

British Columbia Nutrition Survey: Report on Seniors' Nutritional Health

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Executive Summary

The British Columbia Nutrition Survey (BCNS) was conducted in 1999 by Health Canada and the BC Ministry of Health Services, in association with the University of British Columbia, to obtain comprehensive up-to-date information on the eating habits and body weights of adult British Columbians. The 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.

The results presented within this report focuses on the nutritional health of the senior population aged 65-84 years of age, mainly energy and nutrient intakes and food group use in this group. The seniors' population was a particular focus for the BCNS since 13% of the population is over the age of 65 years and this proportion is expected to increase greatly over the next 30 years. As well, research suggests that older individuals experience problems of over nutrition such as obesity and under nutrition such as micronutrient deficiencies.

The findings from the BCNS provide documentation of the nutrition concerns of senior British Columbians, the impetus for future policy and program planning and development. Key findings are highlighted below.

- Sixty-three percent of older adults living in B.C. are overweight or obese and less than 2% are classified as underweight. About 62% of this population are at increased or substantial risk for health problems according to the waist circumference risk categories. Many of these seniors reported having a chronic disorder with about 20% reporting having heart disease, 20% having cancer, 26% high cholesterol and nearly 40% high blood pressure.
- About 56% and 90% of older adults reported no moderate and strenuous exercise, respectively. However, half reported doing mild exercise more than six times per week. Examples of mild exercises include fishing, bowling, horseshoes, golf, easy walking, gardening and housework. When assessing motivational readiness for physical activity, almost 50% and 77% of seniors reported being in the maintenance stage for structured exercise and lifestyle activity, respectively, similar to what younger adults reported.
- Seventy percent of B.C. seniors consumed a vitamin/mineral supplement yesterday. Non-nutritional supplements (i.e., supplements that were not vitamin and mineral supplements) were consumed by one-third to about 40% of the older population. Multiple supplement use increased with age and was more common in women than men. The most common types of supplements used were vitamin and mineral supplements, vitamins E and C supplements, herbal supplements (e.g., ginkgo and St. John's wort) and alternative supplements (e.g., Coenzyme Q10 and glucosamine).
- As expected, energy intakes decreased with age. Mean energy intakes were below the estimated requirements suggesting that B.C. seniors underreported their food intake, similar to all B.C. adults and what has been reported elsewhere.

- The majority of seniors were within the Acceptable Macronutrient Distribution Ranges for protein, total fat and carbohydrates. However, almost 25% of older adults consumed less than 45% of their total energy from carbohydrates and one-third consumed more than 35% of their energy from fat sources.
- The nutrients of concern with high levels of inadequacy (levels of inadequacy $\geq 10\%$ as assessed against an Estimated Average Requirement [EAR]) were folate, vitamins B6, B12 and C, magnesium and zinc for both sexes and protein for men.
- Fibre and calcium were also nutrients of concern for older adults since the usual median intakes were well below the Adequate Intakes (AI) established for these nutrients.
- About 62% of older men and 25% of older women were above the UL for sodium (2.3 g/day). Since a high percentage of seniors in B.C. (38%) reported having high blood pressure, excessive intakes of sodium, along with low intakes of potassium, calcium and magnesium, indicate that the area of nutrient intakes as it relates to high blood pressure remains a public health concern.
- A large proportion of B.C. senior women are not meeting the minimum recommendations for grain products vegetables and fruit, milk and milk products and meat and alternates. Most men did not meet the minimum suggested amount for milk and milk products and almost half did not consume at least five servings of vegetables and fruit.
- On a given day, older adults in B.C. choose lower fat fluid milk products and lower fat meat choices. As with younger adults seniors chose whole grain and enriched grain products more often; however, most of these choices were enriched products. Green and orange vegetables and fruits accounted for only 13% of the portions consumed from this

food group. Even though older adults are consuming leaner meats, only about 10% of the portions for meat and alternates were legumes and seeds.

In conclusion, a large proportion of seniors living in B.C. have inadequate intakes of many macro- and micro- nutrients and over 60% are either overweight or obese, placing them at risk for heart disease, cancers, bone disorders, cognitive impairment, and bowel disturbances. To try and reduce the risk of chronic diseases as the population ages and ultimately curb health care and societal costs at large, it is imperative that support be provided for educational interventions, preventive measures, continuous nutritional surveillance and ongoing research endeavours. Policy makers, health professionals, and communities have to work together to promote the nutritional health, well-being, independence and quality of life of senior British Columbians.

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In addition, I would like to extend my gratitude to Health Canada and the B.C. Ministry of Health Services for funding this project. And finally, a special thank you to all the residents of British Columbia who so willingly agreed to participate (particularly B.C. older adults for this report) and giving their valuable time and input into this project.

1.0 INTRODUCTION

The British Columbia Nutrition Survey (BCNS) was conducted by Health Canada and the B.C. Ministry of Health Services, in association with the University of British Columbia, to obtain comprehensive up-to-date information on the eating habits and body weights of adult British Columbians. The province-wide survey involved 90-minute, in-home interviews conducted by trained public health nurses and nutritionists with 1823 participants, ranging in age from 18-84 years. Several questionnaires were used to assess food consumption and priority nutrition concerns 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 anthropometric data (i.e., height, weight and waist circumference measurements) were also collected. 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 (BC Ministry of Health Services, 2004a).

This present report focuses on the nutritional health of community-dwelling (or free-living) seniors, namely the population aged 65-84 years. Individuals living in institutions were excluded from the sample. Seniors were a particular focus for the BCNS for the following reasons: Older adults are living longer and the proportion of the population that is 65 years and older is increasing in B.C. This proportion is projected to continue to rise over the next couple of decades. Presently, it is estimated that 13.5% of the B.C. population is 65 years and over, with about 10% between 65 and 79 years and the remainder being 80 years old or over. By 2031, it is estimated that seniors will make up about 23% of the population in B.C. The proportion of

seniors over the age of 80 years will also increase from 3.3% of the population in 2001 to 6.1% in 2031(B.C. Stats. Ministry of Management Services, 2004).

As people age, a balanced diet may be harder to achieve as energy requirements decline with age while many nutrient requirements remain the same. Both undernutrition and overnutrition may be problematic for older adults. An increased risk of undernutrition in this population is due to multiple social, economic and medical factors. Malnutrition affects anywhere from 5%-12% of community-dwelling seniors (Johnson et al, 2002). Common nutritional concerns among older adults are obesity and micronutrient deficiencies. As well, this population group has a high risk of diet-related disease conditions such as cardiovascular disease, cerebrovascular disease and type 2 diabetes. All of these conditions are associated with diets high in fat, a lack of variety of food choices, obesity, and sedentary lifestyles (Jensen et al, 1997; American Dietetic Association, 1996; American Dietetic Association, 2000). Studies examining community-dwelling seniors have shown that inadequate consumption of the recommended food groups and high use of prescribed medications were identified as the most frequent nutritional risk factors (Jensen et al, 1997; Dewolfe and Millan, 2003).

In the BCNS we extended the seniors' age grouping beyond what other provincial nutrition surveys did and included individuals from 75 to 84 years of age. As stated earlier, this is a rapidly growing portion of our population and older seniors may be at greater nutritional risk than younger seniors due to potentially 'higher prevalences of food security, chronic diseases, debilitating conditions and social isolation' (Ministry of Health Services, 2004d). Overall, it is

important to have an understanding of the nutritional health of seniors to be able to inform policy and programs to ensure the nutritional well-being of this population group.

In this report, Chapter 2.0 will describe the methodology used and Chapter 3.0 will present and discuss the results from the BCNS pertinent to the B.C. seniors' population. A summary and implications of the results are provided in Chapter 4.0.

2.0 METHODS

The methods used for this report are described in the Reports on Energy and Nutrient Intakes, Food Group Use and Physical Activity and Body Weight (B.C. Ministry of Health Services, 2004a, 2004b, 2004c). The data for the age subsets of 65-74 and 75-84 for both sexes were used.

Tables were generated using data presented in the technical reports provided by Health Canada (BBCA E451311-011B V1, BBCA E431311-011CV1 and E451313-011 CFG-V1) and further manipulations of the raw data as determined by the BCNS research team. Data were analyzed using SAS (SAS Institute Inc, Cary, NC) and SPSS (Statistical Package for Social Sciences, version 11.0, Chicago, Ill., 2002). All data presented in the tables have been weighted in order to provide estimates for the senior British Columbian population. Table 1 provides the observed and weighted sample sizes for the B.C. seniors' population.

Table 1. Observed and weighted sample sizes for B.C. seniors for the B.C. Nutrition Survey

Sample Size	BCNS Participants < 65 years	BCNS Seniors 65-84 years	Men 65-74 years	Men 75-84 years	Women 65-74 years	Women 75-84 years
Observed	1088	735	194	199	169	173
Weighted	1480	343	123	44	114	63

Source: BBCA Technical Document E451313-011B V1.

In addition, all tables in sections 3.2 and 3.3 except for Tables 23 to 25 have been adjusted for intrasubject variability to reflect usual energy and nutrient intakes and usual intakes in relation to food groupings. Tables 23 to 25 present data from one-day intakes only since at the time of writing this report a method was not available that would allow the adjustment to consider four

variables at one time such as the four food groups in Canada's Food Guide to Healthy Eating (CFGHE).

