

ᑭᓄᐃᑦᐱᑦ?  
Qanuippitaa?  
HOW ARE WE?

PHYSICAL ACTIVITY,  
ANTHROPOMETRY AND  
PERCEPTION OF BODY  
WEIGHT





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HOW ARE WE?

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## **BACKGROUND OF THE NUNAVIK INUIT HEALTH SURVEY**

The monitoring of population health and its determinants is essential for the development of effective health prevention and promotion programs. More specifically, monitoring must provide an overall picture of a population's health, verify health trends and how health indicators vary over distance and time, detect emerging problems, identify priority problems, and develop possible health programs and services that meet the needs of the population studied.

The extensive survey conducted by Santé Québec in Nunavik in 1992 provided information on the health status of the Nunavik population (Santé Québec, 1994). The survey showed that health patterns of the population were in transition and reflected important lifestyle changes. Effectively, the Inuit population has undergone profound sociocultural, economic, and environmental changes over the last few decades. The Inuit have changed their living habits as contact with more southerly regions of Quebec increased. A sedentary lifestyle, the switch to a cash-based domestic economy, the modernization of living conditions and the increasing availability and accessibility of goods and foodstuffs imported from southern regions have contributed to these changes. These observations suggest the need for periodic monitoring of health endpoints of Nunavik Inuit to prevent the negative impact of risk factor emergence and lifestyle changes on subsequent morbidity and mortality from major chronic diseases.

In 2003, the Nunavik Regional Board of Health and Social Services (NRBHSS) decided to organize an extensive health survey in Nunavik in order to verify the evolution of health status and risk factors in the population. The NRBHSS and the Ministère de la Santé et des Services sociaux (MSSS) du Québec entrusted the Institut national de santé publique du Québec (INSPQ) with planning, administering and coordinating the survey. The INSPQ prepared the survey in close collaboration with the Unité de recherche en santé publique (URSP) of the Centre hospitalier universitaire de Québec (CHUQ) for the scientific and logistical component of the survey. The Institut de la statistique du Québec (ISQ) participated in methodology development, in particular the survey design.

The general aim of the survey was to gather social and health information on a set of themes including various health indicators, physical measurements, and social,

environmental and living conditions, thus permitting a thorough update of the health and well-being profile of the Inuit population of Nunavik. The survey was designed to permit a comparison of the 2004 trends with those observed in 1992. Data collected in 2004 also allowed researchers to compare the Inuit to other Quebecers.

### ***Target population***

The health survey was conducted among the Inuit population of Nunavik from August 27 to October 1, 2004. According to the 2001 Canadian census, the fourteen communities of Nunavik have a total of 9632 inhabitants, 91% of whom identified themselves as Inuit. The target population of the survey was permanent residents of Nunavik, excluding residents of collective dwellings and households in which there were no Inuit aged 18 years old or older.

### ***Data collection***

Data collection was performed on the Canadian Coast Guard Ship Amundsen, thanks to a grant obtained from the Canadian Foundation for Innovation (CFI) and the Network of Centres of Excellence of Canada (ArcticNet). The ship visited the fourteen villages of Nunavik, which are coastal villages. The study was based on self-administered and interviewer-completed questionnaires. The study also involved physical and biological measurements including clinical tests. The survey was approved by the Comité d'éthique de la recherche de l'Université Laval (CERUL) and the Comité d'éthique de santé publique du Québec (CESP). Participation was voluntary and participants were asked to give their written consent before completing interviews and clinical tests. A total of 677 private Inuit households were visited by interviewers who met the household respondents to complete the identification chart and the household questionnaire. A respondent was defined as an Inuit adult able to provide information regarding every member of the household. The identification chart allowed demographic information to be collected on every member of the household. The household questionnaire served to collect information on housing, environment, nutrition and certain health indicators especially regarding young children.

All individuals aged 15 or older belonging to the same household were invited to meet survey staff a few days later, on a Canadian Coast Guard ship, to respond to an interviewer-completed questionnaire (individual questionnaire) as well as a self-administered confidential

questionnaire. Participants from 18 to 74 years of age were also asked to complete a food frequency questionnaire and a 24-hour dietary recall, and to participate in a clinical session. The individual questionnaire aimed to collect general health information on subjects such as health perceptions, women's health, living habits and social support. The confidential questionnaire dealt with more sensitive issues such as suicide, drugs, violence and sexuality. During the clinical session, participants were invited to answer a nurse-completed questionnaire regarding their health status. Then, participants had a blood sample taken and physical measurements were performed including a hearing test, anthropometric measurements, an oral glucose tolerance test (excluding diabetics) and toenail sampling. Women from 35 to 74 years of age were invited to have a bone densitometry test. Finally, participants aged 40 to 74 could have, after consenting, an arteriosclerosis screening test as well as a continuous measure of cardiac rhythm for a two-hour period.

### ***Survey sampling and participation***

The survey used a stratified random sampling of private Inuit households. The community was the only stratification variable used. This stratification allowed a standard representation of the target population. Among the 677 households visited by the interviewers, 521 agreed to participate in the survey. The household response rate is thus 77.8%. The individual response rates are obtained by multiplying the household participating rate by the individual collaboration rate since the household and individual instruments were administered in sequence. The collaboration rate corresponds to the proportion of eligible individuals who agreed to participate among the 521 participating households. In this survey, about two thirds of individuals accepted to participate for a response rate in the area of 50% for most of the collection instruments used in the survey. A total of 1056 individuals signed a consent form and had at least one test or completed one questionnaire. Among them, 1006 individuals answered the individual questionnaire, 969 answered the confidential questionnaire, 925 participated in the clinical session, 821 had a hearing test, 778 answered the food frequency questionnaire, 664 answered the 24-hour dietary recall, 282 had an arteriosclerosis test, 211 had a continuous measure of their cardiac rhythm for a two-hour period and 207 had a bone densitometry test. More details on the data processing are given in the Methodological Report.

