Health Canada Santé Canada

Should the 1988 Canadian Guidelines for Healthy Weights be Updated?

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Canada

Purpose of this Report:

To provide a background document for the Advisory Committee that will review and update the Canadian Guidelines for Healthy Weights

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1. REVIEW OF MAJOR FINDINGS OF THE 1988 GUIDELINES

In 1988, the Health Promotion Directorate convened an Expert Group on Weight Standards to prepare a report entitled Canadian Guidelines for Healthy Weights (Expert Group on Weight Standards, 1988). Prior to this report, guidelines related to weight and health had never been developed in Canada. The weight guidelines were consistent with the objectives for national nutrition programs at that time and the specific purpose was "to increase the proportion of Canadians who adopt nutrition practices consistent with attaining and maintaining appropriate body weights." (Expert Group on Weight Standards, 1988; Note: *All information for this section quoted or paraphrased from this reference*).

The process to develop the guidelines included meetings, reviews of the scientific literature, preparation of supplementary reports and extensive consultation. The weight-health guidelines were to be used by both health professionals and the public, and the committee set the following 3 goals:

- to provide a scientifically based assessment tool which would also be simple and practical,
- to identify patterns of weight including acceptance of excess and low weights as they relate to health risks or clinical problems, and
- to establish appropriate, realistic weights which relate to positive body image.

1.1 Highlights of the Report

It was recommended that the public use four zones of the Body Mass Index (BMI) (kg/m2) as a measure for healthy weights for men and women 20-65 years of age:

- BMI <20 = "may be associated with health problems for some people"
- BMI 20-25 = "good weight for most people"
- BMI 25-27 = "may lead to health problems in some people"
- BMI >27 = "increasing risk of developing health problems"

It was recommended that health professionals use the BMI (as outlined above) as a

measure for healthy weights and the Waist-Hip Ratio (WHR) (waist circumference in cm/ hip circumference in cm) measurement as an indicator of fat distribution, whereby:

- WHR > 1.0 for men and
- WHR > 0.8 for women = "may be associated with increasing health risks" (Bjorntorp, 1985)

The BMI weight guidelines were applied to the data obtained from the 1981 Canada Fitness Survey (Fitness Canada, 1981). A sample of the results are shown below.

- 15 % of women and 5% of men had a BMI <20, which may be associated with health problems because of underweight.
- One out of every two adult Canadians was at a good weight for health (BMI 20-25).
- 29% of men and 19% of women had a BMI >27, which may be associated with increasing risk of developing health problems because of excess weight.
- With increasing age there was an increased risk of developing health problems associated with weight for both men and women.

The Guidelines for Healthy Weights reflected the scientific knowledge of that time, related to body weight and health risk and measurement of body weight and body fat. Since these guidelines were produced there has been a dramatic increase in research and information in this area. Thus the purpose of this paper is to consider what impact this new information may have on the previous guidelines. As well, it is important to consider if the Canadian population has changed over the past decade and what sub-groups of the population were not discussed in the earlier guidelines. Ultimately, the report will provide a background document for the Advisory Committee that will review and update the Canadian Guidelines for Healthy Weights.

2. WHAT NEW SCIENTIFIC EVIDENCE IS AVAILABLE?

2.1 Indicators of Body Weight

Although in 1988, BMI was a relatively new concept for both health professionals and the public, it has now become a widely accepted measure of body weight. BMI, like most indirect anthropometric measures has its limitations. However, because of the strong association between BMI and health, it has been adopted world wide as an indicator of body weight status. It is often presented as a continuum from "underweight" (BMI<20) to "overweight" (BMI >25), with the "healthy weight range" in the middle (BMI 20-25).

More recently a slightly different cut-off value for underweight has been proposed. The NIH Clinical Practice Guidelines have adopted the WHO guidelines, thus both sources report underweight as being a BMI <18.5 kg/m2 (Expert Panel on Obesity, US, 1998; WHO Consultation on Obesity, 1998).

Various definitions for obesity have been used over time in the scientific literature. In fact "obesity" and "overweight" are often used interchangeably to describe the same group (ie. BMI >27). In most recent reports, there appears to be general agreement that a BMI >25 should be defined as overweight and a BMI >30 represents obesity (WHO Consultation on Obesity,1998; Expert Panel on Obesity, US, 1998; Expert Panel on the Prevention of Obesity and Overweight, Australia, 1997). The Canadian Guidelines identify "at risk" categories rather than specific weight definitions.

2.2 Indicators of Body Fat Distribution

Waist and hip circumference measures and the ratio of the two have been used as an indirect assessment of fat distribution. The greater the abdominal fat accumulation (also called android or central fat distribution), the greater the risk of cardiovascular disease,

diabetes and hypertension. Using more advanced imaging techniques, it was determined that abdominal fat has two distinct subtypes: subcutaneous and intra abdominal adipose tissue masses. At present, there appears to be general agreement among researchers that the intra abdominal or visceral adipose tissue depot is of greatest concern in terms of long-term health consequences (Van Loan, 1996). This depot has been shown to be associated with impaired glucose and lipid metabolism and increased blood pressure (Fujioka et al,1987; Hunter et al.1994; Han et al, 1995), as well as increased risk for Type 2 diabetes (Carey et al, 1997) and cardiovascular disease (Reeder et al, 1997a).

It has been questioned whether the WHR is representative of visceral adipose tissue in lean subjects of both sexes (Bjorntorp, 1993). Others have suggested that the waist circumference (WC) measurement alone would provide a more appropriate indicator of intra abdominal fat accumulation (Despres et al, 1991). WC is more highly correlated with blood pressure and plasma lipid profile than the WHR or the BMI. (Ledoux et al, 1997; Reeder et al, 1997a). Also, WC values are less affected by gender and degree of obesity than WHR. Thus, WC may be a more appropriate and more practical measure of fat distribution. Health risk cut-offs have been proposed by various researchers. One example based on Canadian data is shown in Table 1 (Lemieux S et al.,1996).

