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PREDICTORS OF FITNESS LEVELS OF WESTERN ARCTIC YOUTH IN BOTH URBAN AND RURAL SETTINGS

by

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ABSTRACT

The purpose of this study was to predict the influence of lifestyle on fitness levels of young people living in two distinctly different settings, rural and urban, of the western Arctic region of Canada.

The study involved 130 male and female subjects of high school age (15-19 years). Of these, 65 were drawn from high school students from the Inuvik region; the other 65 were drawn from high school students from Yellowknife.

All subjects participated in two areas of testing in order to analyze their lifestyle and fitness levels. Selected components of the Canadian Standardized Test of Fitness (CSTF) were administered and a modified version of the 1988 Campbell's Lifestyle Questionnaire was administered to ascertain selected aspects of lifestyle. The Canadian Aerobic Fitness Test (CAFT) was administered to predict cardiovascular fitness levels and anthropometric measures were used to determine individual adiposity indices. Smoking status and adherence to Canada's Food Guide were the two only factors that showed a significant association with the two adiposity index-dependent variables, sum of trunk skinfolds (SOTS) and sum of skinfolds (SOS). Four factors showed a significant association with the dependent variable, maximal oxygen consumption (VO2-max); namely, gender, smoking status, energy expenditure in leisure time, and positive well-being.

Recommendations were made in light of the findings. These recommendations work towards minimizing health-associated risk factors, promotion of favourable lifestyle habits, promotion and encouragement of youth to pursue sport and recreational activities, and further study in specific areas of concern.

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CHAPTER I

INTRODUCTION TO THE PROBLEM

For centuries, the indigenous people of the western regions of the Northwest Territories led a traditional, nomadic lifestyle consisting of hunting and fishing in order to provide food, clothing, and shelter necessary for survival. Due to the influence of Western-European culture, the indigenous people of this area have seen their traditional lifestyle change drastically.

Indigenous people originally developed a way of life in the North that reflected their environment. Social institutions enabled the continuation of their survival as a distinct people. This way of life was altered dramatically with the advent of the European settlers, whalers, fur traders, and explorers. As these newcomers interacted with the indigenous people, and with their trade-based culture, they bartered European flour, cloth and guns for furs and native expertise in northern survival (Paraschak, 1983). The economic base of indigenous people accordingly expanded from subsistence activities to trapping. Although this initial interaction altered the material culture and lifestyle of some indigenous northeners, it was not until European social institutions were imposed that the present colonial status of the Northwest Territories became entrenched.

> Religion paved the way. Missionaries travelled north with the fur trade in the mid-1800's, in order to "convert the heathen" in the area that became the District of Mackenzie. Schools for native children were established and run by the churches, beginning in the 1920's, with funding provided by the federal government. It was not until 1947 that the territorial council established a policy whereby the government, and not the churches, would be responsible for providing public education (Paraschak, 1983).

The imposition of the church and the government way of operating the schools (people outside the North made decisions and developed institutions for northeners) resulted in irreversible changes to the indigenous way of life. Children were removed from their families and placed in schools operating in a "southern" system at an early age. Families eventually moved to permanent settlements as their way of life changed inorder to be closer to their children attending school. Even today, some students must leave their communities and relocate to large centres if they wish to continue their education into high school.

Wage earning first came to indigenous people of the North with the construction of the Distant Early Warning (DEW) Line in the mid-1950s. Mining and oil and gas extraction have provided ongoing wage opportunities for indigenous people since the 1960s. In order to benefit from the opportunities, however, the indigenous workers were required to leave their families and home communities and submit themselves to conditions very different from their community life.

An alternative to the wage economy is an economy based on hunting, trapping and fishing pursuits, which could be

considered to fall under the umbrella term "traditional economic activities".

> Hunting, fishing and trapping cannot be understood solely as economic activities. Often northern natives undertake them with little expectation of cash profit. This behaviour seems irrational to the non-native observer but in reality is perfectly reasonable: the hunter derives a spiritual as well as material benefit from being on the land. By the same token, many native people who are employed, and therefore do not have an economic need to do so, continue to hunt, fish or trap in their spare time or in interludes between periods of wage employment. To some extent, this can be explained in terms of the same factors that lead many non-natives to hunt and fish. That is, to obtain free meat and to enjoy a recreational pastime. However, for the native people, the traditional tie to the land is also prominent. For them, being on the land feels right, it is a spiritually meaningful activity. (Dacks, 1981).

The viability of the fur trade was significantly altered when fur prices dropped after the Second World War and the prices of trade goods continued to rise. Since trapping can no longer provide enough money to sustain a family, people have had to supplement their income with government family allowance cheques, old age pension and/or welfare (Paraschak, 1983). Other indigenous northeners have sought out part- or full-time wage labour in order to bolster their trapping income.

With families moving into communities to be near their children in school, they depleted the surrounding area of furs and consequently have been forced to travel further afield to continue trapping (Paraschak, 1983). Although trapping does

not contribute substantially to the economy of the north, it remains an important activity to indigenous people, along with hunting and fishing. It also remains as an economic avenue that maintains indigenous people, within, rather than isolates them from, their own culture.

Shephard and Godin (1976) suggest that the balance between the energy demands of human existence and the energy resources available to a community can be critical for survival, particularly in the harsh environment of the Arctic. These authors believe that the future stability of the Inuit communities is more problematic. They state that until recently, the population was kept in check by sustained breast feeding which reduced fertility and a very high infant mortality. With the provision of primary health care, and improved standard of living, infant mortality has been reduced and the population growth rate has increase.

> Such pressures are exacerbated by diminishing game resources, the high cost of gasoline, and concentration of villagers in regions remote from traditional hunting areas. In short, we have the sad picture of a community that is rapidly getting out of balance, with all that this implies for health, nutrition, self-respect, and human fulfilment. It is perhaps not surprising that some of the Igloolik villagers are choosing to reject the "advantages" of civilization, and are returning to smaller settlements in more remote areas where their traditional lifestyle can be conserved. (Shephard & Godin, 1976).

The impact of the government, church, and free enterprise resulted in a change in the lives of the indigenous people. Indigenous people became a group of people in transition,

unable to return completely to their own culture and unable to fit completely into the new western cultural ways. For many this change in lifestyle has had a negative effect on their health and well-being.

> A sharp change in the secular tenor of life caused changes of homeostatic systems which has affected the native peoples' health. Transition to a settled mode of life, departure from traditional diets, a considerable tension of regulating systems caused an increased incidence of cardiovascular and digestive tract disease.... The occurrence of hypertensive crisis, infarction and atrophic gastritis became more frequent.... The change in the traditional kinds of nourishment, a sudden isolation of children from their natural ecological medium and their outstripping inclusion into the generally accepted regimen of strenuous school instruction cause destabilization of the primary structural - morphological basis of the optical system of the eye.
> (Sedov, 1990).

The geographic area and the people to be examined in this study is as vast as it is varied. The city of Yellowknife, in the south west, with a population in excess of 15,000 people, has developed as a centre of government and industry. This city has all the amenities of any of its southern counterparts. The area is contrasted greatly by the tiny, isolated settlements of the northwest Inuvik region.

The people of the Inuvik region including the tiny settlements of Fort MacPherson, Arctic Red River, Aklavik, Tuktoyuktuk, Paulatuk, Sacks Harbour and others, experience a much different lifestyle. Their lifestyle, including diet and activity, would have many similarities to that of their ancestors. While most of these people are no longer nomadic in

the strictest sense of the word, they still camp out and travel, to some degree, in search of game animals, birds, or fish and later return to their permanent homes.

Statement of Purpose

The purpose of this study was to predict and compare the lifestyle factors that influence fitness levels of young people living in two distinctly different settings, rural and urban, of the western Arctic region of Canada.

For the purposes of this study, fitness levels are described by the results of maximal aerobic power (MVO2) testing and adiposity indices. Analysis of lifestyle focused on factors that have been shown to have a significant influence on fitness levels such as smoking status, physical activity patterns, and diet and nutrition.

Significance of the Study

This study examined and compared the influence lifestyle factors had on the physical fitness levels of the subjects studied. It was important to ascertain this information in order to get an accurate and up-to-date account of the fitness levels, compare them to established norms and standards, and to make recommendations accordingly.

There has been a focus by the various levels of government in all areas of this region to educate and provide human and physical resources in order to enhance the wellness

status of the people living there. This is especially true in the recreation area with considerable funds devoted to recreation facilities and personnel. However, there have been no (or few) studies or investigations on the influence lifestyle has on the health and fitness levels of these residents.

The findings of this study may be of special interest to the people directly involved in decision making and to the civic leaders of this region. The results of this study may provide insight into a number of discrepancies and weaknesses in the lifestyle of these residents and the influence it has on fitness levels and general well-being. This study may be helpful in finding better ways to provide adequate programs and facilities to address the needs of their constituents.

Delimitations

The following delimitations are recognized by the study:

(1) The study involved 130 male and female subjects of high school age (15-19 years). Of these, 65 were drawn from high school students from the Inuvik region. The other 65 were drawn from high school students from Yellowknife.

(2) Subjects with medical or physical impairments were excluded from this study. This included subjects with bone or joint disease, indication of cardio-pulmonary disease or other ailments which would be aggravated by exercise testing. For example, subjects with a resting heart rate of 100 or more beats per minute and resting systolic and diastolic blood

pressure of 150 mmHg and 100 mmHg or more respectively, were excluded.

(3) The Canadian Aerobic Fitness Test (C.A.F.T.) step test, as a measure of aerobic power, and the skinfold method of estimating body fat, are indirect methods of evaluation. The error inherent with this type of testing is acknowledged.

Limitations

The following limitations are recognized in this study.

(1) There was no control over subjects' lifestyle.

(2) Testing of the subjects occurred at a given point in the year. The results are not indicative of seasonal influences.

(3) The results for this age group (15-19 years) will not be applicable to other age groups.

CHAPTER II

REVIEW OF LITERATURE

The review of literature for this investigation must include several significant areas which have had an impact on the lifestyle and fitness levels of the northern population being studied. The impact of the coming of foreigners into this northern frontier has resulted in an acculturation process for the indigenous people. It has impacted their physical, emotional, psychological and spiritual well-being. Therefore, the review of literature will concentrate on the factors which directly or indirectly affect their lifestyle and the corresponding influence on fitness levels and general well-being.

> The 1950s saw an era of rapidly increasing public interest in Canada's vast northland.... The native people were no longer living in the isolation of their past way of life. The government of the day enunciated a policy of greater emphasis on northern development and particularly on the human needs - health, education and a sound economy - of northeners.... This was all part of the federal government's policy to help the Inuit cope with the transition and to ease the trauma of the celerity of the changing Arctic. Whether it was a good approach or not is a subject for debate; the Inuit way of life had been disrupted and a culture undermined.
>
> (Freeman, 1978).

The impact that acculturation has had upon people of the far north has been well-documented (Berry, 1984). The fitness and lifestyle patterns of this group as well as other populations has been extensively reviewed (Rode & Shephard,

1992). The impact of nutrition and diet of northern people shows many significant findings which impact the quality of their life and well-being (Sedov, 1990). The resulting disease and health problems of this group show startling findings attributed to their lifestyle (Freeman, 1978). The literature review also includes an examination of the ethnic differences in fitness levels and work capacities.

Acculturation

"Acculturation" is a term which has been defined as culture change which results from continuous, first-hand contact between two distinct groups (Berry, 1984). The impact of social and cultural change on the mental and physical health of indigenous individuals living in the far north is relevant to this investigation. Without doubt, people of the far north have been major recipients of, and adaptors to, such change.

What kind of changes can occur as a result of acculturation? Berry (1984) suggests that the range is very large.

> First, physical change may occur: a new place to live, a new type of housing, increased population density, more pollution, etc., are all common with acculturation. Second, biological changes may occur: new food and nutritional status, new diseases (often devastating in force), interbreeding yielding mixed (Métis, Mestizo, etc.) populations are common. Third, cultural changes, which are at the heart of the definition, necessarily occur: original political, economic, technical, linguistic, religious, and social institutions become altered, or new ones take their place. Finally, psychological changes, including

> changes in mental health status, almost always occur as individuals attempt to adapt to their new milieu (Berry, 1984).

A typical acculturation situation with which this investigation is concerned within the north involves individuals of a particular (often-dominant) cultural background being in contact with another cultural group which leads to individuals having to adapt to their new situation, using a variety of strategies. Berry (1984) points out that group and individual strategies can vary from readily and easily adopting the changes, to resisting them, or collapsing under their weight.

Schaefer and Metayer (1974), in an address to the Third International Symposium on Circumpolar Health held in Yellowknife, Northwest Territories, spoke about the changing health picture in the Arctic and the frightening prevalence of violence. They indicate that violence, poisoning, infant mortality, and suicide were the leading causes of death for most native groups in the Northwest Territories, Yukon, and Alaska.

Their address concluded that the basic elements of traditional Inuit society, a tightly knit family structure and personal values, attitudes, and practices shaped for successful life in a harsh environment, were falling apart.

> The older generation feels numbed, bewildered, and saddened, while the younger generation is idle, frustrated, and rebellious. Men are deprived of their traditional role as meat providers, emasculated and powerless; relief from feelings of worthlessness and frustration with a temporary

> illusion of power are sought through alcohol. Women have lost their indispensable central role in the family, and no longer have an intimate and intense interaction with their children. They suffer from idleness even more than the men. Children are deprived nutritionally and emotionally from early infancy. They have lost the ideal image of their parents, and no longer learn to become useful by imitating their actions. They often feel misunderstood, useless, and rebellious.
>
> The only social institution of major importance in Inuit life, the family, is disintegrating. Nothing has yet taken its place. The individual is left lonely, frightened, without direction, and full of anxiety. (Schaefer & Metayer, 1974).

