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Report on Physical Activity and Body Weight

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British Columbia Nutrition Survey
Report on Physical Activity and Body Weight

March 2004

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Executive Summary

The B.C. Nutrition Survey (BCNS) is a collaboration of Health Canada and the B.C. Ministry of Health Services, in association with the University of British Columbia. The BCNS was conducted in 1999 to obtain comprehensive up-to-date information on the eating habits and body weights of adult British Columbians. This province-wide survey included 1823 participants aged 19 to 84 years and involved 90-minute, in-home interviews by trained public health nurses and nutritionists. Several questionnaires were used to assess food consumption and priority nutrition issues, including a 24-hour recall, a food frequency questionnaire and a general nutrition questionnaire focusing on physical activity, healthy weight and body image and food security. Socio-demographic information and measured height, weight and waist circumference were also collected from the participants.

Although the BCNS had several objectives, the data presented herein relate to only one: namely, to assess weight and physical activity among adults. The key findings reported in this document are highlighted below in four sections that follow the presentation of results.

Exercise and Physical Activity

- Significant proportions of B.C. adults do no strenuous (61%) or moderate (36%) exercise during their leisure time.
- Overall, men and women report similar amounts of leisure-time exercise, as estimated by minimum Met-minutes of exercise (a measure that combines exercise frequency and intensity). Leisure-time exercise decreases after age 19-30 and then remains essentially stable in both men and women.
- Work-related activity is greater for men than women and also differs among strata, being lowest in the Metro stratum and highest in the Non-metro Interior stratum. Work-related activity was not related to leisure-time physical activity among those who were employed.
- Almost half of British Columbians consider themselves to be in the maintenance stage for structured exercise and about 80% report being in the maintenance stage for lifestyle physical activity. Thus, programs designed to increase lifestyle physical activity may have limited impact, as most British Columbians believe they are already physically active.
- The amount of leisure-time exercise (minimum Met-minutes of exercise) among those at different motivational stages is reflected better by motivational stage for structured exercise than by motivational stage for lifestyle physical activity.

- Despite the findings that a large majority of B.C. adults consider themselves to be in the maintenance stage for lifestyle physical activity and that over half feel they are in the action or maintenance stages for structured exercise, only 5% cited "already active enough" as a reason or barrier to increased physical activity or exercise. The most frequently-cited barriers were related to a lack of time.

Body Weight, Waist Circumference and Weight Change Efforts

- Over half (55.1%) of B.C. adults are overweight (36.9%) or obese (18.2%). This is markedly higher than the 44% prevalence of overweight/obesity assessed 10 years earlier in the 1989 B.C. Heart Health Survey. It is also higher than the 42% prevalence estimated for B.C. adults in the Canadian Community Health Survey (CCHS). Although the CCHS was conducted in 2000-2001, it obtained self-reported heights and weights rather than the measured values obtained in the BCNS and the B.C. Heart Health Survey.
- The prevalence of obesity (BMI > 30) is similar in men and women (19.1% vs 17.2%), but men are more likely than women to be overweight (BMI 25.0–29.9; 44.5% vs 29.1%). Several sociodemographic variables are associated with the prevalence of overweight and obesity:
  - Overweight and obesity increased with *age*.
  - Overweight and obesity differed by *geographic strata* in men but not women. The Metropolitan area had the highest proportion of men in the healthy weight category, while the Coastal stratum had the highest prevalence of overweight men and the Non-metro Interior stratum had the highest prevalence of obese men.
  - *Income status* affected weight category in men. Compared to those who were not low income, low income men were less likely to be overweight (36.9% vs 47.7%) or obese (10.6% vs 21.9%). Among women, the effect of income status was not significant.
  - In women, those with the highest level of *educational attainment* were less likely to be overweight or obese (about 30% vs about 50% in those with lower levels of educational attainment). This finding, coupled with the fact that university graduates were over-represented in the survey, suggests that the true prevalence of overweight and obesity among B.C. women may be somewhat higher than is estimated in the BCNS. The pattern differed among men. Those with secondary education and university graduates had generally similar prevalences of overweight and

obesity (57%-60%), while those with technical education had the highest prevalence (69%).

- Waist circumference increased with age in both men and women. Overall, 42% of B.C. adults were at some degree of increased health risk based on waist circumference. Similar proportions of men and women were at low risk, but men appeared more likely to be at "increased risk" (24.5% vs 16.5%) and women appeared more likely to be at "substantial risk" (23.9% vs 19.6%).
- Overall, about 60% of men and 80% of women correctly perceive their weight as "underweight", "about right" or "overweight". Men were more likely than women to consider themselves underweight when they were not and were also more likely to perceive they were "about right" when they were actually overweight or obese.
- At the time of the survey, 36.5% of B.C. adults were trying to lose weight and 5.5% were trying to gain weight. Women were more likely than men to be trying to lose weight (44.3% vs 28.6%), while men were more likely than women to be trying to gain weight (9.3% vs 1.8%).
- The most common actions reported by those trying to lose weight or gain weight were changing their eating habits and increasing exercise.

Attitudes to Eating and the Body

- Men felt significantly more "comfortable" with their body than women. Level of bodily comfort, however, did not change with age.
- Women were more likely than men to agree with statements reflecting dietary restraint and disinhibition. Restraint scores tended to increase with age up to age 51-70 and to be lower in the oldest age group, but these differences were not significant. For disinhibition, however, the lowest scores were seen in those aged 71 and above.

Relationships among Physical Activity, Body Weight, Waist Circumference and Body Comfort

- Particularly among men, a high Body Mass Index (BMI) appears to serve as a stimulus to increase exercise, as B.C. adults who had recently started to exercise regularly had higher BMI than those who had maintained an exercise program for over six months or who had not yet commenced regular exercise. Thus, while it is encouraging that men with the highest BMIs appear to be attempting to become

more active, this finding also suggests that those with relatively lower (but not low) BMI may be less motivated to exercise.

- There was some evidence that increased exercise was associated with better health outcomes:
  - Among women, those who exercised moderately or strenuously seven or more times a week had lower mean BMI than those who exercised at this level less than four times weekly. Among men, the relationship was not as supportive: Men who exercised less than four or seven or more times weekly, had similar mean BMI that was lower than that of men who exercised moderately or strenuously four to six times weekly.
  - Considering men and women together, those in the normal weight category (BMI 18.5 – 24.9) had higher minimum Met-minutes of exercise (this measure combines exercise frequency and intensity) than those who were obese (BMI >30). However, associations differed between men and women: Normal weight and overweight men (BMI 25.0 – 29.9) exercised similar amounts and these levels were higher than obese men. In contrast, among women, normal weight women had higher minimum Met-minutes of exercise than overweight women, while obese women had intermediate levels and did not differ from either normal weight or overweight women.
  - B.C. adults who exercised moderately or strenuously at least four times a week had lower mean waist circumference than those who exercised at this level fewer than four times weekly.
  - B.C. adults classified as 'at low risk' based on waist circumference had higher minimum Met-minutes of exercise than those classified at 'increased risk', who in turn had a higher mean than those classified at 'substantial risk'.
- Both BMI and amount of exercise were independently associated with the level of bodily comfort: Those with lower BMI (controlling for the amount of exercise) and higher minimum Met-minutes of exercise (controlling for BMI) felt more comfortable with their bodies.

Conclusions

The prevalence of overweight and obesity among B.C. adults is high and has increased markedly over a ten-year period. Conversely, the proportion of B.C. adults obtaining recommended levels of exercise appears lower than desirable. Broadly-based strategies to promote healthy body weight and increased physical activity have potential to enhance the health of the B.C. population.

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1.0 Introduction

The B.C. Nutrition Survey (BCNS) is a collaboration of Health Canada and the B.C. Ministry of Health Services, in association with the University of British Columbia. The BCNS was conducted in 1999 to obtain comprehensive up-to-date information on the eating habits and body weights of adult British Columbians. Similar provincial nutrition surveys have been conducted in all provinces beginning in 1988 with the Nova Scotia Nutrition Survey and ending in 1999 with the BCNS. This report is one of a series arising from the BCNS and, as such, it focuses on only one of the six objectives the survey was designed to meet: namely "to assess weight and physical activity among adults". Readers are referred to the BCNS *Report on Energy and Nutrient Intakes* for a full description of the rationale for the study, a literature review pertaining to the study's objectives, complete descriptions of study methodology and data on response rates (B.C. Ministry of Health Services, 2004).

The province-wide survey involved 90-minute, in-home interviews conducted by trained public health nurses and nutritionists utilizing several questionnaires to assess food consumption and priority nutrition concerns. The questionnaires included a 24-hour recall, a food frequency questionnaire and a general nutrition questionnaire focusing on physical activity, healthy weight and body image and food security. Sociodemographic information, height, weight and waist circumference measurements were also collected from the approximately 1800 participants, aged 19 to 84 years. The data reported herein were obtained from the nutrition, activity and health questionnaire included in Appendix A.

2.0 Methods

The general methods for the B.C. Nutrition Survey are described elsewhere (B.C. Ministry of Health Services, 2004). In this section, methods specific to assessment of physical activity and body weight are presented. The questions posed to the participants were part of the B.C. Nutrition, Activity and Health Questionnaire, which is included in Appendix A.

2.1 Leisure-Time Physical Exercise

The Leisure-Time Exercise Questionnaire was used to assess exercise behaviour (Godin and Shephard, 1985). This instrument assesses the number of times per week that strenuous, moderate and mild exercise sessions of at least 15 minutes duration are undertaken. To approximate the relative energy expenditure of the different categories of exercise, intensity factors expressed in Mets (multiples of basal energy expenditure) are used. For strenuous exercise, the intensity factor is nine Mets, while moderate and mild exercise are assigned intensity factors of five Mets and three Mets, respectively. Using these values, it is possible to estimate a minimum value for "Met-minutes" of leisure-time exercise per week, which reflects both intensity and minimum duration of activity. It must be recognized that the estimate is truly a minimum, since the duration of exercise sessions beyond 15 minutes is not captured with this instrument.

Minimum Met-minutes = 15 minutes per session x [(sessions/wk of strenuous exercise x 9 Mets) + (sessions/wk of moderate exercise x 5 Mets) + (sessions/wk of mild exercise x 3 Mets)].

For example, someone who reported two sessions of strenuous exercise per week, four sessions of moderate exercise per week and seven sessions of mild exercise, each of at least 15 minutes duration, would have performed at least 885 Met-minutes of exercise weekly: 15 minutes x [(2 x 9 Mets) + (4 x 5 Mets) + (7 x 3 Mets)]. Again, this estimate is a minimum, because if some exercise sessions were more than 15 minutes in duration, actual Met-minutes of exercise would be higher.

2.2 Work-Related Physical Activity

Survey respondents were asked which of four work-related activity categories applied to their work or volunteer activity. This question was also used in the Alberta survey, so was included in the B.C. survey to permit comparisons between provinces.

2.3 Stages of Motivational Readiness for Structured Exercise and Lifestyle Physical Activity

A series of questions was asked to assess the motivational readiness for structured exercise (Richards Reed, 1997; Marcus, 2003) and a similar set of questions assessed motivational readiness for lifestyle physical activity. Respondents were asked whether they currently exercised and, in the second set of questions, whether they were currently physically active. Those who did not exercise or were not active, were asked whether they intended to exercise or become physically active within the next 6 months. Those who did exercise or were currently active were asked whether they exercised or were active on a 'regular' basis (i.e., for exercise, 3 or more times per week for 20 minutes or longer per session; for activity, accumulating 30 minutes or more of activity at least 4 days a week). Finally, those who exercised or were active on a 'regular' basis were asked whether they had maintained their exercise or activity level for the past 6 months. From these questions, motivational stages for structured exercise and lifestyle physical activity were assessed as follows:

- Precontemplation = **Do not** exercise/not active AND **do not intend** to exercise/become active in the next six months.
- Contemplation = **Do not** exercise/not active AND **intend** to exercise/become active in the next six months.
- Preparation = **Do** exercise/are active AND **do not** exercise/are not active *"regularly"*.
- Action = **Do** exercise/are currently active *"regularly"* AND **have not** maintained activity level for the past six months.
- Maintenance = **Do** exercise/are currently active *"regularly"* AND **have** maintained activity level for the past six months.

2.4 Barriers to Increased Physical Activity

Respondents were asked an open-ended question about what prevented them from being more physically active, considering both physical activity and exercise. After each response, they were prompted "Anything else?". Accordingly, some individuals provided multiple responses. Thirteen barriers were pre-coded in the instrument, but this list was not read to respondents. If a respondent described a barrier that was not included as part of the pre-coded list, it was transcribed verbatim.

2.5 Body Mass Index

Body mass index (BMI; kg/m^2) was calculated by dividing body weight in kilograms by height in metres squared. Weight was measured using a weight scale that was calibrated weekly and height was measured using a set square and measuring tape. Prior to conducting these measurements, participants were asked to remove their shoes, any heavy clothing and any items from their pockets.

BMI was categorized using the Health Canada (2003) weight classification system, which is aligned with the WHO standards (World Health Organization, 1998). These standards indicate that a BMI <18.5 is "underweight", a BMI between 18.50 and 24.99 is a "normal weight", a BMI between 25.0 and 29.99 is "overweight" and a BMI of ≥30.0 is "obese".

2.6 Waist Circumference

At least two measurements of waist circumference were made using a measuring tape. Waist circumference was categorized according to WHO standards (World Health Organization, 1998). For men, a waist circumference of <94 cm is "low risk", ≥94 - <102 cm reflects "increased risk" and ≥102 cm is "substantial risk". For women, waist circumferences of < 80 cm, ≥80 - <88 cm and ≥88 cm correspond to low risk, increased risk and substantial risk, respectively.

2.7 Perceptions of Body Weight

Respondents were asked whether they felt they were "overweight", "underweight" or "just about right", using questions from the 1990 Canadian Health Promotion Survey (Health and Welfare Canada, 1993). Questions were also asked to assess whether respondents were currently trying to gain weight, lose weight or were not currently trying to change their weight.

2.8 Bodily Comfort

Because a simple, validated measure of body image could not be located in the literature, participants were asked an unvalidated question on how comfortable they feel about their body when they see themselves in a mirror. Five response options, from very uncomfortable to very comfortable, were available.

2.9 Cognitive Dietary Restraint and Disinhibition

The Three-Factor Eating Questionnaire (TFEQ) (Stunkard and Messick, 1985) assesses three dimensions of eating perceptions/behavior: Cognitive restraint of eating, which is the perception that one is attempting to limit the amounts consumed in an effort to control weight; disinhibition of eating, which is the perception of losing control over food intake; and perceived hunger. The original scale contains 21 items that assess restraint, 16 items that assess disinhibition and 14 items that assess hunger. Because the TFEQ was too long to be included in its entirety, items with the highest item-total correlations with the total restraint and disinhibition subscale scores were selected for inclusion in the survey (Barr, S.I. Unpublished results). Five items from the restraint subscale and four items from the disinhibition subscale were included in the survey instrument. Items from the hunger subscale were not included, as empirically this subscale has not been found to correlate with other variables of interest.

2.10 Statistical Analysis

Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS), Version 11.0 (SPSS Inc., Chicago IL, 2002). Variables were examined to determine whether they satisfied the assumption of normality and symmetry using the Kolmogorov-Smirnov test and the value for skewness. For normality, a Kolmogorov-Smirnov P value <0.05 reflected a distribution that was not normal, while for skewness, a skewness value more than twice its standard error reflected a significantly skewed distribution. When this occurred, an attempt was made to transform the variable (e.g., by using a square root or a log transformation). If normality was attained or skewness reduced to an acceptable value, analyses were conducted using the transformed variable; however, results are presented using the units of the original variable. Finally, if it was not possible to obtain a normal or non-skewed distribution, analyses were also conducted using non-parametric tests.