Table 1 Proposed Waist Circumference Cut-Off Points

	Desirable	WC Associated with Increased Health Risks [b]
Men and Premenopausal women <40 yr of age	<90 cm [cd]	>100 cm
Men and Premenopausal women >40 yr of age	<80 cm	>90 cm
Postmenopausal women	<75 cm	>85 cm

Adapted from Lemieux S et al, 1996
[a] Corresponds to a visceral adipose tissue area of <100 cm^2
[b] Corresponds to a visceral adipose tissue area of >130 cm^2
[c] Measurement must be performed at the narrowest part of the torso, between the lower rib and iliac crest, while subject is standing following a moderate expiration.
[d] Determined in a white population free from metabolic disease.

Other documents have suggested slightly different cut-off values for waist circumference measures that imply health risks. The NIH Clinical Practice Guidelines suggest that a WC >102 cm for men and >88 cm for women is associated with increased health risk and the incremental predictive power is decreased at a BMI of >35 kg/m2 (Expert Panel on Obesity, US, 1998). The WHO reports the same waist circumference cut-offs (>102 and >88 cm for men and women respectively) but specifies that these values represent a Caucasian population and that they mean a "substantially increased risk". Values of >94 cm and 80 cm for men and women respectively represent an "increased risk". Caution is advised that single cut-off values will not be globally relevant and that WC guidelines must be population-specific (WHO Consultation on Obesity, 1998). The corresponding visceral adipose tissue area also needs to be determined for the selected WC measures.

2.3 The Concept of "Metabolic Fitness"

Recent research suggests that aerobic fitness and physical activity are highly reliable indicators of health and longevity (Hedblad et al, 1997; Blair et al, 1995, Blair et al,

1996). That is, individuals may derive a protective effect from being physically active and aerobically fit despite possessing risk factors for CVD related to body size and shape. Metabolic fitness refers to the body's physiological components responsible for physical health, which includes favorable blood lipid levels, healthy blood pressure and normal insulin sensitivity. It has been suggested that metabolic fitness should be used as a more direct indicator of morbidity and mortality (not body weight and adiposity) (Abernathy and Black, 1996) and that adequate exercise would likely produce health benefits for most people regardless of their body fat content (Abernathy and Black, 1994). Perhaps, consideration should be given to metabolic fitness as a component of body weight evaluation. More information is needed regarding the impact of normal blood lipids, normal blood pressure and normal insulin sensitivity at all levels of body weight and body fat. That is, is metabolic fitness independent of body size and shape? Should these risk factors be considered along with the assessment of body weight?

In the report of the new Dietary Guidelines for Americans, the section on Evaluating Body Weight, recommends determination of BMI, waist circumference and the presence/absence of other health risk factors (Dietary Guidelines Advisory Committee, 2000). The "other" risk factors include family history of heart disease, being older than 45 years of age (males) or postmenopausal (females), smoking, sedentary lifestyle, high blood pressure, abnormal blood lipids and diabetes. It is suggested that the greater the number of risk factors present, the more likely one would benefit from weight loss if they are overweight or obese. (Dietary Guidelines Advisory Committee, 2000).

2.4 Research on Body Image and Body Weight

One of the objectives of the previous healthy weight guidelines (see Section 1) was "...to establish appropriate, realistic weights which relate to positive body image". Body image is defined as the feelings, attitudes and perceptions of the body, based on social norms, body experiences and individual attitudes about body weight and shape. The healthy

body weight guidelines have the potential to impact individuals' body images, as many may turn to these guidelines as a way of assessing their own body weight. Setting realistic weight guidelines could theoretically foster positive body image for those who fall in the body weight ranges determined to be healthy, although the opposite could occur in those who fall outside the ranges defined as healthy.

In reality, however, the association between body image and body weight is extremely complex. Negative body image occurs in women of all body sizes, so much so that is has been referred to as "normative discontent" (Rodin, 1993). For example, the Canadian Heart Health Survey demonstrated that 35% of women with a healthy BMI (BMI 20-24 kg/m^2) reported that they would like their BMI to be < 20 (Green et al., 1997). Although individuals who fall in the range of overweight or obese (BMI > 27 kg/m^2) are at increased risk for negative body image (Sarwer et al., 1998; Green et al., 1997), body dissatisfaction has been shown to be independent of actual body weight (Sarwer et al., 1998; Foster et al., 1997). Furthermore, research investigating changes in body image in obese women who have lost weight have demonstrated an improvement in body image with weight loss, however the changes in body image were not related to changes in body weight (Foster et al., 1997; Adami et al., 1998). Excess weight, therefore, does not appear to be a singular determinant of the degree of body image dissatisfaction.

A large number of factors contribute to body image with actual body weight playing only a small role. Since body image is determined by what one thinks about the body as opposed to the objective reality of one's appearance, it may be unrealistic to expect body weight guidelines to relate to a specific body image continuum. However, it would be important to consider how the general population is educated about the healthy weight guidelines and to reinforce other factors that support a positive body image.

2.5 Size Acceptance

This topic relates to Section 2.3 and 2.4 and must be considered in any document that sets guidelines for healthy weight. Size acceptance or weight acceptance means accepting the full range of body sizes and weights without bias. It involves examining prejudicial attitudes and beliefs about body weight and not promoting dieting or other weight control methods (Rice, 1993). The size acceptance movement has been suggested as a viable alternative to dieting (Parham, 1996; Gingras, 1997). Health and well-being are determined by biological, genetic, environmental, social and lifestyle factors and body weight represents one of many factors determining health (Rice, 1993). Also, there are a wide range of different philosophical perspectives surrounding weight issues (Neumark-Sztainer, 1999). Rice (1993) has called for a unified response to weight prejudice, weight obsession and associated problems. Individuals of all sizes can be metabolically fit (Section 2.3) and have a positive body image (Section 2.4). If this is the case, body weight per se would not be a critical indicator of health. This is an area that certainly requires more research.