## **INTRODUCTION<sup>1</sup>**

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This theme paper focuses on three major health determinants: physical activity, body weight and waist circumference. For each determinant, the prevalent situation among the Inuit of Nunavik in 2004 is described and various comparisons are made with the rest of Quebec and Canada. Moreover, in the case of body weight and waist circumference, the data allow us to verify the evolution of the problem since the beginning of the 1990s.

The relationship between physical activity, body weight and waist circumference is presented together with the potential relationship between physical activity and a variety of other factors. Data regarding weight perception and actions relating to weight provide additional clarity. Finally, the results and their impact are discussed and some recommendations and avenues for reflection are expressed.

## **I. PHYSICAL ACTIVITY**

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Physical demands related to work, domestic activities and transportation have decreased considerably in the 20<sup>th</sup> century, particularly in industrialized countries (Transportation Research Board & Institute of Medicine, 2005). Aboriginal populations living in these countries have not been spared from this phenomenon and, for the Inuit population, the physical demands of traditional activities (fishing, hunting, etc.) decreased a great deal (Shephard, 1994). As is the case among all these populations, *leisure time* physical activity has become an important way to maintain a sufficient level of physical activity throughout one's lifetime.

It is therefore important to have information on the level of physical activity within a population because it has a significant impact on a number of major health problems (USDHHS, 1996; Bouchard et al., 1994). Ideally, such an assessment would cover the five categories of physical activity potentially included in an average day<sup>2</sup>

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<sup>1</sup> For ease of readability, the expression "Inuit" is used throughout the theme paper to define the population under study even though a small percentage of individuals surveyed identified themselves as non-Inuit. Refer to "Background of the Health Survey" for further details regarding the definition of the target population.

<sup>2</sup> Physical activity that is domestic (e.g. dressing children, vacuuming), work-based (e.g. sorting/filing material, serving tables), transportation-based (e.g. walking to work, biking to school), leisure time (e.g. sports, physical fitness, outdoor activities, dancing) and

(Nolin & Hamel, 2005) over the course of one year. Available data does not allow this type of analysis at the moment, but the survey gives us a good estimate of the level of leisure time physical activity over a one-year period, and a global perspective of work-based or main-occupation-related physical demands.

## **METHODOLOGICAL ASPECTS**

All results are based on the Physical Activity section of the individual questionnaire of the Nunavik Inuit Health Survey 2004, conducted in person with individuals aged 15 and over. Information recall covers the entire year. For leisure time physical activity, the leisure time section of *l'Actimètre* (the Actimeter) has been used (Nolin, 2004b; Nolin et al., 2003). The interviewee indicated, for each season, if the frequency of activity was weekly ("less than once a week" or "about once a week or more"). If the frequency was once or more per week during at least one season, the respondent was asked to give detailed information on the frequency (days/week), duration (time/day) and intensity (perception of effort: four levels) of the usual activity. The information thus collected has allowed analysis to verify whether the recommendations put forward by competent authorities were met (Pate et al., 1995; USDHHS, 1996; Comité scientifique de Kino-Québec (CSKQ), 1999; Kesaniemi et al., 2001; Cavill et al., 2001; Strong et al., 2005) and to classify respondents according to different levels of physical activity (Nolin, 2004a and 2004b).

In the case of the work-based or main-occupation-related physical activity category, respondents chose from among four statements the one that most closely corresponded with the physical demands associated with their daily activities (Statistics Canada, 2003). The information available in this case does not allow analysis to determine if the recommended physical activity level was attained. Also, the two intermediate options had to be grouped together since the volumes of physical activity corresponding to these two statements could be significantly interrelated.

### **Statistical analyses**

Statistical analysis involved comparisons with other socio-demographic characteristics derived from the survey as well as comparisons with other survey databases. Statistical analyses for comparisons have been conducted at a threshold of  $\alpha = 0.05$ . Chi-square test with

a correction for design effect was used to compare proportions. Comparisons of the samples with the population of Canada or the province of Quebec are made when relevant. Data on the Canada and Quebec population used in this report was taken from the Statistics Canada Canadian Community Health Survey (CCHS) Cycle 2.1 (Statistics Canada, 2003). Given the sampling procedures in the two surveys, these comparisons include an adjustment to proportions to take into account the change in the population's age structure, using 1996 Census of Canada data for the reference population. However, only raw data is reported in the text to avoid any possible confusion with adjusted proportions.

The Nunavik territory has been divided in two regions because place of residence could influence life habits. The Hudson coast includes the villages of Kuujjuarapik, Umiujaq, Inukjuak, Puvirnituq, Akulivik, Ivujivik and Salluit while the Ungava coast includes Kangiqsujuaq, Quaqaq, Kangirsuk, Aupaluk, Tasiujaq, Kuujjuaq and Kangiqsujuq.

### **Scope and limitations of the data**

In terms of the education variable, it is important to specify that the choice of answers for post-secondary training were not well adapted to the context of the survey's target population. The answers given for this category reveal that there was likely confusion during data collection between training that requires a post-secondary diploma and training that does not (e.g. driver's license, fishing license, etc). Therefore, the number of people with post-secondary education was likely overestimated.

### **Accuracy of estimates**

The data used in this module comes from a sample and is thus subject to a certain degree of error. The coefficient of variation (CV) has been used to quantify the accuracy of estimates and the Statistics Canada scale was used to qualify the accuracy of estimates. The presence of an "E" footnote next to an estimate indicates a marginal estimate (CV between 16.6% and 33.3%). Estimates with unreliable levels of accuracy (CV > 33.3%) are not presented and have been replaced by the letter "F".

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other (e.g. volunteering).

## RESULTS

### Leisure time physical activity

#### Level of activity

Table 1 shows that, on an annual basis, approximately two out of ten adults (ages 18 and over) (18%) were active<sup>3</sup> during their spare time in 2004. In contrast, nearly seven out of ten (69%) were sedentary. Overall, more than eight out of ten adults (82%) did not attain the recommended level of physical activity (active) that would have permitted them to have substantial health benefits.