For parametric analysis, the General Linear Models procedure in SPSS was used to conduct Analysis of Variance (ANOVA). When significant main effects were observed, post-hoc analysis using Scheffe's test was used to determine which groups differed significantly from one another. When significant interactions with sex were detected, oneway ANOVA was conducted for men and women separately. Cross-tabulations were conducted to examine the distributions of categorical data and Pearson χ^2 was used to determine whether distributions differed

from expected values. Nonparametric analyses included the Mann-Whitney U test for comparison of two unrelated samples (e.g., men and women) and Kruskal-Wallis Analysis of Variance for comparison of three or more unrelated samples (e.g., different age groups). All analyses were conducted on weighted data, so can be considered to be representative of the B.C. population within the constraints of the survey. Analyses were two-tailed and were considered significant at $P < 0.05$.

3.0 Results

The results are presented in four sections. The first section presents descriptive data on exercise and physical activity; the second presents data on body mass index, waist circumference and weight change efforts; the third presents descriptive information on attitudes to eating and the body; and the fourth describes relationships among these variables.

3.1 Structured Exercise and Lifestyle Physical Activity

This section first presents results on the frequency of self-reported strenuous, moderate and mild leisure-time structured exercise. Next, a summary measure of these three structured exercise categories (minimum Met-minutes) is presented. The following sections present data on work-related physical activity; stage of motivational readiness for structured exercise and lifestyle physical activity; and relationships between minimum Met-minutes of exercise and work-related activity and between minimum Met-minutes and stage of motivational readiness. The section concludes with a description of perceived barriers to increased physical activity.

3.1.1 Frequency of Strenuous, Moderate and Mild Leisure-time Exercise

The frequency of strenuous, moderate and mild exercise during leisure time by sex is reported in Table 1. The data reflect the number of times per week that exercise of a given intensity was done for at least 15 minutes. Over 60% of British Columbia adults did not participate in any strenuous exercise and only 15% exercised strenuously for 15 minutes or more at least four times per week. More women than men reported no strenuous exercise (70% vs 52%) and more men than women exercised strenuously at least four times a week (18% vs 11%).

Over a third of participants reported no moderate exercise (about 40% of men and 33% of women) and only 30% exercised moderately at least four times per week. The proportions of women and men exercising moderately at least four times weekly were similar (30.1% vs 29.4% respectively).

Finally, about 11% of B.C. adults reported no mild exercise, while about 60% reported at least four sessions of mild exercise per week and 40% reported at least seven sessions per week. Women appeared to be more likely to participate in mild exercise than men: fewer women than men (7% vs 14%) reported no mild exercise and more women than men

reported mild exercise at least four times per week (64% vs 51%) and at least seven times per week (43% vs 35%).

Table 1 Strenuous, moderate, and mild leisure-time exercise undertaken by B.C. men, women and both sexes combined (number of sessions/wk of at least 15 min duration)

Exercise Category and Number of Weekly Sessions	Men %	Women %	All %
Strenuous[1]			
0	52.5	70.2	61.4
1	9.8	5.8	7.8
2	9.3	6.1	7.7
3	10.2	7.0	8.6
4	5.8	5.8	5.8
5	6.9	3.3	5.1
6	0.5	0.3	0.4
≥7	4.9	1.5	3.2
Moderate[2]			
0	39.8	33.1	36.4
1	9.5	10.8	10.2
2	10.7	11.3	11.0
3	10.6	14.6	12.6
4	5.7	9.4	7.5
5	6.4	6.0	6.2
6	2.2	3.1	2.7
≥7	15.1	11.6	13.4
Mild[3]			
0	14.7	7.2	10.9
1	10.4	6.3	8.3
2	14.7	10.1	12.4
3	9.5	12.6	11.1
4	7.5	6.9	7.2
5	4.8	8.1	6.5
6	3.4	5.6	4.5
≥7	35.2	43.2	39.1

[1] Defined as "Heart beats rapidly, such as running, jogging, hockey, football, soccer, squash, basketball, cross-country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling, singles tennis, intense weight training, high-impact aerobic exercise." (Godin and Shephard, 1985).

[2] Defined as "Not exhausting, such as fast walking, baseball, doubles tennis, easy bicycling, volleyball, badminton, easy swimming, down hill skiing, popular and folk dancing, calisthenics, weight training for toning muscles, low-impact aerobic exercises, curling (sweeper)." (Godin and Shephard, 1985).

[3] Defined as "Minimal effort, such as yoga, archery, fishing from river bank, bowling, horseshoes, golf, snowmobiling, easy walking, curling (other than sweeper), gardening, housework (vacuuming, sweeping)." (Godin and Shephard, 1985).

3.1.2 Minimum Met-Minutes of Leisure-time Exercise

As described earlier, minimum Met-minutes of exercise were calculated by assigning nine Mets to strenuous exercise, five Mets to moderate exercise and three Mets to mild exercise and multiplying by the number of sessions per week, assuming a minimum duration of 15 minutes per session. The distribution of minimum Met-minutes of leisure-time exercise did not satisfy the assumptions for normality or symmetry (Kolmogorov-Smirnov = 0.121, P<0.001; skewness = 4.024 ± 0.059 SE). Although the square root transformation reduced the value of the Kolmogorov-Smirnov statistic to 0.072 and the skewness value to 0.176, the distribution was still not normal or symmetric. Accordingly, results are reported for parametric analyses conducted using the transformed variable and also for nonparametric analyses.

The results in Table 2 indicate that minimum Met-minutes of leisure-time exercise did not differ significantly between men and women, whether parametric or nonparametric analysis was used. They also reveal that exercise activity decreased with age. Post-hoc testing indicated that exercise decreased after age 19-30 and did not change thereafter.

Table 2 Minimum Met-minutes[1] of leisure-time exercise per week by age among B.C. men, women and both sexes combined[2]

Age Group (yrs)	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)	Rank for Met-mins/wk (all)[3]
19-30	767 ± 542	673 ± 408	724 ± 487[a]	1026
31-50	590 ± 650	559 ± 362	574 ± 524[b]	831
51-70	573 ± 602	535 ± 388	553 ± 501[b]	794
≥71	599 ± 584	460 ± 318	517 ± 450[b]	762
All ages	639 ± 611	573 ± 381	606 ± 509	-

[1] Minimum Met-minutes/week = 15 minutes per session x [(sessions/wk of strenuous exercise x 9 Mets) + (sessions/wk of moderate exercise x 5 Mets) + (sessions/wk of mild exercise x 3 Mets)]. (Godin and Shephard, 1985).

[2] ANOVA conducted using the square-root of Met-minutes revealed a significant main effect of age group ($F = 15.73, P < 0.001$). However, there was no effect of sex ($F = 1.179, P = 0.278$), nor was the age group-by-sex interaction significant ($F = 1.556, P = 0.198$).

[3] Nonparametric tests also revealed a significant effect of age group ($\chi^2 = 63.8, P < 0.001$; Kruskal-Wallis test) and a non-significant effect of sex ($Z = -0.684, P = 0.494$; Mann-Whitney U test).

[a,b] Means within the same column with different superscripts differ significantly by Scheffe's post-hoc testing, P<0.05.

In contrast to the differences with age, minimum Met-minutes of exercise did not differ among the three geographic strata included in the sample, nor did it differ by education level or by income status. These findings were similar whether the data were assessed by oneway ANOVA on the square-root transformed data or by using nonparametric analysis. For

strata, mean values for minimum Met-minutes of exercise for the Metropolitan, Coastal and Non-metro Interior strata were 598.4 ± 459.0, 607.2 ± 484.7 and 577.1 ± 658.6, respectively (ANOVA F = 1.179, P = 0.308; Kruskal-Wallis χ^2 = 5.81, P = 0.055). By education, mean values for minimum Met-minutes of exercise for those with secondary school or less, some university or technical training and university graduates were 561.7 ± 480.4, 617.0 ± 554.9 and 598.2 ± 436.5, respectively (ANOVA F = 1.83, P = 0.161; Kruskal-Wallis χ^2 = 4.16, P = 0.125). By income status, mean minimum Met-minutes of exercise for those classified as low income was 636.7 ± 706.9, compared to 588.4 ± 456.8 for those who were not classified as low income. (ANOVA F = 1.73, P = 0.188, Mann-Whitney Z = -0.653, P = 0.51).

3.1.3 Work-Related Physical Activity

Table 3 shows the distribution of B.C. adults by work-related physical activity category and sex. Altogether, slightly more than a quarter were employed in positions that required lifting, carrying or heavy physical labour (the two highest work-related activity categories); about one-third had jobs in which they walked or moved a lot but didn't lift or carry; while the remainder mainly sat at work or were not employed. The distribution differed significantly between men and women: A higher proportion of women than men appeared to work in jobs that required walking or moving but not lifting, while more men were employed in positions requiring heavy physical labour.

Table 3 Distribution of B.C. men, women and both sexes combined by work-related activity category[1]

Work-related Activity Category	Men %	Women %	All %
Mainly sitting, do not walk much during work (e.g., telephone operator, computer programmer)	18.4	17.2	17.8
Walk or move quite a lot but do not lift or carry (e.g., shop assistant, light housework)	25.7	42.4	34.1
Walk a lot and carry a lot (e.g., carpentry, farm work, heavy housework)	18.9	19.9	19.4
Heavy physical labour, usually have to carry, lift heavy things, dig or shovel (e.g., forestry, heavy farm work, warehouse work)	12.9	1.6	7.2
Not applicable (e.g., retired, unemployed)	24.1	18.9	21.5

[1] The distribution of work-related activity category differed significantly by sex ($\chi^2 = 118.5$, $P<0.001$).

Work-related activity category also differed significantly among the three geographic strata, as shown in Table 4. In this regard, it appears that those employed in the Metro stratum were more likely to hold sedentary jobs, while Coastal and Non-metro Interior respondents were more likely to hold jobs requiring lifting, carrying or heavy physical labour.

Table 4 Distribution of B.C. adults by work-related activity category and geographic strata[1]

Work-related Activity Category	Metro %	Coastal %	Non-Metro Interior %	All %
Mainly sitting, do not walk much during work (e.g., telephone operator, computer programmer)	19.6	12.4	14.7	17.8
Walk or move quite a lot but do not lift or carry (e.g., shop assistant, light housework)	34.2	35.1	33.4	34.1
Walk a lot and carry a lot (e.g., carpentry, farm work, heavy housework)	17.1	22.8	25.0	19.4
Heavy physical labour, usually have to carry, lift heavy things, dig or shovel (e.g., forestry, heavy farm work, warehouse work)	6.0	8.4	10.6	7.2
Not applicable (e.g., retired, unemployed)	23.1	21.3	16.3	21.5

[1] The distribution of work-related activity category differed significantly by geographic strata ($\chi^2 = 32.9, P < 0.001$).

3.1.4 Motivational Readiness for Structured Exercise and Lifestyle Physical Activity

The distribution of stages of motivational readiness for structured exercise and lifestyle physical activity by sex are shown in Tables 5 and 6 respectively. Table 5 shows that almost half of B.C. adults reported being in the maintenance phase for structured exercise, while about one-third were in the precontemplation or contemplation stages. The distribution differed significantly by sex and it appears that men tended to be more likely than women to fall into the precontemplation or maintenance stages, while women appeared more likely to be in the action stage. The results for motivational stage for lifestyle physical activity (Table 6) show that almost 80% reported that they were in the maintenance stage for physical activity. Another 10% were in the preparation stage and the remainder fell into the other three stages. Although the distribution did differ significantly by sex, the differences appeared relatively subtle.

Table 5 Distribution of B.C. men, women and both sexes combined by stage of motivational readiness for structured exercise[1]

Motivational Stage for Structured Exercise	Men %	Women %	All %
Precontemplation	16.6	13.7	15.1
Contemplation	17.8	19.3	18.6
Preparation	10.9	11.6	11.2
Action	5.8	11.0	8.4
Maintenance	49.5	44.4	46.7

[1] The distribution of motivational stage differed by sex ($\chi^2 = 20.1$, $P < 0.001$).

Table 6 Distribution of B.C. men, women and both sexes combined by stage of motivational readiness for lifestyle physical activity[1]

Motivational Stage for Lifestyle Physical Activity	Men %	Women %	All %
Precontemplation	4.8	2.5	3.6
Contemplation	2.9	2.7	2.8
Preparation	8.1	11.0	9.5
Action	2.3	6.6	4.4
Maintenance	81.9	77.2	79.5

[1] The distribution of motivational stage differed by sex ($\chi^2 = 14.9$, $P < 0.01$).

Tables 7 and 8 show the distribution by age group of stage of motivational readiness for structured exercise and lifestyle physical activity, respectively. It can be seen that the distribution of motivational stage for structured exercise differed dramatically by age group. The proportion in the precontemplation stage increased steadily with age, from 4% in those aged 19-30 to 37% in those aged 71 and above. The proportion in the contemplation stage was highest among those aged 31-50, while the proportions in the preparation and action stages decreased steadily with age (from 18.5% to 4.4% for preparation as age increased from 19-30 to over 71 and from 15.1% to 1.6% for action over the same age range). Interestingly, the proportion in the maintenance stage for structured exercise was relatively stable across age groups, averaging 46.6%. Changes with age in the motivational stage for lifestyle physical activity

Table 7 Distribution of B.C. adults by stage of motivational readiness for structured exercise and age[1]

Motivational Stage for Structured Exercise	Age Group (yrs)				
	All	19-30	31-50	51-70	≥71
	%	%	%	%	%
Precontemplation	15.2	4.1	11.8	23.6	36.8
Contemplation	18.6	13.3	23.9	18.1	12.1
Preparation	11.2	18.5	11.1	6.4	4.4
Action	8.4	15.1	8.0	4.8	1.6
Maintenance	46.6	49.0	45.2	47.1	45.1

[1] The distribution of motivational stage differed by age group ($\chi^2 = 222.8, P < 0.001$).

Table 8 Distribution of B.C. adults by stage of motivational readiness for lifestyle physical activity and age[1]

Motivational Stage for Lifestyle Physical Activity	Age Group (yrs)				
	All	19-30	31-50	51-70	≥71
	%	%	%	%	%
Precontemplation	3.5	0.0	3.7	5.9	6.5
Contemplation	3.0	0.4	4.3	2.9	4.3
Preparation	9.6	7.7	13.5	7.4	4.3
Action	4.4	5.2	4.6	2.9	5.4
Maintenance	79.5	86.7	73.9	80.9	79.6

[1] The distribution of motivational stage differed by age group ($\chi^2 = 36.1, P < 0.001$).

(Table 8), while significant, appeared much less marked. Regardless of age, close to 80% considered themselves to be in the maintenance stage.

3.1.5 Relationships between Leisure-time Exercise and Work-related Activity and between Leisure-time Exercise and Stages of Motivational Readiness

Table 9 shows the association between work-related activity category and minimum Met-minutes of exercise during leisure time. ANOVA on the square-root transformed data revealed no difference between men and women, but detected a significant effect of work-related activity. Post-hoc testing indicated that the only significant pair-wise difference

was between those who were retired or not employed and those who walked and carried a lot at work. There were no significant differences in leisure-time physical exercise among those who were employed. Analysis using nonparametric tests also revealed a significant effect of work-related activity category (χ^2 = 19.07, P = 0.001) and no effect of sex (Z = -0.68, P = 0.49). Although pairwise comparisons could not be conducted, the data suggest similar conclusions to those reached from parametric analysis–specifically, little difference among those who were employed and lower leisure-time exercise among those who were retired or unemployed.

Table 9 Relationship between minimum Met-minutes[1] of leisure-time exercise and work-related physical activity of B.C. men, women and both sexes combined[2]

Work-related Activity Category	Minimum Met-minutes of exercise/wk			
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)	Rank for Met-minutes/wk[3]
Mainly sitting, do not walk much during work (e.g., telephone operator, computer programmer)	623 ± 527	662 ± 527	642 ± 463[ab]	905
Walk or move quite a lot but do not lift or carry (e.g., shop assistant, light housework)	612 ± 399	535 ± 330	564 ± 359[ab]	938
Walk a lot and carry a lot (e.g., carpentry, farm work, heavy housework)	677 ± 507	644 ± 432	660 ± 470[a]	915
Heavy physical labour, usually have to carry, lift heavy things, dig or shovel (e.g., forestry, heavy farm work, warehouse work)	715 ± 1032	622 ± 241	705 ± 977[ab]	859
Not applicable (e.g., retired, unemployed)	609 ± 648	497 ± 422	560 ± 562[b]	765

[1] Minimum Met-minutes/wk = 15 minutes per session x [(sessions/wk of strenuous exercise x 9 Mets) + (sessions/wk of moderate exercise x 5 Mets) + (sessions/wk of mild exercise x 3 Mets)]. (Godin and Shephard, 1985).

