conditions; whether intervention(s) targeted at medical practitioners can be an effective component in addressing the national health problem of increasing prevalence of obesity, cannot be answered by this survey. The results of this study provide compelling evidence that different medical specialists have different aspects of knowledge attitudes and practices on obesity and weight management. Thus their knowledge of obesity management is varied and variable among them. At least three factors are necessary if MPs are to be promoted as an intervention option for dealing with the epidemic; (1) adequate recognition of obesity as a disease (2) a willingness to provide intervention and (3) adequate skills or resources to do so. It is evident from the study that most MPs acknowledged the medical risks of obesity and perceived a high proportion of their patients as having a weight problem.

This study shows that MPs acknowledge obesity is a growing problem in Kenya, view obesity with concern and feel it a serious problem requiring long-term management and intervention. This is because of the medical complications associated with obesity. A high proportion of MPs agreed that weight loss improved quality of life. However, several barriers interfere with treatment efforts. The majority of the medical specialists did not undergo formal nutrition training in medical school and even those who practiced nutrition were not well prepared to deal with overweight and obese patients. Knowledge of nutrition is fundamental in the management of obesity [91-95]. Obesity itself being a complex and challenging conditions, professionals should undergo separate training on obesity and

nutrition. In this study, some medical specialists had undergone separate obesity training after medical school. They reported a strong interest in training that could improve the quality and outcome of obesity prevention and treatment. A high proportion of practitioners identified training needs among them to be in dietary management, exercise and pharmacological treatment and a smaller proportion identified the need for training in the surgical management of obesity. They also identified ways in which the obesity knowledge can be improved, training and continuing medical education at local and national meetings and other methods like guidelines or standards of practice as preferred education methods. In addition, training in obesity-related assessment and counselling should be incorporated into the undergraduate training and education programmes.

It is known that most patients (especially those who were overweight and obese) want more help with weight management than they are getting from their primary care physicians [137]. Emphasis should therefore be placed on the identification of available resources and their application to practical clinical situations, so that MPs are able to identify issues and appropriately manage the frequent nutritional problems seen in out- and in-patients [138]. Other studies indicate that most USA medical schools and teaching hospitals lack adequate nutrition related training for students, post-doctoral residents and practicing physicians. Over the last few years, many articles, symposia [139,140,141] and even congressional documents in the USA [138] have advocated for increased nutrition education for medical students.

In this study, the MPs had difficulties in managing body weight. Some of the issues that were raised were compliance with type of management, lack of time, lack of monitoring and follow up, lack of patient motivation, and cultural values attached to big size. Weight management requires a lot of time and MPs did not spend the necessary time with such patients. It also requires monitoring to note patient progress and appropriate advice.

Diet, exercise and lifestyle changes constitute important recommendations for treatment [139]. Unfortunately, although effective, in some individuals, these recommendations have proven to be ineffective in adequately addressing the broad, enlarging scope of this public health problem. Drug treatment is often indicated in the treatment of obesity but is somewhat limited by the small number of well-tolerated drugs which have been documented to have long-term efficacy in maintaining body

weight loss. For instance, Phentermine may result in modest weight loss through suppression of appetite, but the reported cardiovascular adverse effects have to be weighed against their short-term efficacy. Similarly, Sibutramine, an inhibitor serotonin and nor epinephrine reuptake, may increase satiety and result in modest body weight loss in thr short-term. The risk to benefit ratio therefore for most of these drugs is unfavourable for use in some patients at least. The FDA also approves Orlistat, a lipase inhibitor, for weight loss, but may have some bothersome gastrointestinal adverse effects, especially among patients who do not adhere to the recommended low fat diet. Irrespective of side effects however, most practitioners were still reluctant to and lacked confidence in prescribing weight loss drugs as confirmed by this study.