The studies carried out by Rode and Shephard (1976, 1985) show significant changes and acculturation of the Canadian Inuit. In 1970-71, these authors were part of a group which studied the fitness of people in Arctic Communities. The Canadian team conducted its studies in Igloolik, a village of some 530 Inuit situated in Canada's eastern Arctic. Their 1970-71 results described certain unusual physiological characteristics of the traditional Canadian Inuit, including an exceptionally large maximal oxygen intake, particularly when expressed per kilogram of body mass; a very limited amount of subcutaneous fat; and a superior leg extension strength.

The authors reported then that the process of acculturation within the Igloolik settlement had progressed rapidly since their original survey of 1970. In 1980-81, these authors had the opportunity to reassess the working capacity of the Igloolik people. Their reports show significant change.

> The "future shock" of Alvin Toffler is being experienced by many Arctic communities at a pace without precedent in southern society, small settlements moving from a neolithic type of economy to what is essentially an urban North American culture in the space of a few decades. (Rode & Shephard, 1985).

The authors pointed out that in the 20 years between the studies of Inuit of Igloolik, the predicted maximum intake had decreased substantially in both sexes. Further evidence that there had indeed been a decline of personal fitness came from a consideration of other variables such as body mass, subcutaneous fat, and leg strength. All these measurements showed changes consistent with a deterioration of personal fitness.

> Previous generations of circumpolar residents have enjoyed a low prevalence of cardiovascular risk factors as a tangible reward for a lifetime of vigorous physical effort. Modern technology is progressively robbing mankind of the need for physical effort at work, at home, and even in his leisure activities. The Igloolik community demonstrates the physiological consequences of such inactivity on a vastly accelerated time scale. It will be most important to monitor the future physiological and medical status of the population now that they have adopted the sedentary lifestyle characteristics of our southern communities (Rode & Shephard, 1985).

The community of Igloolik continued to change rapidly. From 1970 to 1984, The size of the settlement had grown by 36 percent, snowmobile ownership has increased ninefold, movies were now shown five times per week, and over 50 households now owned video-television systems. Many of the Inuit of Igloolik still engaged in a little recreational hunting, but none now

regarded this as making a major contribution to personal survival. This pattern of acculturation to "western civilization" of this isolated indigenous settlement is typical to almost all in the Arctic regions of Canada (Freeman, 1978).

The most striking effect of modernization in the Canadian Eastern Arctic is the development of comparatively large communities, composed of a majority of Inuit and a significant number of non-Inuit. The traditional small, isolated and kinship-based residential group, with its hunting and trapping economy, has given way to the large, socially heterogeneous permanent community with a wage and welfare economy (Sampath, 1976).

Adaptation to this new social structure is having an adverse effect on the mental health of the Inuit. Sampath (1976) conducted an anthropological study and a mental health survey in a southern Baffin Island community with an Inuit population of approximately 500. Ninety-three percent of the adults were formally interviewed. It was shown that psychiatric symptomatology was severe in 10 percent of the population, moderate in 27 percent, mild in 58 percent, and minimal in only 5 percent. Females had a greater degree of symptomatology than the males and 37 percent of the total respondents were suffering from severe mental disorder.

In this study, it appeared that with the male-female relationship, the women bore the brunt of the conflict.

Settlement life was described as a "castrating" factor for the Inuit male. The author attributed the prevalence of psychoses to genetic factors in a group where in-breeding is high, but social factors such as poverty and overcrowding may also be implicated.

Fitness and Lifestyle Habits

Rode and Shephard's research (1992), Fitness and Health of an Inuit Community: 20 Years of Culture Change, is the single most important study in this area for comparative purposes. These authors assessed the impact of cultural change on working capacity, lung function, growth and development, body composition, and strength, by collecting physiological, anthropometric and health data on the Inuit living in Igloolik in the Northwest Territories. Data were collected at three stages of "acculturation", in 1970, 1980, and 1990.

The early study by these authors (1971) described certain unusual physiological characteristics of traditional Canadian Inuit including an exceptional high maximal oxygen consumption and a very limited amount of subcutaneous fat. These characteristics were tentatively attributed to a high level of habitual activity, including frequent walks through deep snow, daily carriage of young children on the back (women only), and vigorous forms of hunting. In 1981, those members of the community who still followed the traditional patterns of hunting, demonstrated high levels of maximal oxygen

consumption and a very limited amount of subcutaneous fat, similar to the 1971 study. In contrast, others, who had decided to adopt the wage-earning economy of the white settler, became less physical fit in these components.

Rode and Shephard (1976) noted that Inuit residents of the Canadian Arctic settlement of Igloolik had an above-average level of cardiovascular fitness. In light of this, these authors set out to explain the growth and development of physiological variables related to cardiovascular performance within this population.

This cross-sectional study of 58 boys and 52 girls aged 9-19 years was completed in the summer of 1970 and repeated on 49 members of the group 12-14 months later. Anthropometric measurements include standing height, body weight, and the thickness of three skinfolds. Cardiovascular performance was assessed by a progressive submaximal step-test, knee extension strength was assessed by cable tensiometer, and hand grip strength assessed by Stolting dynamometer.

The results of this investigation showed both height and weight curves had a similar form to those reported for southern Canadian and United States cities, but the growth spurt is apparently delayed by a few months. At all ages, Canadian Inuit children were shorter and lighter than their white counterparts, but the weight/height ratio was similar to that of the city-dweller. The secular trend to an increase in height (1.7 cm/decade in men, 1.9 cm/decade in women) suggest

that the size differential between the white population and the Innuit will disappear over the next few decades.

It was also shown that skinfold thicknesses were extremely small in Inuit boys throughout development. The girls accumulated a substantial quantity of subcutaneous fat during and following puberty, but remained thinner than city-dwellers. The boys were characterized by a rather poor grip strength and average leg strength. The girls had an average grip strength, but an unusual development of leg strength in late adolescence. The authors suggest that the cause could be due to carrying small children on their backs over the rough terrain. The boys maintained a high level of aerobic power throughout the period of development, but the girls showed a progressive decline from the ages of 12 years, a trend that was thought to be socially conditioned.

Rodes and Shephard (1976) stated that the picture of the Inuit that emerged from their studies has that of an individual with high, but not, an athletic level of cardiovascular fitness. They felt that many factors had contributed to this development.

> Genetic studies suggest a relatively isolated community, where it is conceivable a favourable mutation may have developed. Episodic starvation and disease may have added to the weight of evolutionary pressure. A high protein diet may have helped conserve a compact body form, and thus a high aerobic power per kilogram of body weight (Shephard & Rode, 1976).

In the twenty year time period, the Inuit children and adults of the community experienced very rapid and unprecedented changes in lifestyle with associated changes in body composition and personal fitness.

> The negative changes include a substantial accumulation of body fat, decrease in leg and handgrip strength, and deterioration of aerobic fitness in both sexes and in children as well as adults (Rode & Shephard, 1992).

The authors attributed the factors contributing to this deterioration of fitness level and accumulation of body fat to a decrease in habitual physical activity and the consumption of an excess of refined and "junk" foods such as candy, soft drinks, potato chips, and the like. Television viewing and various forms of video entertainment was identified as an important factor displacing more active pursuits which led to a deterioration of physical fitness.

The youth of the community were not immune to this trend of deterioration in fitness levels. In 1990, the total body fat for the 18-19 year old males was very similar to those that would be obtained on a comparable group of Caucasian. The average increase in total skinfold thickness from 1970 to 1990 for males aged 9-19 years, was 66.5%, and for the females, the increase was reported to be 67.2%. The decline in aerobic capacities was also significant with this age group with on overall drop for the males of 14.5% and, for the females, of 13.5%.

It was important to note that individuals who participated in sports and other forms of vigorous physical activity were able to demonstrate fitness levels equivalent to those seen in 1970. The authors pointed out that these active young people were very few in number.

> The challenge remains to activate that great majority of youth who remain captivated by assorted forms of video entertainment and get them to use the excellent recreational facilities in Igloolik (Rode & Shephard, 1992).

Paffenbarger and colleagues (1986) examined the physical activity and other lifestyle characteristics of 16,936 Harvard alumni, aged 35 to 74 years, for rates of mortality from all causes and for influences in length of life. A total of 1,413 alumni died during 12 to 16 years of follow-up with the underlying causes of death being cardiovascular disease in 45 percent, cancer in 32 percent, other natural causes 13 percent, and trauma in 10 percent. In all age groups, there was a consistent trend toward a lower death rate as physical activity increased from less than 500 to 2,000 or more kcal. per week. The older alumni at the highest activity level had half the risk of those at the low end of activity and younger alumni at the highest activity level had 25 percent less risk than those at the lowest level.

Rates were adjusted for differences in age, cigarette smoking, hypertension, a low net weight gain since college, and early parental death. A decline in death rates with increasing activity was seen for each cause but was strongest

and most significant in relation to cardiovascular and respiratory diseases. Alumni with physician-diagnosed hypertension had about twice the risk of death of normotensive alumni. A steady reduction in the risk of death was shown as exercise increased and cigarette smoking decreased. The risk among sedentary heavy smokers was reduced by two-thirds among the most active non-smokers. At each level of exercise, a reduction in smoking from one or more packs down to none reduced the risk of death in half. Cigarette smokers had an 84 percent greater risk of death than nonsmokers. Heavier men had an 18 percent higher risk than leaner men, and alumni with a parental history of coronary heart disease had a 33 percent higher risk of dying from cardiovascular disease than classmates whose parents were free of coronary heart disease.

The results of the above study found that the amount of additional life attributable to adequate exercise, as compared to inactivity to be one to more than two years. Overall, the study suggested a considerable gain in person-years of life for the habitually energetic alumni, especially if any avoidable adverse risks, such as cigarette smoking and obesity, had been minimized. This study adds evidence to support the widespread and longstanding popular belief that adequate physical exercise is necessary to preserve life and its desirable qualities into old age.

Another landmark study in this area conducted at the Cooper Clinic in Dallas from 1970 to 1981, measured physical

fitness and incidence of hypertension in healthy normotensive men and women (Blair et al., 1984). This investigation measured 4,820 men and 1,219 women aged 20 to 65 years. Participants had no history of cardiovascular disease and were normotensive at baseline. The participants were then followed-up for one to twelve years for the development of hypertension. Incidence of hypertension was then obtained in 1982 as part of a follow-up study.

There were 240 new cases of hypertension reported during the follow-up period. Bivariate analyses indicated a strong association between incident cases of hypertension and lack of physical fitness in both men and women. After adjustment for gender, age, baseline blood pressure, and body mass index, the relative risk of hypertension in the low fitness group was 1.52 times the risk of a person in the high fitness group. It was shown that both baseline blood pressure and low levels of physical fitness were independent contributors to the risk of developing hypertension.

The risk of hypertension increased tenfold for the person who was in the highest blood pressure categories at the time of entry into the study and who had a low level of physical fitness compared with the person who had none of these risk characteristics. It was shown that the incidence of hypertension was 18 per 1,000 in the high fitness group and 32 per 1,000 in the low fitness group.

In this study, lack of physical fitness was significantly associated with hypertension risk after simultaneous adjustment for the possible confounding factors of body mass index, age, gender, follow-up interval, and baseline blood pressure levels.

A study by Epstein et al. (1981), comparing way of life as a determinant of physical fitness, is of special interest. Four hundred and five urban dwellers were compared with 302 communal agricultural settlement dwellers. The Kibbutz, a communal settlement, is a rural way of life in Israel. This study is of special interest because of the control over several factors which normally confound such studies. The way of life in the Kibbutz is marked by a large variety of physical activities including walking and riding bicycles as a way of transportation to the various communal functions. The members of the Kibbutz eat at a common dining room thus eliminating dietary differences. Both populations in this study were ethnically heterogeneous but all subjects were born in Israel, a fact which eliminated behavioral differences. Moreover, anthropometrical features of Kibbutz dwellers were identical.

The subjects were divided into three age groups, 18-21 years, 22-30 years, and 31-40 years, and exhibited no differences in anthropometric data among the two populations in all three subgroups. In the youngest age group no differences in resting heart rate and maximal oxygen

consumption between urbanites and Kibbutz dwellers were found. For those over 21 years of age the maximal oxygen consumption was significantly higher in the Kibbutz group. It seems that Kibbutz dwellers were more physical active than urbanites with more intense physical activity in their jobs and lifestyle, while in the city, cars and buses are the common mode of transportation. The Kibbutz residents were also significantly more active in sports.

The strict control over a variety of possible confounding variables in this study indicate differences in maximal oxygen consumption could be attributed only to the more active way of life in the Kibbutz during both work and recreation time. The fact that the only age group in which Kibbutz members and urbanites had a similar maximal oxygen consumption was eighteen to twenty-one year olds stresses this statement even more. At this age Israelis serve in the army where the demands for physical activity are similar for all.

In the city, the reduction in physical activity brought about by modernization and technology has not been compensated for by sport or leisure exercise. The physically active way of life in the Kibbutz is the only explanation to which the differences in maximal oxygen consumption can be attributed. The results of this study confirm the notion that physical fitness is enhanced by habitual activity.

Andersen and colleagues (1960) considered the work capacity of indigenous people living in or near the Arctic

Circle in western Canada. Eleven members of the Athabaska tribe of the Yukon were studied in the fall of 1958 and were compared to Scandinavian men of similar age. Care was taken to ensure that the subjects were of Indian descent without indication of Eskimo or White admixture. The Arctic Indians demonstrated a higher maximal oxygen consumption per kilogram of body weight. This difference was interpreted as a consequence of a very active lifestyle among the Indians who relied on hunting, fishing and trapping. The authors concluded that the higher scores of the Athabaskans were a result of regular physical work undertaken for subsistence.