A higher proportion of men were observed to be active than women (25% vs. 11%) and conversely, a lower proportion of men were sedentary (60% vs. 77%). We have no indicator allowing verification of the evolution of leisure time physical activity over time or a specific comparison with other populations. Nevertheless, available data (Nolin & Hamel, 2005) suggests that people were less active in Nunavik than elsewhere in Quebec and Canada.

Variations by age (Table 1) among adults showed a significant reduction in the proportion of active men between the 18-29 age group and that aged 50 and over (30% vs. 13%). In the case of women, no variation by age was observed among those who were active. The proportion of active women, whatever their age, was comparable to that of men aged 50 and over. Finally, the proportion of sedentary people remained similar for all age groups, in the case of both men and women.

**Table 1**

Level of leisure time physical activity<sup>a</sup> by gender and age group (%), population aged 18 and over, Nunavik, 2004

Gender and age group	Active	Moderately active	Somewhat active	Sedentary
<b>Men</b>				
18-29 years	30.0	F	F	57.9
30-49 years	25.9	9.0 <sup>E</sup>	6.3 <sup>E</sup>	58.7
50 years +	12.9 <sup>E</sup>	F	F	67.6
<b>18 years +</b>	<b>24.7</b>	<b>8.2<sup>E</sup></b>	<b>6.8<sup>E</sup></b>	<b>60.3</b>
<b>Women</b>				
18-29 years	10.7 <sup>E</sup>	4.8 <sup>E</sup>	4.0 <sup>E</sup>	80.6
30-49 years	11.1 <sup>E</sup>	7.5 <sup>E</sup>	7.2 <sup>E</sup>	74.2
50 years +	10.4 <sup>E</sup>	F	F	77.7
<b>18 years +</b>	<b>10.8</b>	<b>6.5</b>	<b>5.5<sup>E</sup></b>	<b>77.3</b>
<b>Total</b>				
<b>18 years +</b>	<b>17.9</b>	<b>7.3</b>	<b>6.2</b>	<b>68.6</b>

<sup>a</sup> Level of activity on an annual basis.

<sup>E</sup> Interpret with caution.

<sup>F</sup> Unreliable estimate.

Source: Nunavik Inuit Health Survey 2004.

The data pertaining to 15- to 17-year-olds (Table 2) indicate that in 2004 about one out of seven young people (14%) attained the recommended activity level (very active) for this age group. Conversely, nearly six out of ten (59%) were sedentary, that is, active less than once a week for at least six months of the year. This proportion (sedentary) was higher among girls than boys (73% vs. 47%) and, globally, more than eight out of ten 15- to 17-year-olds (86%) were not at the recommended activity level for this age group.

<sup>3</sup> See the definitions in the Appendix (Table A1) and several examples (Table A2) for each level of physical activity.



**Table 2**

Level of leisure time physical activity<sup>a</sup> by gender (%), population aged 15 to 17, Nunavik, 2004

Gender	Very active <sup>b</sup>	Active <sup>c</sup>	Moderately or somewhat active	Sedentary
Boys	22.1 <sup>E</sup>	12.4 <sup>E</sup>	18.6 <sup>E</sup>	46.9
Girls	F	16.4 <sup>E</sup>	F	73.2
<b>Total</b>	<b>14.1<sup>E</sup></b>	<b>14.3<sup>E</sup></b>	<b>12.4<sup>E</sup></b>	<b>59.2</b>

<sup>a</sup> Level of activity on an annual basis.

<sup>b</sup> Recommended weekly level (very active) for children and adolescents (aged 5 to 17), double that of those ages 18 and over.

<sup>c</sup> Recommended weekly level for those aged 18 and over (active).

<sup>E</sup> Interpret with caution.

<sup>F</sup> Unreliable estimate.

Source: Nunavik Inuit Health Survey 2004.

### Association with various factors

Among adults (Table 3), leisure time physical activity was associated with three health determinants, with a health status indicator and with the variable region. The proportion of active individuals was higher among more educated people than among the less educated (23% vs. 12%). The same phenomenon may be observed among those of normal weight compared with those who are obese (21% vs. 14%), among those with the smallest waist circumference (less risk) compared with those whose waist circumference exceeded the highest risk level (25% vs. 13%), as well as among individuals who perceived themselves to be in excellent or very good health compared with those who considered their health to be average or poor (24% vs. 13%). In addition, the percentage of active individuals was higher among residents living along the Ungava coast than among those from the Hudson coast (21% vs. 16%). For all five factors described above, we see the inverse phenomenon for the proportion of sedentary people.

**Table 3**

Level of leisure time physical activity<sup>a</sup> by three health determinants, one health status indicator and region (%), population aged 18 and over, Nunavik, 2004

Determinant, indicator, and region	Active	Moderately or somewhat active	Sedentary
<b>Education level</b>			
Secondary school completed or higher	22.7	16.3	61.0
Secondary school not completed	17.4	12.7	69.9
Elementary school completed or less	12.3 <sup>E</sup>	13.8 <sup>E</sup>	73.9
<b>BMI<sup>b,c</sup> (kg/m<sup>2</sup>)</b>			
< 25	20.9	15.1	64.0
25 to 29.9	19.8	14.7	65.5
≥ 30	13.7	10.8 <sup>E</sup>	75.4
<b>Waist circumference<sup>b,c</sup> (cm)</b>			
Men (< 94) and women (< 80)	24.8	16.1	59.1
Men (94 to 101.9) and women (80 to 87.9)	14.0 <sup>E</sup>	14.9 <sup>E</sup>	71.1
Men (≥ 102) and women (≥ 88)	13.2	10.3	76.4
<b>Perception of health status</b>			
Excellent or very good	24.0	11.9 <sup>E</sup>	64.1
Good	18.6	14.5	66.8
Average or poor	12.8	12.8	74.4
<b>Coastal region</b>			
Ungava	20.8	15.8	63.4
Hudson	15.7	11.8	72.5

<sup>a</sup> Level of activity on an annual basis.