2.6 Genetic Predisposition

Body weight is greatly influenced by genetics, diet and exercise. The significant genetic research discoveries of the last decade have emphasized the complexity of body weight regulation. The positional cloning of the mouse *ob* gene reported by Zhang and colleagues in 1994 and the subsequent discovery of the circulating protein leptin, synthesized in adipose tissue (Zhang et al., 1994) has lead to a dramatic increase in research to document the obesity gene map. At last report, the number of genes and other markers associated with or in some way linked to human obesity phenotypes is estimated to number well over 200 (Chagnon et al, 2000). The goal is to identify the combination of genes and mutations that play a major role in human obesity and then to determine which environmental conditions influence the development of obesity (Chagnon et al, 2000). In the future there may be genetic markers to determine an individuals risk of obesity.

3. WHAT NEW CANADIAN DATABASES ARE AVAILABLE?

A number of surveys have been completed since 1988, which provide more current information about dietary intakes, physical activity, body weight and health status of Canadians. The surveys are briefly described in this section and selected information from them is presented in subsequent sections.

3.1 Heart Health Surveys (HHS)

The Canadian Heart Health Surveys, a joint federal-provincial initiative, examined national and regional patterns of body weight and weight loss practices and cardiovascular risk factors. Surveys to determine the prevalence of cardiovascular disease risk factors were conducted in each province between 1986 and 1992 (Health Canada, 1992). In each province, over 2000 men and women aged 18-74 years participated in the study which followed a standard core protocol (MacLean et al., 1992). The final database includes over 23,000 people and information on all aspects of the causes and consequences of cardiovascular disease (Health Canada, 1995). One supplement of the Canadian Medical Association Journal specifically focuses on issues related to obesity, based on data from the Heart Health Surveys (Canadian Heart Health Surveys Research Group, 1997).

3.2 National Population Health Survey 1994-95 (NPHS)(Statistics Canada, 1995)

The NPHS was designed to measure the health status of Canadians and to increase the knowledge on the determinants of health. It is a longitudinal survey and the same sample of respondents will be interviewed every two years for up to two decades. The first cycle of the survey was completed between June 1994 and June 1995. The survey sampled 26,430 households, with a minimum of 1200 households required per province.
The final response rate was 88%.

3.3 National Population Health Survey 1996-97 (NPHS)(Statistics Canada, 1997)

The NPHS 1996-97 represents the second cycle of the above survey. The survey has continued in 1998-99 and 2000-01. It should be noted that the NPHS represents self-reported weight and height data. As such, comparisons of weight/height data over time within this data set will be more relevant, than comparisons with other surveys where weight and height were measured.

3.4 National Longitudinal Study on Children and Youth. (NLSCY)

The NLSCY is a household survey, which will sample 25,000 children under 12 years of age over time. It will follow this group through until adulthood. It is a partnership between Human Resources Development Canada and Statistics Canada. The purpose is to increase our knowledge of human development in Canada. The major areas of investigation include health, family, community, education and work. A publication entitled Growing Up in Canada provides information from the first cycle of data collection. Similar to the comment related to the NPHS above, the NLSCY represents parent and child self-reported weight and height data. That is, parents reported weight and height of their young children and the older children reported their own information.

As such, comparisons of weight/height data over time within this data set will be more relevant, than comparisons with other surveys where weight and height were measured.

3.5 Trends in the Health of Canadian Youth

Trends in the Health of Canadian Youth is a report (Health Canada, 2000) based on data collected through the 1989/90, 1993/94 and 1997/98 survey cycles for the WHO Cross-National Collaborative Study: Health Behaviours in School Age Children (HBSC). The report presents data on various factors influencing health including healthy eating, dieting and dental hygiene, and exercise and leisure activities. Information is available on data collected from 11,13 and 15 year old Canadians and results are compared to youth from other countries.

3.6 Provincial Nutrition Surveys

An extensive collaboration is currently underway to administer nutrition surveys in each province in Canada. Surveys have been completed in Nova Scotia (Nova Scotia Department of Health, 1993) and Quebec (Sante Quebec) with the remaining reports to be released over the next few years. This information on the dietary intakes of Canadians will be very valuable, as there has not been a National Nutrition Survey since Nutrition Canada in 1972 (Health and Welfare Canada, 1973).

4. HEALTH TRENDS OF THE CURRENT POPULATION.

Over a period of twelve years (1988-2000), it is inevitable that the population of Canada has changed in a number of ways that may affect body weight and health. The approach to health by governments has also changed over this period of time. In 1994, a Population Health Framework was adopted by the Federal, Provincial and Territorial Ministers of Health (Advisory Committee on Population Health, 1994), to consider health in a broader context. The population health approach addresses the entire range of factors that determine health. These factors include income and social status, social support networks, education, employment and working conditions, physical environments, biology and genetic endowment, personal health practices and coping skills, healthy child development and health services. Thus, new guidelines for healthy weights would be considered more broadly to include the environmental factors that influence weight, such as income or education, or the other determinants of health listed above.

4.1 Prevalence of underweight, overweight/obesity

Both ends of the BMI continuum represent health risks related to body weight. Underweight has been defined as a BMI <20 in the following surveys. In Canada (NPHS 1996-97), recent data show that 14% of women and 3% of men would be considered underweight based on this definition. Women in the 20-24 year old age range were most likely to be underweight (25%). These values are very similar to those reported in the HHS (1986-1992) whereby 13% of Canadian women and 4% of Canadian men had a BMI < 20 (Macdonald et al, 1997). Similarly, in 1988 15 % of women and 5% of men were found to have a BMI <20 (Expert Group on Weight Standards, 1988; *Note: This was reported in 1988, but based on the Canada Fitness Survey of 1981*). The HHS also found that the prevalence of underweight was higher in urban than in rural areas (Reeder et al, 1997b).