[2] ANOVA on the square root transformed data revealed a significant main effect of Work-related Activity (F = 4.456, P = 0.001). There was no significant effect of Sex (F = .118, P = 0.73), nor was the Work-related Activity-by-Sex interaction significant (F = 2.24, P = 0.062).

[3] Using nonparametric analysis, the effect of Work-related Activity was statistically significant (χ^2 = 19.07, P = 0.001; Kruskal-Wallis), but the effect of Sex was not (Z = -0.68, P = 0.49; Mann-Whitney U).

[a,b] Means within the same column with different superscripts differ significantly by Scheffe's post-hoc testing, P<0.05.

Table 10 and 11 show the relationship between minimum Met-minutes of leisure-time exercise and stages of motivational readiness for structured exercise and lifestyle physical activity, respectively. Motivational readiness for structured exercise (Table 10) appeared to differentiate the amount of leisure-time exercise very effectively. For men and women

considered together or analyzed separately, leisure-time exercise was lowest among those at the precontemplation and contemplation stages, significantly higher for those at the preparation stage and higher again for those at the action and maintenance stages. Nonparametric analysis of these data also revealed significant effects of motivational readiness for all subjects and for men and women separately.

Table 10 Relationship between minimum Met-minutes[1] of leisure-time exercise and stage of motivational readiness for structured exercise among B.C. men, women and both sexes combined[2]

Motivational Stage for Structured Exercise	Minimum Met-minutes of exercise/wk			
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)	Rank for Met-minutes/wk[3]
Precontemplation	310 ± 233[a]	286 ± 249[a]	266 ± 260[a]	472
Contemplation	320 ± 301[a]	295 ± 291[a]	268 ± 278[a]	457
Preparation	434 ± 187[b]	463 ± 338[b]	493 ± 442[b]	719
Action	703 ± 362[c]	706 ± 353[c]	712 ± 236[c]	1057
Maintenance	770 ± 362[c]	848 ± 563[c]	920 ± 690[c]	1168

[1] Minimum Met-minutes/wk = 15 minutes per session x [(sessions/wk of strenuous exercise x 9 Mets) + (sessions/wk of moderate exercise x 5 Mets) + (sessions/wk of mild exercise x 3 Mets)]. (Godin & Shephard, 1985).

[2] ANOVA conducted on square root transformed data revealed significant main effects of motivational stage ($F = 229.6, P < 0.001$). There was no significant effect of sex ($F = 0.48, P = 0.49$), but the motivational stage-by-sex interaction was significant ($F = 4.98, P = 0.001$).

[3] Nonparametric analysis (Kruskal-Wallis) revealed a significant effect of motivational stage ($\chi^2 = 697.6, P < 0.001$). This was also significant for men ($\chi^2 = 363.4, P < 0.001$) and women ($\chi^2 = 332.4, P < 0.001$) analyzed separately.

[a,b,c] Means within the same column with different superscripts differ significantly by Scheffe's post-hoc testing, $P<0.05$.

Both parametric and nonparametric analyses detected a significant relationship between motivational readiness for lifestyle physical activity and minimum Met-minutes of leisure-time exercise (Table 11). However, compared to motivational stage for structured exercise, leisure-time exercise was not as consistently related to motivational stage for lifestyle physical activity. Although the mean amounts of exercise appeared to increase as motivational stage changed from precontemplation to contemplation to preparation and to action, these differences were not always statistically significant, perhaps because so few individuals considered themselves to fall in these stages. Nevertheless, when men and women were considered together, those in the maintenance stage (about 80% of the B.C. adult population) had the highest level of leisure-time exercise and differed significantly from those in the precontemplation, contemplation and preparation stages. When men and women were examined separately, it was not possible to differenti-

ate among those in the contemplation, preparation, action and maintenance stages, although precontemplators differed significantly from those in action and maintenance.

Table 11 Relationship between minimum Met-minutes[1] of leisure-time exercise and stage of motivational readiness for lifestyle physical activity among B.C. men, women and both sexes combined[2]

Motivational Stage for Lifestyle Physical Activity	Minimum Met-minutes of exercise/wk			
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)	Rank for Met-minutes/wk[3]
Precontemplation	450 ± 176 [a]	197 ± 226 [a]	77 ± 127 [a]	165
Contemplation	230 ± 173 [ab]	252 ± 212 [a]	275 ± 251 [ab]	203
Preparation	377 ± 260 [ab]	326 ± 271 [ab]	252 ± 273 [ab]	250
Action	581 ± 339 [b]	549 ± 309 [bc]	447 ± 153 [b]	399
Maintenance	679 ± 427 [b]	713 ± 622 [c]	744 ± 761 [b]	460

[1] Minimum Met-minutes/wk = 15 minutes per session x [(sessions/wk of strenuous exercise x 9 Mets) + (sessions/wk of moderate exercise x 5 Mets) + (sessions/wk of mild exercise x 3 Mets)]. (Godin and Shephard, 1985).

[2] ANOVA conducted on square root transformed data revealed significant main effects of motivational stage ($F = 25.96, P < 0.001$), sex ($F = 9.37, P = 0.002$), and a significant motivational stage-by-sex interaction ($F = 4.12, P = 0.003$).

[3] Nonparametric analysis (Kruskal–Wallis) revealed a significant effect of Motivational Stage ($\chi^2 = 112.0, P < 0.001$). This was also significant for men ($\chi^2 = 74.2, P < 0.001$) and women ($\chi^2 = 44.7, P < 0.001$) analyzed separately.

[a,b,c] Means within the same column with different superscripts differ significantly by Scheffe's post-hoc testing, $P<0.05$.

3.1.6 Reported Barriers to Increased Physical Activity

Respondents were asked an open-ended question about what prevented them from being more physically active. Any number of responses could be provided, although it appears that some individuals did not respond, as the totals for all responses, including "none of the above" added up to less than 100% (74.5% for all, 69.2% for men and 78.2% for women). The major barriers for all participants and for men and women separately are listed in Table 12. In general, the reasons cited by men and women appeared similar. For both groups, the major barrier was a lack of time, cited by approximately one-fifth of respondents. When combined with another time-related barrier (other commitments), lack of time for increased activity was a barrier for over 25% of B.C. adults. Having an illness or disability, being too tired or lacking motivation were each cited by 6-8%. Only 5% indicated that they were active enough already, so saw no need to increase their activity. Other barriers, such as the weather, financial barriers, lack of facilities or transportation, were each cited by fewer than 5%.

Table 12 Self-reported barriers to increased physical activity among B.C. men, women and both sexes combined

Barrier	Men	Women	All
	%	%	%
Lack of time	18.2	20.1	19.2
Have an illness or disability	6.1	8.5	7.9
Other commitments such as children, family, school or work	5.4	8.5	7.0
Lack of motivation or will power	6.3	6.3	6.3
Too tired/no energy	4.6	7.9	6.3
Active enough already	6.2	4.0	5.1
Weather	3.0	4.9	3.9
Other interests or priorities	2.4	1.8	2.1
Lack of money	1.5	2.4	2.0
No one to exercise with	1.2	1.5	1.4
Lack of interesting or relevant activities	0.3	1.0	0.7
Lack of easily accessible facilities	0.8	0.4	0.6
Lack of transportation	0.9	0.0	0.5
Other reasons	9.7	8.0	8.8
None of the above	2.6	2.9	2.7

3.1.7 Key Findings from this Section

- Significant proportions of B.C. adults do no strenuous (61%) or moderate (36%) exercise during their leisure time.
- Overall, men and women report similar amounts of leisure-time exercise, as estimated by minimum Met-minutes of exercise. Leisure-time exercise decreases after age 19-30 and then remains essentially stable in both men and women.
- Work-related activity is greater for men than women and also differs among strata, being lowest in the Metro stratum and highest in the Non-metro Interior stratum. Work-related activity was not related to leisure-time physical activity among those who were employed.
- Almost half of British Columbians consider themselves to be in the maintenance stage for structured exercise and about 80% report being in the maintenance stage for lifestyle physical activity. Thus, programs designed to increase lifestyle physical activity may have limited impact, as most British Columbians believe they are already physically active.

- The amount of leisure-time exercise among those at different stages of motivational readiness is reflected better by motivational readiness for structured exercise than by motivational readiness for lifestyle physical activity.
- Despite the findings that a large majority of B.C. adults consider themselves to be in the maintenance stage for lifestyle physical activity and that over half feel they are in the action or maintenance stages for structured exercise, only 5% cited "already active enough" as a reason or barrier to increased physical activity or exercise. The most frequently-cited barriers were related to a lack of time.

3.2 Body Mass Index and Weight Change Efforts

This section first presents descriptive data for body mass index (BMI) in relation to sex, age group, geographic strata, education level and income status, followed by a presentation of BMI classification (underweight, normal weight, overweight and obese) by the same variables. A similar set of analyses is then presented for waist circumference. Next, individual perceptions of body weight (underweight, overweight or about right) are compared to actual body weight category. Information is presented on the proportions of British Columbians who are attempting to change their weight and how they are attempting to do this.

3.2.1 Body Mass Index

3.2.1.1 Absolute BMI

The distribution of BMI was highly skewed (skewness = 2.345 ± 0.058 SE), so the $\log_{10}$ transformation was used in an effort to improve the symmetry of the distribution. However, the distribution remained significantly skewed (skewness = 0.902 ± 0.058 SE). Statistical analyses were conducted on the transformed data, although untransformed data are displayed for clarity. Nonparametric analyses were also conducted.

3.2.1.1.1 BMI by age and sex. Table 13 shows mean BMI by age group for men, women and both sexes combined. ANOVA revealed significant main effects of age group and sex and a significant age-by-sex interaction. Overall, men had a significantly higher mean BMI than women. For both sexes combined, post-hoc testing indicated that BMI was lower in the 19-30 age group than in all other age groups, which did not differ from one another. A similar pattern of differences by age was observed in men. In women, the only significant pairwise

difference was between those aged 19-30 and those aged 51-70, with the younger women having a lower mean BMI.

Nonparametric analysis led to generally similar findings: men had a significantly higher BMI than women (mean rank = 943.8 vs 761.5; Z = -7.64, P < 0.001, Mann-Whitney U); and BMI differed by age (χ^2 = 43.09, P < 0.001; Kruskall-Wallis). Although post-hoc testing was not possible, visual inspection of the mean rank for those aged 19 to 30 indicated that it appeared lower than the mean ranks for those aged 31 to 50, 51 to 70 and 71 and above (mean rank = 725.8 versus 890.9, 913.7 and 917.8).

Table 13 Mean body mass index (BMI) by age group for B.C. men, women and both sexes combined[1]

Age Group (yrs)	Body mass index (kg/m²)		
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
19-30	25.2 ± 4.1[a]	24.9 ± 7.1[a]	25.0 ± 5.6[a]
31-50	27.7 ± 5.6[b]	25.5 ± 5.9[ab]	26.6 ± 5.8[b]
51-70	26.8 ± 4.6[b]	26.7 ± 6.6[b]	26.7 ± 5.7[b]
≥71	27.2 ± 4.4[b]	25.4 ± 6.3[ab]	26.2 ± 4.2[b]
All ages	26.7 ± 5.0	25.6 ± 6.3	26.2 ± 5.7

[1] ANOVA of $\log_{10}$ transformed BMI indicated a significant effect of age group ($F = 12.77, P < 0.001$), sex ($F = 19.27, P < 0.001$) and a significant age-by-sex interaction ($F = 3.77, P = 0.01$).

[a,b] Means in the same column with different superscripts differ significantly by Scheffe's test, $P < 0.05$.

3.2.1.1.2 BMI by geographic strata. Table 14 shows mean BMI by geographic strata for men, women and both sexes combined. ANOVA revealed significant main effects of strata and sex and a significant strata-by-sex interaction. Post-hoc testing for both sexes combined revealed that mean BMI was higher in the Non-metro Interior stratum than in the Coastal stratum and that mean BMI in the Metro stratum was intermediate and did not differ from either of the other two strata. For men, mean BMI in the Metro and Coastal strata were similar and significantly lower than mean BMI in the Non-metro Interior stratum. Among women, BMI did not differ significantly among those in different strata.

Nonparametric analysis confirmed these findings. It revealed a significant effect of strata (χ^2 = 9.50, P = 0.009; Kruskall-Wallis): the mean ranks for Metro, Coastal and Non-metro Interior strata were 840.7, 809.8 and 930.1. When men and women were analyzed separately, a

significant effect of strata was seen for men (χ^2 = 14.72, P = 0.001), with the highest mean rank for men in the Non-metro Interior (499.6 versus 414.5 for Metro men and 425.1 for Coastal men). There was no effect of strata for women (χ^2 = 2.03, P = 0.362).

Table 14 Mean body mass index (BMI) by geographic strata for B.C. men, women and both sexes combined[1]

Geographic Stratum	Body mass index (kg/m²)		
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
Metro	26.5 ± 4.8[a]	25.7 ± 6.5[a]	26.1 ± 5.7[ab]
Coastal	26.1 ± 3.9[a]	25.0 ± 6.2[a]	25.5 ± 5.2[a]
Non-metro Interior	28.1 ± 5.9[b]	25.5 ± 5.2[a]	26.9 ± 5.7[b]

[1] ANOVA of $\log_{10}$ transformed BMI revealed a significant effect of strata ($F = 4.26, P = 0.016$), sex ($F = 26.2, P < 0.001$) and a significant strata-by-sex interaction ($F = 3.13, P = 0.044$).

[a,b] Means in the same column with different superscripts differ significantly by Scheffe's test, $P < 0.05$.

3.2.1.1.3 BMI by income status. Table 15 shows data on mean BMI by income status for men, women and both sexes combined. ANOVA revealed a significant main effect of income status, no main effect of sex and a significant income-by-sex interaction. Post-hoc tests indicated that in men, BMI was significantly lower in those classified as low income, while in women, there was no difference in BMI between women who were and were not classified as low income. Non-parametric analysis confirmed these findings. Those categorized as low income had a lower mean rank for BMI when both sexes were combined (Z = -4.95, P < 0.001) and when men were analyzed separately (Z = -6.22, P < 0.001). Mean BMI rank for women did not differ by income status (Z = -0.79, P = 0.43).

Table 15 Mean body mass index (BMI) by income status for B.C. men, women and both sexes combined[1]

Income Status	Body mass index (kg/m²)		
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
Low income	25.0 ± 4.5[a]	26.5 ± 8.7[a]	25.8 ± 7.0[a]
Not low income	27.4 ± 5.2[b]	25.9 ± 6.0[a]	26.7 ± 5.6[b]

[1] ANOVA of $\log_{10}$ transformed BMI revealed a significant main effect of income status ($F = 12.47, P < 0.001$), no effect of sex ($F = 1.30, P = 0.26$) and a significant sex-by- income interaction ($F = 17.68, P < 0.001$).

[a,b] Means in the same column with different superscripts differ significantly, $P < 0.05$.

3.2.1.1.4 BMI by educational attainment. Data on BMI by level of education are presented in Table 16. ANOVA revealed significant main effects of education level and sex, as well as a significant education level-by-sex interaction. For both sexes combined, post-hoc testing indicated that mean BMI of university graduates was significantly lower than mean BMI of those with technical education or some university, while the mean BMI of those who had completed secondary school or less was intermediate and did not differ from the other two groups. Among men, BMI of those who had completed secondary school or less was significantly lower than those with technical education or some university, while university graduates did not differ from either of the other groups. In contrast, for women mean BMI was significantly lower in university graduates than among those with lower levels of educational attainment.