Andersen and Hart (1963) reported the results of work tests of eight Inuit from Pangnirtung on Baffin Island. Testing was done on an ergocycle and both submaximal and maximal tests were administered. A subjective evaluation by the authors was that the Inuit were not particularly active, with a maximal oxygen consumption similar to sedentary Scandinavians.

Men living in small polar communities present opportunities for physiological study. Observations have shown changes in body mass, skinfold thickness, and basal metabolic rate during extended stays in polar regions. Parker (1985) recorded physiological parameters and activity monthly on 19 men wintering at a polar base. A comparison was made between those in the first Antarctic winter (group A), and those in their second consecutive Antarctic winter (group B).

Group A members were more active and spent more time outside during the darker and colder winter period. Combined data showed no correlation between total activity and meteorological conditions, but a clear negative correlation with time spent outside and wind speed. In the first part of the year, group A became fitter, increased maximal oxygen consumption, and increased body and fat mass. These changes were not demonstrated by group B living under identical conditions.

The authors suggested that the changes in physiological parameters in group A were in response to the lifestyle and activity of a polar base, rather than to the Antarctic climate per se. They concluded that such physiological changes occurring from the transition to base life are independent of the seasons and it is lifestyle and physical activity, different from that experience in typical western urban centres, that may be more important in stimulating adaptation, than the dramatized rigors of the Antarctic climate.

Davies and colleagues (1972) pondered the basic premise: was man indeed more active in the past than he is today? They suggested that one way to answer this question was to compare the fitness and habitual activity patterns of some primitive populations still existing today with modern civilized man. The Yoruba villagers of their study fell into this former category. It was shown that the level of their maximal oxygen

consumption was in no way exceptional and differed little from the results given for sedentary Caucasian man.

The authors supported this finding with a review of similar findings from the literature. The review failed to reveal that the primitive populations were in any way superior to other "advanced" groups. The Kalahari Bushmen, reputed to be one of the most primitive groups remaining in the world, for example, scored only slightly higher maximal oxygen consumption than average sedentary Caucasian males. Indeed, the authors contended, if one observes these primitive groups one finds that their pattern of life is certainly hard but not necessarily active. They do have periods of intense activity when hunting and food gathering, but once the appetite has been satisfied they spend long hours either sleeping or sitting around the communal fire.

The authors concluded that it is likely that every society throughout its existence has exhibited these cyclical changes in physical activity and possessed some members who have exerted themselves more than others, hence the wide intersubject variability we see in physical working capacity. From the evidence of their study, interpopulation fitness would seem to remain at a fairly constant level.

Diet and Nutrition

It is generally accepted that a good diet and sound nutrition is a significant, contributing factor in overall

good health and well-being. The pattern of health and sickness among indigenous people has altered significantly since the Second World War as a result of rapid social and lifestyle change (McIntyre & Shah, 1986).

It is generally recognized that the "traditional lifestyles" of northeners is becoming "less traditional" as elements of southern lifestyle are adopted. Coincident with these changes, the patterns of ill-health associated with southern lifestyles are now appearing in the north.
The change away from the traditional food systems of indigenous peoples is recognized as a detraction to sociocultural as well as physical well-being (Kuhnlein, 1990).

Draper (1976) in a review of nutritional research in the Arctic, indicates that this type of research has been stimulated by several factors.

> Rapid erosion of aboriginal cultures has prompted efforts to obtain baseline data on the nutritional status of population isolates still under the influence of traditional diet. In addition, there has been an increased realization that significant malnutrition exists among the populations of generally affluent societies, and that within such societies malnutrition is most prevalent among minorities subjected to rapid cultural change. Such is the situation of most the native peoples of the Arctic region (Draper, 1976).

Dietary surveys of a number of circumpolar populations, in general, attest to the pervasive inroads of commercial items into the indigenous diet. Studies on Canadian Inuit residing in four northern settlements, carried out as part of a national nutrition survey, provided evidence of multiple

nutritional deficiencies (Draper, 1976). Signs of scurvy, anemia, low serum folate levels, and low vitamin A intakes were major findings as well as a high prevalence of obesity. The nutritional status of the Inuit living in this region was found to be inferior to that of North American Indians, which in turn was inferior to that of the general Canadian population.

Serum and 24-hour urinary excretions from Inuit of the Northern Foxe Basin were assayed for constituents that reflect dietary intake (Sayed and colleagues, 1976). Levels of these constituents reflected a generally adequate intake of protein, thiamin, riboflavin, niacin, and vitamin A. However, consumption of folic acid, calcium, and magnesium appeared to be low. It was also shown that, according to the criteria used by Nutrition Canada, one-third of the women but few men were at risk of iron-deficiency anemia. The authors point out these data reflected dietary consumptions similar to those of other Eskimo populations and suggest careful consideration to the effect of acculturation upon diet and consequent nutritional status.

Bang and colleagues (1971) examined the plasma-lipid pattern, including quantitative lipoprotein electrophoresis, in 130 Inuit (69 females, 61 males). These Inuit were hunters and/or fishermen, and their wives living in the northern part of the west coast of Greenland. The authors point out that high concentration of plasma-lipids, especially cholesterol,

are considered to be strongly correlated with atherosclerotic diseases, especially with ischemic heart disease. Furthermore, a high consumption of fat of animal origin raises the level of serum cholesterol. Nevertheless, the incidence of ischemic heart disease is very low in Inuit in the northern part of Greenland even though the Inuit food in this are is extremely rich in animal fat.

The area visited is approximately 500 kilometres north of the Arctic Circle and consists of the village of Umanak with a population of 900 and 7 small settlements containing in all, 1,350 inhabitants. In these remote settlements the dietary habits have only been slightly influenced by non-indigenous cultures. The authors quote, "The Eskimos are probably the most exquisitely carnivorous people on earth, living, as most of them do, almost exclusively on meat and fish" (Bang and colleagues 1971). Further, although the way of life of these indigenous northeners have changed greatly in recent years, the choice of many is still that of the hunter and fisherman, and the products of "civilized" food have only been introduced to a slight degree.

The results of this study showed that there was a very clear difference in most types of blood lipids in the Inuit residents than in the Danish control group. The concentrations of plasma-cholesterol in the Inuit were clearly and significantly lower than in the Danes, and the difference was found to increase with age. The authors point out that in the

years 1963 to 1967, only three cases of atherosclerotic heart disease and not a single case of diabetes mellitus was known to be present in the population of the Umanak area. In these Inuit, the authors point out, the association of low levels of most types of lipid with very low incidence of ischemic heart disease is striking.

The authors believe that the dietary habits of the population in this part of Greenland has not changed much since 1908. Further, the word "Eskimo" is of Red Indian origin and means "people eating raw meat." Their explanation of the rather low level of plasma-cholesterol despite the high intake of animal fat is probably due to the large amount of polyunsaturated fatty acids in the fat tissue of the animals eaten which is known to protect against an increasing plasma-cholesterol level.

The authors state that the cause of the predominantly lower lipid levels in the Inuit than in Danes could be either genetic or derived from the special Inuit way of life, including alimentary habits, or both. In order to elucidate this problem, the blood lipid pattern of 25 female Inuit living in Denmark were examined. It was shown that in the levels of most blood-lipids these Inuit resembled Danes and differed significantly from Inuit living in Greenland. The result of this supplementary investigation points strongly against a genetic and towards an environmental explanation of the very low blood-lipids of the Greenlandic Inuit.

Inuit are generally believed to have a relatively low incidence of cardiovascular disease, although their diet is apparently high in fat and cholesterol (Feldman and colleagues, 1972). To gain some insight into the relationship between the Inuits' unique diet and their serum lipid levels, these authors conducted a series of studies on a group of North Slope Eskimos at Point Hope, Alaska, who persist in a semi-traditional lifestyle. These studies included analysis of food, evaluation of daily caloric and cholesterol intake, determination of serum lipid levels, and the dynamics of cholesterol metabolism.

The people of Point Hope were described as having firmly moulded lifestyles and dietary habits, representing one of the few remnants of the Inuit whale-hunting cultures. The meat and fat taken from the whales is distributed among the villagers and preserved in continuously frozen subterranean caches. Additional food obtained from the ocean included seal, walrus, and variable amounts of fish caught during their brief migrating periods in the spring and early summer. Additional food comes from caribou, available in summer, and an occasional polar bear trapped during the winter months. Grain products and simple carbohydrates are relatively low in the diet, since they must be imported at considerable cost.

The results of this study showed that the mean serum cholesterol concentration, of the 168 Inuit tested, was 221 mg/100 ml. Their low serum triglycerides (69 mg/100 ml),

low very low-density lipoproteins (less than 35 mg/100 ml), and high free fatty acids (34 mg/100 ml) were consistent with their high fat, low carbohydrate ingestion. The average total daily caloric intake of about 3,000 kilocalorie per person was quite similar to the norm as reported in an Alaskan dietary survey. Approximately 50 percent of the calories were provided from fat, 30-35 percent from protein, and only 15-20 percent from carbohydrates.

It was shown that the young Inuit of Point Hope seemed to have a higher cholesterol level than the general population. The cholesterol levels increased with the increase of age, but the increment was not as great as that of the general population. Therefore, the cholesterol levels of these people over age 36 were not different from those of the general population.

The authors compared the diet of young Inuit living in a boarding high school with the diet of Point Hope. As compared with the Point Hope diet, their standardized institutional diet had a higher carbohydrate (48% vs. 20%) of total caloric intake and lower fat (30% vs. 50%) and protein content (14% vs. 30%). The total caloric intake was also lower at the boarding high school, and the daily cholesterol intake was much lower than that of Point Hope. Results showed a significantly higher serum cholesterol level in the Point Hope Inuit. This suggested a direct response of serum cholesterol

levels to alterations of daily cholesterol intake of the Inuit.

The authors stated that, as compared to whites, the Inuit have a much higher capacity for intestinal cholesterol absorption, and possibly a greater ability to suppress body cholesterol synthesis. Nevertheless, a high cholesterol diet produces higher serum cholesterol levels in both ethnic groups (Inuit and whites). Since the Inuit ingest a carnivorous diet, the authors hypothesize that Inuit should experience a high rate of atherosclerosis. They explain the discrepancy between the observed fact of low incidence of atherosclerotic cardiovascular disease and the well-established hypothesis of a positive correlation of serum cholesterol levels and incidence of atherosclerotic cardiovascular disease, by the following observations:

1. This Eskimo population is young, with amean age of 26 years, whereas atherosclerotic cardiovascular disease is usually not manifested until after middle age.

2. A serum cholesterol level of over 250 mg/100 ml was rarely observed in these Eskimos, less than 3% in the population of individuals 40 years of age and over, but is more common among the whites.

3. The Eskimos' vasculature, indeed showed some degree of atherosclerotic changes, but the severity was usually not enough to produce clinically recognizable symptoms and signs.

4. The dietary supply of the Eskimo is not always plentiful all the year around. When the supply is low, they consume less cholesterol and would thus have lower serum cholesterol levels. The lower serum cholesterol levels of Mount Edgecumbe Eskimos is a good example.

5. As shown in previous studies on animals during periods of dietary induced hypercholesteremia, cholesterol deposited in most of the tissues of rabbits and monkeys. During subsequent periods when animals were on cholesterol-free diets, the excessive amounts of cholesterol in most tissues were removed rapidly but the removal from aortas was incomplete. During the lifetime of an individual Eskimo, there must be frequent alternation between hypercholesteremia and hypocholesteremia, depending upon the abundance of food and types of food available. During the hypercholesteremic period, a net influx of cholesterol into the vascular wall would be expected, but it would be removed slowly during the subsequent hypocholesteremic period. The slowness and incompleteness of removal would result in a net retention of cholesterol in the arteries and atherosclerosis. Thus, atherosclerosis indeed exists in Eskimos, but is less severe and only rarely produces clinical manifestations and fatal complication. In contrast, U.S. whites seem to have a continuous influx of lipid into their vascular wall because of their persistent hypercholesteremia, and they are suffering from a high incidence of atherosclerotic cardiovascular disease (Feldman et al., 1972).

A review of an older study on the diet of Alaskan Eskimos and Indians which began in 1956 is of value to compare to recent findings. The purposes of this study by Heller (1964) were to compare the diet of Alaskan Eskimos and Indians with those of other United States citizens in terms of nutrient content and to determine the sources of eleven major nutrients in their diet.

A characteristic feature of the diets of these people is the extreme variation in the individual's mean daily intake of the eleven major nutrients. The author points out that this might be expected, since Eskimos and Indians still obtain the bulk of their food supply by seasonable hunting and fishing.

The most important local foods, such as particular fishes and meats, are available only during short periods each year; thus the food supply not only fluctuates from season to season but also from year to year.

Seasonal and geographic factors account for this. Low intake levels were common in late winter and early spring, a time of the year when stored local food supplies are, in general, greatly reduced and new supplies not yet available. Use of imported foods is limited in these villages, since the economy has not yet become established on a sound monetary basis.

The results of this study indicate that, of all the groups in the study, the diets of pregnant and lactating women in all the villages showed the highest percentage of nutrient deficits in terms of the 1958 recommended dietary allowances. Generally speaking, however, most nutrient intake levels for northern coastal Eskimos were closer to the recommended allowances than were those for residents of the southwestern and interior villages.

It was also shown that, in general, protein and niacin intakes exceeded recommendations; thiamine and iron intakes were highest in villages where meat was the main protein food; most calcium intakes, while considerably below recommended levels, were higher than those which prevailed in times past; vitamin A intake was highest in villages with access to sea mammals and near areas producing wild edible greens in amounts

sufficient for winter storage; "measurable" ascorbic acid intake levels were also generally low by the recommended standard.

The results reveal that protein, carbohydrate, and fat accounted for about one-third each of the total calories in adult diets. Most of the carbohydrate calories came from imported breads, cereals, and sugar products and more than half of the fat calories from imported sources. The author points out that, thus the proportion of unsaturated to saturated fatty acids in their diets is lower today than in the past, especially for the coastal peoples.