The prevalence of overweight in the NPHS 96-97, was found to be 34% of men and 23%

of women. This was using a BMI cut-off of >27. While these estimates were made from self-reported weights, a recent review by Marshall and Ball (1998) concluded that the relationship between self-reported and measured weights is strongly and positively correlated in adults (r>90). The results were similar to reports from the HHS, which also used a BMI cut-off of >27, where the prevalence of obesity based on measured heights and weights was found to be 35% of men and 27% of women (Macdonald et al, 1997). Also the incidence of obesity in adults appears to be steadily increasing. Between 1985 and 1996-97, the proportion of overweight men and women changed from 22% to 34% among men and 14% to 23% among women (Health Canada, 1999). This was based on compiled data from 4 surveys. Values reported in 1988 showed that 29% of men and 19 % of women had a BMI >27 (Expert Group on Weight Standards, 1988; *Note: This was reported in 1988, but based on the Canada Fitness Survey of 1981*).

Furthermore, data from the HHS show the prevalence of obesity is higher among adults in Atlantic Canada and in individuals with lower levels of education (Macdonald et al, 1997; Reeder et al, 1997b). Similarly, Statistics Canada (1997) reports that the chance of being overweight decreases with increasing education level. The HHS also demonstrated that the prevalence of obesity is higher in rural areas of Western Canada than in urban areas (Reeder et al, 1997b).

In NPHS 1996-97, a significant number of women (40%) reported recent attempts at weight loss, even though some of these women were in the healthy weight range. Also 23% of men reported a recent attempt at weight loss (Health Canada, 1999; Statistics Canada, 1997). Individuals will use various methods to try to lose weight, with the most common approaches being dietary restriction, increased activity or a combination of both (Green et al, 1997). Dietary intakes and exercise habits are key behavioural determinants of body weight, and as such, detectable changes in these factors may in part, explain changes in body weight status.

4.2 Physical Activity Trends

The NPHS of 1996-97 showed that among Canadians over the age of 12, 21% were active, 23% were moderately active and 57% were inactive (Statistics Canada, 1997). These rates correspond with the 1994-95 NPHS (Statistics Canada, 1995) and demonstrate that there has been an increase in activity between 1981 and 1995 (CFLRI, 1996a). The NPHS definitions for activity levels are based on estimates of kcal/kg/day of 3.0 or more for active, 1.5-2.9 for moderately active and < 1.5 for inactive.

Rates of physical activity vary depending on age and gender. At the age of 12-14 years, 54% of boys and 33% of girls were physically active during their leisure time. At the age of 20-24 years, 39% of males and 22% of females were physically active and by the 45-54 age group values dropped even lower to 18% of males and 14% of females. (Statistics Canada, 1997; Health Canada, 1999). Thus in general, males tend to be more active than females and activity decreases with age.

Activity also varied somewhat with income level in NPHS 1996-97. Of men in the highest income level, 48% were inactive compared to 53% with the lowest income. For women 51% and 60% were inactive in the highest and lowest income levels respectively. (Health Canada, 1999). Nearly half of families with yearly incomes below $20,000 stated high costs as a barrier to participation in physical activity, compared to one-third of families with incomes ≥ $60,000 (CFLRI, 1996b). Thus in general, activity tends to decrease as income level decreases.

In the NPHS 1996-97 almost half of the Canadian population over the age of 12 reported changing some behaviour to improve their health the year before (Health Canada, 1999). A greater proportion of respondents recognized the need for some change in the future. For both women and men who recognized the need to make a change to improve health, the most common response was the need to exercise more. Lack of time and lack of will

were reported as the main barriers to making lifestyle changes (Health Canada, 1999).

4.3 Dietary Intake Trends

Until recently there has been limited data on the dietary intakes of Canadians. Some information is now available from the HHS and NPHS. Also, Provincial Nutrition Surveys are in various stages of completion. Diet, like physical activity, can influence body weight, so it is important to follow the population trends in these areas, as possible explanations for changes in body weight throughout a population or sub-group.

Information on self-ratings of eating habits as well as nutrition issues of concern was collected in the NPHS 1994-95 (Statistics Canada, 1995). As reported in Toward a Healthy Future (Health Canada, 1999), 45% of men and 46% of women rated their eating habits as excellent or very good and 16% of both men and women rated their eating habits as fair or poor. Fair or poor ratings were also more likely to be made by those with lower rather than higher incomes.

Dietary fat was a nutrition concern of 59% of respondents over the age of 12. Two-thirds of women (67%) and 50% of men were taking action to reduce dietary fat intake. Also, 32% of women and 20% of men were trying to increase their intakes of carbohydrates and fiber (Statistics Canada, 1995; Health Canada, 1999).

4.4 Fat and Fiber Intakes

For many chronic diseases such as CVD, diabetes, cancer and obesity a diet low in total fat and saturated fat and high in fiber may be beneficial. These dietary variables may influence disease progression. In the Nova Scotia Nutrition Survey (NSNS) (Nova Scotia Department of Health, 1993) for adults between the ages of 18 and 74 years, the mean

overall fat intake was 35% of total energy (*Recommended level is no more than 30%.*). This ranged from 32% (elderly women) to 36% (young men). The overall percent of energy derived from saturated fat was 13% (*Recommended level is no more than 10%.*). The main sources of fat in the diet (78%) were fats and oils; meat, poultry and fish; milk, creams, yogurts and cheeses. Results from the Family Food Expenditure Survey 1986-96 (L. Robbins, unpublished data) show that total fat intake of Canadians (as a percent of energy), changed from 37.4% (1986) to 36.0% (1990), to 36.2% (1992), to 35% in 1996. This is in agreement with the NSNS. Similarly, intakes of saturated fat decreased from 13.0% (1986), to 11.9% (1990), to 12.0% (1992) to 11.2% in 1996. This is lower than the values reported for the NSNS, however these two surveys used different methods to assess dietary intake. It is also important to track energy intake, to confirm that fat intake has actually decreased. It may be, as some studies from the US have suggested, that energy intake has increased, which makes the fat percentage appear more favourable.