<sup>b</sup> Body mass index and waist circumference (ages 18 to 74 only).

<sup>c</sup> Body mass index and waist circumference: definitions of categories (Health Canada, 2003).

<sup>E</sup> Interpret with caution.

Source: Nunavik Inuit Health Survey 2004.

**Work-based or main-occupation-related physical activity**

As noted at the beginning of this section, the information available for this activity category does not allow us to check whether or not the recommended physical activity level was attained. The survey gives us only a global perspective of the physical demands associated with this component of daily life. As indicated in Table 4, nearly one adult out of four (24%) reported a main occupation requiring very little physical effort (level 1) in 2004, a situation similar for both genders. In contrast, about one in ten (11%) reported high physical demands in this context (level 3), a condition affecting significantly more men than women (17% vs. 4%). Finally, about two out of three (65%) indicated very diverse physical demands (level 2), demands widely spread over the continuum (low to high).

**Table 4**  
 Physical demands associated with work or main occupation by gender (%), population aged 18 and over, Nunavik, 2004.

Gender	Physical demands <sup>a</sup>		
	Level 1	Level 2	Level 3
Men	22.1	60.6	17.3
Women	26.3	69.9	3.8 <sup>E</sup>
<b>Total</b>	<b>24.1</b>	<b>65.1</b>	<b>10.7</b>

<sup>a</sup> Levels 1 to 3: lower to higher physical demands.

<sup>E</sup> Interpret with caution.

Source: Nunavik Inuit Health Survey 2004.

Compared to the rest of Quebec, a lower proportion has a lower level of physical demands (level 1: 24% vs. 28%) but there is no difference at levels two and three. An analysis by gender reveals no difference with the rest of Quebec for both men and women. Finally, a comparison with the rest of Canada (including Quebec) reveals no difference with the results reported for Nunavik.

**DISCUSSION AND CONCLUSION**

The survey’s results shed significant light on the level of physical activity of the Nunavik population. However, it is important to recall that this data is only partial because the information available covers only two of the five categories of physical activity (leisure time and work-based or main-occupation-related) that are potentially part of any given day.

In the case of leisure time physical activity (the category for which the data is the most complete), fewer than two out of ten adults (ages 18 and over) reached the recommended level. As is the case for their territorial neighbours, the James Bay Cree, a higher proportion of men were active than women (Nolin et al., 2007). In the 15- to 17-year-old age group, only one out of seven attained the recommended level of physical activity for young people of this age and, as with the adults, boys were more active than girls.

Considering the many benefits associated with regular physical activity, and the relative novelty of activities performed for this purpose, significant effort must be devoted to the promotion of leisure time physical activity *throughout the year*. Even if many games have been part of the Inuit culture for many millenniums (Elliott Avedon Museum of Games, 2005), the availability of more regular free time is a recent reality (a few decades) and using this time for physical activity is a recent phenomenon. Furthermore, special attention should be directed to girls and women because, for them, leisure time physical activity seems to be the exception rather than the rule.

This type of intervention is becoming more and more critical, as is apparent in section two when we look at the increase in the prevalence of obesity in this population and the potential benefits associated with regular leisure time physical activity. Moreover, when we consider that a low level of physical activity associated with work or main occupation was not at all compensated for by a higher level of physical activity during spare time (data not presented), an aggressive course of action in the area of leisure time physical activity appears warranted.

According to health care workers in this region, active transportation (walking) seems to be a thing of the past for the majority of residents. This activity category has potential for change, even though a number of factors (type of infrastructure (e.g.: pedestrian potential), distances to travel, safety, weather conditions, etc.) greatly influence whether or not this way of getting around is used. Nevertheless, for those who cannot (or do not wish to) participate in leisure time activities, this category of activity remains a possible avenue for maintaining a physically active lifestyle and health promotion programs must take this possibility into account while adapting it to the reality of each living environment.

In conclusion, as noted, this population has not been spared the phenomenon of a reduction in physical demands in carrying out daily tasks (work and domestic activities). For the vast majority of them, the physical demands associated with this type of activity seem to have become comparable to that elsewhere in Quebec and rest of Canada. In this instance, contrary to the two previous categories (leisure time physical activity and active transportation), the potential for change is very low, if not absent. The task and the technical means available determine the nature and amount of physical activity used. Thus, even if certain “changes” were imaginable, they would occur on a case-by-case basis and could not be easily integrated into a health promotion program. Not only that, economic considerations related to efficiency greatly limit potential action at this level. This again supports the importance of an aggressive course of action in the two other categories of physical activity: leisure time and active transportation.

## II. ANTHROPOMETRY AND PERCEPTION OF BODY WEIGHT

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Obesity has become a growing threat to health. It now affects every country to such an extent that the World Health Organization (WHO) has declared the situation a world epidemic (WHO, 2003). In Canada, the prevalence of obesity among adults has increased considerably in recent years (Torrance et al., 2002; Tjepkema, 2005; Katzmarzyk & Mason, 2006). The same trend has been observed in Quebec (Mongeau et al., 2005). Canadian aboriginal populations have not been spared this excess weight, many weighing in at above the national average (Kuhnlein et al., 2004; Raine, 2004; Tremblay et al., 2005; Bélanger-Ducharme & Tremblay, 2005). The repercussions of excess body weight on health are well known. Obesity is a significant risk factor for mortality (Katzmarzyk et al., 2001) and for health problems, including type 2 diabetes, cardiovascular disease and high blood pressure (Jung, 1997; Birmingham et al., 1999). Excess abdominal fat is associated with an increased risk of these diseases (Health Canada, 2003).

### METHODOLOGICAL ASPECTS

Anthropometric measurements<sup>4</sup> of adults aged 18 to 74 were taken by a nurse. Weight was measured in kilograms using a Tanita bioelectrical impedance scale

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<sup>4</sup> More details on the data processing are given in the Methodological Report.

