Overweight and Obesity in the Niagara Region

PLANNING, RESEARCH, EVALUATION AND POLICY DEVELOPMENT UNIT

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Introduction

In recent years, there has been substantial evidence that the rates of overweight and obesity in the Canadian population are increasing; this increase is particularly pronounced in children (Tremblay et al, 2002). High body mass has been associated with increasing risk of chronic diseases such as type 2 diabetes, hypertension, dyslipidemia, coronary heart disease, gallbladder disease, and osteoarthritis (Must et al, 1999; Brown et al, 2000). The highest obesity categories have been associated with a nearly threefold increased risk of death from all causes, compared to those with a healthy weight (Katzmarzyk et al, 2001). In the United States, extreme obesity has been associated with an increased risk of cancer mortality of 52% in men and 62% in women (Calle et al, 2003). It has been estimated that nine percent of mortality due to all causes in 20 to 64 year olds that occurred in the year 2000 in Canada were attributable to overweight and obesity, representing over 4,000 premature deaths (Katzmarzyk and Ardern, 2004). Achieving and maintaining a healthy weight is important to reducing the risk of disease and improving overall health.

The purpose of this report is to provide background information on the measurement of overweight and obesity, and to assess their prevalence and impact in the Niagara region. These data are already in use by the Public Health Department to provide input into programs designed to address the obesity issue in Niagara.

The Body Mass Index

The body mass index (BMI) is a means of categorizing health risk based on body weight relative to height. It is calculated by dividing an individual's weight in kilograms by the square of their height in metres (kg/m^2). BMI categories can be used at the population level to identify patterns and trends in body weight patterns; at the individual level, BMI can be used to assess risk of morbidity and mortality when combined with an assessment of other risk factors and health behaviours.

In 2003, Health Canada adopted the World Health Organization recommendations for the categorization of BMI in adults, allowing for easier international comparisons (Health Canada, 2003). The current adult BMI categories in use and their associated health risks are as follows:

Figure 1. International BMI Categories and Associated Risk of Health Problems

BMI	Category	Risk of health problems
<18.5	Underweight	Increased risk
18.5 – 24.9	Normal weight	Least risk
25.0 – 29.9	Overweight	Increased risk
30.0 +	Obese	
30.0 – 34.9	Obese Class I	High risk
35.0 – 39.9	Obese Class II	Very high risk
40.0 +	Obese Class III	Extremely high risk

Source: Health Canada (2003)

Use of these BMI categories is not recommended for children under the age of 18 or for pregnant or lactating women. Special considerations should be made when assessing individuals aged 65 and over, or those who are naturally very lean or very muscular with this classification system (Health Canada, 2003).

In children under the age of 18, age and sex specific BMI cut-points are used to define weight categories, to accommodate the wide fluctuations in BMI throughout childhood and adolescence. There are two major classification systems in use for this age group. In the United States, classifications are based on BMI-for-age percentiles of the US Centers for Disease Control and Prevention (CDC) growth charts; overweight in children is defined as the 95th percentile for each age and sex group (Centers for Disease Control and Prevention, 2007). An international standard for BMI classification in children was developed by the International Obesity Task Force (IOTF) that is based on pooled international data and corresponds to the adult BMI cut-points for overweight (25.0) and obesity (30.0) (Cole et al, 2000); it is more useful in making international comparisons than the CDC BMI-for-age charts. Statistics Canada uses the IOTF classification in the analysis of BMI data for 12-17 year olds from the Canadian Community Health Survey (CCHS) (Statistics Canada, 2005).