Mean dietary fiber intake in the NSNS was 13.5 grams per day. The range was from 9.6 grams (young women) to 17 grams (elderly men) (Nova Scotia Department of Health, 1993). Although there is no specific guideline for fiber intake in Canada, various other countries recommend approximately 25-30 grams per day. The main sources (88%) of fiber in the diet were pasta, rice, cereals and breads, vegetables and fruits and fruit juices.

4.5 The Whole Diet Approach

One report based on the Quebec Nutrition Survey discussed different dietary patterns of adults living in Quebec (Beaudry et al., 1998). Three major patterns that were identified were “high-energy density”, “traditional” and “health conscious”. The “health conscious” pattern was a better predictor of nutritional adequacy and women scored positively for this pattern. A measure of the “whole diet” has merit and this approach has also been used in the United States. The Healthy Eating Index (HEI) developed by the USDA assesses ten components considered to reflect a healthy diet (adequate consumption of

foods from 5 food groups, moderate intakes of total fat, saturated fat, cholesterol and sodium, and a measure of variety of dietary intake). It is a measurement tool to assess the quality of the diet and to track the impact of food choices on health. Ultimately it is to be used as a performance measure to evaluate nutrition intervention programs designed to improve dietary habits. A recent report (Bowman et al, 1998), based on data from the 1994-96 Continuing Survey of Food Intakes by Individuals, shows that 12% of Americans have a "good" diet (HEI >80%); 18% have a "poor" diet (HEI <51%); and the dietary intake of the remainder of participants "needs improvement" (HEI 51-80%). It may be important to track food choices such as whole grains and fruits and vegetables and dietary patterns representative of optimal nutrition as well as optimal health.

5. WHAT POPULATION GROUPS WERE NOT ADDRESSED IN THE 1988 GUIDELINES?

Children and youth, senior citizens and the Aboriginal population were not addressed in the 1988 report. The discussion below describes information available about body weight and health for these three groups.

5.1 Children and Youth

The prevalence and incidence of childhood obesity continue to rise in Canada. One study reported a Canadian prevalence of 23% in 7-12 year olds, determined using adiposity based criteria (sum of five skinfold measures) (Limbert et al, 1994). A report in the Canadian Medical Association Journal in 1994 suggested that there is an "epidemic of childhood obesity…." in Canada (Lechky, 1994). Approximately one in five children in the United States is now overweight. (Troiano et al., 1995). In a supplement on childhood obesity in Pediatrics Journal in March 1998, it was stated that "childhood obesity is a

crisis facing US youth, and action to control it must be taken now" (Hill and Trowbridge, 1998). The trend is evident throughout North America. These authors stated that "Most health care costs associated with obesity are found in adults, but there are indications that the situation is changing and that we will be treating more chronic diseases in obese children. Policy makers must be aware of this crisis and be encouraged to work with scientists and health professionals to develop public policy to manage the problem" (Hill and Trowbridge, 1998).

The definition of obesity in children has recently been revised, as use of the BMI has also been adopted as a weight indicator in children. There is international support for use of the BMI for similar reasons to why it is used for adults. BMI correlates with body fat, blood pressure, blood lipids and mortality. At present, a BMI $\geq 95^{th}$ percentile for age and gender is used to define "overweight", while a BMI between the 85^{th} and 95^{th} percentiles defines "at risk of overweight" (Dietz and Bellizzi,1999). The International Obesity Task Force convened a workshop in 1997 on the Assessment of Childhood and Adolescent Obesity (Dietz and Bellizi, 1999). This represents a work in progress regarding measurement issues for childhood and adolescent obesity.

Lifestyle factors are believed to play a role in the increased prevalence of childhood obesity. The Canadian Fitness and Lifestyle Research Institute reports that only one-third of Canadian children and youth are physically active enough to meet the optimal standards for healthy development. (Health Canada, 1999; CFLRI 1996c). Concern for the health of Canadian children has also been expressed by the Heart and Stroke Foundation of Canada. In their *Report Card on the Health of Canada's Kids* (Heart and Stroke Foundation, 1998), the Foundation concluded from a nation-wide survey that "…Canadian children barely get a passing grade when it comes to leading a healthy lifestyle." They went on to state that "…if such childhood habits (inactivity and poor nutrition) aren't altered, youngsters will be headed for a decidedly unhealthy adulthood." Specifically, the report expressed concern regarding lifestyle factors related to the development and perpetuation

of childhood obesity.

Results from the survey showed that only 20% of parents felt that their children ate the recommended amounts of fruits and vegetables and only 28% of parents felt that their children ate predominantly whole grain breads and cereals. Two recent articles discuss how parents can transfer some of the responsibility regarding healthy food choices to the children to help them develop positive eating habits (Birch LL, 1998; Evers, 1997). With regards to physical activity, 63% of parents reported that their children were physically active (defined as playing outside with friends ≥ 3x/week). T.V viewing was estimated at 2.4 hours per day.

Results from the Trends in Health of Canadian Youth Report (Health Canada, 2000) show that >75% of respondents in Grade 6 ate fruits and vegetables daily. This value decreased to <70% for respondents in Grade 10. Over 67% of the respondents consumed low fat milk daily. The report also found that boys were almost twice as likely to exercise regularly compared to girls, and that the frequency of physical activity for both genders decreased with age (Health Canada, 2000). For respondents in Grade 10, approximately 20% of them watched 4 or more hours of television daily. Time spent watching television has been associated with the development of obesity in children (Dietz and Gortmaker, 1985).