Nutrient intakes in section 3.2 were assessed against the Dietary Reference Intakes (DRIs), including the Estimated Average Requirement (EAR), Adequate Intake (AI) and the Tolerable Upper Intake Level (UL), to determine inadequacies or issues of over-consumption in older British Columbians. For nutrients with an EAR, the proportion below the EAR reflects the prevalence of inadequacy. The prevalence of inadequacy cannot be determined for nutrients with an established AI. However, when the median usual intake of a group meets or exceeds the AI, the expected prevalence of inadequacy is low, particularly if the AI was set as the median intake of a healthy group. For a more detailed description of DRIs, refer to Chapter 2.0 (Literature Review, section 2.2.1.4) of the B.C. Nutrition Survey, Report on Energy and Nutrient Intakes (B.C. Ministry of Health Services, 2004a)

In the results that follow, comparative data are presented for B.C. seniors and for the B.C. population. Nutrient and food intake data are also presented for men and women separately for B.C. seniors aged 65-74 and 75-84 years. However, statistical significance of the differences was not assessed, and accordingly, the data should be interpreted with this limitation in mind.

3.0 RESULTS AND DISCUSSION

The results are presented in three sections. The first section presents demographic and descriptive data for the population 65-84 years. The second and third sections present data on energy and nutrient intakes and food group use, respectively, for this population.

3.1 Selected Demographic and Descriptive Data

A number of demographic characteristics of the BCNS senior participants are depicted in Table 2 and compared to the results obtained for the adult population less than 65 years (18-64 y) in the BCNS (B.C. Ministry of Health Services, 2004a). Compared to the younger adult group, a smaller proportion of seniors had a university degree, some university courses and/or a technical school degree. The educational level attained by seniors in the BCNS is similar to what has been reported by Statistics Canada (Canadian Community Health Survey, Cycle 1.1, 2000/2001; Ministry of Health Services, 2004d) for men (50% versus 49% for some aspect of post-secondary education); however, the women in the BCNS appear slightly more educated than the general senior women population (46.5% versus 39.5% with some post-secondary education).

A smaller proportion of B.C. seniors smoked whereas more seniors were vitamin/mineral supplement users than adults aged 18-64 years (Table 2). Trends suggest that fewer seniors aged 75-84 years smoked regardless of gender and more senior women (65-84 years) were vitamin/mineral supplement users than men. Eight per cent of seniors smoked according to data from Statistics Canada (Canadian Community Health Survey, Cycle 1.1, 2000/2001; Ministry of Health Services, 2004d) compared to about 12% from the BCNS.

As one might expect, more seniors were widowed than the young adult population, particularly senior women. Most seniors reported either being married or widowed, similar to what was found in the 2001 census (Statistics Canada, 2001; Ministry of Health Services, 2004d). However, in the 2001 census, 52% of women aged 75-84 years were widowed compared to 38% in the BCNS.

Table 2. Demographic characteristics of the B.C. Nutrition Survey's senior participants (65 years and over) expressed as a percentage (%).

Characteristic	BCNS Participants < 65 y	BCNS Seniors 65-84 y	Men 65-74 y	Men 75-84 y	Women 65-74 y	Women 75-84 y
Education Level:						
Completed high school or less	29.1	51.2	48.4	50.5	53.2	53.4
Technical school/some university	50.3	34.9	34.7	32.7	36.6	33.6
University Degree	20.6	14.0	16.9	16.8	10.2	13.0
Marital Status:						
Married/Common Law	59.3	68.9	85.6	69.2	58.1	55.6
Divorced/Separated	9.7	7.5	7.4	6.2	7.2	4.1
Widowed	1.5	20.8	3.8	19.3	30.1	38.3
Single	28.3	1.5	1.7	1.7	0.9	2.1
Aboriginal/First Nations	2.8	2.1	1.0	3.1	3.7	0.7
Smokers	17.8	11.5	13.6	7.2	16.6	3.2
Vitamin/Mineral Supplement Users	57.1	70.3	56.6	69.5	78.1	83.4

*Data are weighted

3.1.1 Income and Food Security

Socioeconomic status is a key determinant of health and studies have indicated that lower levels of socioeconomic factors such as education and income are associated with higher levels of morbidity and mortality (Huisman et al, 2003; Ministry of Health Services, 2004d). Level of education attained by B.C. seniors according to the BCNS was discussed in the previous section

(Table 2). Regarding income status, fewer senior men and more senior women were classified as low income compared to B.C. adults less than 65 years of age (Table 3) and as reported elsewhere (Ministry of Health Services, 2004d). However, on average, there was no difference in the proportion of younger or older adults classified as low income. In the U.S. in 1998, about 17% of older adults were considered poor or near-poor (American Dietetics Association, 2000), a proportion that is similar to what was observed in the BCNS (22%). However, as indicated in Table 3, fewer seniors were considered food insecure (not having enough money to buy food or the variety and quality of food they would like during the past 12 months) than younger adults in B.C., regardless of gender.

Table 3. Income and food security data of the B.C. Nutrition Survey's senior participants (65 years and over) expressed as a percentage (%).

Characteristic	BCNS Participants <65 y	BCNS Seniors 65-84 y	Men 65-74 y	Men 75-84 y	Women 65-74 y	Women 75-84 y
Low Income	23.8	22.9	18.1	14.9	26.5	33.8
Worried that there would not be enough to eat because of lack of money	11.0	1.3	0.5	0	3.0	0.7
Did not have enough food to eat because of lack of money	3.9	1.5	2.5	0.2	1.7	2.0
Did not eat the quality or variety of foods because of lack of money	16.5	4.8	3.9	2.9	5.4	6.7

*Data are weighted

3.1.2 Health Status

3.1.2.1 Chronic Disorders

The leading causes of death for seniors in B.C. are cardiovascular disease, cancer, strokes, and chronic lung diseases (B.C. Vital Stats Agency Annual Report, 2002). Table 4 shows the proportion of BCNS seniors who reported having a chronic disorder, indicating that one-fifth of B.C. seniors have or have had heart disease and cancer, about 12% live with osteoporosis and nearly 15% have diabetes.

Two of the major risk factors for heart disease are high blood pressure and high cholesterol levels. About 38% of seniors reported having high blood pressure, similar to what has been reported by the Canadian Community Health Survey (Statistics Canada, 2000/2001). As well, one-fifth reported having high cholesterol levels. However, one-quarter of elderly men reported having heart disease while only 13.5% of women reported having this chronic condition. Interestingly, the proportion of men and women reporting high blood pressure remained relatively stable with increasing age; however, the percentage having high cholesterol levels declined with age while the percentage reporting heart disease increased with age, regardless of gender.

Not surprisingly, since osteoporosis is often considered to be a women's condition, more women than men reported having this disorder (21.6% versus 1.6%).

Table 4 also clearly demonstrates the dramatic increase in having a chronic condition from the younger adult age group to the seniors' group, indicating how important it is to implement preventive measures at an early age.

Table 4. Chronic disorders as self-reported by the B.C. Nutrition Survey's senior participants (65 years and over) expressed as a percentage (%).

Chronic Disorders	BCNS Participants <65 y	BCNS Seniors 65-84 y	Men 65-74 y	Men 75-84 y	Women 65-74 y	Women 75-84 y
Diabetes	2.8	14.5	16.6	15.6	13.3	11.8
Heart Disease	1.9	18.9	20.6	35.8	9.7	20.5
Stroke	0.3	5.5	3.8	6.7	3.8	11.1
High Blood Pressure	7.3	37.9	37.3	36.4	37.7	40.4
High Cholesterol	9.7	25.8	28.7	19.5	27.6	21.4
Cancer	3.1	19.5	16.7	30.6	17.3	21.1
Osteoporosis	1.5	11.9	1.3	2.7	19.6	25.0

*Data weighted

3.1.2.2 Body Mass Index and Waist Circumference

About 63% of the B.C. seniors' population was classified as overweight or obese compared to 53% of the adult population less than 65 years of age (Table 5). For the older adults there appears to be a gender difference with more senior men than women being overweight (Table 5; Figure 1). The last time that the BMIs for B.C. adults were calculated from measured heights and weights was in 1989 for the B.C. Heart Health Survey. At that time, the overall prevalence of obesity (BMI >27) was 44% for men and 38% for women 65-74years (Ministry of Health, Province of British Columbia and Health and Welfare Canada, 1990). It is important to note that the cut-off for overweight and obesity has changed since the 1989 survey and that the BCNS also included individuals from 75-84 years. Even so, the proportion of older adults who are overweight and obese has increased in the last decade, a similar trend observed for all age groups.

Waist circumference was measured for all participants in the BCNS to estimate the potential risk for health problems in the adult population. As shown in Table 6, double the proportion of seniors is at substantial risk for health problems compared to the younger adult population. Thus, it is not surprising that more seniors reported having a chronic condition than adults <65 years as discussed in section 3.1.3.1.

Underweight is not a concern for free-living senior adults in B.C. However, the proportion that are overweight and obese remains a major public health concern.

Table 5. Percent distribution (%) of Body Mass Index (BMI) by age and sex for the B.C. seniors' population.

BMI category	BCNS Participants <65 y	BCNS Seniors 65-84 y	Men 65-74 y	Men 75-84 y	Women 65-74 y	Women 75-84 y
Underweight (<18.5 kg/m ²)	1.2	1.4	0.4	2.1	1.1	3.6
Normal weight (18.5-24.9 kg/m ²)	45.6	35.7	28.7	31.8	41.1	42.6
Overweight (25.0-29.9 kg/m ²)	35.5	42.6	49.4	47.5	36.2	37.6
Obese (≥30 kg/m ²)	17.7	20.2	21.5	18.7	21.6	16.2

*Data are weighted

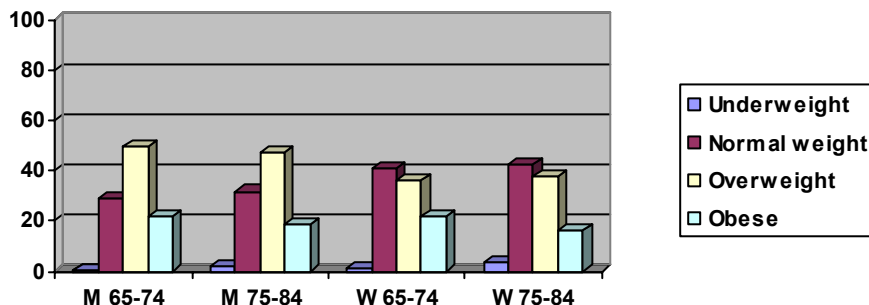


Figure 1. Percent distribution (%) of Body Mass Index (BMI) by age and sex for the B.C. seniors' population. (Note: M=men and W=women; age in years)

Table 6. Percent distribution (%) of waist circumference risk category by age and sex for the B.C. seniors' population.