It has been shown that, historically, the traditional northern diet has been high in fat. However, no relationship has been shown with the occurrence of atherosclerosis in the northern indigenous population. Many explanations have been postulated to uncover the mystery of this phenomenon. Recent studies tend to substantiate that the secret of protection from coronary heart disease lies in the fatty fish which has been a major component of these people.

Cooper (1989) states that the "Eskimo diet is high in the flesh of certain deep-water fish which contain an important Omega-3 fatty acid known by the name eicosapentaenoic acid (EPA). These deep-water fish are especially good sources of EPA because they have access to plankton which is rich in EPA".

In brief, the Omega-3 fatty acids seem to be able to do three things:

1. They tend to "thin out" the blood. Through this process, there is less tendency for the blood to develop clots which could clog vessels and cause a heart attack. In more scientific terms, EPA is a precursor for prostaglandin-3, a hormonelike substance in the blood which controls clotting and artery spasms. A unique quality of EPA seems to be its ability to prevent the rapid collection of blood platelets at the site of plaque accumulation in the vessels, which are building up through atherosclerosis.

2. The Omega-3 fatty acids tend to lower triglyceride levels in the blood. As we've seen, high triglyceride levels may be associated with dangerously low levels of "good" high density lipoprotein (HDL) cholesterol and with other high-risk factors in the development of heart disease.

3. Fish oil, at least in large doses, can lower serum lipid concentrations, but there is no acceptable evidence that it can prevent heart disease (Cooper, 1989).

Other studies lend credence to the significance of high levels of fish oil in the diet. Bang and colleagues (1971) noted that Greenland Inuit had lower plasma concentrations of triglycerides, total cholesterol, and low density lipoprotein (LDL), as well as a lower incidence of coronary heart disease, compared to mainland Danes. They also found higher plasma levels of the Omega-3 fatty acid EPA.

These Inuit had consumed marine animal products that contain substantial quantities of Omega-3 fatty acids. The authors postulated that such a diet may contribute to a beneficial lipid profile and a lower incidence of coronary heart disease.

Disease and Health Problems

It is widely perceived, among observers of indigenous health care in Canada, that chronic diseases such as coronary heart disease and diabetes mellitus, while extremely rare or non-existent in the past, are recognized more frequently, especially over the last two and a half decades.

A study on diabetes mellitus in the Inuit population by Mourstaff and Scott (1973) shows some disturbing trends. This study showed that although clinical diabetes mellitus was still rare, it was increasing. The authors first measured the glucose tolerance of 705 adult Inuit living in western Alaska in 1962. A small fraction of those tested intolerant, and only one person was found with clinical diabetes mellitus. The authors point out that no conclusions were reached on the rarity of diabetes in the Inuit. However it was suggested that a high degree of physical fitness might be an important factor.

The authors postulate that if rarity of glucose intolerance was the result of genetic predisposition, a change with time would not be expected. A change in the prevalence of intolerance, however, would indicate an environmental, nutritional, or physiological cause. The authors therefore repeated the 1962 study ten years later to determine if any changes had occurred.

The results showed about 6 percent more people were overweight and about 4.5 percent more were intolerant of glucose ten years later. The authors claim physical fitness may be associated with both lack of obesity and increase in muscle mass. The latter may result in faster tissue utilization of glucose and, thus greater tolerance.

In the ten years that passed, the Inuit had made increasing use of labour-saving devices such as snow machines instead of dog sleds, chainsaws instead of handsaws, and fuel oil instead of wood for heat. These factors had decreased physical activity and fitness. The authors also felt that it was possible that a higher caloric intake could be responsible for the increased obesity. However, there was no direct evidence that high caloric intake should cause intolerance to glucose.

Young and colleagues (1985) studied the prevalence of diabetes mellitus in 30 isolated communities scattered in the eastern subarctic boreal forest of central Canada. They suggested that 59% of the adult male and 84% of the adult female patients could be considered obese. These measures were within the top quartile of the national standards at the time of diagnosis. Over 39% of the patients had complications of diabetes such as ischemic heart disease.

McIntyre and Shah (1986) conducted a study to determine community levels of blood pressure and to document the

prevalence of hypertension, obesity and cigarette smoking in non-urban Indians in three communities in Northwestern Ontario. McIntyre notes that the pattern of health and sickness among indigenous people in Canada has altered significantly since World War II as a result of rapid social and lifestyle changes. It was felt that this acculturation is be responsible for the higher blood pressure levels seen in the indigenous population. Cardiovascular disease accounts for 20-25% of deaths among registered Indians and represents a significant health problem in terms of proportionate mortality and rate of hospitalization.

McIntyre's findings in the Sioux Lookout Zone suggested that 13% of the population over the age of 15 years were hypertensive. The prevalence of obesity increased with age; over 70% of women between the ages of 35 and 64 were considered in this category. Over half of the subjects (56.4%) smoked with the vast majority of smokers under 35 years of age. Males consistently had been smoking more cigarettes per day, had been smoking longer and were more regular smokers than females.

More recent studies show that diabetes mellitus type II is epidemic among many indigenous populations and is related to obesity, insulin insensitivity and genetic predisposition. Young, McIntyre, Dooley, and Rodriguez (1985) elaborate on the observation that most observers of indigenous health care in Canada perceive that chronic diseases such as diabetes

mellitus are occurring at an increasingly alarming rate. These authors, while pointing out that direct evidence from their study was not available, made the assumption the increase may be attributable to dietary factors resulting in obesity.

Ethnic Differences in Fitness Levels

A study of ethnic variation in work capacities and powers, by Boulay et al. (1988), analyzed different ethnic and racial groups from various countries. This study revealed aerobic power generally between 30 and 50 ml/kg/min., with a mean around 45 ml/kg/min. The authors found the differences between or among groups to be generally small and genuine differences in maximal power were lacking when allowances for other factors were made. Differences between ethnic groups in submaximal work efficiency and endurance performance appear to result from differences in mechanical efficiency owing to test mode and/or level of habituation to the ergometer. The authors conclude that there does not appear to be valid and reliable evidence to support the concept of clear ethnic differences in work capacities and powers.

Oxygen uptake during a maximal ergocycle test was measured in Pascuan subjects, from the Easter Island population, between 10 and 60 years of age (Ekblom and Gjessing, 1968). This population of Polynesians and South Americans had aerobic values similar to other groups. The Easter Island subjects had no regular occupation with the

exceptions of a few individuals, and no strenuous work was necessary to meet daily needs.

Andersen (1967) compared these Pascuans with nomadic Lapps of the northern Scandinavian Peninsula. He reported a large difference between these two samples living in quite different environments. The male Lapps had a higher maximal aerobic power per kilogram than the Pascuans at all ages. For example, between 20 and 29 years of age, the Lapps had a MVO_2 uptake of approximately 55 ml/kg/min. which was significantly superior to the 42 ml/kg/min. exhibited by the Pascuans. An assessment of the respective modes of living indicated, however, that the Lapps were more active, perhaps owing to their harsh environment. Andersen concluded that environmental and cultural variation, was the sole reason for the large differences between these two samples of men.

Farrell and colleagues (1988) examined cardiovascular fitness and maximal heart rate differences among three ethnic groups. The 1,047 participants were divided into six subgroups based on self-reported ethnic identity. The groups were white male, black male, Mexican-American male, white female, black female, and Mexican-American female. No differences were observed among white, black, and Mexican-American males with regard to age-adjusted maximal heart rate or age-adjusted maximal treadmill time. Black females achieved significantly lower values than their white and Mexican-American counterparts on both variables.

The authors conclude that the black female has a significantly lower level of cardiovascular fitness and a significantly lower maximal heart rate than white and Mexican-American females, and that there are no significant differences in cardiovascular fitness level or maximal heart rate in white, black, and Mexican-Americans.

The above studies have demonstrated differences in fitness levels of different ethnic groups. However, are there truly racial differences? Davies and colleagues (1972) claim group differences in physical working capacity in an otherwise genetically homogeneous population have been repeatedly demonstrated but whether genuine ethnic differences in physical working capacity exist is a matter of contention.

Their investigation analyzed four ethnically distinct populations: Caucasian, West African natives of Yoruba stock, and Kurdish and Yemenite Jews. The latter two groups are of particular interest in that though they are genetically dissimilar, they now live under the same environmental and ecological conditions as each other and thus their results are not confounded by present-day environmental (short-term) changes in physical working capacity. They form part of a large population study of Yemenite and Kurdish Jews living in the Neger region of Israel.

The subjects were evaluated using submaximal and maximal work on a stationary bicycle ergometer. The results showed that the responses to exercise were essentially similar in the

four groups, although there was a marked sex difference and the Kurds and Yemenites appeared to have a higher MVO2 than the Europeans and Yoruba. The males in particular were able to reach similar values of maximum ventilation, cardiac frequency, and aerobic power output.

The authors concluded that if differences in aerobic power output exist between ethnic groups, they must be small and therefore of doubtful biological significance. These values are certainly less than the large intersubject variations which exist between members of the same race.

Summary

The review of literature clearly demonstrates that lifestyle has a significant impact on the physical well being of individuals. This review attempts to connect the acculturation process, fitness and lifestyle, diet and nutrition, and disease and health problems to the overall well being of northern inhabitants. It seems clear that the lifestyle of many of these people is far from desirable and might be considered as a threat to their future health.

The review of literature on the acculturation process has shown that, for many of the indigenous people, the impact of social and cultural change on their mental and physical well being has been traumatic. This, in many instances, has negatively impacted their physical, psychological, emotional, and spiritual well being.

The review of the impact of fitness and lifestyle habits has shown the significance and importance of physical activity and healthy living. It has also shown that the lifestyle of northern people has changed from that of the traditionally active and physically healthy to that of a sedentary Western lifestyle with all its failings.

The diet and nutritional aspects of many northern people have also been shown to have changed in a pattern similar to their activity levels. The traditional indigenous diet was shown to be consistent with that of a healthy one. However, with a depletion of the food sources, overcrowding and adoption of an insufficient Western dietary pattern, the health levels of this group are deteriorating.

The literature review has shown that chronic diseases such as obesity, coronary heart disease and diabetes mellitus are recognized more frequently, and are increasing at an alarming rate in the northern indigenous population, especially over the last two and a half decades. This has been attributed to the change in lifestyle habits and fitness levels over the same time frame.

The review of ethnic difference in fitness levels and working capacities has shown that if differences do exist, they are small and of doubtful biological significance. It has been demonstrated that these values are certainly less than the large intersubject variations which exist between members of the same ethnic background. This indicates that the impact

of the lifestyle habits are having a much greater impact on the well-being and fitness levels than does the influence of ethnicity.

The review also lends credence to the need for a new up-to-date study on the present state of the lifestyle habits and the resulting impact on fitness levels of these northern people. From the literature review it appears that there has been limited studies of this nature and there a need for further study.

CHAPTER III

METHODS

Selection of Subjects

Subjects were delimited to two groups of a randomly selected mix of male and female high school students (ages 15-20 years). Group I consisted of 65 subjects from the Inuvik region (two additional subjects were tested, however they were not included in the study because they were uncooperative during testing). Group II Consisted of 65 subjects from the Yellowknife region (one additional subject was tested, however he was not included in the study because he was not cooperative during testing).

The random selection process consisted of selecting every third person from the school list, in alphabetical order and gender specific, of students in the identified age group. This represented approximately one third of the student available in the two schools selected for study (210 students in Inuvik, 257 students in Yellowknife). The gender breakdown was very similar in both groups with 32 females and 33 males in the Inuvik sample and 33 females and 32 males in the Yellowknife sample.

The consent and release process involved several formalities. First, a scientific research licence was attained from the Scientific Institute Of The Northwest Territories

(Appendix A). Second, permission to carry out the testing of the students was obtained from the school boards. Third, the Youth Consent and Release form for the Canadian Standardized Test of Fitness was signed by all parents/guardians (Appendix B).

At each stage of this process, assurance of strict confidentially of the data collected was given. In addition, assurance was also given that interpretation and publication of results would be limited to providing comparison with norms and various aspects of fitness without any subject's named identified. All data collected has been saved on computer disk with each subject's name replaced by a number. All written material containing subject's names have been destroyed.

Participation rate was near 100 percent in both locations. In Inuvik, only five students refused to participate or were excluded because they intentionally spoiled the questionnaire or the step test. In Yellowknife, only two students were excluded for the purposes of this study. One student spoiled the questionnaire while another refused to attempt the step-test.

In addition, a total of four students, two in each location, were screened out in the PAR-Q & YOU, (Appendix C) due to medical problems. In Inuvik, one student was in a leg cast while the other had a bad flu. In Yellowknife, one student was a severe asthmatic, while the other reported fainting spells and severe dizziness.

Dependent Variable

The dependent variables in this study are the MVO2 scores and adiposity indices (SOTS and SOS) of the subjects.

Instruments

This study subjected the participants in two areas of testing in order to analyze their lifestyle and fitness levels. Selected components of the Canadian Standardized Test of Fitness (CSTF) were administered as was a modified version of the 1988 Campbell's Lifestyle Questionnaire.

The sub-maximal step test from the STF was administered to predict cardiovascular fitness levels and anthropometric measures were used to determine individual adiposity indices.

The CSTF is designed to be portable and is used for testing large sample numbers. Inherent with this type of test are a number of weakness. For example it is a submaximal test and, therefore, predicts the MVO2 with a degree of error. However, for the purposes of this study, the STF scores were used only for comparative purposes. It was important to compare the data collected in this study with the norms of the Canadian population obtained by the CSTF and, therefore, to use their methods of testing.