Obesity and co-morbidities such as hyperlipidemia and hypertension are significant risk factors in the development of CVD and Type 2 diabetes (Despres et al, 1995). While CVD and Type 2 diabetes usually emerge in adulthood, risk factors for these diseases can be present during childhood and adolescence (Reaven, 1988; Gutin et al, 1997). Moreover, as all of these parameters tend to track from youth into adulthood (Ernst and Obarzanek, 1994; Whitaker et al, 1997; Orchard et al, 1983, Mossberg, 1989), efforts to modify these variables during childhood and adolescence are important. Research regarding CVD risk factors, physical activity and aerobic fitness in children is lacking. Of the few studies that

have been done, lifestyle modification programs that emphasized regular physical activity have led to improvements in CVD risk factors in obese children and adolescents (Kahle et al, 1996; Gutin et al, 1996).

The reported prevalence of co-morbidities in obese children includes: sleep apnea (1/100), hypertension (1/4) and hypercholesterolemia (1-2/5) (Barlow and Dietz, 1998). Also, the incidence of Type 2 diabetes is increasing in children and adolescents and it is associated with increasing obesity (Young and Rosenbloom, 1998). Obese children may also be at risk of psychological disturbances which can present as depression, low self-esteem, sleep disturbances and/or appetite change. (Dietz, 1998). Obese adolescents develop a negative self-image that appears to persist into adulthood (Dietz, 1998). Weight issues in childhood and adolescence are a significant health concern and should be considered as an important area for further investigation.

5.2 Senior Citizens

The older segment of the Canadian population is increasing in large numbers with current life expectancy for women at 81.4 years and for men at 75.7 years (Health Canada, 1999). Recent estimates suggest that by the year 2016 the proportion of Canadians older than 65 years will have increased from the present level of 12% to 16% (Statistics Canada, 1999). Results from the HHS (Langille et al., 1999) reveal that approximately 45% of Canadians between the ages of 55 and 74 years of age have a BMI of 27 or more. The same survey found that a significant number of Canadians between 55 and 74 years of age also have other known risk factors for cardiovascular disease: 53% were hypertensive, 30% had elevated total blood cholesterol, 56% had elevated low density lipoprotein levels and 50% were inactive.

At present, there is still limited research available on the association between body weight and risk for disease in older adults, although the HHS included individuals up to the age of

74. This survey demonstrated a weak relationship between excess fat or fat distribution and risk factors for cardiovascular disease in individuals between the ages of 55 and 74 years (Ledoux et al., 1997; Rabkin et al., 1997). Harris et al. (1997) demonstrated that there was an association between heavier weight and cardiovascular disease risk factors in individuals over the age of 65 years, although weight at 50 years of age was more closely associated with cardiovascular disease than was current weight. Ledoux et al. (1997) suggest that the physiological changes that occur with advancing age, as well as the greater prevalence of confounding health problems may partially explain the poor association between body weight and risk factors for disease. Keeping physically active can delay many of the usual changes that occur with aging, such as loss of bone and muscle mass and increases in fat mass (Orban, 1992).

A large epidemiological study investigated the effect of age on the relationship between BMI and mortality (Stevens, 1998). There was an association between a greater BMI and increased all-cause mortality and CVD mortality in men and women up to 75 years of age. However, the relative risk declined with age. That is the association was stronger in younger age groups.

There appears to be an association between excess weight and risk for disease in individuals over the age of 65 years, although the association is not a strong one and therefore is inconclusive. As the Canadian population is aging rapidly, it would be important to address the issue of healthy weight guidelines for these individuals; however, more research is required before these guidelines can be established.

5.3 Aboriginal Population

The life expectancy of First Nations people is seven years less than that of the Canadian population in general. (Statistics Canada, Department of Indian Affairs and Northern Development (Status Indians), 1993). This suggests disparities in determinants of health.

It has been demonstrated that obesity is prevalent among Aboriginal groups in Canada and that increased abdominal fat distribution is common (Katzmaryk and Malina, 1998; Young, 1996; Montour et al., 1989; Young and Sevenhuysen, 1989). For example, a recent study found the prevalence of obesity to be 51% and 60% in First Nations males and females, respectively, as compared to 38% and 33% in Canadian men and women of European ancestry, respectively (Katzmaryk and Malina, 1998). However, this difference was only statistically significant in females. Another study reported that almost 90% of Cree and Ojibwa women and 80% of Cree and Ojibwa men between 45 and 54 years of age had a BMI of at least 26 (Young and Sevenhuysen, 1989). In addition, A Second Diagnostic of the Health of First Nations and Inuit People in Canada (Health Canada, 1999a) concludes that Type 2 diabetes, a disease associated with obesity and central fat deposition, is more prevalent in First Nations populations in Canada than in the general Canadian population. Among Aboriginal populations in Canada, other than the Inuit population, there is a clear association between BMI and risk factors for disease (Hall et al, 1991; Young and Sevenhuysen, 1989; Szathmary and Holt, 1983). In a survey of Cree and Ojibwa communities in northern Canada, Young and Sevenhuysen (1989) documented a significant difference between BMI categories (BMI < 25, BMI 26-30 and BMI >31) with respect to lipid profiles, blood pressure, fasting blood glucose and glycated hemoglobin. The higher BMI category was associated with the least favorable results. Furthermore, BMI was an independent and significant predictor of both diabetic and hypertensive status. Similar associations between central fat distribution and Type 2 diabetes have been demonstrated in other First Nations groups (Hall et al, 1991; Szathmary and Holt, 1983).