Waist Circumference Risk Category	BCNS Participants <65 y	BCNS Seniors 65-84 y	Men 65-74 y	Men 75-84 y	Women 65-74 y	Women 75-84 y
Low risk	62.1	38.2	41.4	36.8	36.8	35.5
Increased risk	20.9	27.7	26.3	33.8	27.4	26.8
Substantial risk	17.1	34.1	32.3	29.4	35.8	37.7

*Data are weighted

3.1.2.3 Physical Activity

The frequency of self-reported leisure time structured exercise for BCNS younger and older adults is presented in Table 7. The Leisure-Time Exercise Questionnaire by Godin and Shephard (1985) was used to assess exercise behaviour for the BCNS and data are expressed as the number of times per week that exercise of a given intensity was done for at least 15 minutes (Refer to B.C. Ministry of Health Services, 2004c). As the intensity of the exercise increased, the percentage of adults doing the exercise for more than six times per week decreased. About half of senior adults reported doing mild exercise more than six times per week, compared to 36.3% of younger adults. However, younger adults participated in more moderate and strenuous exercises than senior adults. And, about 56% and 90% of older adults reported no moderate and

strenuous exercise, respectively. This last result is important to examine since recent recommendations suggest that for heart health and weight control benefits an individual needs at least 60 minutes of moderate exercise per day in addition to activities of daily living (Institute of Medicine, 2002). It is clear from the results presented in Table 7, that a large percentage of B.C. seniors is not meeting this recommendation and, combined with the data on BMI presented in the previous section, suggests they are at increased risk for health problems.

Table 7. Mild, moderate and strenuous exercise undertaken by B.C. younger and older adults (number of sessions/week of at least 15 min duration), expressed as a proportion of the population (%).

Exercise category and number of weekly sessions	BCNS Participants <65 y	BCNS Seniors 65-84 y
Mild exercise¹:		
0	10.5	13.0
1-3	34.1	21.7
4-6	18.9	15.1
>6	36.3	49.8
Moderate exercise²:		
0	32.5	53.6
1-3	37.3	18.5
4-6	17.5	11.7
>6	12.5	16.1
Strenuous exercise³:		
0	54.8	90.1
1-3	28.3	5.9
4-6	13.5	1.9
>6	3.5	2.0

¹ 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 & Shehard, 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 & Shephard, 1985)

³ 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 & Shephard, 1985)

Motivational readiness for structured and lifestyle physical activity was assessed using a series of questions derived from Richards Reed (1997) and Marcus (2003) (Refer to B.C. Ministry of Health Services, 2004c). The results are presented in Tables 8 and 9. Table 8 shows that almost half of B.C. adults, regardless of age group, reported being in the maintenance phase for structured exercise whereas the proportion of seniors reported to be in the precontemplation stage was threefold higher than adults less than 65 years. Most adults reported being in the maintenance stage for lifestyle physical activity; 80% and 77% of younger and older adults, respectively (Table 9).

Table 8. Proportion (%) of B.C. younger and older adults by stage of motivational readiness for structured exercise.

Stages of Change for Exercise	BCNS Participants	BCNS Seniors
	<65 y	65-84 y
Precontemplation	11.1	32.5
Contemplation	19.9	12.9
Preparation	12.8	4.3
Action	9.8	2.4
Maintenance	46.4	47.8

*Data are weighted

Table 9. Proportion (%) of B.C. younger and older adults by stage of motivational readiness for lifestyle physical activity.

Stages of Change for Lifestyle Physical Activities	BCNS Participants	BCNS Seniors
	<65 y	65-84 y
Precontemplation	2.9	6.6
Contemplation	2.7	4.0
Preparation	9.9	7.9
Action	4.4	4.4
Maintenance	80.1	77.1

*Data are weighted

3.1.2.4 Supplement Use

The prevalence of supplement use among the elderly population is increasing (Tucker, 2003; Kaufman et al, 2002; Troppmann et al, 2002; Radimer et al, 2000). Studies have shown that supplement use ranges from 30-70% in this population (Tucker, 2003; Houston et al, 1998). The prevalence of supplement use may be attributed to the evidence of health benefits of some and/or health claims of others. For instance, vitamin E has been linked to enhanced immune function (Houston et al, 1998) and, despite recent evidence to the contrary (Eidelman et al, 2004) to reducing heart disease incidence; both beta-carotene and vitamin C have been associated with possible protection against heart disease and cancer (Houston et al, 1998); and calcium and vitamin D are well-known nutrients for bone mineral density maintenance (Murphy et al, 1994).

Examples of health claims associated with herbal or alternative supplements include ginkgo which is associated with enhancing memory and St. John's wort used for reducing depression.

The literature has shown that supplement users are more likely to be women, Caucasian, urban-dwelling, underweight, of older age (i.e., 65 years or more), of higher socioeconomic status, have favourable beliefs in dietary supplements, and have higher nutrient intakes from food (Lyle et al, 1998; Eisenberg et al, 1998; Houston et al, 1998; Kim et al, 1993; McIntosh et al, 1990; Payette & Gray-Donald, 1991; Wyatt et al, 1999).

Interest in supplement use in seniors has grown in recent years for a number of reasons. Aging may lead to the inability to absorb some nutrients such as vitamin B12. Thus, the newly released Dietary Reference Intakes recommend the consumption of synthetic forms (i.e., either supplement or in fortified foods) of this nutrient for adults over 50 years of age (Institute of Medicine, 1998). As well, aging may result in the reduction in the synthesis of other nutrients such as the cutaneous synthesis of vitamin D. Due to insufficient exposure to sunlight and inadequate consumption of vitamin D-rich food sources (Institute of Medicine, 1997), it may be necessary for seniors to supplement with vitamin D (along with calcium) to maximize their bone health. On the other hand, excessive supplement use may lead to adverse effects. High intakes of some supplements may interfere with the normal metabolism of other nutrients, clinical laboratory tests and the therapeutic effects of some medications.

Supplement use for adult British Columbians is presented in the B.C. Nutrition Survey, Report on Supplements (B.C. Ministry of Health Services, 2004e) including data on senior British

Columbians. Supplement use (both nutritional [i.e., vitamins/minerals] and non-nutritional) was determined for the amount taken yesterday and the amount taken during the past month. In general, supplement use was more common among women than men and in adults over the age of 50, similar to what has been reported elsewhere. According to Table 2, 70% of British Columbians aged 65 and over used a vitamin and mineral supplement yesterday. One-day non-nutritional supplement use, including all supplements that are not vitamin/mineral supplements, was 22% for men 51-70 and 36% for men 71-84 years of age; corresponding proportions for women were 45% and 42% (data not shown, B.C. Ministry of Health Services, 2004e). In addition, the prevalence of multiple supplement use increased with age; for example, the proportion of adults over 65 years of age who used four or more supplements yesterday was 25.9% compared to 16% for adults 18-64 years (Table 10).

Table 11 shows the proportion of older adults using the most popular types of supplements in the past month; namely, vitamin and mineral supplements, vitamins E and C supplements as well as herbal (e.g., ginkgo and St. John's wort) and alternative supplements (e.g., Coenzyme Q10 and glucosamine). Many of the vitamin/mineral supplements that B.C. adults used contained calcium, vitamin E and vitamin C. For most of these supplements, the percentages of younger and older adults using them were similar except for vitamin E and vitamin C. A higher proportion of older adults consumed vitamin E and there appears to be a decline in use with age for vitamin C.

Table 10. Proportion (%) of B.C. seniors' population consuming one or more supplements yesterday by age and sex.

Number of Supplements Taken	BCNS Participants <65 y	BCNS Seniors 65-84 y	Men 65-74 y	Men 75-84 y	Women 65-74 y	Women 75-84 y
0	38.7	26.1	39.1	25.8	18.5	14.3
1	18.7	18.4	22.7	14.3	16.2	16.8
2	16.9	17.5	9.1	22.8	22.9	20.4
3	9.5	12.0	10.4	11.5	11.9	15.9
4 or more supplements	16.0	25.9	18.6	25.5	30.5	32.6

*Data are weighted

Table 11. Proportion (%) of B.C. seniors' population consuming the more common types of supplements by age and sex during the past month.

Supplement Type	BCNS Participants <65 y	BCNS Seniors 65-84 y	Men 65-74 y	Men 75-84 y	Women 65-74 y	Women 75-84 y
Vitamin C	13.9	9.5	11.6	11.7	7.2	9.4
Vitamin E	7.1	14.0	16.4	14.8	12.7	12.7
Multivitamins/minerals	19.1	18.2	16.2	16.4	20.4	18.0
Minerals	8.8	7.9	5.6	5.5	9.5	9.2
Alternative supplements (eg. Coenzyme Q, flaxseed oil, glucosamine)	16.9	14.7	13.4	14.9	16.7	12.9
Herbal Supplements (eg, ginkgo, ginger root, St. John's wort)	14.7	13.1	15.6	14.9	10.3	13.7

*Data are weighted

3.2 Energy and Nutrient Intakes

This section provides information on the energy and nutrient intakes of senior British Columbians according to two age groups (i.e., 65-74 and 75-84 years) and gender and helps to identify potential nutrition concerns for this population. The effects of income and geographic strata are not included in this discussion since they did not appear to have an effect on intakes as discussed in Chapter 6.0 of the B.C. Nutrition Survey, Report on Energy and Nutrient Intakes (B.C. Ministry of Health Services, 2004a). As well, education attainment is not included since it did not have an effect on the consumption of most of the nutrients of concern except for vitamin C and vitamin B12, with vitamin C intake higher and vitamin B12 intake lower for those British Columbians who have a higher level of education (B.C. Ministry of Health Services, 2004a).