Table 16 Mean body mass index (BMI) by educational attainment for B.C. men, women and both sexes combined[1]

Educational Attainment	Body mass index (kg/m²)		
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
Secondary school or less	25.9 ± 4.1[a]	26.0 ± 5.9[a]	26.0 ± 5.1[ab]
Technical education or some university	27.2 ± 4.9[b]	25.8 ± 5.8[a]	26.5 ± 5.4[b]
University graduate	27.0 ± 6.2[ab]	24.6 ± 7.6[b]	25.9 ± 7.0[a]

[1] ANOVA of log10 transformed BMI revealed significant main effects of educational attainment ($F = 4.14, P = 0.16$) and sex ($F = 33.58, P < 0.001$) and a significant education level-by-sex interaction ($F = 7.09, P = 0.001$).

[a,b] Means in the same column with different superscripts differ significantly by Scheffe's test, $P < 0.05$.

Nonparametric analysis also revealed a significant effect of educational attainment. However, because some of the observed patterns appeared to differ from the findings in parametric analysis, the mean ranks are presented below in Table 17. For both sexes combined, similar to the parametric analysis, mean rank was lowest in those who had graduated from university, intermediate in those with secondary school or less and highest in those with technical education or some university. Among men, those with technical education or some university had the highest mean rank, while men in the lowest and highest categories of educational attainment appeared to have lower and similar mean ranks. (In contrast, ANOVA results suggested that men with the least education had the lowest BMI, while those with higher education appeared more similar.) Among women, nonparametric analysis confirmed the finding that women with the highest educational attainment had the lowest BMI.

It should be noted that British Columbians who participated in the survey were found to have higher levels of educational attainment than non-respondents and than the province as a whole as estimated from census data (B.C. Ministry of Health Services, 2004). Thus, the potential impact of this source of bias on the results should be considered. The data suggest that mean BMI of men might not be greatly affected, since those with secondary school and university education had similar mean BMI. For B.C. women, however, true mean BMI may be somewhat higher than estimated in the BCNS, since BMI was lower in highly-educated women and this group was disproportionately represented in the survey.

Table 17 Mean ranks for body mass index (BMI) of B.C. men, women and both sexes combined by level of educational attainment

Educational Attainment	Mean rank for body mass index		
	Men[a]	Women[b]	All[c]
Secondary school or less	396.2	446.9	844.0
Technical education or some university	460.4	437.9	894.0
University graduate	417.3	345.0	770.1

[a] Significant effect of level of educational attainment, $\chi^2 = 11.51, P = 0.003$.

[b] Significant effect of level of educational attainment, $\chi^2 = 20.96, P < 0.001$.

[c] Significant effect of level of educational attainment, $\chi^2 = 15.83, P < 0.001$.

3.2.1.2 BMI Category

BMI was classified according to the World Health Organization and Health Canada standards as underweight (<18.5), normal weight (18.5–24.9), overweight (25.0–29.9) and obese (≥30.0). The distributions of BMI category were examined by age group, sex, geographic strata, income status and educational attainment. Results, shown in detail below, indicate that the proportions in each BMI category differed according to each of these sociodemographic variables.

3.2.1.2.1 BMI category by sex. Data on the distribution of BMI category by sex are presented in Table 18. The distribution differed significantly between men and women and it appears that women were more likely than men to be in the normal weight category and less likely to be classified as overweight. The prevalence of obesity, however, appeared approximately similar between sexes.

Table 18 Distribution of B.C. adults by body mass index (BMI) category and sex[1]

BMI Category	Male (%)	Female (%)	All (%)
Underweight (<18.5)	0.8	1.7	1.3
Normal weight (18.5-24.9)	35.6	52.0	43.7
Overweight (25.0-29.9)	44.5	29.1	36.9
Obese (≥30)	19.1	17.2	18.2

[1]Distribution of BMI category differed significantly by sex, $\chi^2 = 58.64, P < 0.001$.

3.2.1.2.2 BMI category by age group. Table 19 shows that the distribution of BMI category differed significantly by age group. As age increased, it appears that the proportion of the population at a normal weight decreased, while the proportions that were overweight or obese increased.

Table 19 Distribution of B.C. adults by body mass index (BMI) category and age group[1]

BMI Category	Age group (yrs)				
	19-30 (%)	31-50 (%)	51-70 (%)	>71 (%)	All (%)
Underweight (<18.5)	1.3	1.4	0.7	2.3	1.3
Normal weight (18.5-24.9)	57.6	41.8	37.2	32.0	43.8
Overweight (25.0-29.9)	29.3	37.7	39.8	45.1	36.8
Obese (≥30)	11.8	19.1	22.3	20.6	18.1

[1]Distribution differed significantly by age group, $\chi^2 = 58.58, P < 0.001$.

3.2.1.2.3 BMI category by geographic strata. The distribution of BMI category by geographic strata is presented in Table 20 for men, women and both sexes combined. For men and women combined, the distribution of BMI category differed significantly by strata and it appears that the proportion at a normal weight was highest in the Metro stratum. The proportion that was overweight appeared highest in the Coastal stratum, while the prevalence of obesity was highest in the Non-metro Interior stratum. For men, the distribution also differed significantly by strata and the patterns were similar to those observed for both sexes combined. Among women, however, the distribution by BMI category did not differ by strata.

Table 20 Distribution of B.C. men, women and both sexes combined by body mass index (BMI) category and geographic strata

BMI Category	Men[a]			Women[b]			All[c]		
	Metro	Coastal	Non-metro Interior	Metro	Coastal	Non-metro Interior	Metro	Coastal	Non-metro Interior
	%	%	%	%	%	%	%	%	%
Underweight (<18.5)	0.7	1.0	0.5	1.7	2.0	2.1	1.2	1.5	1.3
Normal weight (18.5-24.9)	40.0	27.7	26.2	53.5	47.0	49.2	46.7	37.6	37.9
Overweight (25.0-29.9)	43.0	53.5	44.4	28.4	34.0	28.9	35.7	43.6	36.6
Obese (≥30)	16.3	17.8	28.9	16.4	17.0	19.8	16.3	17.3	24.2

[a] Distribution differed by strata, $\chi^2 = 23.8, P = 0.001$.

[b] Distribution did not differ by strata, $\chi^2 = 3.1, P = 0.80$.

[c] Distribution differed by strata, $\chi^2 = 19.7, P = 0.003$.

3.2.1.2.4 BMI category by income status. Table 21 presents information on the distribution of BMI category by income status. For both sexes combined, the distribution differed significantly between those who were and were not classified as low income. It appears that the proportion at a normal weight was higher among those in the low income group compared to those who were not classified as low income, while the prevalence of overweight and obesity appeared to be lower. A similar pattern was seen among men and appeared even more marked. Among women, however, the distribution of BMI category by income status did not differ significantly between those who were and were not classified as low income.

3.2.1.2.5 BMI category by educational attainment. Table 22 presents data on the distribution of BMI category by educational attainment for men, women and both sexes combined. All three distributions differed significantly by educational attainment. For men and women combined, the proportion at a normal weight appeared highest among those with the highest educational attainment, while the prevalence of obesity was lowest among this group. This pattern differed by sex, however. For men, the trends were not clear. For example, the proportion at a normal weight was highest among men who had completed secondary school or less, lowest in men who had completed technical training or some university and intermediate among those with a uni-

Table 21 Distribution of B.C. men, women and both sexes combined by body mass index (BMI) category and income status

BMI Category	Men[a]		Women[b]		All[c]	
	Low income %	Not low income %	Low income %	Not low income %	Low income %	Not low income %
Underweight (<18.5)	3.8	0.2	1.1	1.6	2.4	0.8
Normal weight (18.5–24.9)	48.8	30.3	52.5	49.7	50.7	39.1
Overweight (25.0–29.9)	36.9	47.7	23.2	30.8	29.4	40.0
Obese (≥30)	10.6	21.9	23.2	17.9	17.5	20.1

[a] Distribution differed by income status for B.C. adult men, $\chi^2 = 41.1, P < 0.001$.

[b] Distribution did not differ by income status for B.C. adult women, $\chi^2 = 4.884, P = 0.18$.

[c] Distribution differed by income status for all B.C. adults, $\chi^2 = 22.0, P < 0.001$.

versity degree. In contrast, the changes in BMI category by educational attainment appeared more consistent among women. Compared to women with less education, the proportion at a normal weight appeared considerably higher among women with a university degree, while the prevalence of overweight and obesity appeared considerably lower. Similar to mean BMI, the possible impact of the higher level of educational attainment among survey participants than among the B.C. population requires consideration. Again, the impact on men may be limited, since the association between educational attainment and body weight category was not linear. For women, however, the proportion of women in the normal weight category may be somewhat overestimated in the survey, since women with higher educational attainment were over-represented and these women appeared more likely to fall in the normal weight category.

Table 22. Distribution of B.C. men, women and both sexes combined by body mass index (BMI) category and educational attainment

BMI Category (kg/m²)	Men[a] (%)			Women[b] (%)			All[c] (%)		
	Sec.[d]	Tech.[e]	Uni.v[f]	Sec.[d]	Tech.[e]	Univ.[f]	Sec.[d]	Tech.[e]	Univ.[f]
Underweight (<18.5)	1.0	0.2	2.2	1.4	1.7	2.5	1.2	1.0	2.3
Normal weight (18.5–24.9)	41.9	30.3	37.7	47.6	48.9	67.7	44.8	39.6	51.9
Overweight (25.0–29.9)	38.1	48.9	44.3	30.8	31.5	20.5	34.4	40.1	32.9
Obese (≥30)	19.0	20.6	15.8	20.2	17.9	9.3	19.6	19.3	12.8

[a] Distribution differed significantly by educational attainment, $\chi^2 = 18.1, P = 0.006$.

[b] Distribution differed significantly by educational attainment, $\chi^2 = 22.9, P = 0.001$.

[c] Distribution differed significantly by educational attainment, $\chi^2 = 23.4, P < 0.001$.

[d] Secondary school or less.

[e] Some university of technical school.

[f] University degree completed.

3.2.2 Waist Circumference

3.2.2.1 Absolute Waist Circumference

The distribution of waist circumference was highly skewed (skewness = 0.793 ± 0.06 SE), so a log-log transformation was used in an effort to improve the symmetry of the distribution (skewness = 0.367 ± 0.06 SE). Statistical analyses were conducted on the transformed data, although untransformed data are displayed for clarity. And because the transformed distribution remained significantly skewed, non-parametric analyses were also conducted.

Descriptive data for waist circumference were generated according to age and sex. Results, shown in Table 23, indicate that men had a significantly higher waist circumference than women and that mean waist circumference increased with age. For all adults, waist circumference was lowest among 19-30 year-olds, was significantly higher among those aged 31 to 50 and was significantly higher again in those aged 51 and above. The pattern of increase with age differed slightly between men and women, indicated by a significant age-by-sex interaction. For men, waist circumference was lowest in those aged 19 to 30 years, significantly higher in those aged 31 to 70 years and significantly higher again in those aged 71 and above. Among women, those aged 51 and above had a significantly higher waist circumference than those aged 19 to 50 years.

Nonparametric analyses confirmed that men had a significantly higher waist circumference than women (mean rank = 1041.2 for men and 572.2 for women, $Z = -20.21$, $P < 0.001$; Mann-Whitney) and that waist circumference increased significantly with age (mean rank: 661.7 for age 19-30, 818.8 for age 31-50, 935.2 for age 51-70 and 951.6 for age 71 and above, $\chi^2 = 80.42$, $P < 0.001$; Kruskal-Wallis).

Table 23 Mean waist circumference by age for B.C. men, women and both sexes combined[1]

Age Group (yrs)	Waist circumference (cm)		
	Men (Mean ± SD)	**Women (Mean ± SD)**	**All (Mean ± SD)**
19–30	86.1 ± 9.7[a]	75.3 ± 10.3[a]	81.2 ± 11.3[a]
31–50	93.3 ± 12.0[b]	79.0 ± 13.9[a]	86.1 ± 14.8[b]
51–70	94.7 ± 12.3[b]	84.0 ± 12.9[b]	89.3 ± 13.7[c]
≥71	99.0 ± 13.2[c]	83.0 ± 8.7[b]	89.6 ± 13.4[c]
All ages	91.7 ± 12.1	79.4 ± 12.8	85.6 ± 13.9

[1] ANOVA of log-log transformed waist circumference revealed significant main effects of age group ($F = 46.90$, $P < 0.001$) and sex ($F = 326.54$, $P < 0.001$) and a significant age group-by-sex interaction ($F = 3.30$, $P = 0.02$).

[a,b,c] Means in the same column with different superscripts different significantly by Scheffe's test, $P < 0.05$.

3.2.2.2 Waist Circumference Category

The distribution of B.C. adults by waist circumference risk category is shown in Table 24 for men, women and both sexes combined. The distributions differed significantly in all cases. For the combined data, about three-quarters of those aged 19-30 were categorized as being at low risk and this decreased steadily with age, such that fewer than a third of those aged 71 and above were at low risk. In contrast, the proportions at increased risk and substantial risk appeared to increase steadily with age, from about 15% and 10% respectively in 19-30 year olds to about 30% and almost 40% in those aged 71 and above.

Table 24 Distribution of B.C. men, women and both sexes combined by waist circumference risk category

Age Group (yrs)	Waist circumference risk category (%)								
	Men[a]			Women[b]			All[c]		
	Low[1]	Incr.[2]	High[3]	Low[1]	Incr.[2]	High[3]	Low[1]	Incr.[2]	High[3]
19–30	79.0	14.8	6.1	70.4	15.5	14.1	74.7	15.4	10.0
31–50	56.3	27.5	16.2	65.2	15.0	19.8	60.8	21.3	18.0
51–70	50.5	28.5	21.0	36.5	28.0	35.4	43.7	28.3	28.0
≥71	32.5	29.9	37.7	33.0	28.4	38.6	32.7	29.1	38.2
All ages	58.9	24.5	16.5	56.5	19.6	23.9	57.7	22.1	20.2

[a] Distribution differed significantly by age group, $\chi^2 = 78.08$, $P < 0.001$.

[b] Distribution differed significantly by age group, $\chi^2 = 78.93$, $P < 0.001$.

[c] Distribution differed significantly by age group, $\chi^2 = 136.60$, $P < 0.001$.

[1] Low risk (< 94 cm for men and < 80 cm for women).

[2] Increased risk (≥ 94 and < 102 cm for men, and ≥ 80 and < 88 cm for women).

[3] Substantial risk (≥ 102 cm for men and ≥ 88 cm for women).

3.2.3 Body Weight Perceptions

Respondents were asked to indicate whether they considered their weight to be overweight, underweight or just about right. The distribution of weight perception differed significantly by sex (χ^2 = 50.63, P < 0.001). Women appeared to be more likely than men to consider themselves overweight (49.3% vs 37.2%) and less likely to consider themselves underweight (3.0% vs 9.9%). About half of both men (52.9%) and women (47.7%) felt that their weight was just about right.

The distribution of weight perception by age group is shown in Table 25 for B.C. men, women and both sexes combined. All three distributions differed significantly by age. For both sexes combined, the proportions who thought they were overweight increased from about 30% in those aged 19-30 to over 50% in those aged 51-70 and then decreased to about 40% in those aged 71 and above. Reciprocal changes were seen in the proportions who thought their weight was just about right: This decreased from 56% to 44% as age increased from 19-30 to 51-70 and then increased to about 56% in those aged 71 and above.

Table 25 Distribution of B.C. men, women and both sexes combined by age and perceived weight status

Age Group (yrs)	Perception of weight status								
	Men[a]			Women[b]			All[c]		
	Over	Under	About right	Over	Under	About right	Over	Under	About right
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
19– 0	23.2	21.5	55.4	36.5	6.3	57.2	29.7	14.1	56.2
31–50	43.5	5.8	50.7	51.6	1.4	47.0	47.6	3.6	48.8
51–70	41.3	6.6	52.1	61.9	1.4	36.7	51.7	3.9	44.3
≥71	37.3	4.8	57.8	41.7	5.2	53.1	39.9	4.5	55.6
All ages	37.1	10.0	52.9	49.3	3.0	47.7	43.3	6.4	50.3

[a] Distribution differed significantly by age, $\chi^2 = 59.83, P < 0.001$.