Physicians' and GPs' involvement in the management of obesity as a primary medical conditions has been emphasized in a number of studies [127, 131, 132, 134]. Physicians have also been sited as active promoters of weight loss in their patients. Other studies even indicate that patients would take the physicians more seriously if they mentioned that the patient should lose weight[142]. There is clearly an urgent need for MPs to improve their knowledge in all areas of nutrition and the management of obesity in particular. The results from this study suggest that the MPs need more training in diet, exercise, pharmacological and surgical interventions for the management of overweight and obesity. The greatest number of MPs in the three study centres in Kenya, wanted more training in diet and exercise compared to other approaches of managing obesity. It should however be brought in mind that lack of knowledge in nutrition among MPs is a problem everywhere in the world. For instance, a survey in the USA indicated that nutrition education in medical schools was very limited and suggestions to include more nutrition courses and training hours in medical schools have been documented [141]. However, there is a need to include dieticians in any intervention of weight management programmes since they can act as a supporting resource in view of their better training in nutrition and their better skills in being able to manage obese and overweight patients [144].

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 THE STUDY AND ITS LIMITATIONS

The study was of a descriptive design and, it had several limitations:

- Sample size calculation lacked physicians' input.
- The number of female practitioners was very small (21%). This affects the data analysis and the outcome of the study in relation to gender.
- The number of different specialists was variable with the GP'S being represented five times more frequently in the study sample as compared with other specialists. "Other" specialists (dermatologists, ENT specialists psychiatrists/psychologists and anaesthetists) were very small in number that they had to be classified as one entity.
- The questionnaire was not fully validated.
- A full assessment of knowledge on all aspects of obesity was not possible because of the time that would have been required and was unlikely to be given by the MPs.
- Knowledge on diet and exercise was also not tested, but it can be assumed to be poor, since most of the MPs identified this aspect of training as one of the most important for further attention.

5.2 CONCLUSION

This study has shown that MPs, in general, were not very confident in managing obesity and that they did not have adequate nutrition/dietary education, yet they still managed patients wanting to lose weight. The study identified a great need for MPs to become better trained in all aspects of the management of obesity and to build greater confidence in the management of such patients. It is also of concern that there was notable use of pharmacotherapy by the MPs despite the lack of knowledge and confidence in its prescription. More studies to evaluate MPs effectiveness in management of obesity should be undertaken.

5.3 RECOMMENDATIONS

1. There is a need to train MPs in Kenya on obesity and weight management. The topics listed below were of particular interest to the MPs:
    - Exercise and dietary management of overweight and obesity
    - Use of pharmacotherapy in weight management
    - Surgical management of obesity
2. More data on prevalence of obesity in Kenya should be available or made public. This will improve the awareness and appreciation of obesity as a problem and hence may initiative more training on the management of obesity by the medical practitioners.
3. Weight management should be managed as a team approach rather than a single professional, particularly in view of the limitations in skills and expertise among MPs documented in this study.
4. More studies to evaluate MPs effectiveness in management of obesity should be undertaken.
5. The Kenya Medical Practitioners Board should set a programme in place to train health professionals on obesity, its causes, assessment and management.
6. The medical school syllabus should be improved to include more nutrition courses.
7. There should be government policy on obesity and clearly defined intervention(s) on prevention should be undertaken, which would bring Kenya in line with other developing countries.

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ADDENDUM 1: PROTOCOL APPROVAL (University of Stellenbosch)

UNIVERSITEIT·STELLENBOSCH·UNIVERSITY
jou kennisvennoot • your knowledge partner

25 July 2003

Ms AA Ojwang
Department of Human Nutrition

Dear Ms Ojwang

RESEARCH PROJECT: **"THE KNOWLEDGE ATTITUDES AND PRACTICES OF MEDICAL PRACTITIONERS ON OBESITY AND WEIGHT MANAGEMENT IN 3 URBAN CENTRES IN KENYA"**
PROJECT NUMBER : 2003/120/N

It is my pleasure to inform you that the abovementioned project has been approved by the Manager: Research Development and Support (Tygerberg), in accordance with the authority given to him by the Committee for Human Research, and that you may start with the project. This approval will however be submitted at the next meeting of the Committee for Human Research for ratification, after which we will contact you again.

Notwithstanding this approval, the Committee can request that work on this project be halted temporarily in anticipation of more information that they might deem necessary to make their final decision.

In future correspondence, kindly refer to the above project number.