Vitamins A, D and E are not included in the discussion since the 1999 Canadian Nutrient File used for determining the content of foods consumed by British Columbians was incomplete for vitamins D and E and did not use the appropriate unit (retinol activity equivalents, RAE) for vitamin A for comparisons with the Estimated Average Requirement. However, these are important nutrients to consider for the aging population. Excessive vitamin A intake has been correlated with an increased risk for hip fracture primarily in women not receiving hormone replacement therapy (Feskanich D et al, 2002), vitamin E may play a role in slowing down the formation of cataracts and age-related macular degeneration (Jacques, 1999; Chylack et al, 2002), and vitamin D along with calcium plays a vital role in bone health and fracture risk (Lewis & Modlesky, 1998; Chapuy et al, 2002).

3.2.1 Energy

Energy requirements decrease with age due to a loss of lean body mass resulting in a lower basal metabolic rate and a decrease in physical activity (McGee & Jensen, 2000; ADA, 2000). This decreasing energy need could place seniors at risk for either over-nutrition (as shown in the discussion on overweight and obesity, section 3.1.3) or under-nutrition leading to macro- or micro-nutrient deficiencies (as discussed in forthcoming sections).

Energy intakes for the seniors' population in B.C. are shown in Table 12. For both sexes energy intakes decreased with age as expected, with women consuming less energy than men. Table 12 also shows estimates of total energy expenditure (TEE) for the senior population. The formulas used to determine TEE are presented in footnotes 2, 3, 4 and 5 of Table 12, using participants' measured heights and weights and physical activity coefficients (PA) that assume participants were either sedentary or engaged in low levels of activity. These two PAs were used since it was shown that older adults in B.C. were relatively inactive (refer to section 3.1.2.3).

Mean energy intakes were below the sedentary TEE for men and women in both age groups. Thus, mean energy intakes were essentially lower than the estimated requirements, suggesting that older participants underreported their food intake similarly to most adult British Columbians (B.C. Ministry of Health Services, 2004a) and to what is reported in the literature (Buzzard, 1998; Briefel et al, 1997; Lee and Nieman, 2003).

Table 12. Energy intakes (kcal) by sex and age.

Sex	Age (years)	Mean \pm SEM	25 th	50 th	75 th	TEE Sedentary Mean \pm SEM ^{1,2,3}	TEE Low Activity Mean \pm SEM ^{4,5}
Men	65-74	2169 \pm 51	1734	2190	2548	2238 \pm 23	2485 \pm 26
Men	75-84	1869 \pm 74	1601	1774	2078	2075 \pm 32	2312 \pm 35
Women	65-74	1545 \pm 30	1326	1540	1746	1665 \pm 14	1915 \pm 16
Women	75-84	1468 \pm 32	1322	1514	1612	1573 \pm 22	1820 \pm 25

*Data are weighted

¹SEM=Standard Error of the Mean

²TEE Sedentary for Men=Total Energy Expenditure for those who are sedentary, estimated using the following formula= $662-9.53 \times \text{Age (yr)} + \text{PA} \times (15.91 \times \text{Weight [kg]} + 539.6 \times \text{Height [m]})$, where PA is the physical activity coefficient and equal to 1.0

³TEE Sedentary for Women=Total Energy Expenditure for those who are sedentary, estimated using the following formula= $354-6.91 \times \text{Age (yr)} + \text{PA} \times (9.36 \times \text{Weight [kg]} + 726 \times \text{Height [m]})$, where PA is the physical activity coefficient and equal to 1.0

⁴TEE Low Activity for Men=Total Energy Expenditure for those whose activity is low, estimated using the following formula= $662-9.53 \times \text{Age (yr)} + \text{PA} \times (15.91 \times \text{Weight [kg]} + 539.6 \times \text{Height [m]})$, where PA is the physical activity coefficient and equal to 1.11

⁵TEE Sedentary for Women=Total Energy Expenditure for those who are sedentary, estimated using the following formula= $354-6.91 \times \text{Age (yr)} + \text{PA} \times (9.36 \times \text{Weight [kg]} + 726 \times \text{Height [m]})$, where PA is the physical activity coefficient and equal to 1.12

Mean values for the proportion of energy derived from alcohol and macronutrients for the B.C. senior population are presented in Table 13. The results are similar to what was observed for younger B.C. adults.

Table 13a presents the distribution of energy derived from macronutrients and the shaded areas in the table represent the Acceptable Macronutrient Distribution Ranges (AMDR). Almost all seniors were within the AMDR for protein. Seventy percent of the seniors' population met the AMDR for carbohydrate, slightly higher than younger adults. The proportion within carbohydrate's AMDR increased with age and more women than men fell within the range. Almost one-quarter of older adults consumed less than 45% of their total energy from carbohydrates. For total fat, about 60% of older adults fell within the AMDR however; there was still one-third consuming more than 35% of their energy from fat sources.

Younger and older adults were consuming about 10% of energy from saturated fats. According to the new Dietary Reference Intakes guidelines, no AMDR was set for saturated fats since this type of fat was considered unnecessary and there was no evidence to suggest that they play a role in chronic disease prevention. It is recommended to consume as little saturated fat as possible without compromising adequate nutrition (Institute of Medicine, 2002). From Table 13a, 40% of seniors were consuming more than 10% of their energy from saturated fats. These intakes are not in line with the new guideline and suggest that saturated fats are still a public health concern for older adults in B.C.

Table 13. Percentage (%) of energy derived from alcohol, carbohydrates, fat, protein and saturated fat by age and sex.

Nutrient	BCNS Participants <65 years	BCNS Seniors 65-84 years	Men 65-74 years	Men 75-84 years	Women 65-74 years	Women 75-84 years
Alcohol	2.5	2.2	3.3	2.8	2.6	1.8
Carbohydrate	50.1	50.8	49.7	50.7	50.7	54.0
Fat	31.6	30.6	31.4	31.4	30.4	28.4
Protein	15.8	16.4	15.6	15.1	16.3	15.8
Saturated Fat	10.4	10.3	10.2	10.1	10.7	9.8

*Data are weighted

Table 13a. Distribution of energy derived from carbohydrate, total fat, saturated fat, and protein for the seniors' population and by age and sex (expressed as a percentage (%) of energy).¹

Nutrient	BCNS Participants <65 years	BCNS Seniors 65- 84 years	Men 65-74 years	Men 75-84 years	Women 65-74 years	Women 75-84 years
Carbohydrate						
<45% of energy	28.7	23.5	27.6	23.6	23.1	16.1
≥45% to ≤65%	64.0	70.0	66.3	70.8	70.1	76.3
>65%	7.3	6.6	6.1	5.6	6.8	7.6
Total Fat						
<20% of energy	8.3	10.6	8.4	6.3	12.0	15.6
≥20% to ≤35%	58.1	62.3	62.0	64.1	58.4	69.1
>35%	33.6	27.1	29.6	29.6	29.6	15.3
Saturated Fat²						
≤10% of energy	56.9	59.7	56.1	64.4	59.6	64.1
>10%	43.1	40.3	43.9	36.6	40.4	35.9
Protein						
<10% of energy	6.3	2.4	2.9	3.7	0.9	3.3
≥10% to ≤30%	92.7	97.1	97.1	96.3	97.9	96.0
>30%	1.0	0.5	0.0	0.0	1.3	0.6

¹The shaded areas represent the Acceptable Macronutrient Distribution Ranges (AMDR) where appropriate and the proportion of the population meeting these recommendations.

²No AMDR is set for saturated fats.

*Data are weighted

3.2.2 Macronutrients

Table 14 presents the mean usual intakes of the major macronutrients for the B.C. senior population. Two of the macronutrients (i.e., carbohydrate and protein) have an established EAR. Almost no older British Columbian was below the EAR for carbohydrate which is based on the amount needed for brain function (Institute of Medicine, 2002). Most adult British Columbians consumed 10% or more of their energy intake from protein (B.C. Ministry of Health Services, 2004a), which is within the acceptable range (Institute of Medicine, 2002). However, 8-15% of seniors were below the EAR (based on the lowest continuing intake of dietary protein that is sufficient to achieve nitrogen balance (Institute of Medicine, 2002)). The health implications of this result are unknown at this time and should be considered for future research, especially since

adequate protein is important for preserving muscle mass and bone health (Cloutier and Barr, 2003; Ginty, 2003).

Adequate Intakes (AI) have been set for dietary fibre, linoleic acid and α -linolenic acid. For fibre, the AIs are based on the amounts needed to help protect against coronary heart disease (Institute of Medicine, 2002). The median intakes for fibre for the seniors' population were well below the AI for both age and sex groups. This finding is a concern for this age group since increasing dietary fibre intake has been associated with improving bowel health and many seniors experience problems with deteriorating bowel function (Dukas et al, 2003; Poullis et al, 2004).