[b] Distribution differed significantly by age, $\chi^2 = 41.13, P < 0.001$.

[c] Distribution differed significantly by age, $\chi^2 = 93.22, P < 0.001$.

Table 26 shows the extent to which respondents' perceptions about their weight reflected their actual weight category classified according to WHO standards. For men, all those with a BMI in the underweight category correctly perceived that they were underweight. However, among men with a BMI in the normal weight range, almost a quarter thought they were underweight. Over half the men with a BMI that categorized them as overweight thought that their weight was about right. However, a large majority of obese men (BMI ≥30) perceived that they were overweight. For women, almost half of those who were underweight according to their BMI thought that their weight was about right, while the other half did perceive that they were underweight. Among women at a normal weight according to BMI, almost 80% thought their weight was just about right. About three-quarters of overweight women thought that they were overweight and almost all (95%) obese women perceived that they were overweight.

Table 26 Distribution of B.C. men and women by perceived versus actual weight status

Actual weight status (BMI category)	Perception of weight status					
	Men			Women		
	Over	Under	About right	Over	Under	About right
	(%)	(%)	(%)	(%)	(%)	(%)
Underweight (<18.5)	-	100	-	6.7	46.7	46.7
Normal weight (18.5–24.99)	6.1	23.7	70.2	17.9	4.0	78.0
Overweight (25–29.99)	41.1	1.5	57.4	76.3	0.4	23.3
Obese (≥30)	86.9	-	13.1	95.3	0.7	4.0

This comparison of "perception versus reality" appeared to differ between men and women. Altogether, 60.6% of men compared to 80% of women perceived their weight status correctly (e.g., had a BMI ≥ 25.0 and thought that they were overweight). Nine percent of men perceived that they were underweight when they were not, compared to only 2.3% of women. Twenty-eight percent of men and only 7.4% of women thought their weight was just about right when they were actually overweight. And finally, 2.1% of men and 9.4% of women thought they were overweight when they were not.

3.2.4 Weight Change Attempts

Respondents were asked whether they were presently trying to change their weight and, if so, whether they were trying to lose weight or to gain weight. As shown in Table 27, over a third of British Columbians were presently trying to lose weight, while only about 5% were trying to gain weight. The distribution differed significantly by sex and it appears that women were more likely to be trying to lose weight, while men were more likely to be trying to gain weight.

Table 27 Distribution of B.C. men, women and both sexes combined by weight change status[1]

Weight change status	Men (%)	Women (%)	All (%)
Trying to lose weight	28.6	44.3	36.5
Trying to gain weight	9.3	1.8	5.5
Not trying to change weight	60.4	52.1	56.2
Not sure	1.6	1.4	1.5

[1] The distribution differed by sex, $\chi^2 = 13.03, P = 0.001$.

Table 28 shows the proportions of B.C. men and women in different age groups who were currently trying to lose weight, to gain weight or who were not presently trying to change their weight. All three distributions differed significantly by age. Among men, the youngest age group appeared to differ from the older age groups. They were much more likely to be trying to gain weight (about 25% vs 3-6%) and less likely to be trying to lose weight (about 23% vs about 30%). Among women, the oldest age group appeared to differ from the three younger age groups. Women aged 71 and above were less likely to be trying to lose weight (31% vs 42-51%) and somewhat more likely to be trying to gain weight (about 6% vs about 1%).

Table 28 Distribution of B.C. men, women and both sexes combined by age group and weight change status[1]

Age Group (yrs)	Weight change status								
	Men[a]			Women[b]			All[c]		
	Lose	Gain	No change	Lose	Gain	No change	Lose	Gain	No change
	%	%	%	%	%	%	%	%	%
19–30	23.2	24.9	47.2	46.4	1.4	50.9	34.4	13.7	48.9
31–50	29.3	3.0	67.1	42.5	0.8	54.0	36.0	1.9	60.6
51–70	32.9	5.6	61.0	50.7	1.4	46.5	42.0	3.5	53.8
≥71	29.3	2.4	67.1	31.2	6.2	61.5	31.0	4.6	63.8

[1] Percentages within a sex and age group may total less than 100%, as the table does not include those who were not sure whether they were trying to change their weight or not.

[a] Distribution differed significantly by age, $\chi^2 = 35.79, P < 0.001$.

[b] Distribution differed significantly by age, $\chi^2 = 21.23, P = 0.002$.

[c] Distribution differed significantly by age, $\chi^2 = 26.18, P < 0.001$.

Those who were currently trying to change their weight were asked an open-ended question about what they were doing to lose or gain weight. Table 29 shows actions reported by men, women and both sexes combined who were trying to lose weight. Close to three-quarters of respondents reported that they were trying to change their eating habits or exercise more.

Table 29 Actions taken by B.C. adults currently trying to lose weight[1]

Action	Men	Women	All
	%	%	%
Change eating habits	73.2	72.9	73.0
Exercise more	64.6	75.9	71.5
Follow specific diet plan	1.6	5.3	3.7
Skip meals	0.8	0.5	0.5
Take diet pills	0.0	0.2	0.1
Use meal replacements	0.0	1.5	0.9
Attend weight control program	0.0	1.8	1.1
Consult registered dietitian	0.0	1.3	0.8
Other actions	10.2	10.8	10.3

[1] Responses were provided to an open-ended question asked of those who said they were trying to lose weight. This included 28.6% of men and 44.3% of women (36.5% of adults of both sexes).

Actions reported by those trying to gain weight are reported in Table 30. Changing eating habits and exercising more were the most commonly reported actions for both sexes combined. Men, however, were much more likely than women to report exercising more and using meal replacements or supplements, while women were more likely than men to report changing their eating habits to gain weight.

Table 30 Actions taken by B.C. adults currently trying to gain weight[1]

Action	Men	Women	All
	%	%	%
Change eating habits	54.2	93.8	60.6
Exercise more	56.6	6.2	48.5
Restricting exercise	0.0	6.2	1.0
Use meal replacements/supplements	21.7	6.2	18.2
Consult registered dietitian	0.0	6.2	1.0
Other actions	9.6	0.0	9.1

[1] Responses were provided to an open-ended question asked of those who said they were trying to gain weight. This included 9.3% of men and 1.8% of women (5.5% of adults of both sexes).

3.2.5 Key Findings from this Section

- Over half (55.1%) of B.C. adults are overweight (36.9%) or obese (18.2%). This is markedly higher than the 44% prevalence of overweight/obesity assessed 10 years earlier in the 1989 B.C. Heart Health Survey. It is also higher than the 42% prevalence estimated for B.C. adults in the Canadian Community Health Survey (CCHS). Although the CCHS was conducted in 2000-2001, it obtained self-reported heights and weights rather than the measured values obtained in the BCNS and the B.C. Heart Health Survey.
- The prevalence of obesity (BMI ≥30) is similar in men and women (19.1% vs 17.2%), but men are more likely than women to be overweight (BMI 25.0–29.9; 44.5% vs 29.1%). Several sociodemographic variables are associated with the prevalence of overweight and obesity:
  - Overweight and obesity increased with *age*.
  - Overweight and obesity differed by *geographic strata* in men but not women. The Metropolitan area had the highest proportion of men in the normal weight category, while the Coastal stratum had the highest prevalence of overweight men and the Non-metro Interior stratum had the highest prevalence of obese men.

- *Income status* affected weight category in men. Compared to those who were not low income, low income men were less likely to be overweight (36.9% vs 47.7%) or obese (10.6% vs 21.9%). Among women, the effect of income status was not significant.
- In women, those with the highest level of *educational attainment* were less likely to be overweight or obese (about 30% vs about 50% in those with lower levels of educational attainment). This finding, coupled with the fact that university graduates were over-represented in the survey, suggests that the true prevalence of overweight and obesity among B.C. women may be higher than is estimated in the BCNS. The pattern differed among men. Those with secondary education and university graduates had generally similar prevalences of overweight and obesity (57-60%), while those with technical education had the highest prevalence (69%).

- Waist circumference increased with age in both men and women. Overall, 42% of B.C. adults were at some degree of increased health risk based on waist circumference. Similar proportions of men and women were at "low risk," but men appeared more likely to be at "increased risk" (24.5% vs 16.5%), while women appeared more likely to be at "substantial risk" (23.9% vs 19.6%).
- Overall, about 60% of men and 80% of women correctly perceived their weight as "underweight", "about right" or "overweight". Men were more likely than women to consider themselves underweight when they were not and were also more likely to perceive they were "about right" when they were actually overweight or obese.
- At the time of the survey, 36.5% of B.C. adults were trying to lose weight and 5.5% were trying to gain weight. Women were more likely to be trying to lose weight (44.3% vs 28.6%) while men were more likely to be trying to gain weight (9.3% vs 1.8%).
- The most common actions reported by those trying to lose weight or gain weight were changing their eating habits and increasing exercise.

3.3 Attitudes to Eating and the Body

3.3.1 Attitudes to the Body

Respondents were asked to indicate "how comfortable do you feel about your body when you see yourself in a mirror?" Results, shown for men, women and both sexes combined in Table 31, reveal a clear sex difference. Women were almost twice as likely as men to feel very or somewhat uncomfortable with their body (35.6% vs 18.1%) and were less likely to feel very or somewhat comfortable (42.1% vs 57.4%).

Table 31 Distribution of B.C. men, women and both sexes combined by level of bodily comfort[1,2]

Level of bodily comfort	Men	Women	All
	%	%	%
Very uncomfortable	3.5	8.8	6.1
Somewhat uncomfortable	14.6	26.8	20.7
Neutral	24.4	21.8	23.1
Somewhat comfortable	35.2	28.4	31.8
Very comfortable	22.2	13.7	17.9

[1] Respondents were asked "How comfortable do you feel about your body when you see yourself in a mirror?"

[2] The distribution differed significantly by sex, $\chi^2 = 81.07, P < 0.001$.

In contrast to the significant sex difference, the level of bodily comfort did not differ by age. Results are shown for men and women combined in Table 32. When this analysis was conducted for men and women separately, there were also no differences by age group (data not shown).

Table 32 Distribution of B.C. adults by level of bodily comfort and age[1,2]

Level of bodily comfort	Age group (yrs)			
	19-30	31-50	51-70	≥71
Very uncomfortable	5.3	6.5	7.0	5.1
Somewhat uncomfortable	16.7	21.9	23.2	21.1
Neutral	23.6	23.0	21.6	26.9
Somewhat comfortable	37.2	31.7	28.8	26.3
Very comfortable	17.2	17.0	19.5	20.6

[1] Respondents were asked "How comfortable do you feel about your body when you see yourself in a mirror?"

[2] The distribution did not differ significantly by age, $\chi^2 = 17.01, P = 0.149$.

3.3.2 Eating Attitudes and Behaviours

As shown in Table 33 and 34, women were more likely than men to agree with statements reflecting cognitive dietary restraint or disinhibition.

Table 33 Proportion of B.C. men, women and both sexes combined agreeing with eating attitude and behaviour statements

Attitude/Behaviour Statement	Men	Women	All
	%	%	%
I don't eat some foods because they make me fat[R,1]	36.1	43.6	39.9
When I feel 'down' or sad, I often overeat[D,1]	12.3	28.2	20.3
I deliberately take small helpings to control my weight[R,1]	22.0	35.4	28.7
Sometimes can't seem to stop eating[D,1]	19.3	23.7	21.5
When I feel lonely, I console myself by eating[D,2]	4.9	21.2	13.1

[R] Statement reflects cognitive dietary restraint (Stunkard and Messick, 1985).

[D] Statement reflects disinhibition (Stunkard and Messick, 1985).

[1] Significant difference between men and women as assessed by χ^2, $P < 0.001$.

[2] Significant difference between men and women as assessed by χ^2, $P < 0.05$.

Table 34 Distribution of B.C. men, women and both sexes combined by responses to eating attitude and behaviour statements

	Men	Women	All
	%	%	%
How often are you restricting your food intake in a conscious effort to control weight?[R,1]			
Rarely	58.2	43.1	50.6
Sometimes	23.6	33.7	28.7
Usually	13.4	16.7	15.1
Always	4.8	6.4	5.6
Do you go on eating binges when not hungry?[D,1]			
Never	81.8	70.8	76.3
Rarely	12.5	15.7	14.1
Sometimes	4.9	11.4	8.2
At least weekly	0.7	2.1	1.4
How likely are you to consciously eat less than you want?[R,1]			
Unlikely	60.0	48.7	54.3
Slightly likely	21.6	28.2	24.9
Moderately	13.0	19.0	16.0
Very likely	5.4	4.1	4.8

Table 34 Distribution of B.C. men, women and both sexes combined by responses to eating attitude and behaviour statements (continued)

How would you rate your restraint?[R,1]	Men	Women	All
	%	%	%
Eat whatever I want, whenever I want	27.0	17.4	22.2
Usually eat whatever, whenever I want	26.9	21.5	24.2
Often eat whatever, whenever I want	18.9	24.0	21.4
Often limit food intake, but often 'give in'	16.3	25.1	20.7
Usually limit food intake, rarely 'give in'	10.4	10.8	10.6
Constantly limit food intake, never 'give in'	0.6	1.2	0.9

[R] Statement assesses cognitive dietary restraint (Stunkard and Messick, 1985).

[D] Statement assesses disinhibition (Stunkard and Messick, 1985).

[1] Distribution differed significantly by sex, $\chi^2 \geq 28.64, < 0.001$.

Scores for cognitive dietary restraint and disinhibition were derived by compiling the responses to the items reflecting restraint and disinhibition, respectively. These scores had high values for skewness (restraint skewness = 0.903 ± 0.059 SE; disinhibition skewness = 1.711 ± 0.059 SE). The square root transformation was used in an effort to improve symmetry. Although skewness values were reduced, the distributions remained skewed (square root of restraint skewness = 0.176 ± 0.059 SE; square root of disinhibition skewness = 0.975 ± 0.059 SE). Accordingly, analyses were also conducted using nonparametric statistics.

Table 35 shows mean restraint scores for men, women and both sexes combined for the four DRI age groups. ANOVA of the square root transformed data indicated that women's scores were significantly higher than men's scores. There was also a significant effect of age, with scores tending to increase with age up to age 51-70 and then to decrease in those aged 71 and above. However, post-hoc testing indicated that no two groups differed significantly from one another. Nonparametric analyses confirmed that women had higher restraint scores than men ($Z = -5.325$, $P < 0.001$; Mann-Whitney) and that there was an effect of age ($\chi^2 = 9.62$, $P = 0.022$). Similar to the parametric data, mean ranks appeared to increase up to age 70 and tended to be lower in those aged 71 and above.

Table 35 Mean restraint scores of B.C. men, women and both sexes combined by age[1,2]

Age group (yrs)	Restraint score		
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
19-30	1.087 ± 1.578	1.421 ± 1.623	1.240 ± 1.606
31-50	1.091 ± 1.323	1.655 ± 1.666	1.377 ± 1.532
51-70	1.349 ± 1.591	1.718 ± 1.752	1.542 ± 1.685
≥71	1.146 ± 1.645	1.383 ± 1.662	1.421 ± 1.645
All ages	1.169 ± 1.477	1.594 ± 1.676	1.376 ± 1.594

[1] Restraint scores reflect the perception that food intake is consciously limited in an attempt to control body weight. Scores are based on five items taken from the restraint subscale of the Three-Factor Eating Questionnaire (Stunkard and Messick, 1985).

[2] ANOVA of square-root transformed data revealed a significant effect of sex ($F = 7.15, P = 0.008$) and of age ($F = 2.83, P = 0.037$) and no age-by-sex interaction ($F = 0.955, P = 0.413$). Post-hoc analysis indicated that no two age groups differed significantly from one another.