Yours faithfully

CJ VAN TONDER
RESEARCH DEVELOPMENT AND SUPPORT (TYGERBERG)

CJVT/ev

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Fakulteit Gesondheidswetenskappe • Faculty of Health Sciences

Verbind tot Optimale Gesondheid • Committed to Optimal Health
Afdeling Navorsingsontwikkeling en -steun • Division of Research Development and Support
Posbus/PO Box 19063 • Tygerberg 7505 • Suid-Afrika/South Africa
Tel: +27 21 938 9207 • Faks/Fax: +27 21 933 6330
E-pos/E-mail: cjvt@sun.ac.za

ADDENDUM 2: RESEARCH PERMIT (KENYA)

CONDITIONS

1. You must report to the District Commissioner of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least four (4) bound copies of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.

GPK 7092—6m—11/96

REPUBLIC OF KENYA

RESEARCH CLEARANCE PERMIT

(CONDITIONS—see back page)

PAGE 2

THIS IS TO CERTIFY THAT:

Prof./Dr./Mr./Mrs./Miss ALICE A. OJWANG

of (Address) ROCHE PRODUCTS LTD.
P.O. BOX 44212, NAIROBI

has been permitted to conduct research in

KISUMU, NAIROBI, MOMBASA Location,

District,

NYANZA, NAIROBI, & COAST Province,

on the topic THE KNOWLEDGE ATTITUDES AND PRACTICES OF MEDICAL PRACTITIONERS ON OBESITY AND WEIGHT MANAGEMENT IN 3 URBAN CENTRES IN KENYA

for a period ending 30th October, 19xx 2003

PAGE 3

Research permit No. 13/001/33C 237

Date of issue 3rd September, 2003

Fee received Shs. 500

Applicant's Signature

For: A. G. KAARIA
Permanent Secretary,
Office of the President
EDUCATION

Ministry of Education, Science and Technology
P. O. Box 30040, Nairobi

ADDENDUM 3: CONSENT FORM

FACULTY OF HEALTH SCIENCES, STELLENBOSCH UNIVERSITY

GUIDELINES FOR THE FORMULATION OF AN INFORMATION AND INFORMED CONSENT DOCUMENT

TITLE OF THE RESEARCH PROJECT:

The Knowledge, Attitudes and Practices of Medical Practitioners on Obesity and Weight Management in three Urban Centres in Kenya.

REFERENCE NUMBER:……..…….

PRINCIPAL INVESTIGATOR: ALICE ACHIENG OJWANG

Address:

ALICE ACHIENG OJWANG

C/O ROCHE PRODUCTS

P. O BOX 44212, 00100, NAIROBI KENYA

TEL: 2711447, OR 254-722-826-240

DECLARATION BY OR ON BEHALF OF PATIENT/*PARTICIPANT:

I, THE UNDERSIGNED, …….. *(name)*

[ID No: ……..……] the patient/*participant or* in my capacity as ……. of the patient/*participant [ID No:……..] of ……..……..……..……

……..……*(address).*

A. HEREBY CONFIRM AS FOLLOWS:

1. I the participant have been invited to participate in the above-mentioned research project, which is being undertaken, by the Department of Human Nutrition, Faculty of Health Sciences, Stellenbosch University.

2. The following aspects have been explained to me:

2.1 **Aim**

The aim of the survey is to determine the knowledge attitudes and practices of doctors on obesity and weight management and to determine their training needs.

The purpose is to be able to make recommendations on the doctors needs for education and training for the successful management of obesity.

2.2 **Procedures**

In order to collect this information, I have been told that a number of questions regarding the knowledge, attitudes, and practices of Medical Practitioners on obesity and weight management will be asked. There will be a questionnaire with three different sections.

I have also been told that this information will be collected from 566 other Medical Practitioners in three urban centres in Kenya, Namely Nairobi, Kisumu and Mombasa.

2.4 The questions will take approximately 20 minutes to answer.

2.5 By participating in the survey, the researcher will be able to make

recommendations that will benefit all Medical Practitioners if implemented.

2.6 It was also explained to me that the information I will give will be kept confidential but that it will be used anonymously for making known the findings to the other scientists.