The AIs for the two essential polyunsaturated fats, linoleic and α -linolenic acids are based on median intakes in the U.S. (Institute of Medicine, 2002). The usual median intakes for α -linolenic acid met the AI of 1.6 g/day for men and 1.1 g/day for women. However, the median linoleic acid intakes for older men and women were below the AI of 14 and 11 g/day, respectively. Similar results were seen for all B.C. adults (B.C. Ministry of Health Services, 2004a). The health implication of this result is unclear but it is important to point out that even though seniors have median intakes below the AI for linoleic acid, the incidence of essential fatty acid deficiency is rare in North America.

Table 14. Macronutrient intakes of B.C. seniors from food sources alone (including fortified sources), expressed by sex and age in years.

Nutrients	Sex-Age	Mean + SEM	25 th	50 th	75 th	AI	EAR	%<EAR
Carbohydrates (g)	M 65-74	271 ± 7	217	266	330	na	100	0
	M 75-84	238 ± 9	196	237	266		100	0
	W 65-74	198 ± 4	166	197	227		100	<1
	W 75-84	200 ± 4	181	199	222		100	0
Fat (g)	M 65-74	78 ± 3	54	77	99	na	na	na
	M 75-84	67 ± 4	50	62	78			
	W 65-74	53 ± 1	42	52	63			
	W 75-84	48 ± 2	39	48	56			
Fibre (g)	M 65-74	19.9 ± 0.9	13.3	18.2	23.7	30	na	na
	M 75-84	18.2 ± 1.1	13.1	17.4	21.4	30		
	W 65-74	15.7 ± 0.6	11.7	15.3	18.7	21		
	W 75-84	16.2 ± 0.7	12.4	15.8	20.1	21		
Linoleic Acid (g)	M 65-74	11.3 ± 0.6	6.7	9.9	14.3	14	na	na
	M 75-84	9.2 ± 0.6	6.1	8.0	11.6	14		
	W 65-74	6.8 ± 0.2	5.3	6.7	8.1	11		
	W 75-84	5.6 ± 0.3	4.5	5.2	6.7	11		
α-Linolenic Acid (g)	M 65-74	1.8 ± 0.1	1.1	1.6	2.4	1.6	na	na
	M 75-84	1.7 ± 0.2	1.1	1.5	2.0	1.6		
	W 65-74	1.3 ± 0.1	1.0	1.2	1.4	1.1		
	W 75-84	1.2 ± 0.1	0.9	1.1	1.4	1.1		
Protein (g/kg)	M 65-74	1.08 ± 0.04	0.79	1.02	1.22	na	0.66	10.4
	M 75-84	0.92 ± 0.04	0.74	0.90	1.07		0.66	15.2
	W 65-74	1.00 ± 0.03	0.82	0.94	1.14		0.66	8.6
	W 75-84	0.93 ± 0.03	0.76	0.91	1.05		0.66	8.0

*Data are weighted

SEM=standard error of the mean

AI=adequate intake

EAR=estimated average requirement

3.2.3 Vitamins

Tables 15 and 16 show the mean usual intakes of B.C.'s older population, the distribution of their intakes and the assessment of these intakes against the DRIs for the vitamins analyzed in the BCNS. Table 15 includes vitamin intakes solely from food sources including fortified foods and Table 16 includes intakes from food sources, fortified foods and supplements. At the time this report was being written, data on vitamins A, D and E were not available. Highlights from Tables 15 and 16 include:

- Nutrients of concern with high levels of inadequacy (levels of inadequacy $\geq 10\%$ as assessed against an EAR) for both sexes were folate, vitamins B6, B12, and C. When intakes from supplement use are added to the estimate the prevalence of inadequacy does decrease but these nutrients still remain a public health concern.
- Inadequate folate can increase blood levels of homocysteine, a risk factor for cardiovascular disease and stroke. As well, folate deficiency has been implicated in the development of depression and some cancers such as colon cancer (Tucker et al, 1996; Bailey et al, 2001; Willett and Stampfer, 2001). It is important to monitor folate status in older adults since almost half of the seniors' population was below the EAR for folate from food sources (including fortified foods) and one-third were still below the EAR when supplement intakes were factored into the analysis.
- Individuals who don't get enough of vitamin B12 can suffer from anemia, other blood-cell disorders, and neurological disorders including memory loss and changes in gait (Institute of Medicine, 1997). With food and supplements combined, 7-6-10.1% of older British Columbians were below the EAR for vitamin B12. It is important to monitor this vitamin in the senior population since it has been estimated that 10-30% of individuals 50

years and older may have decreased B12 absorption. For this reason, a recommendation of consuming synthetic forms of vitamin B12 from fortified foods and/or supplements was made by the expert Dietary Reference Intake panel (Institute of Medicine, 1997). Thus, estimated intakes from supplements alone were generated for the 65-74 and 75-84 age groups in the B.C. population (data not shown). Fortified foods were not included in the estimate since very few foods in Canada are fortified with vitamin B12. The prevalence of inadequacy from supplements alone was 73.7% in men aged 65-74 and 67.1% in those aged 75-84 years. Corresponding prevalences for women were 58.7% and 51.4%.

- Fortified foods alone do not place older residents at risk for folic acid toxicity but with the consumption of supplements, 3.2-6.3% of older adults exceeded the UL of 1000 mcg of synthetic folic acid. This could be a concern for seniors since a high intake of synthetic folic acid could mask a vitamin B12 deficiency placing individuals at risk for neurological damage.
- Inadequate vitamin B6 intakes could result in low blood levels of vitamin B6, another contributing factor to increasing homocysteine levels (Institute of Medicine, 1998). Approximately 16% of seniors had intakes from food and supplements that fell below the EAR and thus, vitamin B6 is another nutrient to monitor for the seniors' population.
- Due to its antioxidant properties, studies have shown that vitamin C may play a role in reducing the risk of cardiovascular disease, some cancers and macular degeneration (Rose et al, 1998). Almost one-quarter of B.C. seniors were below the EAR for this vitamin from food alone and close to one-fifth were below the EAR from food and supplement sources, making vitamin C a nutrient of concern for B.C. older adults.

- A high proportion of women aged 65-74 years (16.6%) appear to be inadequate in thiamin intakes from food sources alone but this amount is reduced to 3% when supplement intakes are included.
- The UL for niacin (35 NE/day) is based on the amount of synthetic niacin consumed from supplements, fortified foods and pharmacological agents that can cause the side effect of flushing. The amount of synthetic niacin consumed in older British Columbians was estimated only from the supplement data since it would be difficult to determine the amount provided by fortified foods. Still, anywhere from 14% for men aged 65-74 years to about 41% of women 75 years and over were above the UL for niacin. Similarly, findings from the U.S. have shown that a large percentage of the senior population was above the UL for this vitamin, most likely due to a high intake of pharmacological doses for the management of hypercholesterolemia (U.S. Department of Agriculture, 1995).
- Even though the proportion of seniors above the UL was low (<5%) for vitamins B6 and C, it was supplement consumption that drove the small proportion of the population above the established tolerable levels.

Table 15. Vitamin intakes of B.C. seniors from food sources alone (including fortified sources), expressed by sex and age in years.

Nutrients	Sex-Age	Mean \pm SEM	25 th	50 th	75 th	AI	EAR	%<EAR	UL	%>UL
Folate (DFE)	M 65-74	444 \pm 16	311	405	559	na	320	29.4	na	na
	M 75-84	343 \pm 9	310	342	380		320	37.6		
	W 65-74	325 \pm 9	254	313	381		320	56.1		
	W 75-84	306 \pm 15	244	281	332		320	69.3		
Folic Acid (mcg)	M 65-74	105 \pm 6	51	92	136	na	na	na	1000	0
	M 75-84	67 \pm 4	49	63	80				1000	0
	W 65-74	67 \pm 3	44	66	82				1000	0
	W 75-84	52 \pm 3	37	52	65				1000	0
Niacin (mg Eq)	M 65-74	39 \pm 1	32	38	46	na	12	0	na	na
	M 75-84	33 \pm 1	29	33	37		12	0		
	F 65-74	29 \pm 1	25	28	34		11	0		
	F 75-84	26 \pm 1	21	27	30		11	0		
Pantothenic Acid (mg)	M 65-74	5.3 \pm 0.2	4.0	5.2	6.5	5	na	na	na	na
	M 75-84	4.9 \pm 0.3	3.8	4.7	5.5	5				
	F 65-74	4.1 \pm 0.1	3.6	4.1	4.8	5				
	F 75-84	4.2 \pm 0.2	3.5	3.9	4.8	5				
Thiamin (mg)	M 65-74	1.8 \pm 0.1	1.4	1.8	2.2	na	1.0	3.6	na	na
	M 75-84	1.6 \pm 0.1	1.3	1.6	1.8		1.0	2.5		
	W 65-74	1.3 \pm 0.0	1.0	1.3	1.6		0.9	16.6		
	W 75-84	1.3 \pm 0.0	1.2	1.3	1.5		0.9	2.6		
Riboflavin (mg)	M 65-74	2.1 \pm 0.1	1.7	2.0	2.3	na	1.1	2.0	na	na
	M 75-84	1.7 \pm 0.1	1.4	1.7	1.9		1.1	3.4		
	W 65-74	1.5 \pm 0.0	1.3	1.5	1.7		0.9	0.3		
	W 75-84	1.6 \pm 0.1	1.3	1.5	1.8		0.9	2.9		
Vitamin B6 (mg)	M 65-74	1.9 \pm 0.1	1.5	2.0	2.3	na	1.4	20.8	100	0
	M 75-84	1.8 \pm 0.1	1.5	1.7	2.1		1.4	15.4	100	0
	W 65-74	1.5 \pm 0.0	1.2	1.5	1.7		1.3	26.0	100	0
	W 75-84	1.5 \pm 0.1	1.2	1.5	1.8		1.3	30.3	100	0
Vitamin B12 (mcg)	M 65-74	5.0 \pm 0.6	2.6	3.6	5.0	na	2	11.1	na	na
	M 75-84	4.0 \pm 0.8	2.4	3.1	4.1		2	9.7		
	W 65-74	2.9 \pm 0.2	2.1	2.6	3.3		2	16.2		
	W 75-84	3.0 \pm 0.3	2.1	2.6	3.1		2	12.6		
Vitamin C (mg)	M 65-74	101 \pm 6	52	89	136	na	75	33.8	2000	0
	M 75-84	105 \pm 6	78	101	126		75	20.4	2000	0
	W 65-74	101 \pm 5	65	97	129		60	21.9	2000	0
	W 75-84	94 \pm 7	45	84	129		60	31.4	2000	0

*Data are weighted

SEM=standard error of the mean

AI=adequate intake

EAR=estimated average requirement

UL=tolerable upper intake level

Table 16. Vitamin intakes of B.C. seniors from food sources and supplements (including fortified sources), expressed by sex and age in years.