(TBF-300). Half a kilogram (0.5 kg) was automatically subtracted from the weight of each respondent to account for clothing. Height without shoes was measured in centimetres using a vertical tape featuring a horizontal bar that rested on the head. The waist circumference was measured in centimetres with a tape placed in a horizontal manner over the clothing, at the level where a narrowing of the body was visible (the narrowest level of the trunk). If the circumference of the waist was not sufficiently defined, the measurement was taken at the level of the last floating rib. The measurement was read at the end of an exhalation. Questions about body weight perceptions and actions relating to weight were responded to via a questionnaire completed by the interviewer (INSPQ & NRBHSS, 2004).

The Canadian body weight classification system (Table A3, Appendix) was used to assess the risk of developing health problems. It uses two measurements, the body mass index (BMI) and the waist circumference (WC). The BMI is the most useful indicator for assessing the health risk related to body weight and is calculated by dividing the weight by height squared ( $\text{kg/m}^2$ ). Waist circumference, expressed in centimetres, is a complementary indicator that evaluates health risks associated with excess abdominal fat. This classification system is recommended by Health Canada (2003) for all racial or ethnic groups in Canada, including the Inuit. It should be noted that the system has certain limitations since a given BMI and waist circumference do not necessarily correspond with the same risk level in different populations (Health Canada, 2003).

### Statistical analyses

Here again, statistical analyses for comparisons according to different socio-demographic characteristics have been conducted at a threshold of  $\alpha = 0.05$ . Therefore, comparisons by level of education include the same data limitations expressed in the physical activity section. As for the accuracy of estimates, the rule defined in the preceding section also applies here.

Some comparisons have been made with results obtained during the 1992 Santé Québec survey where the questions asked are comparable. Given the sampling procedures in the two surveys, these comparisons include an adjustment in proportions to take into account the change in the population's age structure. This adjustment is made on a five years age groups basis using Nunavik 2001 census of Statistics Canada as reference population. However, only raw data is reported in the text, tables and figures to avoid

any possible confusion with adjusted proportions. In addition, measurements were compared using generalized multinomial logistic models adjusted for age and survey design. The Wald chi-square statistic with Satterthwaite correction for degrees of freedom (Aguirre-Torres, 1994) was used for this model.

Also, the results related to anthropometry are compared to those of Quebec with the 2004 Canadian Community Health Survey Cycle 2.2 (CCHS 2.2) (Statistics Canada, 2004), while the perception of body weight is compared with the 2003 CCHS Cycle 2.1 (Statistics Canada, 2003). These comparisons include an adjustment in proportions to take into account the change in the population's age structure using Canada 1996 census of Statistics Canada as reference population.

## RESULTS

### Anthropometrical measurements

#### Body mass index

At the time of the survey (Table 5), about 41% of Inuit<sup>5</sup> aged 18 to 74 were of normal weight, 30% were overweight (BMI 25-29.9) and 28% were considered obese (BMI ≥ 30). Among the obese individuals, a little more than one third (10%) were in classes II and III (BMI ≥ 35). Underweight respondents accounted for a very low percentage (1%). There are no significant differences between the sexes for the various BMI categories, although the proportion of obese women tends to be higher. However, cases of severe obesity (BMI ≥ 35) were significantly higher among women (13% vs. 7%).

**Table 5**

Body weight categories by gender (%), population aged 18 to 74, Nunavik, 2004

Category	Total	Men	Women
Underweight	1.4 <sup>E</sup>	F	1.4 <sup>E</sup>
Normal weight	40.6	43.6	37.2
Overweight	29.8	29.4	30.2
Obese (BMI ≥ 30)	28.3	25.6	31.2
Obese, classes II and III (BMI ≥ 35)	10.0	7.4 <sup>E</sup>	13.0

E Interpret with caution.

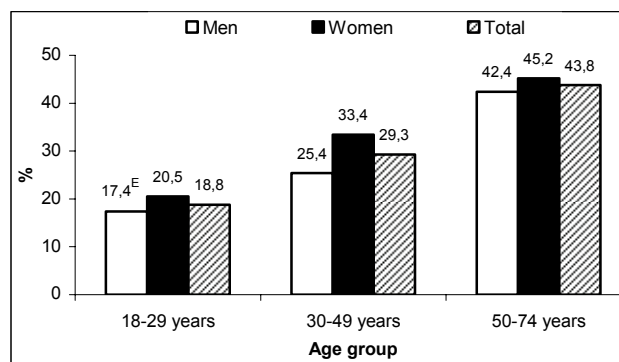
F Unreliable estimate.

Source: Nunavik Inuit Health Survey 2004.

As Figure 1 indicates, the prevalence of obesity increased by age group, in the case of both men and women, and individuals aged 50 to 74 were affected twice as much as young people aged 18 to 29 (44% vs. 19%). The variation by educational level (data not presented) indicated that the proportion of obese individuals was higher among those with less education (elementary school completed or less) in comparison with those who had completed several years of secondary school (36% vs. 23%). Those with the highest level of education (secondary school completed or higher) had showed a proportion of obese individuals comparable to those with less education (32%).

**Figure 1**

Prevalence of obesity by gender and age group (%), population aged 18 to 74, Nunavik, 2004



<sup>E</sup> Interpret with caution.

Source: Nunavik Inuit Health Survey 2004.

The prevalence of overweight individuals in the population of Nunavik was roughly similar to that of other Quebecers<sup>6</sup> of the same age evaluated in the CCHS 2004, Cycle 2.2 – Nutrition survey (data not presented). Nevertheless, the population of Nunavik was more affected by obesity than were people in the south (28% vs. 21%). Inuit women had a higher prevalence of obesity than their Quebec counterparts (31% vs. 23%) but among men no significant difference was observed.

A comparative analysis of 1992 and 2004 data (Table 6) indicates that the prevalence of obesity (19% vs. 28%) and of severe obesity (6% vs. 10%) increased by 49% and 59% respectively. Although the prevalence of obesity was higher among women in 2004, the most significant development was among men (an increase of 73% vs.