In the CSTF step test, subjects stepped to a musical cadence for a maximum of three minutes. There were three, three minute sessions. Pulse rates were taken after each session, and the test continued or terminated according to the

pre-established guidelines. The test was terminated if the pulse rate was 30 or more beats per 10 second count after the first three minute session, and if the pulse rate was 27 or more beats per 10 second count after the second three minute session. The maximum pulse rate was used to predict the MVO2 of the subject. Resting and post-exercise blood pressure, and resting heart rate were also determined.

Height, weight, skinfolds and girths completed the CSTF. The anthropometric measure consisted of: standing stretch stature, weight, triceps, biceps, subscapular, suprailiac and calf skinfolds.

The height, weight, and anthropometric measurements were used to determine the individual adiposity indeces (SOS and SOTS). Adiposity index is felt to be a more desirable method of determining risk for coronary heart disease than just skinfold measurements (Robbins and colleagues 1991).

The purposes of the 1988 Campbell's Survey were to provide an update of the 1981 Canada Fitness Survey, examine the contribution of exercise to health, and investigate adherence over time to a regular exercise routine.

The Campbell questionnaire, for the purposes of this study, was modified slightly by the author and pre-tested on a group of twenty northern aboriginal and non-aboriginal college students. This was necessary to insure that items unique to the northern culture, such as specific foods and activities, were included. Specifically, "northern games" was

added in the "Physical Activity In Your Spare Time" category. Seal, caribou, and muktuk was added to the meat section of the "Nutrition" category as was bannock to the bread and cereal section.

The 1988 Campbell's survey was similar to the original 1981 Canada Fitness Survey and served to provide an update. The 1988 survey was improved and modified with the entire draft instrument tested in a pilot study of the design to ensure comprehension and to obtain estimates of test-retest reliability. Recommendations to increase understanding were implemented prior to the launch of the 1988 study. The final questionnaire was revised based on the results of the pre-test and the guidance of an advisory committee (Campbell's Survey 1990).

Information on physical activity, other health practices, determinants of activity, and certain health indicators were collected by means of this self-completing questionnaire (Appendix D).

Treatment Procedures

Testing took place in the spring, during the months of May and June, 1992. All subjects participated in the Standardized Test of Fitness supervised by the author and a trained fitness assessment assistant. Prior to the test, all subjects, if of legal age, or their parent/guardians signed a consent and release form (Appendix B) and completed a screening procedure.

The latter consisted of a self-completed Physical Activity Readyness Questionnaire (PAR-Q), about symptoms of cardiovascular disease and limb problems, measurements of resting heart rate and blood pressures, and observations for signs warning of potential difficulty (Appendix C).

Although the various tests which form the CSTF generally require less than maximal physical effort, the screening procedures identify those who, for health reasons, might be at risk during the testing. Subjects who are screened out were not tested or included as subjects for this study.

Instructions were given to the subjects regarding each component of the CSTF. Safeguards were in place to protect the subjects at all times with close monitoring and instructions given to discontinue the test at any time they felt they were unable to continue. They were briefed before each test component and given guidelines for discontinuing the test for a variety of reasons which they may experience.

The subjects also completed a modified version of the 1988 Campbell questionnaire (Appendix D). They were briefed prior to starting this questionnaire. The author or assistant were available to assist where necessary.

Analysis

The degree of association between the variables was established using several different analytical techniques.

Stepwise Logistic Regression was used to ascertain the factors which predict the adiposity indexes (SOTS and SOS).

Stepwise Polychotomous Logistic Regression was used to identify the significant lifestyle factors that predict cardiovascular fitness (MVO2).

Factors included for analysis in these models, taken from the 1988 Campbell's survey, in order to predict which criterion variables are significant were: gender, location, ethnicity, smoking status, television viewing, energy expenditure in leisure time, positive well-being, depression, stress, adherence to Canada's food guide, adequate sleep, good diet, smoke free environment, proper weight, stress control, regular activity, social participation in sport, social support to participate in activities, attitude towards vigorous activities, limiting fat in diet, limiting salt in diet, limiting sugar in diet, behaviour control, and goal attainment index.

CHAPTER V

RESULTS AND DISCUSSION

The Results and Discussion chapter is divided into two major sections: The Stepwise Logistic Regression models used to ascertain the factors that predict the adiposity indexes SOTS and SOS and the Stepwise Polychotomous Regression model used to ascertain the factors that predicted cardiovascular fitness (MVO2).

Adiposity Indexes: SOTS and SOS

A total of thirty criterion variables, taken from the 1988 Campbell's survey, were available for inclusion in these multiple regression models. For these analyses, the SOTS and SOS were the dependent variables. In order to determine which variables should be removed or entered in these stepwise regression models, P-values for removal were set at greater than 0.1500, and for inclusion P-values were set at less than 0.1000. These values were set automatically by the computer program.

Based on these limitations, the following criterion variables were included in the models: gender, location, ethnicity, smoking status, television viewing, energy expenditure in leisure time, positive well being, depression status, stress status, and adherence to Canada's Food Guide.

Analysis of these criterion variables showed that only

two were statistical significant in the SOTS model. These are smoking status, P-value 0.0003, and adherence to Canada's Food Guide, P-value 0.0277. The model for SOTS then is the following: log(odds)(where odds is the ratio of okay to excess SOTS) = -0.1911 + 0.3675 x(1) (smoker) -2.696 x(2) (never smoked) + 0.7382 x(1) (food guide low) + 1.415 x(2) (food guide partial).

The model for SOS is very similar with the same two criterion variables included for the statistical analysis. For smoking status, the P-value was 0.0115, and for adherence to Canada's Food Guide, the P-value was 0.0426. The model for SOS then is the following: log (odds) (where odds is the ratio of okay to excess SOS)= -0.8164 + 0.3573 x(1) (smoker) -1.655 x(2) (never smoked) + 0.9184 x(2) (food guide low) + 1.288 x(2) (food guide partial).

The models show that the only statistically significant criterion variables that show an association with the dependent variables SOTS and SOS were smoking status and degree of adherence to the food guide. Here, the odds of being in the acceptable range of SOTS and SOS are greater in a subject that is a smoker and demonstrates a low adherence to the food guide.

These findings appear to be counter intuitive at first. However, an explanation is plausible. As demonstrated in The Health of Canada's Youth (1992), more adolescent girls are now smoking. This increase in smoking for this group is

attributed to problems related to changing role expectation including the influence present day society exerts upon this group to be slim. The association between smoking and the effect upon food suppression is well recognized. It was also shown that young people, both male and female, who are categorized as smokers also are more likely to have poor diets.

The prevalence of smoking in the subjects analyzed in this study show some alarming statistics. Approximately one half (49.2%) indicated that they were regular smokers with slightly more females (52.3%) than males (46.2%) fitting this category.

In comparison, these statistics are far worse than the Canadian norms for this age group (15 - 19 years) where it has been shown that 20% of males and 23% of females are smokers (Campbell's Survey, 1990). Rode and Shephard (1992) show that smoking for this age group in the community of Igloolik was almost universal with 87% of the males and 95% of the females indicating they smoked in 1990.

Analysis of place of residence in this study revealed a significant finding where it was clearly evident that far more subjects smoked in Inuvik than in Yellowknife. ($P = 0.005$). In Inuvik it was shown that 66.2% of the subjects were current smokers compared to 32.3% in Yellowknife.

Similar significant findings were shown when ethnicity was considered with many more smokers in the aboriginal than

in the non-aboriginal categories (P = 0.00000). In the aboriginal category, it was shown that 69% of these subjects were current smokers compared to 25.4% in the non-aboriginals.

The data clearly shows that the rate of smoking of some subgroups in this study is at endemic proportions while in others, it is similar to national norms. It appears that ethnicity and place of residence are the most significant indicators of smoking status. Non-aboriginal subjects, overall, were close to the national norms. Subjects from Yellowknife were also fairly close to these norms. However, aboriginal people were very significantly above the norms at an alarming percentage. Place of residence also shows similar significant finding with statistics for Inuvik far exceeding the national norms.

Adherence to Canada's Food Guide is determined by the degree to which the subject conforms to appropriate number of servings within and between the four food groups, meat and alternates, dairy products, fruits and vegetables and breads and cereals. Three categories were created: "Low", "Partial", and "High" (Campbell's Survey, 1990).

The results of this category show that overall, the subjects in this study were significantly better than the national norms for their age group. Results of the Campbell's Survey (1990) show that for females, less then 15% were classified in the "High", 56% in the "Partial", and 29% in the "Low" category. Results for the males show 37% classified in

the "High", 44% in the "Partial" and 20% in the "Low" category.

In comparison, the overall results for this study for the females show 46% classified in the "High", 28% in the "Partial" and 26% in the "Low" category. The results for the males were even more impressive with 54% classified in the "High", 29% in the "Partial" and 17% in the "Low" category.

When the results for place of residence in this study are analyzed, while both areas are superior to national norms, subjects from Yellowknife demonstrate closer adherence to the Food Guide than those from Inuvik.

The results for the females in Yellowknife show that 55% were classified in the "High", 21% in the "Partial" and 24% in the 'Low" category. In comparison, the results for Inuvik for females show 38% classified in the "High", 34% in the 'Partial", and 28% in the 'Low" category.

The results for the males in both locations show comparable trends. In Yellowknife 63% of the male subjects were classified in the "High", 31% in the 'Partial" and 6% in the "Low" category. In Inuvik, 46% were classified in the "High", 27% in the "Partial" and 27% in the 'Low" category.

The patterns of the findings of this study in this category are quite surprising. Regardless of gender and location, adherence to the food guide was superior to national norms. While the results were better, they do have certain commonalities. For example, the young males in this study and

the Campbell's Survey (1990), show better adherence to the Food Guide than the young females.

The low adherence to the Food Guide of the young females in the Campbell's Survey has been attributed to the trend for undereating which is consistent with the very low prevalence of obesity for this group and their concern for maintaining or reducing body weight. The same can be suggested for this study, but not to the same general degree.

Cardiovascular Fitness MVO2

A Stepwise, Polychotomous Regression Model was used to treat this area due to the multiple number of categories of the dependent variable. The dependent variable, MVO2, was broken down into five, distinct, categories: excellent, above average, average, below average, and poor.

A total of thirty criterion variables taken from the 1988 Campbell' survey, were available for inclusion into this multiple regression model. It was apparent that it was not feasible to include all of these in this type of model due to the relatively small sample size and the large number of cells it would create. Therefore it was decided that the less meaningful criterion variables would be excluded.

It was felt that it would be appropriate to use the same variables for inclusion as were identified for the adiposity index models. The criterion variables used in the model were: gender, location, ethnicity, smoking status, television viewing, energy expenditure in leisure time, positive well-

being, depression status, stress status, and adherence to Canada's Food Guide.

In order to determine which variables should be removed or entered in this stepwise regression model, P-values for removal were set at greater than 0.1500, and for inclusion, P-values were set at less than 0.100. These values were automatically set by the computer program. Analysis of these criterion variables showed that four were statistically significant. These were gender (P-value 0.0025), smoking status (P-value 0.0089), energy expenditure in leisure time (P-value 0.0000), and positive well being (P-value 0.0316).

The model generated to determine the predicted MVO2 level then is the following: Y = 0.43369 + 0.12617 x(1)(sex) - 0.00335 x(2) (smoker) - 0.03092 x(3) (never smoked) + 0.02619 x(4) (inactive) + 0.3809 x(5) (active) - 0.04633 X(6) (positive well-being).

The model showed that the only statistically significant criterion variables, based on p-values, that show an association with the dependent variable, MVO2 scores, are gender, smoking status, energy expenditure in leisure time, and positive well being. Here, the odds of being in the superior categories of MVO2 scores are greater in a subject that is male, never smoked, active in leisure time activities, and demonstrates a positive well being.

Gender Influence

Comparing the results of this study with norms established from the Canadian Standardized Test of Fitness (1986), there are remarkable similarities. The latter norms were based on data from 1981 Canada Fitness Survey. In this case, approximately sixty percent of Canadian males and females, in the age group used in the present study, were classified as being in the average or higher categories of predicted MVO2.

In this study, the results were almost identical with 60% of the males and 61.5% of the females in the same classifications of predicted MVO2. Breaking the results down by location show very similar results with 60.7% of Inuvik males and 59.4% of Yellowknife males in this category as well. The females were much the same with 59.4% of Inuvik females and 63.7% of Yellowknife females in the same classification.

The findings here are also consistent with those in The Health of Canada's Youth (1992). According to this publication, in Canada, boys increase their involvement in exercise as they get older and by age 15 three-quarters of them are exercising at least two hours per week. The authors note that the number of girls who exercise regularly is substantially lower than boys and is a cause for concern. It was also demonstrated that fewer boys than girls tend to be classified as inactive.

There was a significant association with the MVO2 dependent variable and smoking status as well (P = 0.0089). Data on the percentage of smokers in this study, as was presented in the discussion on the association with the Adiposity Index (SOTS), clearly shows alarming statistics.

It appears that ethnicity and place of residence are the most significant indicators of smoking status. Non-aboriginal subjects, overall, are closer to the national norms as were subjects who reside in Yellowknife. However, aboriginal subject are significantly above the norms at an alarming rate as are residents of Inuvik, but not to the same degree.

It has long been established that smoking is a risk factor for coronary heart disease and a variety of other serious illnesses (Paffenbarger & colleagues, 1986). The Campbell's Survey (1990) demonstrates that there in an inverse relationship between activity level and the probably of being a current smoker.

The Campbell's survey indicates that there has been an overall decline in the number of smokers in Canada between 1981 and 1988. However, this decline is not evident in the female population age 15 - 24 years who are now smoking more than their male counterparts.