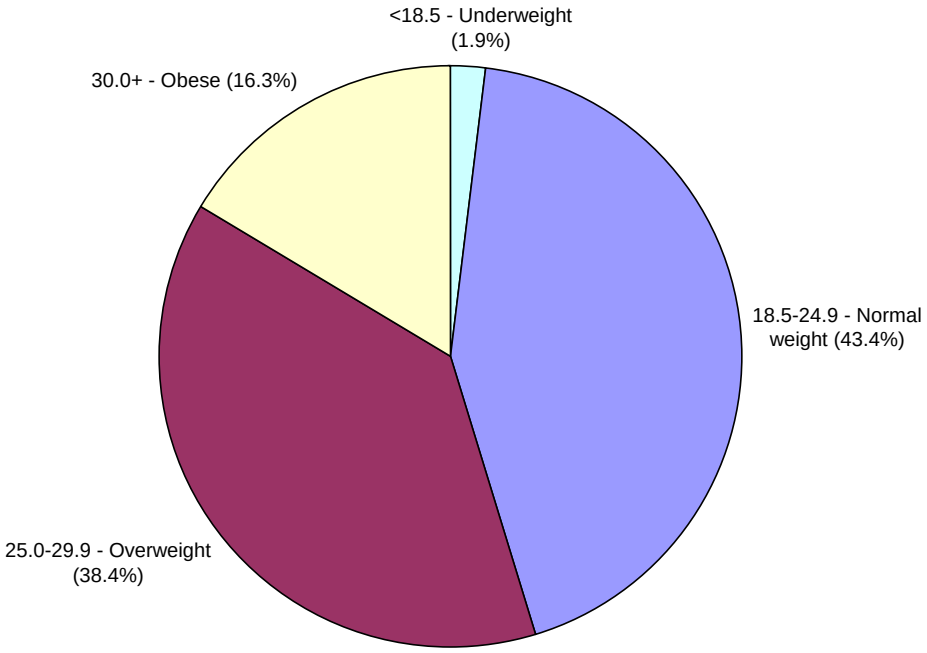
BMI is most accurately assessed by direct measurement of individuals, although this is often impractical for population-based studies due to the cost. A more feasible and commonly used method of BMI estimation is by self-report of height and weight via survey.

Local BMI data are available from two sources: the CCHS, a biannual survey (via telephone and personal interview) of the Canadian population aged 12 years and up, and the Rapid Risk Factor Surveillance System (RRFSS), a monthly telephone survey of adults aged 18 years and up conducted on behalf of the majority of public health units in Ontario. A mix of data from the two sources is used in this report; the CCHS allows for provincial and national comparisons as well as measurement of BMI in adolescents, and RRFSS allows for combination of years of data to facilitate analyses for subsets of the adult population (e.g. by age and sex).

Overweight and Obesity in Adults in the Niagara Region, 2001-2005

In the Niagara Region, BMI data are obtained from RRFSS for people 18 years of age and older. For the years 2001 to 2005 combined, 54.7% of respondents in Niagara had a BMI in the overweight or obese range. A further 1.9% of respondents were considered underweight, leaving less than half of Niagara's population with a BMI in the healthy range (Figure 2).

Figure 2. BMI Distribution in the Niagara Region, Adults 18+, 2001-2005



Data Source: Rapid Risk Factor Surveillance System (RRFSS)
PREP Unit, Niagara Region Public Health Department

BMI data collected from the CCHS allows local rates to be compared to those of Ontario and Canada for 2005. Compared to the province as a whole, Niagara has a lower proportion of people in the normal weight category and a higher proportion of people in the obese category (statistically significant at the 95% confidence level). There are no statistically significant differences in BMI distribution between Niagara and Canada.

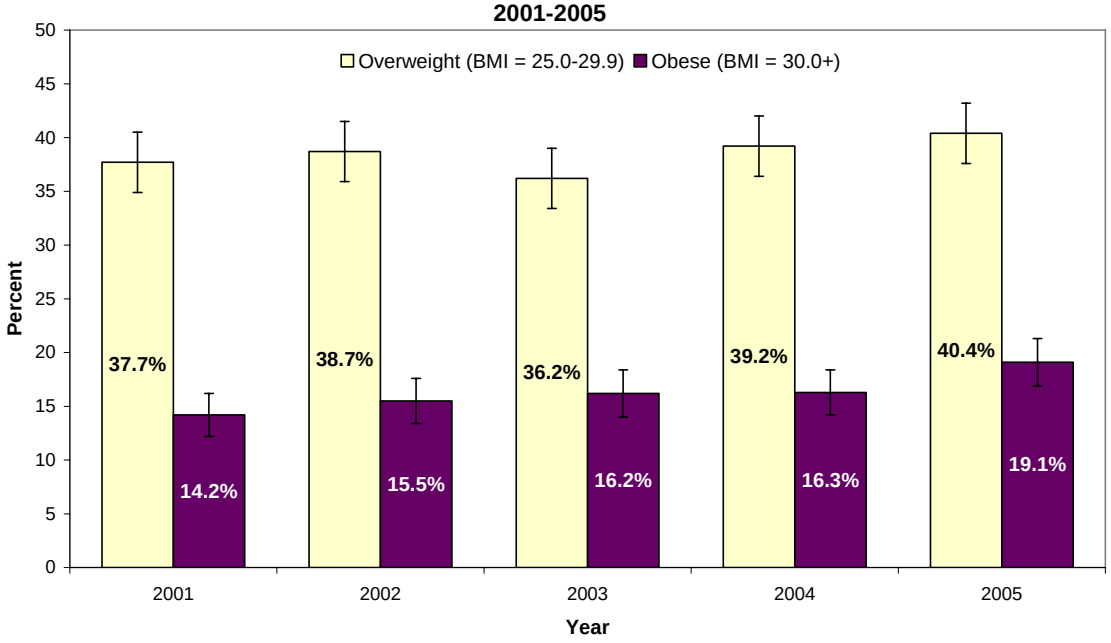
Table 1. BMI Distribution in Niagara Region, Ontario, and Canada, Adults 18+, 2005