<sup>5</sup> Inuit aged 18 to 74 represent 98% of the sample.

<sup>6</sup> Rest of Quebec: all of Quebec, excluding regions 17 (Nunavik) and 18 (James Bay Cree Territory).

31% among women since 1992). The survey reveals an increase in the obesity rate in Nunavik in all age categories between 1992 and 2004 (data not presented). This increase is particularly of note among those aged 18 to 29 where the rate increased from 9%<sup>E</sup> to 19%.

**Table 6**

Comparison of body weight categories by gender (%), population aged 18 to 74, Nunavik, 1992 and 2004

		Underweight	Normal weight	Overweight	Obese	Obese II-III (BMI ≥ 35)
<b>1992</b>						
Men	F	41.3	43.9	14.8	F	
Women	F	36.6	38.2	23.9	10.6 <sup>E</sup>	
<b>Total</b>	F	39.1	41.3	19.0	6.3	
<b>2004</b>						
Men	F	43.6	29.4	25.6	7.4 <sup>E</sup>	
Women	1.4 <sup>E</sup>	37.2	30.2	31.2	13.0	
<b>Total</b>	1.4 <sup>E</sup>	40.6	29.8	28.3	10.0	

E Interpret with caution.

F Unreliable estimate.

Sources: Nunavik Inuit Health Survey 2004 and Santé Québec survey 1992.

### Waist circumference

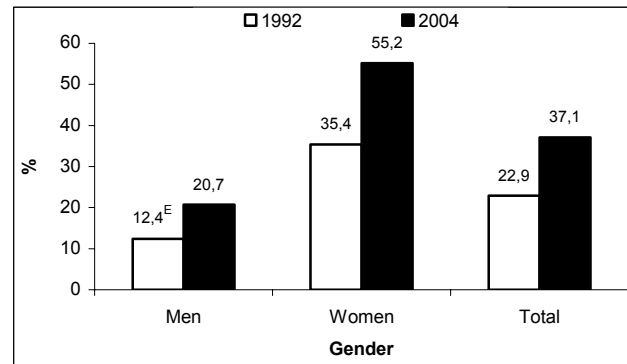
Excess abdominal fat measured by waist circumference is a complementary indicator of health risk. According to Health Canada thresholds (Table A3, Appendix), at the time of the survey, nearly four out of ten Inuit (37%) had a waist circumference indicative of an increased risk of health problems. A significant difference is seen in the distribution by gender, with more than one out of two women (55%) considered at risk versus one in five men (21%). The prevalence of abdominal obesity increased with age, those between 50 and 74 being affected twice as much as those between 18 and 29 (58% vs. 26%). Moreover, Ungava residents seemed proportionately more numerous to have an at-risk waist circumference than their Hudson neighbours (41% vs. 35%) (data not presented).

A comparative analysis of 1992 and 2004 data indicates that the proportion of adults with an at-risk waist circumference increased by 62% (23% vs. 37%) (Figure 2). A higher prevalence of abdominal obesity was seen among women in 2004, however the increase since 1992 was more pronounced among men (an increase of 67% vs. 56% among women). Between 1992 and 2004,

the number of individuals with an at-risk waist circumference increased in every age group. However, those between 18 to 29 years of age experienced a higher rate of increase than their elders (an increase of 133% vs. 29% among elders) (data not presented).

**Figure 2**

Evolution of the percentage of people with an at-risk waist circumference by gender (%), population aged 18 to 74, Nunavik, 1992 and 2004



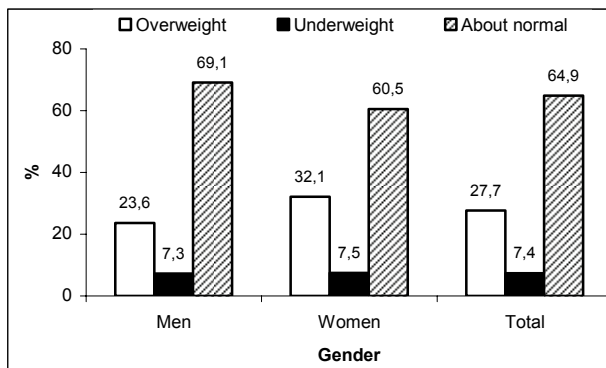
E Interpret with caution.

Sources: Nunavik Inuit Health Survey 2004 Santé Québec survey 1992.

### Perception and actions about the body weight

The results reveal that at the time of the study, the majority of the adult population of Nunavik (65%) considered themselves to have a more or less normal body weight; nearly three out of ten people (28%) perceived that they had a weight surplus and 7% thought they were underweight (Figure 3). Proportionately more women than men considered themselves to be overweight (32% vs. 24%), but an equal number of women and men considered themselves underweight (7% vs. 8%).

**Figure 3**  
Perception of body weight by gender (%), population aged 18 to 74, Nunavik, 2004



Source: Nunavik Inuit Health Survey 2004.

In comparison with other Quebecers of the same age (18 to 74) who answered the same question in the 2003 CCHS 2.1, fewer adults in Nunavik perceived that they had a weight surplus (28% vs. 34%) and a greater proportion identified themselves as thin (7% vs. 3%). Nunavik men had a different overall perception of their weight than their Quebec counterparts, whereas for Northern women, perception differed solely when it came to being underweight (8% vs. 2% among women in the south). The perception the Inuit of Nunavik had with respect to body weight was more similar to that of their counterparts from Nunavut<sup>7</sup> questioned during the 2003 CCHS 2.1, where there was no difference in this variable between the two communities of the same ethnic origin (data not presented).

When the perception of body weight among adults of Nunavik is analyzed by body mass index (Table 7), among those who had a surplus of weight (BMI  $\geq$  25), we observe that the majority (54%) perceived themselves as having a more or less normal body weight. Some Inuit who were overweight or obese (3%) even believed themselves to be underweight, although this percentage must be interpreted with caution given the low number of respondents. These results demonstrate a significant discrepancy between perception and actual body weight among people with a weight surplus.