Rode and Shephard (1992) noted a similar trend in their twenty year study of residents of Igloolik where the percentage of young females (age 17-19 years) who smoked increased from 75% in 1970 to an alarming 95% in 1990. While

there was a decrease with their male counterparts over this twenty year period, in 1990, 87% of the males surveyed indicated that they are current smokers. The study also demonstrated that in that same time frame, the aerobic capacities of the young females decreased by 15% and for the young males, by 12%.

In The Health of Canada's Youth (1992), it was demonstrated that it was quite common for fifteen year olds who smoke not to be involved in athletics, not to eat healthy foods regularly, and to show evidence of health problems such as headaches, stomach aches and other ailments.

Energy Expenditure In Leisure Time

There was a very statically significant association between the dependent variable, MVO2 scores, and this independent variable, energy expenditure in leisure time ($P = 0.0000$). This association is not unusual as it is universally accepted that regular intense activity has a positive affect on aerobic capacities.

Energy expenditure in leisure time, based on the total amount of energy expended by an individual on all physical recreation activities, shows a somewhat disturbing trend when compared to national norms. Result for the Campbell's Survey (1990), show that in the 15-19 year old age group, 69% of the males and 39% of the females were classified as active.

By comparison, in this study, 53.8% of the males and 38.5% of the females were classified in the active category.

Analysis of place of residence shows that in Inuvik, 48.5% of males and 40.6% of females are classified in this category, as compared to Yellowknife, where 59.4% of the males and 36.4% of the females were similarly rated. Comparison based on ethnicity did not show significant differences with 43.7% of aboriginal subjects and 47.5% of non-aboriginal subjects classified as active.

These results clearly demonstrate that the females are very similar to the national norms where as the males, in all categories, are well below these norms. Most alarmingly are the result for the males from Inuvik where there are 20.5% fewer than the national norm classified as active.

Although the females of this study score comparatively well in the "active" classification, the percentage classified in the "inactive" category does show some cause for concern. The results for Yellowknife were the most alarming where 42.4% of females were classified in the "inactive" category as compared to Inuvik where the result was 31.3%.

This trend is similar to that found in the Campbell's Survey, (1990), The Health of Canada's Youth, (1992), and Rode and Shephard, (1990) where fewer boys than girls tend to be inactive. The results for this study appear to demonstrate that the trend in more pronounced then elsewhere especially with respect to the Yellowknife females.

Positive Well-being

There was a statistically significant association between the dependent variable, MVO2 scores, and the independent variable, "positive well-being" (P=0.0316). "Positive well-being" is based on the calculations of Bradburn's "Affect Balance Scale" (Campbell's Survey, 1990) where respondents rate the frequency of positive and negative feelings.

It is not unusual to see this statistically significant association between these variables as the Campbell's Survey indicates that the positive association between emotional health and physical activity is well established.

The results of the Campbell's Survey show that in the 15-19 year old category, 26% of the male and 17% of the female subject indicate generally good mood and positive feelings. The results of this study revealed similar trends with the males somewhat better off than the national norm at 30.8% and the females somewhat below the national norms at 12.3% in the same classification.

Further analysis, however, showed wide discrepancies between the sub-groups. When place of residence was analyzed, for example, the results for the female population in this category was almost identical with 12.1% and 12.5% indicating "positive well-being" in Yellowknife and Inuvik respectively.

The male population showed a major difference with subjects in Yellowknife well above the national norms and subjects from Inuvik slightly below these norms. It was shown

that an impressive 40.6% of the males in Yellowknife, as compared to only 21.2% of those from Inuvik, indicated a state of positive well-being.

Analysis based on ethnicity revealed that the aboriginal subjects were much lower than their non-aboriginal counterparts and well below the national norms in this area of well-being.

It was shown that by far the group showing the worst scores in this category were the aboriginal female subjects with only 6.5% demonstrating a state of "positive well-being". The aboriginal males, while below the national norms, fared much better with 20% in this category. The non-aboriginal females were just slightly above the national norms at 17.6%. Most impressive were the non-aboriginal male where 48% demonstrated a state of positive well-being.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

Smoking status showed a statistically significant association with the two dependent variables on adiposity indices, SOTS and SOS, as well as the dependent variable MVO2 scores. It was shown that almost one-half of all subject in this study were current smokers.

It was shown that 52.3% of the females and 46.2% of the males indicated that they were smokers. This is much worse than the Canadian norm where 23% of the females and 20% of the males were smokers. It was not as alarming as Rode and Shephard (1990) reported were in Igloolik 95% of the females and 87% of the males were smokers.

The implications of this study is cause for concern. It was evident that many subjects start smoking at a very early age. It is evident that in specific subgroups, particularly the aboriginal population, females in general, and subjects living in Inuvik, smoking is common place for the majority.

It is, therefore, imperative that educational measures advocating smoking cessation must be significantly increased and applied at the very earliest stage of a child's development. This focus should begin and be concentrated at the primary level of education and continue throughout the entire schooling process.

The health risk associated with this degree of smoking if

continued might be staggering. It is well documented that cigarette smoking is a "primary" risk factor for a variety of serious ailments (Robbins & colleagues, 1991). Given the age of the subjects in this study, these risks are not likely to manifest themselves until sometime in the future. The ramifications for the health status of many of these subjects addicted to smoking at this age is a major cause for concern.

Diet, as measured by the degree to which subjects adhere to Canada's Food Guide, showed a significant association with the dependent variables, SOTS and SOS. It was evident that the degree to which subjects in this study adhere to the Food Guide was much better than the national norms.

The implication of this finding is significant in that good dietary habits are associated with good health and well-being. Programs from government departments such as education, and health and welfare should promote this finding and continue with efforts to support this positive trend.
In both, gender and location, the trend for healthy diet was superior to the Canadian norms. There were certain commonalities however, in that the males in this study and in the Campbell's Survey, demonstrated better adherence to the guide than did the females.

Another implications of this finding may be taken from the study by Evers (1990), where it was demonstrated that there is a growing recognition of the contribution that traditional food patterns make to nutritional intake. The

author studied four Dogrib communities, in the same geographical location as this study, in order to assess the role of traditional foods such as caribou, fish and birds. The findings indicated that traditional foods patterns make a significant contribution to nutrient intake.

It is evident from the positive finding from this study, that the use of traditional, indigenous, food should be encouraged. While it has been shown that in many native communities (Rode & Shephard, 1990), there has been a tremendous trend away from the traditional diet and an excess consumption of "junk food", it is dangerous to generalize from one population to another. It is evident that there are regional differences in diet and nutrient intake related to seasonal influences, availability of local foods and different lifestyles.

The residents of this study should be encouraged to include traditional foods in their diets which satisfies many of the daily nutrients requirements. It is also recommended that educational measures be focused to show the value of nutritional diet with the benefits of the traditional foods highlighted. The risks associated with the consumption of refined and "junk foods" such as soft drinks, potato chips, candy and others should also be included in these educational promotions.

It was shown that there is a very significant association with the dependent variable, MVO2 scores, and energy

expenditure in leisure time activities. This is not unusual considering the proven association between these two variables (Robbin et al.,1991).

The scores on the aerobic component, step test, of the Canadian Standardized Test of Fitness were almost identical to the national norms (CSTF, 1986). This finding was consistent with the evidence analyzed in The Health of Canada's Youth (1992) where it was shown that the number of girls who exercise regularly is substantially lower than the boys. It was also shown that fewer boys than girls tend to be inactive.

This indicates that there is a need for the government officials of the area, as well as across Canada, to focus their attention on the education and promotion of health and fitness. There is a need to study the gender differences in order to determine appropriate steps and measures which need to be taken to address the needs of both sexes with an increased focus on the females.

While it was noted that the overall MVO2 scores were comparable to the national norms, a disturbing statistic clearly indicated that the males of Inuvik were alarmingly below the norms for energy expenditure in leisure time activities. In this case, 20.5% fewer males, in this area, were classified as "active" than the national norms. It was also shown that an alarming 42.4% of the females from Yellowknife were classified as "inactive" which is well off the national norm.

This clearly indicates target groups for further investigation and analysis. It appears that overall the subjects performed up to a satisfactory standard with this indicator, but there are wide disparities between subgroups. There is a need to concentrate on the problems unique to these groups.

The emotional and psychological indicators, stress and depression status, of the subjects in this study revealed a number of characteristics and idiosyncracies. It was shown that there was a significant association between the dependent variable, MVO2 scores, and "positive well-being" status. This association is not unusual as it was shown there is a positive correlation between emotional health and physical activity (Campbell's Survey, 1990).

Generally, it was shown that most subjects demonstrated a state of "positive well-being" similar to national norms. However, there were areas of concern. Analysis based on ethnicity clearly demonstrated that aboriginal subjects, particularly the females, were much lower than their non-aboriginal counterparts and well below the national norms.

This statistic clearly indicated that the aboriginal females were suffering severely with only 6.5% of them demonstrating a state of "positive well-being". It is strongly recommended that existing studies be reviewed to determine the roots and causes of this problem with the necessary steps put in place to address it.

The pervasive degree of depression indicated for specific subgroups in this study was a cause for concern. It was shown that females, in general, were almost four times as likely to be depressed as were the males. Subjects living in Yellowknife indicated a similar trend where they were twice as likely to be depressed as those from Inuvik. The same statistic was evident when ethnicity was factored in with non-aboriginal subjects seen as twice as likely to be depressed as were the aboriginal subjects.

Analysis of "stress" status indicated similar findings where female subjects, in general, were over twice as likely to be stressed as were the males. It was also shown that non-aboriginal female subjects were over four times as likely to be stressed as were the aboriginal females. It was also indicated that, in general, non-aboriginal subjects were two and one-half times as likely to be stressed as were aboriginal subjects. Place of residence was also a factor where subjects from Yellowknife were twice as likely to be stressed as were those from Inuvik.

The elevated stress levels demonstrated in the non-aboriginal subjects likely arise from a number of factors. The majority of non-aboriginal resident of northern communities are transient rarely staying for longer than a year or two. The stress on young people who fit this category where they are new to the community and school would be substantial. The degree of stress would be further compounded by the ethnic and

cultural differences they would experience. In addition the northern climate would be quite harsh and intimidating to the uninitiated. It is also quite likely that many of these families that move to the north do so out of necessity having been forced to seek employment away from their roots in the south. These factors would add to the stress levels and general mental health of these people.

The implications of these findings are complicated and far reaching. However, it is clear that the emotional and psychological well-being of specific subgroups in this study leave a lot to be desired. The reason and factors influencing these finding were not analyzed in this study and the author makes no attempt to explain them. The recommendation clearly indicates the need for further study to better understand these disturbing findings.

The results of this study, in general, on parameters of physical fitness, indicate that this population was comparable to national norms for this age group. The findings on the lifestyle habits however, give cause for much consternation. The risks and health hazards associated with the negative lifestyle of many of the subjects studied have potential calamitous consequences if left unchecked.

While the fitness levels were acceptable by comparison to national norms, at this young stage of the subjects lives, they are likely to show a rapid decline over time. In the

future, it can be anticipated that serious health problems for many will emerge.

Recommendations

1. Develop, promote and educate all ages on the health risks associated with tobacco use and addiction. The youngest school children should be targeted and existing resources concentrated at the primary level of education. Further restrictions on the availability and opportunity to smoke should be encouraged.

2.The favourable experience of those involved in community sport and recreational pursuits should be further promoted and encouraged. Further study is required aimed at ways to increase participation and to attract individuals who are not motivated to be active.

3.Emotional and psychological profiles must be developed in order to ascertain the causal relationship with the disturbing levels of depression and stress.

4.There is a need for further study to thoroughly investigate the causes and remedies for the concern and problems identified in this investigation.

APPENDIX A

SCIENTIFIC RESEARCH LICENCE

SCIENTIFIC RESEARCH LICENCE NUMBER 12083N

ISSUED TO: Mr. Bert Squires
Box 1407
Inuvik, NWT, X0E 0T0
(403) 979-7800

DATED: April 23, 1992

FILE NUMBER: 12 410 395

RESEARCH TEAM: Self

AFFILIATION: Arctic College, Aurora Campus; Dalhousie University

FUNDING AGENCY: NSTG

TITLE: Comparison of Lifestyle Habits and Fitness Levels of an Indigenous Population in Both Urban and Rural Settings

OBJECTIVES: To explore the different lifestyle habits and the resulting influence on fitness levels and other parameters; to determine areas of major nagative and positive influences on the well-being of this group; to make recommendations as to how to improve the lifestyle in order to positively influence the overall well-being of the people of this area;

DATES: April and May, 1992

ITINERARY: Inuvik

Scientific Research Licence 12083N expires on December 31, 1992.
Issued at the City of Yellowknife on April 23, 1992.

J.D. Heyland
Science Advisor

APPENDIX B

YOUTH CONSENT AND RELEASE FORM

Appendix B

Youth Consent and Release Form for the Canadian Standardized Test of Fitness

(Individuals under the age of majority and living with parent/guardian)

I, the undersigned, do hereby acknowledge:

- my consent for my dependent to perform a fitness test consisting of stepping on double 20 cm steps at speeds appropriate for his/her age and gender, measurements of standing height, weight, girths and skinfolds and tests of grip strength, push-ups, trunk forward flexion and sit-ups, the results of which will assist in determining the type and amount of physical activity most appropriate for his/her level of fitness;

- my understanding that the heart rate and blood pressure of m dependent will be measured prior to and at the completion of the test;

- my consent to the tests conducted by an appraiser who has been trained to administer the Canadian Standardized Test of Fitness. I understand that the interpretation of results is limited to providing a comparison with percentile-based norm and information on various aspects of fitness;

- my understanding that there are potential risks; i.e., episodes of transient lightheadedness, fainting, abnormal blood pressure, chest discomfort, leg cramps and nausea, *and that I, on behalf of my dependent, assume willfully those risks;*

- the obligation of my dependent to immediately inform the appraiser of any pain, discomfort, fatigue or any other symptoms that he/she *may suffer* during and immediately after the testing;

- my understanding that my dependent may stop or delay any further testing if he/she so desires and that the testing ma be terminated by the appraiser upon observation of any symptoms of distress or abnormal response;

- my understanding that I and my dependent may ask any questions or request further explanation or information abou the procedure at any time before, during and after the testing;

- that I have read, understood, and completed the Physical Activity Readiness Questionnaire and the answers to all the questions were negative regarding my dependent:

■ that I hereby release

_____
NAME OF ORGANIZATION ADMINISTERING THE TEST

or its agents, officers and employees from any liability with respect to any damage or injury (including death) that my dependent may suffer during the administration of the Canadian Standardized Test of Fitness except where the damage or injury is caused by the negligence of

_____
NAME OF ORGANIZATION ADMINISTERING THE TEST

or its agents, officers and employees acting within the scope of their duties.