BMI Category	Prevalence Estimates (%)		
	Niagara	Ontario	Canada
Underweight (<18.5)	2.7	2.8	1.7
Normal weight (18.5-24.9)	42.4*	47.4*	38.9
Overweight (25.0-29.9)	34.6	34.3	34.9
Obese (30.0 +)	20.3*	15.5*	24.3
Obese Class I (30.0 – 34.9)	13.6	11.3	17.4
Obese Class II (35.0 – 39.9)	4.3	2.9	4.8
Obese Class III (40.0+)	2.4	1.3	2.1

Data Source: Canadian Community Health Survey Cycle 3.1, 2005
**statistically significant difference between Niagara and Ontario*

While there appears to be a slight increasing trend in the rates of obesity in Niagara between 2001 and 2005, there were no statistically significant differences among years (Figure 3). Provincial and national data show a similar stability over this time frame (Statistics Canada, 2007), but longer-term trends demonstrate alarming increases in overweight and obesity in adults (Ontario Chief Medical Officer of Health, 2004; Tjepkema, 2006).

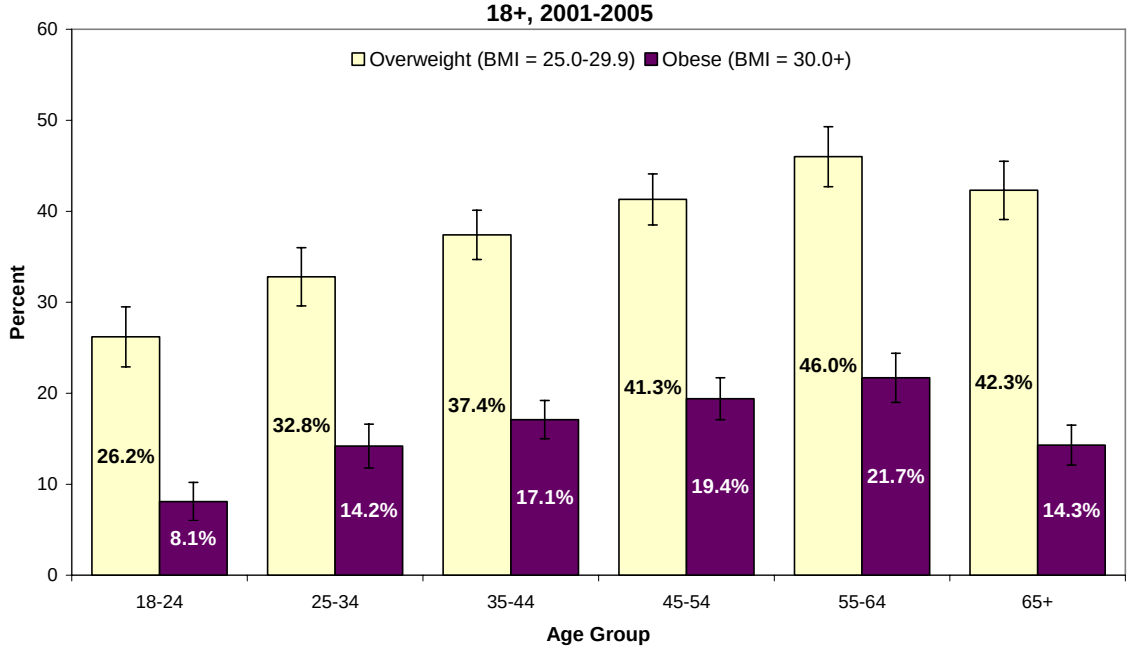
Percent who are Overweight or Obese by Year, Niagara Region, Adults 18+, 2001-2005



Source: Rapid Risk Factor Surveillance System
PREP Unit, Niagara Region Public Health Department

In general, BMI increases with age. Respondents aged 55-64 years had the highest rates of overweight and obesity, and were significantly more likely to have a BMI above 25.0 than those in the younger age groups (Figure 4). The proportion of people in the overweight and obese categories begins to decrease in the 65+ age group; this drop is statistically significant in the obese category.