Nutrients	Sex-Age	Mean \pm SEM	25 th	50 th	75 th	AI	EAR	%<EAR	UL	%>UL
Folate (DFE)	M 65-74	654 \pm 57	329	495	745	na	320	23.0	na	na
	M 75-84	702 \pm 127	317	368	981		320	28.0		
	W 65-74	668 \pm 60	312	437	917		320	29.0		
	W 75-84	736 \pm 95	272	393	1224		320	42.0		
Folic acid (mcg)	M 65-74	231 \pm 33	70	120	226	na	na	na	1000	3.4
	M 75-84	282 \pm 76	54	78	449				1000	6.3
	W 65-74	273 \pm 36	63	97	434				1000	3.2
	W 75-84	310 \pm 55	51	83	633				1000	3.9
Niacin (mg Eq)	M 65-74	85 \pm 19	34	43	60	na	12	0	35	14.4
	M 75-84	62 \pm 22	31	37	54		12	0	35	21.0
	W 65-74	66 \pm 14	28	38	62		11	0	35	28.7
	W 75-84	52 \pm 5	27	45	68		11	0	35	40.5
Pantothenic Acid (mg)	M 65-74	9.7 \pm 1.7	4.3	5.8	8.4	5	na	na	na	na
	M 75-84	9.8 \pm 4.6	4.0	5.3	9.6	5				
	W 65-74	11.6 \pm 2.3	4.0	4.9	13.0	5				
	W75-84	11.7 \pm 2.2	3.8	4.9	14.2	5				
Thiamin (mg)	M 65-74	5.1 \pm 1.2	1.5	2.0	2.8	na	1.0	3.0	na	na
	M 75-84	4.7 \pm 2.1	1.4	1.7	3.2		1.0	<1		
	W 65-74	7.0 \pm 1.8	1.2	1.9	3.4		0.9	2.9		
	W 75-84	7.8 \pm 2.2	1.3	2.8	3.8		0.9	0		
Riboflavin (mg)	M 65-74	5.1 \pm 1.0	1.7	2.2	3.7	na	1.1	1.7	na	na
	M 75-84	4.9 \pm 2.0	1.5	1.9	4.4		1.1	1.3		
	W 65-74	7.3 \pm 1.8	1.4	2.0	4.5		0.9	0		
	W 75-84	7.9 \pm 2.1	1.6	3.6	5.4		0.9	1.0		
Vitamin B6 (mg)	M 65-74	8.6 \pm 2.0	1.6	2.1	3.2	na	1.4	18.5	100	4.3
	M 75-84	7.2 \pm 2.7	1.6	2.0	5.0		1.4	12.2	100	2.1
	W 65-74	16.6 \pm 7.4	1.5	2.0	5.3		1.3	16.1	100	3.8
	W 75-84	11.3 \pm 3.1	1.5	3.5	9.6		1.3	15.6	100	4.0
Vitamin B12 (mcg)	M 65-74	19.6 \pm 6.1	2.7	4.1	12.3	na	2	10.1	na	na
	M 75-84	37.2 \pm 24.0	2.5	3.6	19.6		2	9.4		
	W 65-74	32.9 \pm 13.5	2.5	3.9	17.4		2	8.0		
	W 75-84	19.9 \pm 5.2	2.4	5.6	27.5		2	7.6		
Vitamin C (mg)	M 65-74	262 \pm 35	74	116	265	na	75	25.1	2000	0.3
	M 75-84	336 \pm 79	85	161	338		75	16.0	2000	1.6
	W 65-74	293 \pm 44	89	152	243		60	9.3	2000	1.7
	W75-84	403 \pm 101	98	179	575		60	18.2	2000	1.3

*Data are weighted

SEM=standard error of the mean

AI=adequate intake

EAR=estimated average requirement

UL=tolerable upper intake level

3.2.4 Minerals and Electrolytes

Mean usual mineral and electrolyte intakes, the distribution of these nutrients and the assessment against established DRIs of older British Columbians from food sources are presented in Table 17. Data including food and supplement consumption for minerals are shown in Table 18.

Highlights from Tables 17 and 18 are:

- Usual median intakes of calcium are well below the set AI of 1200 mg/day for all sex-age groups in the senior population. According to the BCNS, the median intakes of calcium for all adult sex-age groups except for men between the age of 19-30 years were below the respective AIs, making calcium a nutrient of concern for most adults in B.C. (B.C. Ministry of Health Services, 2004a). Low calcium intakes with inadequate vitamin D places seniors at risk for health issues such as osteoporosis. Osteoporosis affects one in four women and one in eight men over the age of 50 (<http://www.osteoporosis.ca/english>). One-fifth to one-quarter of older women in B.C. reported having osteoporosis in the present study, similar to the national prevalence figures.
- The prevalence of inadequacy for iron was not determined for the age groups used in the present report but was determined for the age groups reported in the B.C. Nutrition Survey, Report on Energy and Nutrients Report (B.C. Ministry of Health Services, 2004a), i.e., 19-30, 31-50, 51-70, 70+ years. According to that report, only pre-menopausal women in B.C. were found to be at risk of inadequacy of iron (B.C. Ministry of Health Services, 2004a).
- A high proportion of senior British Columbians had inadequate intakes of magnesium and zinc with food alone and when supplement intakes were included as assessed against

their established EARs. These two nutrients are also a concern for all age-sex groups in the adult B.C. population (B.C. Ministry of Health Services, 2004a).

- The median intakes for the seniors' population were below the AI for potassium and above the AI for sodium. This is a similar finding that has been observed for the adult population in the U.S. and Canada (Institute of Medicine, 2004).
- Excessive intakes of the minerals with an UL were not a problem for seniors, however; supplement use did contribute to an increase in the percentage above the UL for zinc in all age-sex groups and for iron in men aged 75-84 years.
- About 62% of older men and one-quarter of older women were above the UL for sodium (2.3 g/day). Studies have shown that 75%-95% of adults living in the U.S. and Canada have sodium intakes above the UL, placing these adults at potential risk for high blood pressure (Institute of Medicine, 2004). As shown in section 3.1.2, a high percentage of seniors in B.C. (38%) reported having high blood pressure. Excessive intakes of sodium, along with low intakes of potassium, calcium and magnesium, indicate that the area of nutrient intakes as it relates to high blood pressure remains a public health concern.

Table 17. Mineral and electrolyte intakes of B.C. seniors from food sources alone (including fortified sources), expressed by sex and age in years.

Nutrients	Sex-Age	Mean + SEM	25 th	50 th	75 th	AI	EAR	%<EAR	UL	%>UL
Calcium (mg)	M 65-74	847±31	661	771	1019	1200	na	na	2500	0
	M 75-84	700±42	498	652	854	1200			2500	0
	W 65-74	668±25	464	646	833	1200			2500	0
	W 75-84	771±36	606	743	910	1200			2500	0
Iron (mg)	M 65-74	16.0±0.5	12.4	15.5	18.7	na	na ^a	na	45	0
	M 75-84	13.8±0.6	11.5	13.6	15.7				45	0
	W 65-74	11.5±0.3	9.3	11.5	13.3				45	0
	W 75-84	11.2±0.3	9.3	10.9	12.6				45	0
Magnesium (mg)	M 65-74	365±11	285	354	429	na	350	49.6	na	na
	M 75-84	319±14	270	314	347		350	77.1		
	W 65-74	283±7.8	232	269	339		265	48.2		
	W 75-84	284±8.8	236	274	323		265	42.2		
Potassium (mg)	M 65-74	3328±87	2701	3326	4071	4700	na	na	na	na
	M 75-84	3117±125	2564	3126	3622	4700				
	W 65-74	2739±68	2206	2708	3272	4700				
	W 75-84	2703±86	2230	2661	3169	4700				
Phosphorus (mg)	M 65-74	1446±41	1154	1421	1705	na	580	1.5	4000b	0
	M 75-84	1191±46	1014	1170	1362		580	<1	3000	0
	W 65-74	1102±29	933	1064	1283		580	4.3	4000b	0
	W 75-84	1108±37	899	1083	1291		580	1.8	3000	0
Sodium (mg)	M 65-74	2809±85	2149	2753	3289	1300c	na	na	2300	68.7
	M 75-84	2496±118	1918	2457	2963	1200			2300	54.5
	W 65-74	2166±59	1759	2051	2478	1300c			2300	32.6
	W 75-84	1855±57	1533	1748	2127	1200			2300	17.1
Zinc (mg)	M 65-74	11.8±0.4	8.8	11.0	14.1	na	9.4	29.2	40	<1
	M 75-84	9.6±0.4	8.0	9.3	11.2		9.4	51.6	40	0
	W 65-74	8.8±0.2	7.5	8.5	9.9		6.8	13.0	40	0
	W 75-84	8.1±0.3	6.8	7.7	9.3		6.8	23.1	40	0

*Data are weighted

SEM=standard error of the mean

AI=adequate intake

EAR=estimated average requirement

UL=tolerable upper intake level

a To determine the prevalence of inadequacy for iron, a mathematical approach (i.e., the full probability approach) is used and not the EAR cut-point method developed by the Institute of Medicine (Institute of Medicine, 2000). A description of the method used for iron is described in Appendices M and N in the B.C. Nutrition Survey, Report on Energy and Nutrients (B.C. Ministry of Health Services, 2004a).

b The UL for Phosphorus is 4000 mg for individuals 51-70 years and 3000 mg for individuals over 70 years. These age groups were used when the calculations were done for the proportion of the population exceeding the UL.

c The AI for Sodium is 1300 mg for individuals 51-70 and 1200 mg for individuals over 70 years. It can be seen from the data that the distribution for sodium intake for the senior population exceeds the AI for these age groups.