Although obesity is as prevalent among the Inuit population of Canada as the general Canadian population, the association between obesity and metabolic disturbances differs from the general Canadian population and other Aboriginal groups. Young (1996) showed that obesity, assessed by either BMI, WHR or skinfold measurements, was not associated with higher levels of fasting glucose or insulin levels in the Inuit people. In addition, although there was an increasing trend in blood pressure and lipid levels with obesity in the Inuit, the magnitude of the response differed with respect to high density lipoproteins and triglyceride levels as compared to the general population of Manitoba. It has been suggested that the obesity criteria used for Canadians in general may not be applicable to Inuit people (Young, 1996).

With the exception of the Inuit population, there is a clear association between obesity and risk for disease in the Aboriginal population of Canada. It is unclear as to whether the standard BMI and WC criteria would be appropriate to predict health risk for this group. Although more research is required to confirm the prevalence of obesity and its metabolic effects in the various Aboriginal groups of Canada, this population should be addressed in the revised Guidelines for Healthy Weights.

6. UPDATE OF SCIENTIFIC EVIDENCE FOR THE RELATIONSHIP BETWEEN BODY WEIGHT AND MORBIDITY AND MORTALITY.

In a report on the prevention of obesity in adults, the health risks of obesity are reiterated. (Douketis and Feldman, 1994; Douketis et al., 1999). There still appears to be widespread agreement that obesity increases the risk of CVD, hypertension, hyperlipidemia and diabetes. Obesity is also associated with sleep apnea, cholelithiasis, venous thromboembolism and certain cancers (breast, colon, endometrial, ovarian and prostate) (Douketis and Feldman, 1994; Douketis et al., 1999). In fact, there are estimates that 66% of Type 2 diabetes, 52% of cholelithiasis, 22% of coronary heart disease and 29% of hypertension may be due to obesity (Colditz, 1992). The psychological impact of obesity

may also be substantial, due to our society's emphasis on a lean body image and the negative perception of overweight (Douketis and Feldman, 1994; Douketis et al., 1999). Thus, the public health implications of obesity must be considered as a serious concern (Reeder, 1996). Also, the direct costs of obesity in Canada in 1997 has been estimated to be $1.8 billion (Birmingham et al., 1999). The dilemma remains that there appears to be a lack of long-term effectiveness of weight reduction therapy for a large majority of obese individuals (Douketis and Feldman, 1994; Douketis et al., 1999).

7. OBESITY IS A GLOBAL ISSUE

Governments and health agencies around the world are re-evaluating the relationship between body weight and health status. Health risk is associated with both underweight and overweight. This section will address the increasing worldwide concern about what has been called the global epidemic of obesity. A number of recent reports from expert committees are available, which document key issues related to the definition, prevalence, health consequences, treatment and prevention of obesity. Highlights from each report are summarized.

7.1 WHO Consultation on Obesity (1998)

The WHO consultation formally recognized obesity as a disease. The report stated that obesity is prevalent in developed and developing countries and it affects both adults and children. There was a recommendation for the adoption of an international classification system whereby a BMI $\geq$ 25 = overweight; BMI $\geq$ 30 = obesity. Central intra-abdominal fat should be documented with simple measures such as waist circumference or WHR. New criteria for determination of obesity in children are needed; however it was acknowledged in the report that this was currently in progress (as discussed above).

Sedentary lifestyles and high fat, energy dense diets were identified as fundamental causes of obesity and that genetic and biological factors may predispose an individual to more easily gain weight in this type of environment.

7.2 International Obesity Task Force (IOTF) Annual Report (1998)

The IOTF is an official committee of the International Association for the Study of Obesity (IASO). It works in collaboration with the WHO to ensure that the recommendations from their consultation report (WHO, 1998) are acted upon. As stated in their Annual Report 1997-98 the IOTF has four main goals. These include:

- "To increase awareness among governments, health care professionals and the community, that obesity is a serious medical condition and a major health problem with substantial economic costs.
- To guide the development of better prevention and management strategies.
- To secure the commitment of policy makers to action.
- To foster the development of national, regional and international efforts to combat this disease." (IOTF,1998)

Five working groups have been established within the IOTF to continue the scientific evaluation and future plans for action for specific areas. The working groups are Public Health and Prevention, Childhood and Adolescent Obesity, Economic Costs, Management of Obesity and Health Professional Training

7.3 Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults – The Evidence Report (NIH, NHLBI, USA 1998)

As these are clinical guidelines, the health risks of obesity were a key focus. Obesity increases the risk of morbidity from hypertension, dyslipidemia, type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea, respiratory problems, and endometrial, breast, prostate and colon cancers. Obesity is associated with increases in all-cause mortality. Obese individuals may experience social stigmatization and discrimination. These guidelines supported the WHO BMI cut-offs (BMI ≥25 = overweight; BMI ≥30 = obesity). It was reported that 54.9% of adults in the US are overweight or obese (ie. BMI 25+) and that overweight and obesity are more frequently observed in some minority groups, those with lower incomes or less education.
The development of obesity is an interaction of social, behavioural, cultural, physiological, metabolic and genetic factors. Evidence based guidelines are presented for the treatment of individuals who are overweight or obese.
(Expert Panel on Obesity, 1998)

7.4 Dietary Guidelines for Americans 2000

The current revision of the Dietary Guidelines for Americans includes a substantial component related to body weight. One section entitled Aim for Fitness includes two guidelines: “Aim for a healthy weight.”; and “Be physically active each day.” This is the first time that dietary guidelines have included such a significant emphasis on physical activity. Individuals are encouraged to evaluate their weight using BMI and waist circumference. BMI can be compared to a chart that displays health risk. A waist circumference >35 inches (88 cm) for women and >40 inches (102 cm) for men is considered as a greater risk for health problems. For weight management and achievement

of a healthy weight, recommendations related to dietary choices and regular exercise are itemized. (Dietary Guidelines Advisory Committee, 2000)