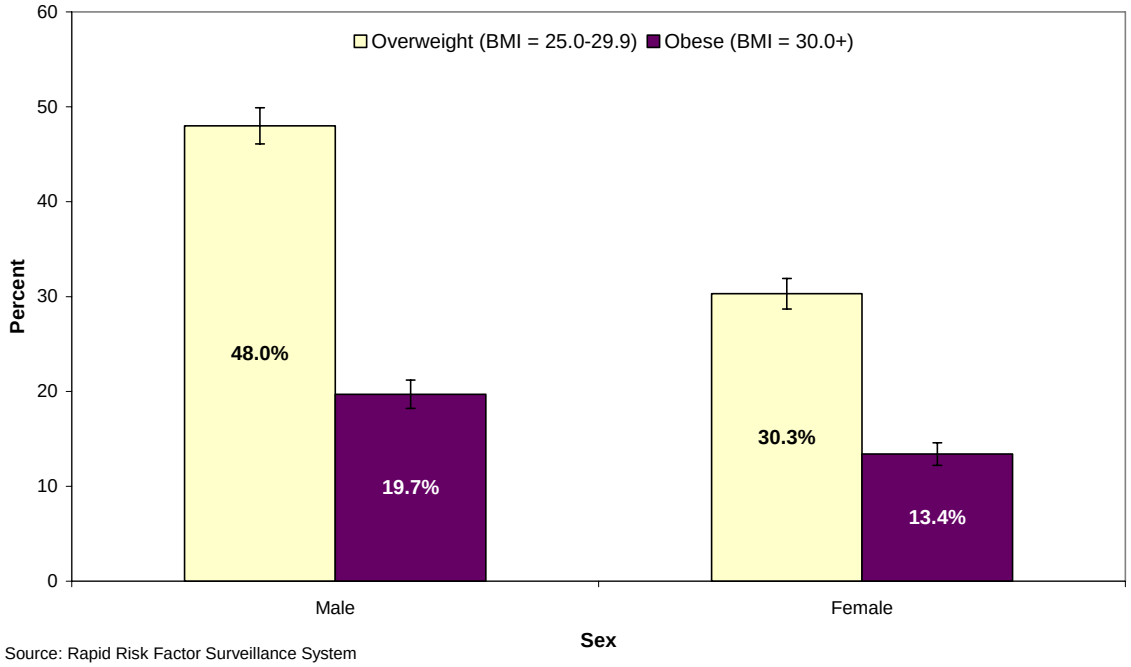
Percent who are Overweight or Obese by Age Group, Niagara Region, Adults 18+, 2001-2005



Source: Rapid Risk Factor Surveillance System
PREP Unit, Niagara Region Public Health Department

A much higher percentage of males than females have a BMI in the overweight category in the Niagara region (48% versus 30%, respectively). There is a less pronounced, but still statistically significant, difference in the proportion of males and females in the obese category (Figure 5). This difference is seen at the provincial level, as well; data from the 1990 Ontario Health Survey, the 2000/01 CCHS, and the 2003 CCHS all show a higher proportion of males in the overweight and obese categories (Ontario Chief Medical Officer of Health, 2004).