Table 18. Mineral intakes of B.C. seniors from food sources and supplements (including fortified sources), expressed by sex and age in years.

Nutrients	Sex-Age	Mean + SEM	25 th	50 th	75 th	AI	EAR	%<EAR	UL	%>UL
Calcium (mg)	M 65-74	952± 36	708	885	1228	1200	na	na	2500	0
	M 75-84	827 ±53	600	741	1042	1200			2500	0
	W 65-74	944± 44	579	845	1200	1200			2500	1.1
	W 75-84	1161± 65	771	1066	1531	1200			2500	<1
Iron (mg)	M 65-74	17.6± 1.0	13.2	16.2	20.1	na	na ^a	na	45	<1
	M 75-84	20.6 ±2.8	12.1	14.9	21.9				45	6.9
	W 65-74	14.0± 0.8	10.4	12.9	15.7				45	<1
	W 75-84	14.4 ±1.1	10.3	12.9	16.9				45	<1
Magnesium (mg)	M 65-74	386 ±12	288	372	471	na	350	45.0	350	<1
	M 75-84	353 ±18	287	332	410		350	63.1	350	<1
	W 65-74	345 ±13	246	319	396		265	28.1	350	3.2
	W 75-84	352 ±17	260	313	399		265	26.5	350	4.5
Phosphorus (mg)	M 65-74	1466± 41	1156	1431	1720	na	580	1.5	4000b	0
	M 75-84	1218 ±46	1037	1213	1390		580	<1	3000	0
	W 65-74	1135 ±30	962	1106	1313		580	3.8	4000b	0
	W 75-84	1152 ±39	951	1138	1333		580	1.8	3000	0
Zinc (mg)	M 65-74	15.6 ±1.0	9.3	12.4	16.4	na	9.4	25.9	40	4.1
	M 75-84	15.7 ±1.9	8.6	11.2	22.4		9.4	36.6	40	4.4
	W 65-74	13.2± 0.8	8.1	9.8	17.4		6.8	9.7	40	1.1
	W 75-84	17.6± 1.8	7.4	11.8	24.4		6.8	13.4	40	8.0

*Data are weighted

SEM=standard error of the mean

AI=adequate intake

EAR=estimated average requirement

UL=tolerable upper intake level; for niacin based on the consumption of synthetic niacin in fortified foods, supplements and pharmacologic agents; for magnesium based on the consumption of synthetic magnesium from pharmacologic agents

a To determine the prevalence of inadequacy for iron, a mathematical approach (i.e., the full probability approach) is used and not the EAR cut-point method developed by the Institute of Medicine (Institute of Medicine, 2000). A description of the method used for iron is described in Appendices M and N in the B.C. Nutrition Survey, Report on Energy and Nutrients (B.C. Ministry of Health Services, 2004a).

b The UL for Phosphorus is 4000 mg for individuals 51-70 years and 3000 mg for individuals over 70 years. These age groups were used when the calculations were done for the proportion of the population exceeding the UL.

3.3. Food Group Use

According to the BCNS, only one-third of B.C. senior adults knew about Canada's Food Guide to Healthy Eating (CFGHE). Of those who had knowledge of CFGHE, about 8% of men and 20% of women used the guide for shopping for groceries, planning meals in the home and/or choosing restaurant items. Even though it was discouraging to know that so few older adults knew about CFGHE, it was not surprising that more women used the guide for buying food or meal planning since women traditionally do more of the food work in the home.

Food variety and balance are two of the key messages from CFGHE and together are a good way to facilitate the adequate intake of nutrients. Canada's Food Guide to Healthy Eating also includes the following guidance statements to help reduce the risk of diet-related diseases:

- Choose lower fat foods more often
- Choose whole grain and enriched products more often
- Choose dark green and orange vegetables and orange fruit more often
- Choose lower fat milk products more often
- Choose leaner meats, poultry and fish, as well as dried peas, beans and lentils more often.

To help better understand why many seniors in B.C. are not consuming adequate intakes of some nutrients and why many are reporting having certain diet-related chronic conditions, an examination of food group use and compliance with the guidance statements in CFGHE is included in this section.

3.3.1 Food Group Use Adjusted for Usual Intakes

One way to determine if the B.C. seniors' population is consuming a variety of foods and possibly adequate nutrient intakes is to use the adjusted data from the BCNS and compare this data to the minimum recommendations for each of the four food groups in CFGHE. The proportion of B.C. older adults not meeting, meeting or exceeding the recommendations in CFGHE for the four food groups is shown in Tables 19-22. The results suggest that a large proportion of senior women are not meeting the minimum recommendations for grain products, vegetables and fruit, milk products and meat and alternates. Most men did not meet the minimum suggested amount for milk products and almost half did not consume at least five servings of vegetables and fruit. Highlights include:

- According to Table 19, about two-thirds of older women and one-third of older men consumed less than the recommended five servings per day of grain products. Grain products are an important source of fibre and folic acid, two of the nutrients that are a concern for older adults due to inadequate intakes by a substantial percentage of this population.
- For vegetables and fruit, close to 60% of women and just under 50% of men did not meet the minimum recommendation of five servings (Table 20). Adequate vegetable and fruit intake has been associated with a decreased risk of heart disease and some cancers (reference). It has already been noted in the section on health status (3.1.2), that many seniors reported having heart disease and cancer. Inadequate intakes of this food group could be one of the contributing factors to acquiring these conditions and may place more of this population at risk for developing these health problems. As well, vegetables and fruits are good sources of fibre, folate and vitamin C and the finding that many seniors

were not meeting the minimum recommendation for this food group helps to explain one of the reasons why intakes of these nutrients were inadequate for a substantial portion of this population.

- About 80% of women and 85% of men did not consume the suggested amount of milk and milk products according to CFGHE (Table 21). Other studies have also shown that community-dwelling seniors had inadequate consumption of dairy foods (Ryan et al, 1992; Fischer et al, 1995). Milk and milk products are excellent sources of calcium and a good source of vitamin B12. Very low consumption of these foods explains why seniors are below the AI for calcium and contributes to the understanding of why many are below the EAR for vitamin B12 when examining intakes from food sources alone. Studies have shown that calcium, along with vitamin D helps to reduce the risk of osteoporosis (reference), a condition that 20% of senior women in this study reported having.
- In Table 22, one-third of women aged 65-74 years and a surprising 71% of women 75-84 years consumed less than 100 grams of meat and alternates. Senior men fared better with only about one-tenth not meeting the suggested amount of meat and alternates according to CFGHE.

Table 19. Proportion (%) of the seniors' population consuming grains relative to the recommendations in Canada's Food Guide To Healthy Eating, by age and sex.

Sex - Age Group	Less Than Suggested Amount (< 5 servings/day)	Suggested Amount (5-12 servings/day)	More Than Suggested Amount (>12 servings/day)
BCNS Participants < 65 years	36.3	60.5	3.1
BCNS Seniors 65-84 years	50.9	47.9	1.2
Women 65-74	70.7	29.3	0
Women 75-84	66.2	33.8	0
Men 65-74	30.0	66.4	3.6
Men 75-84	42.2	57.8	0

*The data are adjusted for intra-individual variability and weighted by sample weights to provide population estimates.

Table 20. Proportion (%) of the seniors' population consuming vegetables and fruit relative to the recommendations in Canada's Food Guide To Healthy Eating, by age and sex.

Sex - Age Group	Less Than Suggested Amount (< 5 servings/day)	Suggested Amount (5-10 servings/day)	More Than Suggested Amount (>10 servings/day)
BCNS Participants <65 years	66.7	29.8	3.4
BCNS Seniors 65-84 years	52.8	45.2	2.0
Women 65-74	57.2	42.6	0.2
Women 75-84	61.6	35.1	3.3
Men 65-74	47.8	49.5	2.7
Men 75-84	45.9	50.4	3.7

*The data are adjusted for intra-individual variability and weighted by sample weights to provide population estimates.

Table 21. Proportion (%) of the seniors' population consuming milk and milk products relative to the recommendations in Canada's Food Guide To Healthy Eating, by age and sex.

Sex - Age Group	Less Than Food Guide (< 2 servings/day)	Suggested Amount (2-4 servings/day)	More Than Food Guide (> 4 servings/day)
BCNS Participants <65 years	75.4	21.5	3.1
BCNS Seniors	81.7	16.9	1.4
Women 65-74	86.6	12.8	0.6
Women 75-84	74.6	20.6	4.8
Men 65-74	78.2	20.5	1.3
Men 75-84	91.0	8.6	0.4

*The data are adjusted for intra-individual variability and weighted by sample weights to provide population estimates.