<sup>7</sup> Representative sample of 70.7% of the population of Nunavut; the results must be interpreted with caution.

**Table 7**  
Perception of body weight by the presence or not of surplus weight (%), population aged 18 to 74, Nunavik, 2004

Surplus of weight (presence or absence)	Perception of body weight		
	Underweight	Normal	Surplus
Presence (BMI $\geq$ 25)	2.8 <sup>E</sup>	53.9	43.3
Absence (BMI < 25)	15.0	81.0	4.0 <sup>E</sup>

<sup>E</sup> Interpret with caution.

Source: Nunavik Inuit Health Survey 2004.

In terms of action taken with respect to body weight, at the time of the survey, one out of five adults (20%) responded that they were trying to lose weight, about one out of ten (9%) stated they were gaining weight and the majority (71%) indicated they were doing nothing (data not presented). The results show there was no difference in the distribution of men and women who were trying to do something about their weight.

## DISCUSSION AND CONCLUSION

The results of the present survey reveal that the prevalence of obesity and of severe obesity among adults in Nunavik has increased significantly. Inuit women are markedly more affected by this problem than are men. This corresponds with the results of a recent study conducted among Canadian Arctic populations (Kuhnlein et al., 2004). However, the increase between 1992 and 2004 has been more pronounced among men, reducing the gap between the two genders. One alarming observation is that, despite the higher rate of obesity among the older population, it was the younger population aged 18 to 29 who experienced the most significant increase since 1992 (103%).

Scientific literature reports a relationship between a lower educational level and a high BMI (Raine, 2004). The results of the present survey do not indicate as clear a relationship. A lower rate of obesity among moderately educated individuals (23%) (several years of secondary school completed) is likely explained by the overrepresentation of young people aged 18 to 29 at this level of education.

The survey also reveals an increase in the prevalence of abdominal obesity in Nunavik. The number of Inuit with an at-risk waist circumference has increased since the 1992 survey; this now affects more than one third of the

population (37%). There are many more at-risk women than men; however, the latter have witnessed the highest increase over the past 12 years. Older individuals are at greater risk but once again, young adults (aged 18 to 29) have shown a greater increase in abdominal fat since 1992.

Despite having an obesity rate that is higher than that of other Quebecers, there are proportionally fewer Nunavik adults who perceive themselves as being overweight and more of them perceive themselves as underweight in comparison with their neighbours to the south. There is little data on Inuit perceptions of obesity. Weight surplus may be viewed differently according to the culture (Brown & Konner, 1987; Paeratakul et al., 2002; Willows, 2005). A study of a Cree community in Ontario demonstrated a preference for larger body sizes (Gittelsohn et al., 1996). The present survey shows that among adults with a weight surplus (BMI  $\geq 25$ ) (58%), more than one of two consider themselves to be of normal weight (54%). This significant discrepancy between objective and subjective evaluations reveals an inaccurate perception of body weight that may incite individuals not to act on this significant health risk factor.

This marked increase in the prevalence of body and abdominal obesity puts the population of Nunavik at greater risk for chronic diseases in the future and therefore justifies the implementation of strategies aimed at preventing excess weight gain. Women and older adults are more affected by obesity, but its more rapid spread among men and young adults should be the subject of specific attention. The cultural difference in perception of body weight among the Inuit of Nunavik must be taken into account and public health programs adapted accordingly. Once excess weight is put on, it is difficult to lose it on a permanent basis (Groupe de travail provincial sur la problématique du poids (GTPPP), 2004). Although clinical interventions are important, it would probably be more efficient to target interventions based upon prevention in order to eliminate weight gain. In addition to educating the population, interventions should target the establishment of an environment conducive to better nutrition and a less sedentary lifestyle.

While this gauge is recommended for all Canadians, BMI has limitations, particularly for some ethnic groups (Health Canada, 2003). Given that BMI does not take into account unusual leg length (WHO, 2003), and that the average relative sitting height (length of the trunk compared to the total body length) of Canadian Inuit is greater than that of other Canadians (Demirjian, 1980),

sitting height measurement may potentially be useful for adjusting the BMI for Inuit (Charbonneau-Roberts et al., 2005) and thereby gaining a better appreciation of the health risks.

In the future, more research on perceptions and attitudes linked to body weight among the Inuit of Nunavik should be undertaken to better understand their differences. A specific study of this population should be conducted regarding the validity of the BMI intervals and waist circumference thresholds in relation to the level of health risk.

Modernization of the lifestyles of traditional societies, particularly in terms of eating habits, has contributed to an increase in the prevalence of obesity (Brown & Konner, 1987). Paradoxically, Westernization of the Inuit culture may at the same time increase the number of underweight women (Andersen et al., 2004). Appropriate steps to stop the progression of obesity among adults in Nunavik should now be developed while ensuring that these measures do not promote the adoption of behaviour that is harmful to health.

## KEY ISSUES

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### PHYSICAL ACTIVITY

- ✦ Fewer than two in ten adults (ages 18 and over) attained the recommended level with leisure time physical activity. In the 15- to 17-year-old age group, only one in seven attained the recommended level of physical activity for young people of this age and, as with the adults, boys were more active than girls.
- ✦ The proportion of active individuals, during leisure time, was higher among people who are more educated, have a normal weight, a smaller waist, who perceived themselves as being in very good health, and are living along the Ungava coast.
- ✦ Nearly one adult in four reported a main occupation in 2004 requiring very little physical effort. In contrast, about one in ten reported high physical demands in this context, a condition affecting significantly more men than women.