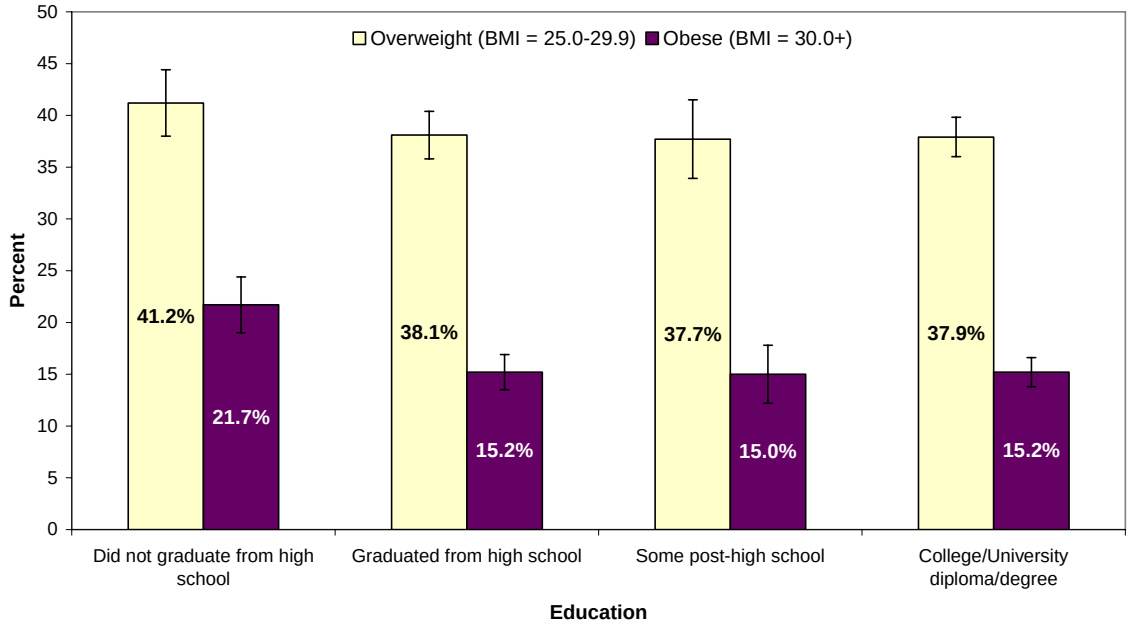
Percent who are Overweight or Obese by Sex, Niagara Region, Adults 18+, 2001-2005



Source: Rapid Risk Factor Surveillance System
PREP Unit, Niagara Region Public Health Department

Adults without a high school education had a higher rate of obesity than those who had obtained a high school diploma or higher levels of education; differences in the overweight category were not statistically significant (Figure 6). Data from the 2004 CCHS show a similar trend at the national level (Tjepkema, 2006).

Percent who are Overweight or Obese by Highest Education Level, Niagara Region, Adults 18+, 2001-2005



Source: Rapid Risk Factor Surveillance System
PREP Unit, Niagara Region Public Health Department

Overweight and Obesity in Adolescents in the Niagara Region

Data on adolescent obesity are obtained from the CCHS for youth aged 12 to 17 years. Self-reported height and weight were used to calculate BMI, and BMI categories were created using the IOTF classification system (Cole et al, 2000). With this data source, comparisons can be made with provincial data. In 2003, 29.2% of Niagara youth aged 12 to 17 were considered overweight or obese, compared to 21.2% in Ontario; however, the difference is not statistically significant. In 2005, 21.7% of 12 to 17 year olds in the Niagara region were overweight or obese; however, this estimate is subject to high sampling variability and should be interpreted with caution. The provincial rate was 19.7% (Statistics Canada, 2005).

Overweight and Obesity in Children in Canada

Local or provincial data on obesity in children under the age of 12 are not available. However, published results of the 2004 CCHS Nutrition survey are available at the national level. In 2004, 19% of Canadian boys aged 2 to 5 and 25% of boys aged 6 to 11 were considered overweight or obese based on the IOTF classification system; 24% of girls aged 2 to 5 and 26% of girls aged 6 to 11 fell into the same category (Shields, 2006).

The Health Impact of Overweight and Obesity in the Niagara Region

The population attributable risk (PAR) is commonly used to provide a measure of the impact of a risk factor on a specific outcome (e.g. illness or death). It is defined as "the incidence of disease (or mortality) that is associated with (attributable to) exposure to the risk factor" (Last, 2001), and is calculated using the population proportion of the risk factor, and the relative risk associated with that risk factor. When the number of deaths in a population for a given time frame is known, the PAR can be used to calculate the number of excess deaths in the population that would not have occurred if the risk factor (in this case, obesity) were removed.

Using BMI prevalence data from the 2001-05 RRFSS and estimates of relative risk of death at different levels of BMI from a previous Canadian study (Katzmarzyk et al, 2001), the population attributable risk of death due to obesity was calculated using two equations: one that would produce a conservative estimate of the PAR, and one that would produce an overestimate due to bias in the calculation of relative risk (Katzmarzyk and Ardern, 2004). For the method of calculation, please see Appendix A. Due to data limitations, PAR could only be calculated for adults age 20 to 64. The results show that between 11% and 15% of deaths in that age group in the Niagara region can be attributed to overweight and obesity.