7.5 Acting on Australia's Weight: A Strategic Plan for the Prevention of Overweight and Obesity, 1997

In 1989, 48% of men and 34% of women in Australia were overweight or obese and the incidence appears to be increasing even though many adults are concerned about their weight and are trying to lose weight. Adult men increase weight markedly between the ages of 25 and 40 whereas women increase weight during the menopausal years of 45-55. Sub-groups, which appear to be at greater risk of developing obesity are: Aboriginal and Torres Strait Islander groups, those who have a sedentary occupation and low-income groups. There is increased concern about obesity in children and adolescents. Overweight and obesity have been identified as key risk indicators of preventable morbidity and mortality especially for hypertension, cardiovascular disease and Type 2 diabetes. Again, the WHO definitions were identified as indicators of body weight status (BMI ≥ 25 = overweight; BMI ≥ 30 = obesity). Increased abdominal fat is associated with dyslipidemia, hypertension and type 2 diabetes and can be assessed with a measurement of waist circumference. The report focuses on prevention of obesity.
(Expert Panel on the Prevention of Obesity and Overweight, Australia, 1997)

7.6 The Asia-Pacific Perspective: Redefining Obesity and its Treatment, 2000

This report addresses a new consideration in the global use of single BMI cut-offs. It has been observed that increased risks associated with obesity occur at lower BMIs in Asians and that they are predisposed to abdominal obesity. Also, Pacific Islanders are muscular and have less body fat than Europeans with the same BMI and therefore may have a

higher BMI threshold before being at risk of obesity-associated illness. Another consideration highlighted in this report was that while in Western societies obesity is generally socially unacceptable, in Pacific Islanders obesity was, and in some cases remains a symbol of wealth and increased social status. (Steering Committee on The Asia-Pacific Perspective: Redefining Obesity and its Treatment, 2000)

8. What Research Gaps Still Exist?

As the prevalence of obesity continues to increase worldwide, research efforts have accelerated to address the complex influences that impact body weight. There is a vast body of literature that has emerged over the last decade, which has helped to answer some questions and to pose new ones. Many of the new databases will provide information about some of the research gaps suggested below. Additional research is also required to support preliminary findings in some of these areas. Setting research priorities would be useful to help secure resources to answer the specific research needs. More information is needed regarding:

- The impact of normal blood lipids, normal blood pressure and normal insulin sensitivity at all levels of body weight and body fat. That is, is metabolic fitness independent of body size and shape?
- The relationships between body weight, body image and size acceptance.
- Weight-health relationship in children, youth, seniors and Aboriginal populations.
- Behavioral determinants related to eating and physical activity patterns.
- Do behaviors in children "track" into adulthood?
- Food choices and dietary patterns and obesity
- Improved techniques to increase the validity and accuracy of measurement of food intake and physical activity.
- Innovative techniques for treatment of obesity.
- Innovative techniques for prevention of obesity.

9. SUMMARY AND NEXT STEPS

9.1 Summary

- In general, when BMI is used as an indicator of excess body weight, a BMI >25 defines "overweight" and a BMI >30 defines "obesity".
- Waist circumference rather than WHR appears to be favored as an indirect indicator of intra-abdominal and total abdominal fat mass.
- Metabolic fitness may be a useful indicator of morbidity and mortality independent of body weight and adiposity.
- A large number of factors contribute to body image with actual body weight playing only a small role.
- Size acceptance involves examining prejudicial attitudes and beliefs about body weight and not promoting dieting or other weight control methods.
- Recent genetic discoveries have demonstrated the complexity of human obesity.
- A number of recent Canadian data sets are available to systematically re-evaluate the weight-health relationship. However, caution must be used in the interpretation of self-reported height and weight data.
- The prevalence of underweight (BMI category <20) has not changed in men or women since 1988. [Men: 5%, 3%; Women: 15%, 14% (1988/NPHS 1996-97 respectively)].
- The prevalence of overweight (BMI category >27) has increased by 6 percentage points in men and 8 percentage points in women since 1988. [Men: 29%, 35%; Women: 19%, 27% (1988/ HHS)].
- Trends in diet and exercise do not clearly explain the changes in prevalence of overweight.
- Increasing numbers of children, youth, seniors and Aboriginal people are at body weights suggestive of increased health risks.
- Obesity has become a world wide public health issue.
- There are many research gaps regarding the relationship between weight and health.

9.2 Next Steps

Issues surrounding body weight are very complex. Weight reflects a combination of genetic, biological, psychological, sociological, economic and emotional factors. As such, defining "healthy weight" in such a broad context may not be possible. A recent report: American Health Foundation Roundtable on Healthy Weight, a supplement to the American Journal of Clinical Nutrition, offers an excellent review of challenges relating weight to health (Expert Panel on Healthy Weight, 1996). The panel did provide recommendations for healthy weight targets and weight loss to reduce health risk.

In consideration of a revision of Canada's Healthy Weight Guidelines, the opportunity exists to reevaluate a number of key questions.

- Is there a need for Healthy Weight Guidelines? Would Healthy Lifestyle Guidelines perhaps be more appropriate?

- What is a healthy weight? Certainly weight alone does not determine health, so can weight be put in a context related to other health and lifestyle factors?

- Is there evidence to develop guidelines for healthy weight for all age groups and ethnic backgrounds?

- Is there evidence to demonstrate how to achieve a healthy weight?

- What environmental change is necessary to support achievement of healthy weights? This is a difficult question. It may include a wide spectrum of possible strategies to help support Canadians in making positive lifestyle choices. (Some examples include: more public school education related to healthy lifestyles; school and workplace policies to support healthy eating and active living; strategies for "safe" playgrounds; community-level strategies for "healthy communities" and "healthy cities").

In conclusion, to answer the question posed in the title of this paper, it appears that the 1988 Canadian Guidelines for Healthy Weights should be updated. Over the last decade there has been a dramatic increase in knowledge regarding the body weight-health relationship, which will support evidence-based guidelines. The task will be a challenging one, however given the health-related issues associated with body weight, it appears to be a necessary one.

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