Similar to restraint scores, disinhibition scores were also higher in women than men, whether assessed by ANOVA or using nonparametric analysis ($Z = -7.546$, $P < 0.001$, Mann-Whitney) (Table 36). ANOVA revealed a significant effect of age, which was confirmed using nonparametric analysis ($\chi^2 = 27.22$, $P < 0.001$). Post-hoc testing indicated that disinhibition scores of those aged 71 and above were significantly lower than those of younger adults.

Table 36 Mean disinhibition scores of B.C. men, women and both sexes combined by age[1,2]

Age group (yrs)	Disinhibition score (Mean ± SD)		
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
19-30	0.402 ± 0.762	0.907 ± 1.209	0.634 ± 1.023[a]
31-50	0.538 ± 0.943	0.975 ± 1.310	0.760 ± 1.164[a]
51-70	0.244 ± 0.528	0.816 ± 1.231	0.544 ± 1.004[a]
≥71	0.268 ± 0.593	0.204 ± 0.676	0.233 ± 0.637[b]
All ages	0.425 ± 0.813	0.878 ± 1.250	0.651 ± 1.078

[1] Disinhibition scores reflect the perception that control over food intake can be lost in response to certain situations, leading to overeating. Scores are based on four items taken from the disinhibition subscale of the Three-Factor Eating Questionnaire (Stunkard and Messick, 1985).

[2] ANOVA of square root transformed scores revealed significant effects of age group ($F = 8.94, P < 0.001$) and sex ($F = 27.68, P < 0.001$) and a non-significant age group by sex interaction ($F = 2.32, P = 0.074$).

[a,b] Means in the same column with different superscripts differed significantly by Scheffe's test, $P < 0.05$.

3.3.3 Key Findings from this Section

- Men felt significantly more 'comfortable' with their body than women. Level of bodily comfort, however, did not change with age.
- Women were more likely than men to agree with statements reflecting dietary restraint and disinhibition. Restraint scores tended to increase with age up to age 51-70 and to be lower in the oldest age group, but these differences were not significant. For disinhibition, however, the lowest scores were seen in those aged 71 and above.

3.4 Relationships

In this section, associations among physical activity, weight status and eating attitudes and bodily comfort are examined. Among the many possible relationships that could be assessed, the focus was on those potentially associated with health outcomes (e.g., associations between physical activity and BMI or waist circumference). It should be emphasized that, because of the cross-sectional nature of the data, causal inferences cannot be made. For example, if higher physical activity was found to be associated with lower BMI, it cannot be ascertained whether activity leads to lower BMI or whether those with lower BMI are more likely to be physically active.

3.4.1 Relationship between Activity Level and Body Mass Index

Possible relationships between BMI and a number of variables related to physical activity were examined, including stage of motivational readiness for structured exercise, stage of motivational readiness for lifestyle physical activity, minimum Met-minutes of exercise and number of strenuous plus moderate exercise sessions per week. For the latter analyses, the number of strenuous plus moderate physical activity sessions per week was recoded as 0-3, 4-6 and ≥7.

3.4.1.1 BMI and Stage of Motivational Readiness for Structured Exercise

For men and women grouped together, those in the precontemplation, preparation and maintenance stages had lower mean BMI than those in the action stage, while those in the contemplation stage had mean BMI that did not differ from either of these two groups (Table 37). When men were examined separately, the only significant group difference was that the mean BMI of men in the action stage was significantly higher than that of men in the other four stages. Among women, a similar trend

was observed, but pairwise comparisons were not significant. These findings suggest that those with lower BMIs were either not yet motivated to exercise (precontemplation, contemplation, preparation) or were already exercising (maintenance phase), while those with higher BMIs had recently taken action to increase their activity level. An implication is that it may be difficult to motivate those with relatively lower BMIs to exercise.

Table 37 Mean body mass index (BMI) by stage of motivational readiness for structured exercise among B.C. men, women and both sexes combined[1]

Motivational stage for structured exercise	Body mass index (kg/m^2)		
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
Precontemplation	26.0 ± 4.6[a]	25.1 ± 6.7[a]	25.6 ± 5.7[a]
Contemplation	27.3 ± 6.2[a]	26.2 ± 5.3[a]	26.8 ± 5.8[a,b]
Preparation	26.7 ± 4.1[a]	25.7 ± 4.2[a]	26.2 ± 4.1[a]
Action	30.2 ± 6.4[b]	27.4 ± 10.2[a]	28.4 ± 9.1[b]
Maintenance	26.7 ± 5.0[a]	25.6 ± 6.3[a]	25.7 ± 5.1[a]

[1] ANOVA of $\log_{10}$ transformed BMI data revealed significant main effects of sex ($F = 32.16, P < 0.001$) and motivational stage ($F = 10.64, P < 0.001$), while the sex-by-motivational stage interaction was not significant ($F = 1.39, P = 0.234$).

[a,b] Means in the same column with different superscripts differ significantly by Scheffe's test, $P < 0.05$.

3.4.1.2 BMI and Stage of Motivational Readiness for Lifestyle Physical Activity

Associations between BMI and motivational readiness for lifestyle physical activity are shown in Table 38. Because there was no main effect of sex ($F = 3.22$, $P = 0.073$) and no sex-by-stage interaction ($F = 0.86$, $P = 0.488$), only data for men and women combined are shown. These data reveal a seemingly inconsistent pattern: Those in the precontemplation stage had a lower BMI than those in the contemplation and preparation stages, while those in the maintenance and action stages had intermediate values that did not differ from the other two groups. This apparently inconsistent relationship may have been because 80% were classified in the maintenance stage, so proportions in other stages were low and BMI means were variable.

Table 38 Mean body mass index (BMI) by stage of motivational readiness for lifestyle physical activity among B.C. adults[1]

Motivational stage for lifestyle physical activity	Body mass index (kg/m²) (Mean ± SD)
Precontemplation	24.5 ± 5.0[a]
Contemplation	29.5 ± 11.3[b]
Preparation	28.3 ± 6.0[b]
Action	26.3 ± 8.2[a,b]
Maintenance	25.6 ± 5.4[a,b]

[1] ANOVA of $\log_{10}$ transformed BMI revealed a significant main effect of motivational stage ($F = 7.38, P < 0.001$).

[a,b] Means with different superscripts differed significantly by Scheffe's test, $P < 0.05$.

3.4.1.3 BMI and Number of Weekly Strenuous Plus Moderate Exercise Sessions

The association between the number of strenuous and moderate exercise sessions per week differed between men and women (Table 39). Among men, the association was not linear: Those who exercised seven or more and less than four times per week had similar BMI and both were lower than those who exercised four to six times per week. In contrast, women who exercised seven or more times per week had significantly lower BMI than those who exercised less than four times weekly, while those who exercised four to six times a week had intermediate values that did not differ significantly from the other two groups.

Table 39 Mean body mass index (BMI) by number of weekly strenuous plus moderate exercise sessions among B.C. men, women and both sexes combined[1]

Sessions of strenuous plus moderate exercise per week	Body mass index (kg/m²) Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
≤3	26.7 ± 5.2[a]	26.1 ± 6.0[a]	26.4 ± 5.6[a]
4-6	28.1 ± 3.9[b]	25.6 ± 7.3[ab]	26.6 ± 6.8[a]
≥7	26.0 ± 3.9[a]	24.4 ± 5.2[b]	25.4 ± 4.5[b]

[1] ANOVA performed on $\log_{10}$ transformed BMI data revealed significant main effects of sex ($F = 27.04, P < 0.001$) and number of exercise sessions ($F = 8.95, P < 0.001$) and a significant sex-by-exercise session interaction ($F = 6.10, P = 0.002$).

[a,b] Group means in the same column with different superscripts differed significantly by Scheffe's test, $P < 0.05$.

3.4.1.4 BMI and Minimum Met-minutes of Exercise

Spearman rank correlation coefficients were calculated to assess the relationship between BMI and minimum Met-minutes of exercise. For men, there was no association (r = -0.019, P = 0.568), while among women, there was a weak negative association (r = -0.159, P <0.001) that accounted for only 2.5% of the variance in BMI. Relationships between these two variables were also assessed by determining whether minimum Met-minutes differed among those in different BMI categories. For this analysis, underweight individuals were excluded, as there were too few for the analysis to be meaningful. Results, shown in Table 40, indicate that the associations differed between men and women. Obese men had significantly lower minimum Met-minutes of exercise than normal weight or overweight men, who did not differ. Among women, overweight women had a significantly lower mean than normal weight women, while obese women did not differ from the other two groups.

Table 40 Mean minimum Met-minutes of exercise by body mass index (BMI) category among B.C. men, women and both sexes combined

BMI Category from WHO	Minimum Met-minutes of exercise (minutes/wk)[1,2]		
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
Normal weight (18.5-24.99)	644.5 ± 628.5[a]	631.0 ± 397.5[a]	636.6 ± 505.6[a]
Overweight (25.0-29.99)	710.0 ± 661.9[a]	497.3 ± 333.2[b]	627.2 ± 566.7[a]
Obese (≥30.0)	473.4 ± 389.8[b]	537.1 ± 357.2[ab]	502.1 ± 376.2[b]

[1] Minimum Met-minutes/wk = 15 minutes per session x [(sessions/wk of strenuous exercise x 9 Mets) + (sessions/wk of moderate exercise x 5 Mets) + (sessions/wk of mild exercise x 3 Mets)]. From Godin and Shephard, 1985.

[2] ANOVA of square-root transformed minimum Met-minutes of exercise revealed that the main effect of sex was not significant (F = 0.01, P = 0.925), but that the effect of BMI category was significant (F = 5.50, P = 0.004). The sex-by-BMI category interaction was significant (F = 11.89, P < 0.001).

[a,b] Means in the same column with different superscripts differed significantly by Scheffe's test, P < 0.05.

3.4.2 Relationships between Activity Level and Waist Circumference

Possible relationships between waist circumference and a number of variables related to physical activity were examined, including stage of motivational readiness for structured exercise, stage of motivational readiness for lifestyle physical activity, minimum Met-minutes of exercise and number of strenuous plus moderate exercise sessions per week. For the latter analyses, the number of strenuous plus moderate physical activity sessions per week was recoded as 0-3, 4-6 and ≥7.

3.4.2.1 Waist Circumference and Stage of Motivational Readiness for Structured Exercise

Although ANOVA revealed a significant main effect of motivational stage for structured exercise in men and women combined, none of the pairwise comparisons was significant (Table 41). However, those in the maintenance stage tended to have a smaller waist circumference than those in the other four stages (84.4 cm compared to about 86.5 cm). When the data for men were examined separately, men in the action stage were found to have significantly higher waist circumference than those in the precontemplation, contemplation and maintenance stages, while those in the preparation stage had an intermediate value that did not differ from the other two groups. This finding of the highest mean for men in the action stage is similar to what was observed when associations between BMI and motivational stage for structured exercise were examined. Among women, none of the pairwise comparisons was significant and this was also similar to what was observed with BMI.

Table 41 Mean waist circumference by stage of motivational readiness for structured exercise among B.C. men, women and both sexes combined[1]

Motivational stage for structured exercise	Waist circumference (cm)		
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
Precontemplation	91.7 ± 11.9[a]	80.4 ± 17.6[a]	86.5 ± 15.8[a]
Contemplation	92.7 ± 14.3[a]	81.7 ± 11.2[a]	86.8 ± 13.9[a]
Preparation	93.8 ± 13.6[ab]	79.4 ± 11.1[a]	86.6 ± 14.3[a]
Action	98.1 ± 16.1[b]	79.6 ± 12.1[a]	86.3 ± 17.1[a]
Maintenance	90.1 ± 9.9[a]	78.0 ± 12.1[a]	84.4 ± 12.5[a]

[1] ANOVA of log-log transformed waist circumference data revealed significant main effects of sex ($F = 370.94, P < 0.001$) and motivational stage ($F = 6.56, P < 0.001$), as well as a significant sex-by-motivational stage interaction ($F = 2.50, P = 0.041$).

[a,b] Means in the same column with different superscripts differ significantly by Scheffe's test, $P < 0.05$.

3.4.2.2 Waist Circumference and Stage of Motivational Readiness for Lifestyle Physical Activity

Table 42 shows waist circumference means relative to stage of motivational readiness for lifestyle physical activity. Although those in the maintenance stage tended to have lower values, none of the pairwise comparisons was significant. Again, this may be related to the fact that the overwhelming majority (80%) reported being in the maintenance stage for physical activity.

Table 42 Mean waist circumference by stage of motivational readiness for lifestyle physical activity among B.C. men, women and both sexes combined[1]

Motivational stage for lifestyle physical activity	Waist circumference (cm)		
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
Precontemplation	87.0 ± 18.1	80.9 ± 16.9	85.4 ± 17.6
Contemplation	95.1 ± 16.2	83.0 ± 9.9	89.6 ± 14.8
Preparation	105.7 ± 21.7	83.2 ± 12.8	92.5 ± 20.1
Action	90.8 ± 10.0	82.1 ± 19.5	84.4 ± 17.7
Maintenance	90.1 ± 10.2	76.6 ± 10.8	83.7 ± 12.5

[1] ANOVA of log-log transformed waist circumference data revealed significant main effects of sex ($F = 42.20, P < 0.001$) and motivational stage ($F = 10.96, P < 0.001$), but the sex-by-motivational stage interaction was not significant ($F = 1.73, P = 0.141$). Among men, women and both groups combined, none of the pairwise comparisons between motivational stages was significant as assessed by Scheffe's test.

3.4.2.3 Waist Circumference and Number of Weekly Strenuous plus Moderate Exercise Sessions

As can be seen in Table 43, men who had three or fewer sessions of strenuous plus moderate exercise per week had significantly higher mean waist circumference than men who exercised seven or more times per week. Men who exercised four to six times weekly had intermediate values and were not significantly different from those who exercised more or less. Women who had three or less sessions of strenuous plus moderate exercise per week also had the highest mean value for waist circumference. Those who exercised four to six and seven or more times weekly had lower means and did not differ significantly from one another.

Table 43 Mean waist circumference by number of weekly strenuous plus moderate exercise sessions in B.C. men, women and both sexes combined[1]

Sessions of strenuous plus moderate exercise per week	Waist circumference (cm)		
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
≤3	93.0 ± 13.1[a]	81.2 ± 14.2[a]	86.9 ± 14.9[a]
4-6	92.1 ± 11.9[ab]	78.2 ± 11.7[b]	84.2 ± 13.6[b]
≥7	89.5 ± 10.4[b]	76.1 ± 9.2[b]	84.4 ± 11.9[b]

[1] ANOVA conducted on log-log transformed data revealed a significant effects of number of exercise sessions ($F = 16.29$, $P < 0.001$) and sex ($F = 438.06, P < 0.001$), but no significant age-by-sex interaction ($F = 1.44, P = 0.238$).

[a,b] Means in the same column with different superscripts differed significantly by Scheffe's test, $P < 0.05$.

3.4.2.4 Waist Circumference and Minimum Met-minutes of Exercise

Spearman rank correlation coefficients were calculated to assess the relationship between waist circumference and minimum Met-minutes of exercise. For both men and women, there were weak negative associations ($r = -0.153$, $P < 0.001$ and $r = -.174$, $P < 0.001$ respectively) that accounted for only 2.3-3.0% of the variance in waist circumference. Relationships between these two variables were also assessed by determining whether minimum Met-Minutes differed among those in different waist circumference risk categories (Table 44). Because the effects of sex and the sex-by-waist circumference risk category were not significant, post-hoc tests were conducted only for men and women combined. Results showed that those at low risk on the basis of waist circumference had significantly higher mean minimum Met-minutes of exercise than those at increased risk, who in turn had significantly higher mean minimum Met-minutes of exercise than those at substantial risk.