In 2003 (the most recent year for which mortality data are available), there were 684 deaths due to all causes in adults aged 20 to 64 in Niagara. This translates to between 73 and 106 deaths for the year in adults being preventable by the elimination of overweight and obesity in the population.

Discussion

This report gives an overview of the obesity issue in the Niagara region. Reflecting trends seen provincially and nationwide, less than half of our residents are at a healthy weight for their height. Locally, rates of overweight and obesity have not changed significantly in the past several years for which data are

available, but studies done at the national level show that there are significantly more people who are overweight or obese now than there were 30 years ago (Tjepkema, 2004). It is reasonable to expect that a reversal of this trend will take a similar amount of time.

Local data show that overweight and obesity are related to increasing age, and that males are more likely to have a high BMI than females. In addition, lower education levels are associated with the highest rates of obesity. While these demographic differences may help tailor health promotion communications for vulnerable groups, the healthy weights message is universal.

There are limitations to using self-reported height and weight in the calculation of BMI; people tend to either overestimate their height (more common in males) or underestimate their weight (more common in females), resulting in an overall underestimate of BMI on a population level. For example, the 2003 CCHS estimate for the proportion of obese in the Canadian adult population was 15% based on self-report, while in 2004 it was 23% based on direct measurement (Tjepkema, 2004).

Obesity is a risk factor for a variety of chronic health conditions, and is ultimately responsible for up to 15% of deaths in the Niagara region. Related functional limitations and psychosocial impacts can also result in an impaired quality of life for individuals living with excess body weight. Maintaining a healthy weight through proper nutrition and regular exercise can help prevent these problems and contribute to a healthier community.

Locally, the TREKZONE initiative is a community-based plan to support healthy lifestyles in Niagara, focused on physical activity, healthy eating, and community design. The strategy aims to facilitate healthy eating and physical activity for Niagara's residents where they live, learn, work, and play (Coppola and Zalot, 2006). For more information on TREKZONE, please see www.trekzone.ca.

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Appendix A

Calculations of PAR were done under two scenarios: a "low" scenario using the conservative equation PAR = Σ[P(RR-1)/RR], and a "high" scenario using the biased equation PAR = [Σ (P)(RR-1)]/[1+ Σ (P)(RR-1)].

Where:
$P_{overweight}$ = 0.379, P_{obeseI} = 0.120, $P_{obeseII/III}$ = 0.047
$RR_{overweight}$ = 1.16, RR_{obeseI} = 1.25, $RR_{obeseII/III}$ = 2.96
Number of deaths in 2003 in ages 20-64 = 684

Scenario 1 (low)

$PAR = [P_{overweight} (RR_{overweight} – 1)/ RR_{overweight}] + [P_{obeseI} (RR_{obeseI} – 1)/ RR_{obeseI}] + [P_{obeseII/III} (RR_{obeseII/III} – 1)/ RR_{obeseII/III}]$

= [0.379*(1.16-1)/1.16]+[0.12*(1.25-1)/1.25]+[0.047*(2.96-1)/2.96]

= 0.107397

Excess death = $N_{deaths\ in\ time\ period}$ * PAR
= 684 * 0.107397
= 73.45988

Therefore, 73 deaths (10.7%) in this age group were attributable to overweight and obesity in 2003, according to this scenario.

Scenario 2 (high)

$PAR = [P_{overweight} (RR_{overweight} – 1) + P_{obeseI} (RR_{obeseI} – 1) + P_{obeseII/III} (RR_{obeseII/III} – 1)] / 1 + [P_{overweight} (RR_{overweight} – 1) + P_{obeseI} (RR_{obeseI} – 1) + P_{obeseII/III} (RR_{obeseII/III} – 1)]$

= [0.379*(1.16-1) + 0.120*(1.25-1) + 0.047*(2.96-1)] / {1 + [0.379*(1.16-1) + 0.120*(1.25-1) + 0.047*(2.96-1)]}

= 0.15452

Excess death = $N_{deaths\ in\ time\ period}$ * PAR
= 684 * 0.15452
= 105.6916

Therefore, 106 deaths (15.5%) in this age group were attributable to overweight and obesity in 2003, according to this scenario.