2.7 I the participant will have access to the findings after it has been presented to the Department of Human Nutrition and published in peer-reviewed literature.

2.8 It was also clearly explained to me that I can refuse to participate in this research survey or can stop answering the questions at any time during the interview. If this was to happen, I the participant will not be disadvantaged in anyway and it will not be held

against me.

3. The information above was explained to me the participant by……*(name of relevant person)* in English/…… and I the participant is in command of this language. The participant was given the opportunity to ask questions and all these questions were answered satisfactorily.

4. No pressure was exerted on me the participant to consent to participation and I the participant understands that I the participant may withdraw at any stage without any penalization.

5. Participation in this study will not result in any additional costs to myself.

B. I HEREBY CONSENT VOLUNTARILY TO PARTICIPATE IN THE ABOVE-MENTIONED PROJECT, THAT POTENTIAL PARTICIPANT MAY PARTICIPATE IN THE ABOVE-MENTIONED STUDY.

Signed/confirmed at …… on……20 ……..
(place) *(date)*

…… ……
Signature or right thumb print of patient/*representative of the patient/*participant

Signature of witness

DECLARATION BY OR ON BEHALF OF THE RESEARCHER (S):

I, ……, declare that

1. I explained the information given in this document to …… *(name of the participant)* ……. *(name of the representative);*
2. I asked the participants or his representatives to ask questions of clarification, if something was not clear.
3. This conversation was conducted in English and the participant did not need any translation.

4. Signed at …… on ……..……...20 ….

(place) *(date)*

……..

*Signature of investigator/*investigator's representative*

……

Signature of witness

IMPORTANT MESSAGE TO PARTICIPANT:

Dear participant,

Thank you for your participation in this study. Should, at any time during the study,

- An emergency arise as a result of the research, or
- You require any further information with regard to the study, kindly contact **Alice AChieng Ojwang** at **0722816240 or 2711447** . *The cellular number is provided so you can get me any time.*

ADDENDUM 4: QUESTIONNAIRE

SECTION A: SOCIAL DEMOGRAPHIC INFORMATION

Please mark the relevant block or blocks and fill in on space provided where necessary.

1. GENDER

1. ❑ Male _____

2 ❑ Female _____

2. Age in Years._____ (Please write in Numerical numbers)

3. What is your practise in the medical field? (Indicate, tick relevant box)

1 ❑ General Practitioner

2 ❑ Physician

3 ❑ Subspecialty (If you choose **3.2** please specify).____

4 ❑ Surgeons (specify) _____

5 ❑ Paediatricians

6 ❑ Gynaecologists

8 ❑ Other (please specify e.g., ophthalmologist)_____

4. Did you undergo any formal nutrition training in Medical School?

0 ❑ No

1 ❑ Yes

5. If the answer to Question **4** is **Yes**, did it prepare you well for dealing with obese and overweight patients?

0 ❑ No

1 ❑ Yes

9 ❑ Not applicable

6. Have you had any formal training on obesity management?

0 ❑ No

1 ❑ Yes

7. If the answer to question **6** is **Yes**, where did you receive the training?

1 ❑ Graduate Medical school

2 ❑ Workshops

3 ❑ Certificate Course

8 ❑ other (please specify)_____

9 ❑ Not applicable

8. If the answer to question **6** is **No**, which method would you prefer to make you better equipped in managing obese and overweight patients? (Tick all that apply)

1 ❑ Local Obesity seminars and update

2 ❑ Readily available information on diet and nutrition e.g. guidelines

3 ❑ Literature on Pharmacological management modalities e.g. studies, drug profiles and evidence based studies

4 ❑ Obesity management course as part of Continuous Professional Development Program