Table 44 Mean minimum Met-minutes of exercise by waist circumference risk category in B.C. men, women and both sexes combined

Waist Circumference risk category[1]	Minimum Met-minutes of exercise (minutes/wk)[2,3]		
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
Low risk	699.9 ± 553.4	631.0 ± 394.8	666.5 ± 484.1[a]
Increased risk	652.6 ± 823.8	523.6 ± 316.3	595.5 ± 652.6[b]
Substantial risk	472.2 ± 390.3	467.5 ± 340.4	469.4 ± 360.5[c]

[1] "Low risk" reflects a waist circumference of <94 cm for men and <80 cm for women; "increased risk" reflects a waist circumference of ≥94 - <102 cm for men and ≥80 - <88 cm for women; "substantial risk" reflects a waist circumference ≥102 cm for men and ≥88 cm for women.

[2] Minimum Met-minutes/wk = 15 minutes per session x [(sessions/wk of strenuous exercise x 9 Mets) + (sessions/wk of moderate exercise x 5 Mets) + (sessions/wk of mild exercise x 3 Mets)]. From Godin and Shephard, 1985.

[3] ANOVA of square-root transformed minimum Met-minutes of exercise revealed that the main effect of sex was not significant ($F = 0.44$, $P = 0.505$), but that the effect of waist circumference risk category was significant ($F = 21.38$, $P < 0.001$). The sex-by-waist circumference risk category interaction was not significant ($F = 0.595$, $P = 0.552$).

[a,b,c] Means in the same column with different superscripts differed significantly by Scheffe's test, $P < 0.05$.

3.4.3 Relationships between Body Comfort Level and BMI or Physical Activity

Data reported earlier established that BMI was associated to some extent with physical activity level (e.g., minimum Met-minutes of exercise differed among those with BMI classified as healthy, overweight or obese; BMI differed among those with 0-3, 4-6 and >7 sessions of strenuous plus

moderate physical activity per week). For this reason, associations between BMI and body comfort level were also examined with minimum Met-minutes of exercise as a co-variate and associations between physical activity and body comfort level were examined with BMI as a covariate.

3.4.3.1 Body Comfort Level and BMI

Associations between body comfort level and BMI revealed that those who were less comfortable with their bodies tended to have higher mean BMI (Table 45). Specifically, for men and for both sexes combined, those who were 'very' or 'somewhat uncomfortable' with their bodies had higher mean BMI than those who were 'neutral', 'somewhat comfortable' or 'very comfortable'. Among women, those who were 'very uncomfortable' with their bodies had significantly higher mean BMI than those who were 'neutral', while those who were 'somewhat uncomfortable' had an intermediate BMI that did not differ from either group. All three of these groups, however, had higher mean BMI than women who were 'very' or 'somewhat comfortable' with their bodies. This analysis was also conducted with age and minimum Met-minutes of exercise as co-variates. Although the effects of both co-variates were significant ($F = 17.84$, $P < 0.001$ for age; $F = 5.52$, $P = 0.019$ for minimum Met-minutes of exercise), the effect of body comfort level remained significant ($F = 32.56$, $P < 0.001$). In other words, when age and amount of physical activity were held constant, those with higher values for BMI still experienced more discomfort with their bodies.

Table 45 Mean body mass index (BMI) by level of bodily comfort for B.C. men, women and both sexes combined[1]

Level of bodily comfort	Body mass index (kg/m^2)		
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
Very uncomfortable	29.6 ± 8.2[a]	29.2 ± 7.8[a]	29.3 ± 7.9[a]
Somewhat uncomfortable	29.0 ± 5.4[a]	27.7 ± 7.0[ab]	28.2 ± 6.5[a]
Neutral	26.6 ± 5.2[b]	25.6 ± 5.6[b]	26.1 ± 5.4[b]
Somewhat comfortable	25.9 ± 3.9[b]	24.2 ± 5.0[c]	25.2 ± 4.5[b]
Very comfortable	26.4 ± 5.0[b]	23.2 ± 5.6[c]	25.1 ± 5.4[b]

[1] ANOVA of $\log_{10}$ transformed BMI by level of bodily comfort revealed significant main effects of sex ($F = 32.98$, $P < 0.001$) and body comfort level ($F = 34.91$, $P < 0.001$), as well as a significant sex-by-body comfort interaction ($F = 3.92$, $P = 0.004$).

[a,b,c] Means in the same column with different superscripts differed significantly by Scheffe's test, $P < 0.05$.

3.4.3.2 Body Comfort Level and Minimum Met-minutes of Exercise

The association between body comfort level and amount of physical activity was also examined (Table 46). For both sexes combined, those who were 'very uncomfortable' with their bodies had the lowest weekly minimum Met-minutes of exercise, while those who were 'very comfortable' with their bodies had the highest weekly activity levels. Although the exact pattern of significance differed slightly between men and women, the general finding persisted that activity level was lowest in those who were most uncomfortable and highest in those who were most comfortable. This analysis was also conducted with age and BMI as co-variates. Although the effects of both co-variates were significant ($F = 4.28$, $P = 0.039$ for BMI; $F = 36.15$, $P < 0.001$ for age), the independent effect of exercise persisted ($F = 7.07$, $P < 0.001$). In other words, when age and BMI were kept constant, those who were more active were still more comfortable with their bodies.

Table 46 Mean weekly minimum Met-minutes of exercise by level of bodily comfort for B.C. men, women and both sexes combined

Level of bodily comfort	Minimum Met-minutes of exercise/wk[1,2]		
	Men (Mean ± SD)	Women (Mean ± SD)	All (Mean ± SD)
Very uncomfortable	508 ± 442[a]	456 ± 358[a]	471 ± 383[a]
Somewhat uncomfortable	563 ± 540[ab]	550 ± 332[b]	554 ± 415[ab]
Neutral	506 ± 464[a]	615 ± 424[b]	628 ± 489[ab]
Somewhat comfortable	679 ± 555[ab]	565 ± 384[ab]	628 ± 489[bc]
Very comfortable	792 ± 828[b]	659 ± 383[b]	739 ± 690[c]

[1] Minimum Met-minutes/wk = 15 minutes per session x [(sessions/wk of strenuous exercise x 9 Mets) + (sessions/wk of moderate exercise x 5 Mets) + (sessions/wk of mild exercise x 3 Mets)]. From Godin and Shephard, 1985.

[2] ANOVA of square root transformed minimum Met-minutes of exercise by level of bodily comfort revealed that the main effect of sex was not significant ($F = 0.12$, $P = 0.729$), but that the effect of body comfort level ($F = 8.70$, $P < 0.001$) and the sex-by-body comfort interaction ($F = 4.64$, $P = 0.001$) were significant.

[a,b,c] Means in the same column with different superscripts differed significantly by Scheffe's test, $P < 0.05$.

3.4.4 Key Findings from this Section

- Particularly among men, a high BMI may serve as a stimulus to increase exercise, as B.C. adults who had recently started to exercise regularly had higher BMI than those who had maintained an exercise program for over six months or who had not yet commenced regular exercise. Thus, while it is encouraging that men with the highest BMIs appear to be attempting to become more active, this finding also suggests that those with relatively lower (but not low) BMI may be less motivated to exercise.
- There was some evidence that increased exercise was associated with better health outcomes:
    - Among women, those who exercised moderately or strenuously seven or more times a week had lower mean BMI than those who exercised at this level less than four times weekly. Among men, the relationship was not as supportive: Men who exercised less than four or seven or more times weekly, had similar mean BMI that was lower than that of men who exercised moderately or strenuously four to six times weekly.
    - Considering men and women together, those in the normal weight category (BMI 18.5-24.9) had higher minimum Met-minutes of exercise (this measure combines exercise frequency and intensity) than those who were obese (BMI ≥30). However, associations differed between men and women: Normal weight and overweight men (BMI 25.0-29.9) exercised similar amounts of met-minutes, that were higher than obese men. In contrast, normal weight women had higher minimum Met-minutes of exercise than overweight women, while obese women had intermediate levels and did not differ from either normal weight or overweight women.
    - B.C. adults who exercised moderately or strenuously at least four times a week had lower mean waist circumference than those who exercised at this level fewer than four times weekly.
    - B.C. adults classified as at low risk based on waist circumference had higher minimum Met-minutes of exercise than those classified at increased risk, who in turn had a higher mean than those classified at substantial risk.
- Both body mass index and amount of exercise were independently associated with the level of bodily comfort: Those with lower BMI (controlling for the amount of exercise) and higher minimum Met-minutes of exercise (controlling for BMI) felt more comfortable with their bodies.

4.0 Conclusions

The purpose of this analysis was to assess weight and physical activity among British Columbia adults. A key finding was that over half of B.C. adults (55%) are overweight or obese. The prevalence of overweight and obesity has increased markedly since 1989, when measured BMI values were obtained during the B.C. Heart Health Survey and revealed a prevalence of overweight/obesity of 44% (Heart and Stroke Foundation of B.C. and Yukon, 1998). It should also be noted that the prevalence of overweight and obesity is considerably higher than the estimate of 42% obtained in the most recent Canada Community Health Survey (CCHS), which was conducted in 2000-2001 (Statistics Canada, 2002). Since the BCNS and the CCHS took place within the same general time period, the difference does not reflect changes over time. Instead, it likely reflects the different methodologies: the CCHS obtained self-reported heights and weights, while the BCNS used measured values. It is well-established that weight is under-reported and that height tends to be over-reported and the combination of these two biases leads to self-reported values for BMI that are lower than measured values (Rowland, 1990). The proportion of B.C. adults who are overweight or obese appears to be lower than that reported in other provinces. For example, in Prince Edward Island, 67% had a BMI >25 (Taylor et al, 2002), while in Saskatchewan, 58.4% of those under 60 years of age fell in this category (Stephen and Reeder, 2001). However, this should not be interpreted as meaning that the issue does not need to be addressed in B.C., as secular data collected elsewhere indicate that it is a growing concern (Flegal et al, 2002). And while the proportions of B.C. adults who are overweight or obese differ to some extent according to sociodemographic variables, no groups are immune. Accordingly, strategies that are broadly based and directed to the population as a whole appear warranted.

Level of physical fitness is another important health risk factor and has been shown to modify the relationship between overweight/obesity and health risk (e.g., Stevens et al, 2002, Wei et al, 1999, Evenson et al, 2003, Haapanen-Niemi et al, 2000, Farrell et al, 2002). For example, men who are obese and physically fit were at considerably lower risk of total and cardiovascular mortality than those who were obese and unfit (Wei et al, 1999). Accordingly, if data were available to show that B.C. adults had a high level of physical fitness, the high prevalence of overweight and obesity might be of less concern. In the studies reporting these associations, however, physical fitness was assessed using objective measures such as treadmill testing protocols. In contrast, the BCNS assessed self-reported physical activity using the Godin Leisure Time Exercise Questionnaire (Godin and Shepherd, 1985). Although self-reported physical activity is known to correlate with physical fitness, the relation-

ship is an imperfect one (Williams, 2001). For example, an objective fitness measure (maximal oxygen uptake) was correlated with self-reported strenuous activity assessed with the Godin Leisure Time Exercise Questionnaire, but no associations were observed between fitness and self-reported moderate and light activity (Godin and Shepherd, 1985).

Given the above considerations, the data obtained in the BCNS suggest that as a group, British Columbians are not physically active enough to attain the fitness levels needed to reduce the health risk associated with overweight and obesity. For example, when only strenuous exercise is considered (because it correlates with fitness), it was found that 61% of B.C. adults do no strenuous exercise and that less than 15% exercise strenuously for at least 15 minutes four or more times per week. The proportions participating in moderate exercise were less discouraging, but still reflect room for improvement: 36% did no moderate exercise and about 30% exercised moderately for at least 15 minutes four or more times per week.

Recent recommendations issued from the Institute of Medicine (IOM) of the National Academy of Sciences call for the accumulation of at least 60 minutes per day of moderate exercise, in addition to activities of daily living (IOM, 2002). In this case, "moderate" exercise is described as the equivalent of walking/jogging at 4-5 miles/hour, which is almost certainly more intense than most people's definition of "brisk walking". Although the IOM recognized that cardiovascular benefits could be attained with lower amounts of exercise, the increased amounts were felt to be necessary for weight control (IOM, 2002). When assessed against this recommendation, it appears that few B.C. adults are active at this level.

The movement towards promotion of lifestyle physical activity, as opposed to "exercise", may have had unexpected outcomes. Although research indicates that health benefits can be accrued with lifestyle physical activity programs (Andersen et al, 1999), the fact that activities like walking and climbing stairs are now recognized as part of an active lifestyle may lead some people to believe that they are already doing an appropriate amount of activity, when in fact they are doing little more than minimal activities of daily living. Data obtained from the BCNS support this speculation: about 80% of B.C. adults categorized themselves in the "maintenance" stage for lifestyle physical activity. This means that they believed they accumulated at least 30 minutes of activity per day on at least four days of the week and had done so for at least six months. Of course, without an objective measure of fitness, it is not possible to determine whether this activity level is actually sufficient to attain health benefits. Nevertheless, the data suggest that new

strategies may be required if the desired outcome is to increase the amount of physical activity undertaken by the B.C. population.

In conclusion, the prevalence of overweight and obesity among B.C. adults is high and has increased markedly over a ten-year period. Conversely, the proportion of B.C. adults obtaining recommended levels of exercise appears lower than desirable. Broadly-based strategies to promote healthy body weight and increased physical activity have potential to enhance the health of the B.C. population.

5.0 References

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Appendix A

Nutrition, Activity and Health Questionnaire

Identifier # | | | | | |

B.C. NUTRITION, ACTIVITY AND HEALTH QUESTIONNAIRE (Fall Session) FORM D

In the event you find any of the questions sensitive to you, please let me know and we can move on to the next question.

The next questions are about your physical activity and weight.

1. Considering a week in the past month, how many times on the average did you do the following kinds of physical activities for more than 15 minutes **DURING YOUR LEISURE TIME**? (*Show card with examples listed for part a, b and c. Write in each box the appropriate number of times per week.*)

   a. **STRENUOUS EXERCISE** (heart beats rapidly) such as running, jogging, hockey, football, soccer, squash, basketball, cross-country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling, singles tennis, intense weight training, high-impact aerobic exercises.

   # times per week | | |

   b. **MODERATE EXERCISE** (not exhausting) such as fast walking, baseball, doubles tennis, easy bicycling, volleyball, badminton, easy swimming, down hill skiing, popular and folk dancing, callisthenics, weight training for toning muscles, low-impact aerobic exercises, curling (sweeper).

   # times per week | | |

   c. **MILD EXERCISE** (minimal effort) such as yoga, archery, fishing from river bank, bowling, horseshoes, golf, snowmobiling, easy walking, curling (other than sweeper), gardening, housework (vacuuming, sweeping).

   # times per week | | |

For respondents aged 75-84 (age/sex group 7 and 14), go to question 3

2. How do you describe your work? **BY WORK** we mean paid work and non-paid work such as a homemaker. Which of the following best describes how you spend most of your work time. (*Show card. Check (✓) only one. If the person is retired or unemployed, check not applicable. If a person does volunteer work for 20 hours or more per week, this can be considered unpaid work.*)

   - ❑ My work is mainly sitting. I do not walk much during work, e.g. telephone operator, computer programmer.
   - ❑ In my work I walk or move quite a lot but I do not have to lift or carry heavy things, e.g. shop assistant, light housework.
   - ❑ In my work I have to walk and carry a lot or climb staircases often or go uphill, e.g. carpentry, farm work, heavy housework.
   - ❑ My work is heavy physical labour where I usually have to carry, lift heavy things, dig or shovel, e.g. forestry work, heavy farm work, warehouse work.
   - ❑ Not applicable (ie. retired, unemployed, other (specify: _____)

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3. Would you consider yourself overweight, underweight or just about right?

❑ Overweight ➔➔ Would you consider yourself:
- ❑ Very overweight
- ❑ Somewhat overweight
- ❑ A little overweight

❑ Underweight ➔➔ Would you consider yourself:
- ❑ Very underweight
- ❑ Somewhat underweight
- ❑ A little underweight

❑ Just About Right

4. Are you presently trying to change your weight?

❑ Yes ➔➔➔ Are you trying to lose or gain weight?

❑ No ➔ **go to Q 7**

❑ Not sure ➔ **go to Q 7**

❑ Lose ➔➔ How much?