_____
NAME OF DEPENDENT

_____
SIGNATURE OF PARENT/GUARDIAN DATE

_____
WITNESS DATE

NOTE: This form must be completed, signed and submitted to the appraiser, along with the completed PAR-Q at the time of testing. This form must also be witnessed at the time of signing and the witness must be of the age of majority.

APPENDIX C

PAR-Q & YOU

Appendix C

NAME OF PARTICIPANT

DATE

PAR-Q & YOU

PAR-Q is designed to help you help yourself. Many health benefits are associated with regular exercise, and the completion of PAR-Q is a sensible first step to take if you are planning to increase the amount of physical activity in your life.

For most people physical activity should not pose a problem or hazard. PAR-Q has been designed to identify the small number of adults for whom physical activity might be inappropriate or those who should have medical advice concerning the type of activity most suitable for them.

Common sense is your best guide in answering these few questions. Please read them carefully and check ( ) the YES or NO opposite the question if it applies to you.

YES	NO	
		1. Has your doctor ever said you have heart trouble?
		2. Do you frequently have pains in your heart and chest?
		3. Do you often feel faint or have spells of severe dizziness?
		4. Has a doctor ever said your blood pressure was too high?
		5. Has your doctor ever told you that you have a bone or joint problem such as arthritis that has been aggravated by exercise, or might be made worse by exercise?
		6. Is there a good physical reason not mentioned here why you should not follow an activity program even if you wanted to?
		7. Are you over age 65 and not accustomed to vigorous exercise?

IF YOU ANSWERED

YES to one or more questions:
If you have not recently done so, consult with your personal physician by telephone or in person BEFORE increasing your physical activity and/or taking a fitness appraisal. Tell your physician what questions you answered YES to on PAR-Q or present your PAR-Q copy.

Programs
After medical evaluation, seek advice from your physician as to your suitability for:
- unrestricted physical activity starting off easily and progressing gradually;
- restricted physical activity to meet your specific needs, at least on an initial basis. Check in your community for special programs or services.

NO to all questions:
If you answered PAR-Q accurately, you have reasonable assurance of your present suitability for:
- A GRADUATED EXERCISE PROGRAM - a gradual increase in proper exercise promotes good fitness development while minimizing or eliminating discomfort.
- A FITNESS APPRAISAL - the Canadian Standardized Test of Fitness (CSTF).

Postpone:
If you have a temporary minor illness, such as a common cold.

APPENDIX D

LIFESTYLE QUESTIONNAIRE

APPENDIX D

YOUR LIFESTYLE

1. In a typical week, how many hours do you spend doing the following activities?

	hours per week				
	0	1-2	3-4	5-9	10-1
watching television					
reading					
crafts or hobbies done mainly on your own					
visiting with relatives					
visiting with friends					
attending cultural events (feasts, northern cultural events, etc.)					
organizing or coaching physical activity or sport programs as a volunteer					
involvement with religious groups or church activity					
involvement in service or fraternal organizations					
involvement with social or entertainment groups such as card club or a dance club					
other group activities (pleaqe specify):					
activity: _____					
activity: _____					

2. Spare time provides a chance to reach many different goals. How important is it to you to reach each of these goals in <u>your</u> spare time?

	very important				not at all important
just relaxing, forgetting about your cares					
getting together with other people					
having fun					
earning money					
getting outdoors					
competing, winning					
feeling independent					
feeling better mentally					
feeling better physically					
improving/maintaining physical fitness					
challenging your abilities, learning new things					
looking better, controlling your weight					
taking risks, seeking adventure					

3. Which of the following best describes your experience with tobacco? *(Check all that apply.)*

I have never smoked

I stopped smoking cigarettes: recently
over a year ago _ _ years ago

I stopped smoking a pipe cigar or cigarillos: recently
over a year ago

I currently smoke: cigarettes occasionally
less than 1/2 pack daily
about a pack daily
2 or more packs daily

4. Does your spouse (or mate) currently smoke cigarettes, a pipe, cigars, or cigarettes?

does not smoke:

currently smokes: cigarettes
a pipe, cigars, cigarillos

don't have a spouse (or mate):

5. How many close relatives do you have — people that you can talk to about private matters, and can call for help?

_ _ close relatives

6. How many close friends do you have that you feel really close to — people that you can talk to about private matters, and can call on for help?

_ _ close friends

7. Does your spouse (or mate) exercise regularly?

yes
no
don't have one

8. Of your other relatives and friends, how many exercise regularly?

_ _ relatives
_ _ friends
none exercise regularly

PHYSICAL ACTIVITY IN YOUR SPARE TIME

9. The following activities refer to physical activities that are not related to work. Have you done any of the following physical activities in the past 12 months?

Please indicate whether you have done each activity listed below. Then for those activities which you have done, please complete the number of times done each month, and the average time spent on each occasion (not counting travel time, changing, etc.)

Average time per occasion

Number of times each month

	No	Yes	J	F	M	A	M	J	J	A	S	O	N	D
walking for exercise			--	--	--	--	--	--	--	--	--	--	--	--
bicycling			--	--	--	--	--	--	--	--	--	--	--	--
jogging or running			--	--	--	--	--	--	--	--	--	--	--	--
home exercises			--	--	--	--	--	--	--	--	--	--	--	--
exercise class, aerobics														

	No	Yes	J	F	M	A	M	J	J	A	S	O	N	D
ice skating			--	--	--	--	--	--	--	--	--	--	--	--
cross-country skiing hiking			--	--	--	--	--	--	--	--	--	--	--	--
ice hockey			--	--	--	--	--	--	--	--	--	--	--	--
swimming			--	--	--	--	--	--	--	--	--	--	--	--
			--	--	--	--	--	--	--	--	--	--	--	--

	No	Yes	J	F	M	A	M	J	J	A	S	O	N	D
yard work			--	--	--	--	--	--	--	--	--	--	--	--
camping			--	--	--	--	--	--	--	--	--	--	--	--
badminton			--	--	--	--	--	--	--	--	--	--	--	--
weight training			--	--	--	--	--	--	--	--	--	--	--	--
baseball, softball			--	--	--	--	--	--	--	--	--	--	--	--

	No	Yes	J	F	M	A	M	J	J	A	S	O	N	D
popular dance or social dance			--	--	--	--	--	--	--	--	--	--	--	--
northern games			--	--	--	--	--	--	--	--	--	--	--	--
square or folk dance			--	--	--	--	--	--	--	--	--	--	--	--
bowling			--	--	--	--	--	--	--	--	--	--	--	--

Please refer to the Physical Activity Reference Card and list any other activities that you have done in the past 12 months.

	J	F	M	A	M	J	J	A	S	O	N	D
	--	--	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--	--	--

10. In the past year, did you <u>stop</u> doing any physical activity in your spare time (not including any activity stopped because of a change in season)?

No Yes: What was it? _____

_____

_____

_____

_____

What was the main reason for stopping?

_____

Any other activity?

_____

What was the main reason for stopping?

_____

11. Have you done some physical activity at least once a week during the past 3 months?

No Yes: Which exercise or sport activity contributed most to your fitness during the past 3 months?

_____

b. Was this activity . . . *(Check all that apply.)*

- scheduled at specific times
- directed by an instructor or supervisor
- competitive, with organized tournaments, leagues or races
- casual, freely scheduled with little or no direction from an instructor

c. What usually happened to your heart rate and breathing when you did this activity? Was it . . . *(Choose one.)*

- a little faster than normal
- a lot faster but talking was possible
- so fast that talking was impossible
- unchanged

d. How long have you been doing some physical activity in your spare time at least once a week?

- less than 3 months
- 4-6 months
- 6 months to just under 1 year
- 1-2 years
- 3-4 years
- 5-7 years
- more than 7 years (since before 1981)

12. Comparing your activity in your spare time during the last 12 months with 3 to 4 years ago, would you say you are . . . *(Chose one.)*

- much more physically active
- a little more physically active
- a little less physically active
- much less physically active
- about the same — I have always been active
- about the same — I have never been active

13. Compared to other people your age when you were 15 years old, would you say you were ...

much more active much less active

14. Compared to the way other people your age spend their spare time, would you say you are ...

much more active much less active

15. With whom do you usually do your physical activities in your spare time? *(Choose one.)*

no one	co-workers
friends	classmates at school
immediate family	others

16. Where do you usually do your physical activities in your spare time? *(Choose one.)*

home	commercial facility or private club
park	outside using no special facility
recreational facility	school, college or university facility
work	other

17. Are there any exercise or sports activities you would like to start in the next year?

No Yes: First choice: _____

Second choice: _____

18. How important are the following in preventing you from being more physically active?

	very important				not at all important
lack of time due to work or school					
lack of time due to family obligations					
lack of time due to other interests					
lack of energy, too tired					
lack of athletic ability					
lack of programs, leaders or accessible facilities					
lack of a partner					
lack of support from family or friends					
lack of babysitting services					
cost					
lack of self-discipline or willpower					
self-conscious, ill at ease					
long-term illness, disability or injury					
fear of injury					

OPINIONS ABOUT VIGOROUS PHYSICAL ACTIVITY

For the next few questions, regular participation in vigorous physical activity means doing some activity in your spare time:

- 3 or more times each week,

- for 20 minutes or more each time, and
- at a level which causes your breathing to be a lost faster, but at which talking is still possible

19. How do you feel about participating regularly in vigorous physical activity? Do you think it is ...

boring	fun
beneficial	harmful
unpleasant	pleasant
convenient	inconvenient
painful	not painful
easy	difficult

20. All things considered, how much choice to you have over whether you participate regularly in vigorous physical activity?

completely my choice	too many constraints imposed on me

21. How much do the following people encourage you to participate regularly in vigorous physical activity?

	doesn't apply don't have one	encourages me, very supportive	discourages me, very negative
spouse, boyfriend			
parents			
son, daughter			
other family members			
most of your close friends			
your employer			
your doctor, nurse			

OPINIONS ABOUT VIGOROUS PHYSICAL ACTIVITY

22. How much does (or would) participation in vigorous physical activity help you to ...
(Please answer whether or not you are now active in your spare time.)

	a great deal	not at all
relax, forget about your cares		
get together with other people		
have fun		
earn money		
get outdoors		
compete, win		
feel independent		

feel better mentally
feel better physically
challenge your abilities,
learn new things

look better
control / lose weight
take risks, seek adventure

improve/maintain overall physical fitness
improve/maintain cardiovascular fitness
improve/maintain muscular strength
and fitness
improve/maintain flexibility

23. Would you agree or disagree that, if you wanted to, you could easily participate in vigorous physical activity 3 or more times a week for at least 20 minutes at a time?

strongly agree strongly disagree

24. In the coming year, how often do you intend to participate regularly in vigorous physical activity?

never
less than once a week
1-2 times per week
3 times per week
4-5 times per week
6 or more times per week

NUTRITION

25. In answering the following questions, think about your typical eating pattern. For each food listed, please give the number of servings eaten on a typical day and then the average number of days each week that you eat this type of food.

Servings are defined on the reference card. For a combination dish, such as pizza, casserole or soup, please try to break it down into individual ingredients. For example, one slide of pizza includes bread, cheese and perhaps meat.