Table 22. Proportion (%) of the seniors' population consuming meat and alternatives relative to the recommendations in Canada's Food Guide To Healthy Eating, by age and sex.

Sex - Age Group	< 100 g/day	100 g - 300 g/day	> 300 g/day
BCNS Participants < 65 years	25.7	65.5	8.8
BCNS Seniors 65-84 years	29.2	68.5	2.3
Women 65-74	31.6	68.1	0.3
Women 75-84	71.3	29.7	0
Men 65-74	13.4	80.4	6.2
Men 75-84	11.8	88.1	0

*The data are adjusted for intra-individual variability and weighted by sample weights to provide population estimates.

3.3.2 Food Group Use From One-Day Intakes

Table 23 shows the percentage of the B.C. seniors' population who met the CFGHE guidelines for zero, one, two, three or four food groups on a given day. For older women, only 0.7-1.8% met the minimum suggested servings for all food groups on a given day compared to 5.2-9.1% of older men. However, these data only reflect one-day diets and it is possible that adjusting for usual intakes would show that a higher proportion of this population met the nutritional guidance as outlined in CFGHE (personal communication, Junkins, 2003). Even though the data are not representative of usual intakes, the values still provide an indication of how senior British Columbians are doing with respect to the recommendations put forth in CFGHE. These results are similar to what was seen for all adults in B.C. (B.C. Ministry of Health Services, 2004b).

Table 23. Percentage (%) of the B.C. population who met Canada's Food Guide to Healthy Eating guidelines for either 0, 1, 2, 3 or 4 food groups according to the B.C. Nutrition Survey participants' one-day dietary recalls, by each age-sex group.

Number of Food Groups Met	BCNS Participants <65	BCNS Seniors 65-84	Women 65-74	Women 75-84	Men 65-74	Men 75-84
0	6.4	7.8	6.8	17.8	2.0	4.5
1	26.5	28.7	32.4	31.2	22.2	29.0
2	37.2	38.1	42.8	36.0	38.3	35.1
3	23.1	21.3	16.3	14.4	28.4	26.2
4	6.8	4.2	1.8	0.7	9.1	5.2

*The data are weighted by sample weights to provide population estimates.

The contribution of each of the food groups as well as the "other foods" group (which includes alcohol, high fat/high salt snacks, high fat/high sugar foods, and so on) from one-day diets is illustrated in Table 24. According to the B.C. Nutrition Survey, Report on Food Group Use (B.C. Ministry of Health Services, 2004b), all adults received 25% of their energy from the 'other foods' group. For the older adults, women tended to receive slightly less of their energy

from the ‘other foods’ group and more from the vegetables and fruit group than the general adult population in B.C.

Table 24. Source of percent (%) energy in one-day intakes of B.C. seniors’ population for each major food group, by age and sex.

**Column Totals may not add to 100% because of rounding.*

Food Group	BCNS Participants <65	BCNS Seniors 65-84	Women 65-74	Women 75-84	Men 65-74	Men 75-84
Grain Products	29.8	31.4	32.3	32.0	31.9	29.3
Meat & Alternatives	18.6	17.1	18.0	14.4	18.0	18.1
Milk & Milk Products	11.7	12.8	12.1	16.7	11.7	10.5
Vegetables & Fruit	14.4	15.3	18.4	19.2	15.2	18.3
Other	25.7	21.0	19.2	17.7	23.2	23.9

*The data are weighted by sample weights to provide population estimates.

For an indication of whether older adults are complying with the guidance statements in CFGHE, the proportion of portions consumed for particular food sub-groupings within each food group was estimated from one-day diets and the results shown in Table 25. There were little differences found between younger and older adults for each of the sub-groupings listed in the table. Highlights for the older adults include:

- Choose lower fat foods more often
 - A higher proportion of fluid milk was low fat; however, higher fat cheeses and yogurts were consumed.
 - Only one-fifth of grain products were high fat.
 - For beef and processed meats, only about 16% of the meat and alternates portions were higher fat varieties.
- Choose whole grain and enriched products more often

- As with the younger adults, seniors are choosing whole grain and enriched products more often; however, the majority of the choices are enriched products and not whole grain. Since adults have more bowel problems as they age, this finding raises a public health concern and suggests that more education should be targeting to increase whole grain varieties.
- Choose dark green and orange vegetables and orange fruit more often
 - Green and orange vegetables and fruit accounted for only 13% of the portions consumed in one-day. This finding also suggests that more education is needed in this area.
- Choose lower fat milk products more often
 - As stated earlier, seniors were consuming lower fat fluid milk but higher fat other milk products.
- Choose leaner meats, poultry and fish, as well as dried peas, beans and lentils more often.

Since only 16% of beef and processed meats were high fat choices, it can be assumed that leaner cuts of meat are being chosen more often. However, only one-tenth of the portions were legumes and seeds and thus, increasing awareness of the benefits of consuming legumes should be addressed. From an epidemiological review, Savige (2002) concluded that diets containing a high variety of foods including the addition of fish, nuts and legumes, could protect against chronic diseases as well as enhancing longevity.

Table 25. Proportion (%) of portions consumed for the food sub-groupings in one-day intake diets of B.C. seniors' population.

**Column Totals under each of the major food groups may not add to 100% because only specific food groupings were chosen within each group for discussion on Canada's Food Guide to Healthy Eating guidance statements.*

Food Group	BCNS Participants < 65 years	BCNS Seniors 65-84 years
Grain Products:		
Whole grain	15.3	22.4
Enriched	72.2	65.2
Higher fat products	21.2	22.5
Vegetables and Fruit:		
Green/yellow	13.0	13.3
Potatoes	9.4	8.7
Milk and Milk Products:		
Low fat fluid milk	50.7	54.2
Low fat other products (cheese and yogurt)	6.6	6.5
High fat fluid milk	4.2	9.8
High fat other products	38.9	29.6
Meat and Alternates:^a		
Beef and other meat products	34.4	30.2
Poultry	23.1	22.5
Fish	10.9	15.5
Processed Meats	10.7	9.0
Eggs	10.9	12.0
Legumes/seeds	10.0	10.7
High fat beef and processed meats	16.4	16.3

*The data are weighted by sample weights to provide population estimates.

^a The meat and alternates portions are expressed as 50-gram equivalents.

4.0 CONCLUSIONS

The proportion of older adults in B.C. is increasing and is expected to continue to increase for the next couple of decades. As well, life expectancy has increased resulting in more people living into their eighties and nineties. These increases present more challenges to health professionals who work with this population group. This report on the 'Nutritional Health of B.C. Seniors', as part of the B.C. Nutrition Survey, provides valuable baseline information on free-living older adults between the ages of 65 to 84 years and will provide guidance for establishing healthy public policies and developing health-related programs for this population group. Importantly, this is the first population-based nutrition survey in Canada that obtained data from seniors beyond 74 years of age. This report includes demographic information that impacts nutritional health such as education and income, self-reported health status, body mass index and waist circumference risk, physical activity, supplement use, energy and nutrient intakes, and food group use of seniors living in British Columbia.

Highlights from the report are the following:

- 48.9% of seniors had some aspect of post-secondary education with 14% having a university degree completed.
- 23% of seniors were classified as low income, similar to younger adults. A very small proportion of seniors were found to be food insecure.
- Many B.C. seniors are at risk for health problems since two-thirds were classified as overweight or obese and, as assessed by the waist circumference risk category, a large proportion were either at increased or substantial risk for health problems. As well, seniors were relatively inactive according to questions that examined the number of times

particular types of exercise were done weekly. Many seniors who participated in the BCNS already reported having heart disease (19%), cancer (20%), high blood pressure (38%), and high cholesterol (26%). In addition 20% to 25% of older women reported having osteoporosis. Other disorders such as poor bowel health and cognitive impairment were not reported in the BCNS but are also of concern for the older population especially since many seniors do not consume adequate amounts of fibre or micronutrients such as folate, vitamins B6, B12, and C (as shown in this report).

- 70% of older adults consumed a vitamin and mineral supplement yesterday and about 1/3rd consumed an alternate type of supplement (not containing vitamin/minerals). The popular types of supplements were vitamin/mineral supplements, vitamins E and C, and herbal and alternate types. Supplement use helped to reduce the prevalence of inadequacy of certain nutrients such as folate and vitamin B12 but also drove a small proportion of seniors above the tolerable upper intake levels for nutrients such as vitamin C and zinc.
- Following the minimum recommendations and guidance statements according Canada's Food Guide to Healthy Eating helps to ensure the adequate consumption of nutrients. However, many of these recommendations were not met by seniors. Older women were below the minimum recommendations for all four food groups and many older men were below the suggested amounts for milk and milk products, vegetables and fruit and grain products. In addition, on a given day, many seniors were not consuming legumes and whole grain choices. Thus, it's not surprising that the nutrients of concern for the B.C. seniors' population due to low intakes are fibre, folate, vitamin B12, vitamin B6, vitamin

C, calcium, magnesium and zinc for both sexes and protein for older men. The nutrients of concern due to excessive intakes are niacin and sodium for both sexes.

- On a positive note, more seniors were consuming leaner choices of meats and lower fat fluid milk products as well as choosing enriched (and some whole grain) products more often on a given day.

As shown in this report a substantial number of B.C. seniors have inadequate intakes of many macro- and micro- nutrients and over 60% are either overweight or obese, placing them at risk for health related problems such as heart disease, cancers, bone disorders, cognitive impairment, and bowel disturbances. Thus, it is important that we continue to monitor this population and provide support for education, preventive measures, nutritional surveillance and research endeavours to try and reduce the risk and occurrence of chronic diseases as we get older. Policy makers, health professionals, and communities have to work together to promote the well-being and quality of life of our older citizens.

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