8 ❑ Other (please specify)_____

9. Have you ever given advice to a patient on nutrition for weight loss management?

0 ❑ No

1 ❑ Yes

SECTION B: KNOWLEDGE

1. Obesity is a health problem in Kenya today.

1 ❑ Strongly agree

2 ❑ Agree

3 ❑ Disagree

4 ❑ Strongly disagree

5 ❑ Do not know

2. Do you think that obesity is a medical problem requiring long-term management?

0 ❑ No

1 ❑ Yes

2 ❑ Not sure

3 ❑ Do not know

3. In your opinion, what are the major factors contributing to obesity in Kenya today?

1 ❑ Genetic factors

2 ❑ Sedentary lifestyle

3 ❑ High Fat intake

4 ❑ High sugar intake

5 ❑ Don't Know

8 ❑ Other (please indicate)_____

4. What is the definition for Obesity?

1 ❑ BMI of 19.3 – 26.7 kg/m² in Children aged 5-12 years

2 ❑ BMI ≥30 kg/m² and above

3 ❑ Waist circumference more that 88 cm in women and 102 cm in men

4 ❑ None of the above

5 ❑ Do not know

5. What conditions are associated with obesity?

1 ❑ Diabetes

2 ❑ High blood pressure

3 ❑ Miscarriages

4 ❑ Anaesthesia complications

5 ❑Immobility

6 ❑Cardiovascular conditions

7 ❑Respiratory problems

8 ❑Other (Please specify)_____

6. When should you initiate weight management?

1 ❑ When a patient complains of her weight

2 ❑ Weight increase in-patient who is being monitored

3 ❑ When a patient presents with co-morbidity

4 ❑ Patients request

8 ❑ Other (please specify)_____

7. To whom do you recommend weight management?

1 ❑ Patient who is obese

2 ❑ Patient with dyslipideamia

3 ❑ All patients with co-morbidities related to obesity

4 ❑ Do not have any criteria

8. What is the accepted criterion for implementing pharmacological intervention?

1 ❑ Patient with a BMI ≥30 kg/m²

2 ❑ Patient with a BMI of ≥27 kg/m² with co-morbidities

3 ❑ Any patient who wants to lose weight

4 ❑ Don't know

8 ❑ Other (please specify)_____

9. Do you know any type of Medications for Pharmacological weight Reduction?

0 ❑ No

1 ❑ Yes

10. If your answer to 9 is **Yes**, please specify

1 ❑_____

2 ❑_____

3 ❑_____

4 ❑_____

5 ❑_____

11. If your answer to question 8 is **No**, Would you like to get some information on weight loss Medication?

0 ❑ No

1 ❑ Yes

9 ❑ Not applicable

SECTION C: ATTITUDES

1. Do you feel there is need for early diagnosis and treatment of obesity?

0 ❑ No

1 ❑ Yes

2 ❑ May be

3 ❑ Do not know

2. What are your major concerns regarding obesity?

0 ❑ None

1 ❑ Underlying co-morbid medical condition e.g. diabetes, cardiac, dislipideamia

2 ❑ Psychosocial impact on patients

3 ❑ Increased insurance cover for obese patients or lack of it.