			.	

Kg

or

			.	

Lbs

❑ Not sure

➥ **go to Q 5**

❑ Gain ➔➔ How much?

			.	

Kg

or

			.	

Lbs

❑ Not sure

➥ **go to Q 6**

❑ Not Sure ➔ **go to Q 7**

Identifier # | | | | | |

5. What are you currently doing to lose weight? (*Do NOT read out responses. Check (✓) all that apply. After each verbal response, ask, "Is there anything else you are doing?"*)

- ❑ Changing eating habits (such as reducing portions, eating less fat)
- ❑ Exercising more
- ❑ Following a specific diet plan
- ❑ Skipping meals
- ❑ Taking diet pills
- ❑ Taking meal replacements/supplements (specify _____)
- ❑ Attending a weight control program
- ❑ Receiving dietary counselling with registered dietitian/nutritionist
- ❑ Receiving dietary counselling (other, specify_____)
- ❑ Other (specify_____)

➔ **GO TO QUESTION 7a**

6. What are you currently doing to gain weight? (*Do NOT read responses. Check (✓) all that apply. After each verbal response, ask, "Is there anything else you are doing?"*)

- ❑ Changing eating habits (such as increasing portions, eating more frequently, eating higher calorie foods)
- ❑ Exercising more
- ❑ Restricting exercise
- ❑ Following a specific diet plan
- ❑ Taking meal replacements/supplements (specify_____)
- ❑ Receiving dietary counselling with registered dietitian/nutritionist
- ❑ Receiving dietary counselling (other, specify_____)
- ❑ Other (specify_____)

7a. The next question addresses your exercise habits and is based upon the following definition of exercise. (*Show card. Read definition*.)

Exercise includes activities such as swimming, aerobic dancing, biking, rowing, jogging, brisk walking, etc. Activities that are primarily sedentary, such as bowling, or playing golf with a cart, would not be considered exercise. (*Ask the respondent if he/she understands the definition. Repeat the definition if necessary*.)

Considering this definition, please listen to the following statements and answer yes or no. (*Check (✓) the response*)

I currently exercise.

- ❑ Yes ➔ **go to question 7c**
- ❑ No

7b. I intend to exercise in the next 6 months.

- ❑ Yes ➔ **go to question 8**
- ❑ No ➔ **go to question 8**

Identifier # | | | | | |

7c. I'm going to read you a definition of ***REGULAR*** exercise to consider for the next statement. ***REGULAR*** exercise is equal to 3 times or more per week for 20 minutes or longer each time. (*Show card. Read definition. Ask the respondent if he/she understands the definition. Repeat the definition if necessary*.)

I currently exercise ***REGULARLY***.

- ❑ Yes → **go to question 7d**
- ❑ No → **go to question 8**

7d. I have been exercising ***REGULARLY*** for the past 6 months.

- ❑ Yes
- ❑ No

The next set of questions are about your weight and the way you feel about your body.

8. On a scale of 1-5, where 1 is very uncomfortable and 5 is very comfortable, how comfortable do you feel about your body when you see yourself in a mirror? (*Show card. Circle answer.*)

1	2	3	4	5	
Very Uncomfortable	Somewhat Uncomfortable	Neutral (neither comfortable nor uncomfortable)	Somewhat Comfortable	Very Comfortable	Not Sure

For respondents aged 75-84 (age/sex group 7 and 14), go to question 23

9. First, I'm going to read out some statements. please state whether the statement is true (T) or false (F) for you. (*If respondent cannot decide whether a statement is true or false for them, ask them to identify whether it is true or false most of the time*)

I. I do not eat some foods because they make me fat..... T F

ii. When I feel 'down' or sad, I often overeat..... T F

iii. I deliberately take small helpings as a means of controlling my weight ..... T F

iv. Sometimes when I start eating, I just can't seem to stop ..... T F

v. When I feel lonely, I console myself by eating ..... T F

Identifier # | | | | | |

10. For the next set of questions, I'm going to ask you to indicate which response best describes your eating behaviour.

    i. How often are you restricting your food intake in a conscious effort to control your weight. Would you say you do this:

1	2	3	4
Rarely	Sometimes	Usually	Always

    ii. Do you go on eating binges even though you are not hungry? Would you say you do this: (*Read definition: A binge means eating a very large amount of food in a very short period of time, and feeling that you can't control how much you're eating.*)

1	2	3	4
Never	Rarely	Sometimes	At least weekly

    iii. How likely are you to consciously eat less than you want. Would you say you are:

1	2	3	4
Unlikely	Slightly likely	Moderately likely	Very likely

    iv. On a scale of 0-5, where 0 means no restraint in eating (eating whatever you want, whenever you want), and 5 means total restraint (constantly limiting food intake and never 'giving in'), how would you rate yourself? (*Show card. Circle response*).

0	1	2	3	4	5
eat whatever you want, whenever you want	usually eat whatever you want, whenever you want	often eat whatever you want, whenever you want	often limit food intake, but often 'give in'	usually limit food intake, rarely 'give in'	constantly limit food intake, never 'give in'

11-22. questions were withdrawn for the fall session

Identifier # | | | | | |

Next, I am going to ask some questions about your family's food situation.

23. In the past 12 months, did you or anyone else in your family worry that there would not be enough to eat because of a lack of money?

- ❑ Yes
- ❑ No
- ❑ Don't know

24. In the past 12 months, did you or anyone else in your family not have enough food to eat because of a lack of money?

- ❑ Yes
- ❑ No
- ❑ Don't know

25. In the past 12 months, did you or anyone else in your family not eat the quality or variety of foods that you wanted to eat because of a lack of money?

- ❑ Yes
- ❑ No
- ❑ Don't know

➥ **If respondent answered Yes to any of Q 23, 24 OR 25, go to Q 26**
➥ **If respondent answered No or Don't know to all of Q 23, 24 AND 25, go to Q 29**

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26. In the past 12 months, how often did you or anyone in your family receive food from a food bank, soup kitchen or other charitable agency because there was not enough money for food?

- ❑ About every week
- ❑ About every other week
- ❑ About every month
- ❑ About 6 times
- ❑ About once or twice
- ❑ Not at all
- ❑ Don't know

27. In the past 12 months, how often did you or anyone in your family eat cheaper foods or eat the same foods for several days in a row because there was not enough money for food?

- ❑ About every week
- ❑ About every other week
- ❑ About every month
- ❑ About 6 times
- ❑ About once or twice
- ❑ Not at all
- ❑ Don't know

Identifier # | | | | | |

28. In the past 12 months, how often did you or other members of your family skip meals or eat less than you should because there was not enough money for food?

- ❑ About every week
- ❑ About most every other week
- ❑ About every month
- ❑ About 6 times
- ❑ About once or twice
- ❑ Not at all
- ❑ Don't know

29. In some parts of Canada there are food action programs to help people with their food situation. Do you think any of the following programs would help you? (*Read definittions of programs*.)

a. Community Kitchens - a small group of people get together to plan, shop and cook for themselves and their families (usually in a community centre), sharing the cost, and taking the food home to be eaten.

- ❑ Yes
- ❑ No
- ❑ Don't know

b. Food Buying Clubs - a large group of people get together to buy food directly from wholesalers and local growers, to sort and package for delivery to or pick-up by club members.

- ❑ Yes
- ❑ No
- ❑ Don't know

c. Community Gardens - people grow fruits and vegetables for themselves and their families at a public garden usually with advice and support of volunteer gardeners.

- ❑ Yes
- ❑ No
- ❑ Don't know

d. Community Food Advisors - volunteers are trained to share their food skills in free workshops usually offered through community centres on preparing low cost, nutritious meals.

- ❑ Yes
- ❑ No
- ❑ Don't know

Identifier # | | | | | |

Next I'm going to ask some questions about food shopping.

30. Thinking about the food in the store where you do or a member of your family does most of the food shopping, on a scale of 1 to 5 where 1 is strongly disagree and 5 is strongly agree, how would you respond to the following statements? (*Show response cards*.)

The food is reasonably priced.

1 Strongly Disagree	2 Disagree	3 Neutral (neither agree nor disagree)	4 Agree	5 Strongly Agree	Don't Know

The food is of reasonable quality.

1 Strongly Disagree	2 Disagree	3 Neutral (neither agree nor disagree)	4 Agree	5 Strongly Agree	Don't Know

There is reasonable variety in the food available.

1 Strongly Disagree	2 Disagree	3 Neutral (neither agree nor disagree)	4 Agree	5 Strongly Agree	Don't Know

31. When available, do you choose to buy foods grown or produced in B.C. instead of food grown or produced elsewhere? (*Read response categories*.)

- ❑ Always
- ❑ Often
- ❑ Sometimes
- ❑ Never
- ❑ Don't know
- ❑ Don't shop

32. When available, do you choose to buy organically grown foods instead of conventionally produced foods? (*Read response categories*.)

- ❑ Always
- ❑ Often
- ❑ Sometimes
- ❑ Never
- ❑ Don't know
- ❑ Don't shop

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Now I'm going to ask you about your consumption of foods from sources outside of the commercial food supply. These include home-grown and wild foods.

For questions 33 to 38, respondents aged 75-84 (age/sex group 7 and 14) are only asked the first part of each question (i.e. if they have eaten the food in the past 12 months).

33. In the past 12 months, did you eat any berries grown in B.C.? These include home-grown or wild strawberries, blueberries, raspberries, blackberries, salmonberries, huckleberries and gooseberries. (*Prompt - This does not include berries bought at the grocery store or farmers market or picked at a u-pick*).

❑ Yes ❑ No → **go to question 34** ❑ Don't know → **go to question 34**

Over what time period did you eat these berries, including berries that were made into jam, canned or frozen and eaten later in the past 12 months? (*Read list*)	In that time period, how often did you eat these berries? (*Prompt - either per day, per week, per month or per year*)		On average, how much did you eat each time you ate some?		COMMENTS
	#	DAY/D WEEK/W MONTH/M YEAR/Y	REFERENCE PORTION SIZE OR MODEL	HOW MUCH/ HOW MANY?	
❑ over 2 weeks ❑ over 1 month ❑ over 3 months ❑ over 6 months ❑ over 12 months ❑ other, specify:			1 SP-S (jam) ½ CUP		

34. In the past 12 months, did you eat any wild mushrooms grown in B.C.? (*Prompt - This does not include mushrooms bought in the grocery store or farmers market*)

❑ Yes ❑ No → **go to question 35** ❑ Don't know → **go to question 35**

Over what time period did you eat wild mushrooms in the past 12 months? (*Read list*)	In that time period, how often did you eat wild mushrooms? (*Prompt - either per day, per week, per month or per year*)		On average, how much did you eat each time you ate some?		COMMENTS
	#	DAY/D WEEK/W MONTH/M YEAR/Y	REFERENCE PORTION SIZE OR MODEL	HOW MUCH/ HOW MANY?	
❑ over 2 weeks ❑ over 1 month ❑ over 3 months ❑ over 6 months ❑ over 12 months ❑ other, specify:			½ CUP		

Identifier # | | | | | |

35. In the past 12 months, did you eat any wild fish caught in B.C.? (*Prompt - This does not include fish bought in the grocery store or fish market or caught at a fish farm.*)

❑ Yes ❑ No ➔ **go to question 36** ❑ Don't know ➔ **go to question 36**

What kind of wild fish did you eat? (*Read list. Check (✓) all that apply*)	Over what time period did you eat this fish, including the fish that was smoked, canned or frozen and eaten later in the past 12 months? (*Read list*) A - over 2 weeks B - over 1 month C - over 3 months D - over 6 months E - over 12 months F - other (specify)	In that time period, how often did you eat this fish? (*Prompt - either per day, per week, per month or per year*)		On average, how much did you eat each time you ate some?	
		#	DAY/D WEEK/W MONTH/M YEAR/Y	REFERENCE PORTION SIZE OR MODEL	HOW MUCH/ HOW MANY?
❑ salmon				PC-S	
❑ salmon liver				1 liver	
❑ trout				PC-S	
❑ trout liver				1 liver	
❑ whitefish				PC-S	
❑ whitefish liver				1 liver	
❑ chub				PC-S	
❑ chub liver				1 liver	
❑ burbot				PC-S	
❑ burbot liver				1 liver	
❑ squawfish				PC-S	
❑ squawfish liver				1 liver	

COMMENTS:

36. In the past 12 months, did you eat any wild birds (such as duck, goose, partridge, quail and grouse) caught in B.C.? (*Prompt - This does not include wild birds bought in the grocery store or farmers market.*)

❑ Yes ❑ No ➔ **go to question 37** ❑ Don't know ➔ **go to question 37**

Over what time period did you eat wild birds, including the birds that were smoked or frozen and eaten later in the past 12 months? (*Read list*)	In that time period, how often did you eat wild birds? (*Prompt - either per day, per week, per month or per year*)		On average, how much did you eat each time you ate some?		COMMENTS
	#	DAY/D WEEK/W MONTH/M YEAR/Y	REFERENCE PORTION SIZE OR MODEL	HOW MUCH/ HOW MANY?	
❑ over 2 weeks ❑ over 1 month ❑ over 3 months ❑ over 6 months ❑ over 12 months					

Identifier # | | | | | |

36. In the past 12 months, did you eat any wild birds (such as duck, goose, partridge, quail and grouse) caught in B.C.? (*Prompt - This does not include wild birds bought in the grocery store or farmers market*.)

❑ Yes ❑ No → **go to question 37** ❑ Don't know → **go to question 37**

Over what time period did you eat wild birds, including the birds that were smoked or frozen and eaten later in the past 12 months? (*Read list*)	In that time period, how often did you eat wild birds? (*Prompt - either per day, per week, per month or per year*)		On average, how much did you eat each time you ate some?		COMMENTS
	#	DAY/D WEEK/W MONTH/M YEAR/Y	REFERENCE PORTION SIZE OR MODEL	HOW MUCH/ HOW MANY?	
❑ other, specify:			PC-S		

37. In the past 12 months, did you eat any wild shellfish caught in B.C.? (*Prompt - This does not include shellfish bought in the grocery store or fish market*.)

❑ Yes ❑ No → **go to question 38** ❑ Don't know → **go to question 38**

What kind of shellfish did you eat? (*Read list. Check (✓) all that apply*)	Over what time period did you eat this shellfish, including the shellfish that was canned or frozen and eaten later in the past 12 months? (*Read list*) A - over 2 weeks B - over 1 month C - over 3 months D - over 6 months E - over 12 months F - other (specify)	In that time period, how often did you eat this shellfish? (*Prompt- either per day, per week, per month or per year*)		On average, how much did you eat each time you ate some?	
		#	DAY/D WEEK/W MONTH/M YEAR/Y	REFERENCE PORTION SIZE OR MODEL	HOW MUCH/ HOW MANY?
❑ shrimp / prawns				MO-M	
❑ oysters / mussels / clams				MO-M	
❑ crab				MO-M	
❑ crab digestive organs (show picture)				MO-S	

COMMENTS:

38. In the past 12 months, did you eat any wild game (such as caribou, deer or rabbit) caught in B.C.? (*Prompt - This does not include game bought in the grocery store or farmers market*.)

❑ Yes ❑ No → **go to next questionnaire** ❑ Don't know → **go to next questionnaire**

Identifier # | | | | | |

(*Probe to find out if muscle, liver or kidney, was eaten*)	Over what time period did you eat wild game, including the game that was smoked, made into sausages or frozen and eaten later in the past 12 months? (*Read list*) A - over 2 weeks B - over 1 month C - over 3 months D - over 6 months E - over 12 months F - other (specify)	In that time period, how often did you eat wild game? (*Prompt - either per day, per week, per month or per year.*)		On average, how much did you eat each time you ate some?	
		#	DAY/D WEEK/W MONTH/M YEAR/Y	REFERENCE PORTION SIZE OR MODEL	HOW MUCH/ HOW MANY?
❑ muscle				PC-S	
❑ liver				1 liver	
❑ kidney				1 kidney	
COMMENTS:					