## **ANTHROPOMETRY AND PERCEPTION OF BODY WEIGHT**

- ↪ At the time of the survey, about 41% of Inuit aged 18 to 74 were of normal weight, 30% were overweight and 28% were considered obese. The prevalence of obesity increased by age group in the case of both men and women.
- ↪ The prevalence of obesity and of severe obesity among adults in Nunavik increased significantly between 1992 and 2004. Inuit women are markedly more affected by this problem than are men. Despite the higher rate of obesity among the older population, it was the younger population, aged 18 to 29, who had experienced the most significant increase since 1992 (102%).
- ↪ Nearly four out of ten Inuit had a waist circumference indicative of an increased risk of health problems, a higher proportion than that observed in the 1992 survey. There are many more at-risk women than men. Older individuals are also at greater risk but once again, young adults (aged 18 to 29) have shown a greater increase in abdominal fat since 1992. Moreover, Ungava residents seemed proportionately more likely to have an at-risk waist circumference than their Hudson neighbours.
- ↪ Despite having an obesity rate that is higher than that of other Quebecers, there are proportionally fewer Nunavik adults who perceive themselves as being overweight and more of them perceive themselves as underweight in comparison with their neighbours to the south. The current survey shows that among adults with a weight surplus (58%), more than one in two considered themselves to be of normal weight (54%).
- ↪ In terms of efforts undertaken with respect to body weight, at the time of the survey one out of five adults (20%) responded that they were trying to lose weight, about one in ten (9%) stated they were gaining weight and the majority (71%) indicated they were doing nothing.

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## APPENDIX

**Table A1**

Classification criteria for each level of leisure time physical activity, Nunavik Inuit Health Survey, 2004

Level	Frequency (days/week)	Intensity <sup>a</sup>	EEl <sup>b</sup> ((kcal/kg)/week)	Seasons <sup>c</sup>
Very active <sup>d</sup>	5 or more	Light or higher	28 and over	3 or more
Active <sup>e</sup>	3 or more	Light or higher	14 and over	3 or more
Moderately active	2 or more	Light or higher	7 and over	3 or more
Somewhat active	1 or more	Light or higher	Over 0	3 or more
Sedentary	Less than 1	All	All	2 or more

<sup>a</sup> **Light or higher intensity** corresponds, according to international criteria (Kesaniemi et al., 2001), to 20% or more of reserve aerobic power (RAP). The term *moderate*, used in public health recommendations (CSKQ, 1999; USDHHS, 1996 and 1999), also includes the *light* intensity level even though, unfortunately, this “general” term may seem to exclude it (Nolin, 2006).

<sup>b</sup> **EEl**: energy expenditure index.

<sup>c</sup> **Seasons**: in the case of Nunavik, the criterion three seasons or more *must include winter* because it lasts nearly six months.

<sup>d</sup> **Very active**: basic recommended level among those aged 5 to 17 years (Cavill et al., 2001; Strong et al., 2005). Example: brisk walking, 60 minutes/day, 7 days/week (see other examples in Table A2, Appendix).

<sup>e</sup> **Active**: basic recommended level among those aged 18 years and over (Pate et al., 1995; USDHHS, 1996; CSKQ, 1999; Kesaniemi et al., 2001). Example: brisk walking, 30 minutes/day, 7 days/week (see other examples in Table A2, Appendix).

**Adapted from:** Nolin, B., 2004a and 2004b.

**Table A2**

Three examples for each level of leisure time physical activity

Level	Activity (intensity <sup>a</sup> )	Duration <sup>b</sup> (minutes/day)	Frequency <sup>c</sup> (days/week)	Seasons <sup>d</sup> (number)
Very active <sup>e</sup>	Walking (brisk)	60	7	≥ 3
	Walking (moderate pace)	80	7	≥ 3
	Jogging (moderate speed)	35	5	≥ 3
Active <sup>f</sup>	Walking (brisk)	30	7	≥ 3
	Walking (moderate pace)	40	7	≥ 3
	Jogging (moderate speed)	30	3	≥ 3
Moderately active	Walking (brisk)	30	4	≥ 3
	Walking (moderate pace)	40	4	≥ 3
	Jogging (moderate speed)	30	2	≥ 3
Somewhat active	Walking (brisk)	30	2	≥ 3
	Walking (moderate pace)	40	2	≥ 3
	Jogging (moderate speed)	30	1	≥ 3
Sedentary	Any of the above	Any of the above	Less than 1	≥ 2

<sup>a</sup> **Intensity**: exact speed (km/h) is not given since the effort must be adapted to the personal capacity of each individual, according to one’s age, physical fitness level and health status.

<sup>b</sup> **Duration**: approximate duration. The duration can be divided into shorter periods (minimum 10 minutes) if the person prefers this formula. Example: brisk walking (3 times/day, 10 minutes each time, instead of once/day, 30 minutes).

<sup>c</sup> **Frequency (minimum)**: very active (5 days/week), active (3 days/week), moderately active (2 days/week), somewhat active (once/week).

<sup>d</sup> **Seasons**: in the case of Nunavik, the criterion three seasons or more *must include winter* because it lasts nearly six months.

<sup>e</sup> **Very active**: recommended level for those aged 5 to 17 (see definition, Table A1, Appendix).

<sup>f</sup> **Active**: recommended level for those aged 18 and over (see definition, Table A1, Appendix).

*Note:* Several other sports, outdoor, physical fitness and dance activities also allow an individual to attain a given level.

**Adapted from:** Nolin & Hamel, 2005.

**Table A3**  
Weight classification system for Canadian adults

<b>Level of risk by body mass index category</b>		
<b>BMI Category</b>	<b>Classification</b>	<b>Health risk</b>
< 18.5	Underweight	Increased risk
18.5 – 24.9	Normal weight	Least risk
25.0 - 29.9	Overweight	Increased risk
30.0 and over	Obese	
30.0 – 34.9	Obese class I	High risk
35.0 – 39.9	Obese class II	Very high risk
40.0 and over	Obese class III	Extremely high risk

<b>Level of risk by waist circumference</b>		
<b>Gender</b>	<b>Waist thresholds</b>	<b>Health risk</b>
Men	≥ 102 cm	Increased risk
Women	≥ 88 cm	Increased risk

**Adapted from:** Health Canada, 2003.



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HOW ARE WE?