8 ❑ Other (please specify)_____

3. What are the major difficulties you encounter managing obesity and overweight?

1 ❑ Lack of time to manage adequately

2 ❑ Compliance with type of management

3 ❑ Lack of monitoring and follow up

4 ❑ Lack of motivation from the patient

5 ❑ Increased cost of treatment

6 ❑ Cultural values attached to big size

8 ❑ Other (please specify)_____

4. Do you feel that treating obesity

1 ❑ Reduces patient hospitalization

2 ❑ Will reduce cost of Medical care

3 ❑ Improve metabolic conditions

4 ❑ Improve quality of life

5 ❑ Will have no Impact

8 ❑ Others (Please specify)_____

5. Do you feel adequately informed to give nutrition advice on weight loss?

0 ❑ No

1 ❑ Yes

6. If your answer is to question 5 is **Yes**, how often do you do that to your patients?

1 ❑ Always

2 ❑ Most of the time

3 ❑ Sometimes

4 ❑ When indicated

9 ❑ Not Applicable

7. If your answer to question **5** is **No**, what are your reasons?

1 ❑ Lack of adequate information/knowledge in nutrition

2 ❑ Lack of time to give nutrition advice

3 ❑ Prefer to refer to a nutritionist

4 ❑ Do not consider nutrition management to be important

5 ❑ Do not find a reason to give nutrition advice

8 ❑ Other (please specify)_____

9 ❑ Not applicable

8. Do you feel adequately informed to prescribe weight loss medication(s)?

0 ❑ No

1 ❑ Yes

9. If your answer to question **8** is **No**, what would you like to be done about it?

1 ❑ Get information on particular medication

8 ❑ Other (please specify)_____

9 ❑ Not applicable

10. I would like to be more competent in (Tick all appropriate boxes)

1 ❑ Dietary management of obesity

2 ❑ Exercise management of obesity

3 ❑ Pharmacological Management of obesity

4 ❑ Surgical management of obesity

8 ❑ Other (please specify)_____

9 ❑ None of the above

SECTION D: PRACTICES

1. Where do you practice?

1 ❑ Own Private practice

2 ❑ Academic Institution

3 ❑ Tertiary care Institution

8 ❑ Other (Please specify)_____

2. Where do you spend **more than 50%** of your practise time?

   1 ❑ Own Private practice

   2 ❑ Academic Institution

   3 ❑ Tertiary care Institution

   8 ❑ Other (Please specify)_____

3. In the last 3 months, how many obese patients did you see on average per month?

   1 ❑ Did not taken note of numbers

   2 ❑ 0-5

   3 ❑ 6-10

   4 ❑ 11-15

   5 ❑ More than 15

4. In the last 3 months how many obese patients did you manage on **diet and exercise** on average per month?

   1 ❑ Did not taken note of numbers

   2 ❑ 0-5

   3 ❑ 6-10

   4 ❑ 11-15

   5 ❑ More than 15

5. In the last 3 months how many obese patients did you manage on **pharmacological intervention** on average per month?

   1 ❑ Not taken note of numbers

   2 ❑ 0-5

3 ❑ 6-10

4 ❑ 11-15

5 ❑ More than 15

6. Which of the following anthropometric assessment tools do you have in your Surgery? (Tick all appropriate boxes)

0 ❑ None

1 ❑ Weighing Scale

2 ❑ Height meter/Stadiometer

3 ❑ Waist circumference tape

4 ❑ Bio-analysis impedance maChine (BIA)

8 ❑ Other (please specify)_____

7. How often do you use them?

1 ❑ Always

2 ❑ Once in a while

3 ❑ Sometime

4 ❑ Rarely

5 ❑ Not at all

9 ❑ Not applicable

8. How do you assess for overweight and obesity in your patients? (Tick the appropriate box)

1 ❑ Body Mass Index

2 ❑ Waist circumference

3 ❑ Waist Hip Ratio

4 ❑ Weight alone

4 ❑ Do not assess obesity

8 ❑ Other (please specify)_____

9. How do you manage the weight of your obese and overweight patients?

1 ❑ Refer to Nutritionist/dietician

2 ❑ Provide advice on diet and exercise

3 ❑ Pharmacological intervention

4 ❑ Surgical intervention, Please Specify_____

5 ❑ Do not address obesity

8 ❑ Other (Please specify)_____

10. Do you feel confident in prescribing weight loss medication?

0 ❑ No

1 ❑ Yes

2 ❑ Sometimes

11. If your answer to question 10 is No, what are your concerns?

1 ❑ Lack of adequate knowledge of drugs in the market

2 ❑ Fear of side effects

3 ❑ Cost of the medication

4 ❑ Long term solution

5 ❑ Lack of efficacy

8 ❑ Other (please specify)_____

9 ❑ Not Applicable

12. If the answer to question **10** is **Yes**, which one(s) do you prescribe?

0 ❑ None

1 ❑ Orlistat (Xenical)

2 ❑ Meridia (Reductil)

3 ❑ Herbal Weight Loss drugs

8 ❑ Others (please specify)_____

9 ❑ Not applicable

13. Would you say that 'I actively assess' obesity and overweight in my patients?

0 ❑ No

1 ❑ Yes

14. Would you say that 'I actively manage' obesity and overweight in my patients?

0 ❑ No

1 ❑ Yes

15. How do you think the management of obesity by doctors can be improved?

1 ❑_____

2 ❑_____

3 ❑_____

4 ❑_____

5 ❑_____

Thank you very much for Your Time and Participation