How often do you have	...never or less than once a week	servingsdays per per day week
red meat (beef, pork, lamb, liver, etc.)		____
processed meats (bacon, hot dogs, cold cuts, etc.)		____
chicken, turkey, other poultry		____
fish		____
eggs		____
dried beans, dried peas, nuts		____
country food (seal, caribou, muktuk, etc.)		____
	never <1 a week	servingsdays per day per week
vegetable		____

yellow vegetables (carrots, squash, sweet potato, etc.) _____
green vegetables (broccoli, green beans, cabbage, spinach, etc.) _____
potato _____
other vegetables including tomatoes _____

oranges, grapefruit, lemons _____
orange, grapefruit, or lemon juice _____
other fruit (apples, bananas, peaches, etc.) _____
other fruit juice _____

	never <1 a week	servingsdays per dayper week
milk (whole or evaporated)		_____
milk (2%, skim, buttermilk)		_____
milk products (puddings, yogurt, ice cream)		_____
cheese and cheese products (whole)		_____
cheese and cheese products (low fat)		_____
bannock, bread, muffins, cereals, etc., made from whole grains		_____
bannock, bread, muffins, cereals, etc, made with refined white flour		_____
rice, pasta (macaroni, spaghetti, etc.)		_____
margarine, vegetable oils, salad dressings, butter		_____
sweets (soft drinks, cookies, cakes, pie, sweet cereals, jams, jellies, candy, donuts, etc.		_____
sugar added at the table		_____
salt added at the table		_____
salty snacks (potato chips, pretzels, etc.)		_____
tea, coffee		_____
alcohol (beer or wine or liquor)		_____
other _____		_____

26. How often to you eat the following store-bought foods?

	never or less than once a week	servingsdays per weekper dayweek
frozen meals		_____
frozen vegetables		_____
canned vegetables		_____
frozen desserts and pastries		_____
fresh baked goods		_____
canned soup		_____

27. How many days per week do you ...

	days perweek
eat small amounts all day rather than any regular meals	___
replace 1 or 2 regular meals by eating small amounts	___
eat 3 regular meals	___
eat breakfast (not just coffee or tea)	___
eat at a restaurant, take-out, or snack bar	___

28. Compared to about 6 or 7 years ago, that is at 1985, have you been consuming more, less, or the same amount of:

	When did you make this change?			
	same as before	more	less	less than 12 months ago	more than 12 months ago
country meat					
red meat (store bought)					
poultry					
fish					
fruit and vegetables					
fats and fried foods					
sugar and sweet foods					
salt and salty food					
store-bought, prepared foods					
total calories					
meals on a regular basis					
bannock					
whole grain cereals					
low-fat dairy products					
alcohol (beer or wine or liquor)					

29. At what weight do you look your best? ___ lbs. or ___ kg

30. Do you watch what you eat, for health reasons?

No Yes

Do you take dietary measures to ... *(Check all that apply.)*

- lose weight
- maintain weight
- prevent specific health problems
- control heart disease
- control high blood pressure
- control diabetes
- control food allergies
- another reason:

_____

_____

31. Are you on a diet prescribed for you by a doctor or dietitian?

No Yes

32. How often do you...

	very often				never
eat second helpings					
avoid sugar and sweet foods					
avoid salt and salty foods					

use artificial sweeteners instead of sugar
trim visible fat off meat

remove skin from chicken, ducks, geese
choose diet food and drinks over regular
induce vomiting, take laxatives to lose weight

take appetite suppressants
choose foods high in calcium

YOUR HEALTH AND WELL-BEING

33. How important is each of the following to your health?

	very important	not at all important
adequate rest and sleep		
good diet		
maintaining proper weight		
participation in social and cultural activities		
control of stress		
regular physical activity such as exercise, sports or games		
a smoke-free environment		

34. Here is a list of how people feel at different times. During the past few weeks, how often have you felt ...

	often	sometimes	never
on top of the world			
very lonely or remote from other people			
particularly excited or interested in something			
depressed or very unhappy			
pleased about having accomplished something			
bored			
proud because someone complimented you on something you had done			
so restless you couldn't sit long in a chair			
that things were going your way			
upset because someone criticized you			
stressed			

35. Are you limited in the type or amount of <u>work</u> you can do (or school you can attend) because of illness, injury or handicap? *(Check all that apply.)*

- No
- Yes, because of a temporary illness
- Yes, because of a long-term illness
- Yes, because of a temporary injury
- Yes because of a permanent injury or handicap

36. Are you limited in the amount of leisure-time physical activity you can do because of illness, injury or handicap? *(Check all that apply.)*

- No
- Yes, because of a temporary illness
- Yes, because of a long-term illness
- Yes, because of a temporary injury
- Yes, because of a permanent injury or handicap

37. Did your mother or father ever have ...

	Mother			Father		
	yes	no	don't know	yes	no	don't know
heart disease						
high blood pressure						
diabetes, non-insulin-dependent						
diabetes, insulin-dependent						
a stroke						
cancer						
overweight problem						

38. Do you presently have ...

	no	yes	for how many years
anemia			— —
skin allergies			— —
hay fever or other allergies			— —
asthma			— —
arthritis or rheumatism			— —
lower back problems			— —
cancer			— —
diabetes, non-insulin-dependent			— —
diabetes, insulin-dependent			— —
cerebral palsy			— —
emphysema or chronic bronchitis			— —
any emotional disorders			— —
epilepsy			— —
high blood pressure			— —
heart or circulation problems			— —
paralysis of the arms			— —
paralysis of the legs			— —
kidney problems			— —
stomach or intestinal ulcer			— —
thyroid trouble or goitre			— —
recurring migraine headaches			— —
missing arm(s) or hand(s)			— —
missing leg(s) or foot (feet)			— —

39. Do you have any other long-term illness or impairment not listed above?

No Yes: what is it? _____ 95
Any others? _____
_____

40. The next question asks about trouble you have doing certain activities even when using a special aid. Report on those problems which you expect to last 6 months or more.

Do you have any trouble ...	have trouble	no trouble
hearing what is said in a normal conversation with one other person?		
hearing what is said in a group conversation with at least three other people?		
reading ordinary newsprint, with glasses if normally worn?		
seeing clearly the face of someone from 12 feet (4 meters), with glasses if normally worn?		
speaking and being understood		
walking 400 yards (400 meters) without resting?		
walking up and down a flight of stairs?		
carrying an object of 10 pounds for 30 feet (5 kg for 10 meters)?		
moving from one room to another?		
standing for long periods of time, that is for more than 20 minutes?		
when standing, bending down and picking up an object from the floor?		
dressing and undressing yourself?		
getting in and out of bed?		
cutting your own toenails?		
using your fingers to grasp and handle?		
reaching in any direction?		
cutting your own food?		

41. In the past 12 months, have you suffered an injury as a result of doing sports or exercise?

No Yes: Most recent injury:
What activity? _____
For how long did this injury prevent you from ..._____
working or studying: ___ days or ___ weeks or ___ months
exercising: ___ days or ___ weeks or ___ months

42. During the last 12 months ...

... did you see or talk to a doctor about your health?
No Yes: how many times ___ times

... did you see or talk to any other kind of health professional?
No Yes: how many times ___ times

... how many nights did you spend in a hospital, a nursing home or a convalescent home?

None or ____ nights

43. During the past two weeks ...

... how many days did you stay in bed all or most of all the day because of illness, injury or some other health problem?

None or ____ days

How many of these days were work or school days?

None or ____ days

... not counting days in bed, how many days did your health keep you from normal activities?

None or ____ days

How many of these days were work or school days?

None or ____ days

44. Below is a list of how you might have felt or behaved. Please indicate how often you have felt this way in the past week. During the past week ...

	less than one day	1-2 days	3-4 days	5-7 days
I was bothered by things that don't usually bother me.				
I did not feel like eating; my appetite was poor.				
I felt that I could not shake off the blues even with help from my family or friends.				
I felt that I was just as good as other people.				
I had trouble keeping my mind on what I was doing.				
I felt depressed.				
I felt that everything I did was an effort.				
I felt hopeful about the future.				
I thought my life had been a failure.				
I felt fearful.				
My sleep was restless.				
I was happy.				
I talked less than usual.				
I felt lonely.				
People were unfriendly.				
I enjoyed life.				
I had crying spells.				
I felt sad.				
I felt that people disliked me.				
I could not get "going."				

45. What do you consider to be your ideal weight from the point of view of health?

____ lbs or ____ kg

46. In general, how would you describe your state of health?

very good
good
average
poor
very poor

ABOUT YOU

47. Are you ...

male? female?

48. What is your date of birth?

___ day ___ month ___ year

49. Where were you born?

Newfoundland	Manitoba
Nova Scotia	Saskatchewan
New Brunswick	Alberta
Prince Edward Island	British Columbia
Quebec	Northwest Territories
Ontario	Yukon

outside of Canada: _____

50. What languages did you first learn at home?

English	Dene
French	Other
Inuktituk	

51. What is your marital status?

married (including common-law relationship) separated
widowed single (never married)
divorced

52. How would you describe yourself? *(Check all that apply.)*

student full-time	employed full-time
student part-time	employed part-time
homemaker full-time	retired: since _____
homemaker part-time	unemployed or on strike: since _____
hunter/trapper full-time	hunter/trapper part-time

other: _____

53. What is the highest level of education you have reached?
If you are a student, please indicate your current level of education.

elementary or less	some post-secondary
some secondary school	community college or CEGEP diploma
secondary diploma	one or more university degrees

54. About how many years have you lived in the Northwest Territories?

____ years

55. About how many years have you lived in this community?

____ years

56. About how many years have you lived in this neighbourhood?

____ years

57. What are the highest levels of education your father and your mother reached?

Father's education:	Mother's education:
elementary or less	elementary or less
some secondary school	some secondary school
secondary diploma	secondary diploma
some post-secondary	some post-secondary
post-secondary diploma or certificate	post-secondary diploma or certificate
one or more university degrees	one or more university degrees

58. Where were your father and mother born?

Father:	Mother:
Newfoundland	Newfoundland
Nova Scotia	Nova Scotia
New Brunswick	New Brunswick
Prince Edward Island	Prince Edward Island
Quebec	Quebec
Ontario	Ontario
Manitoba	Manitoba
Saskatchewan	Saskatchewan
Alberta	Alberta
British Columbia	British Columbia
Northwest Territories	Northwest Territories
Yukon	Yukon
outside of Canada	outside of Canada

59. What kind of work do you do?
Please provide as much detail as possible (e.g., construction, hunting/trapping, etc.)

am not _____
not working

b. For whom do you work? Please indicate what kind of business, industry or service this is (e.g., retail shoe store, paper box manufacturing, board of education, government department, self-employed carpentry).

_____

c. How many people are you in charge of at work (including those directly and indirectly under your supervision?)

none	11 to 49
1	50 to 99
2 to 4	100 or more
5 to 10	

d. How many hours per week do you normally work at your job?

____ hours

e. Do you have any of the following at or near your place of work?

pleasant places to walk, jog or wheel
showers or change rooms
playing fields or open spaces for ball games, etc.
organized recreational sport teams
organized fitness classes
other physical activities

f. At work, do you have ...

programs to improve health, physical fitness or nutrition
a total ban on smoking
smoking restricted to designated areas

g. At work, how much time to you spend ...

	almost all	about 3/4	about 1/2	almost none
sitting				
standing				
walking, wheeling				
walking up and down stairs				

h. Comparing you present physical activity level at work with 6 or 7 years ago, that is in 1985, would you say you are ...

much more active ... much less active

60. Before taxes, approximately what were your total personal and total household incomes last year?

Total personal income:	Total household income:
less than $10,000	less than $10,000
$10,000 - $14,000	$10,000 - $14,000
$15,000 - $19,000	$15,000 - $19,000

$20,000 - $24,000
$25,000 - $34,000
$35,000 - $54,000
$55,000 and over

$25,000 - $34,000
$35,000 - $54,000
$55,000 and over

61. Information about yourself:

Name:

Age:

Home Community:

Ethnic Background (i.e., Inuit, Dene, White):

Address where you can be reached in September:

Telephone Number:

This completes the questionnaire part of the survey.

Thank you for participating.

APPENDIX E
RAW DATA

APPENDIX E

RAW DATA

101-132 = Inuvik, Female
233-264 = Inuvik, Male
310-332 = Yellowknife, Female
401-432 = Yellowknife, Male

VO2-MAX (Maximal Oxygen Consumption)
1 = Excellent
2 = Above Average
3 = Average
4 = Below Average
5 = Poor

BMI (Body Mass Index)
1 = Acceptable
2 = Excessive

SOS (Sum of Skinfolds)
1 = Acceptable
2 = Excessive

WHR (Waist-Hip-Ratio)
1 = Acceptable
2 = Excessive

SOTS (Sum of Trunk Skinfolds)
1 = Acceptable
2 = Excessive

Sex 1 = Male
2 = Female

Location
1 = Inuvik
2 = Yellowknife

Ethnicity
1 = Aboriginal
2 = Non-Aboriginal

Smoke (Smoking Status)
1 = Active Smoker
2 = Never Smoked
3 = Quit Smoking

TV (Television Viewing)
1 = 0-4 Hours per Week
2 = 5-14 Hours per Week
3 = 15+ Hours per Week

EN-EXPLT (Energy Expenditure in Leisure Time)
1 = Inactive
2 = Moderately Active
3 = Active

POS-WB (Positive Well-Being)
1 = Yes
2 = No

DEP (Depressed)
1 = Yes
2 = No

Stress (Stressed)
1 = Yes
2 = No

Food-GD (Adherence to Canada's Food Guide)
1 = Low
2 = Partical
3 = High

AD-Sleep (Adequate Sleep)
1 = Important
2 = Non Important

Good-DT (Good Diet)
1 = Important
2 = Not Important

SMK-FENV (Smoke Free Environment)
1 = Important
2 = Not Important

PROP-WT (Proper Weight)
1 = Important
2 = Not Important

ST-CONT (Stress Control)
1 = Important
2 = Not Important

REG-ACT (Regular Activity)
1 = Important
2 = Not Important

SOC-PART (Social Participation)
1 = Important
2 = Not Important

SOCSUPAT (Social Support to Participate in Activies)
1 = Encouraged
2 = Neutral
3 = Discourage

AT-VIG-AT (Attitude Towards Vigorous Activity)
1 = Very Positive
2 = Positive
3 = Average
4 = Negative

LIM-FATS (Limit Fat in Diet)
1 = Yes
2 = No

LIM-Salt (Limit Salts in Diet)
1 = Yes
2 = No

LIM-SUG (Limit Sugar in Diet)
1 = Yes
2 = No

BEH-CONT (Behavior Control)
1 = High
2 = Moderate
3 = Little

GO-AT-IN (Goal Attainment Index)
1 = High
2 = Medium
3 = Low

	VO2-MAX	BMI	SOS	WHR	SOTS	SEX	LOCATION	ETHNICITY	SMOKE	TV	EN_EXPLT	POS_WB	DEP	STRESS	FOOD_GD	AD_SLEEP	GOOD_DT	SMK_FENV	PROP_WT	ST_CONT	REG_ACT	SOC_PART	SOCSUPAT	AT_VIG_AT	LIM_FATS	LIM_SALT	LIM_SUG	BEH_CONT	GO_AT_IN
101	1	2	2	1	2	2	1	2	3	1	3	1	2	1	2	1	1	2	2	2	2	1	2	3	1	1	2	2	2
102	4	1	2	1	1	2	1	1	1	2	3	2	1	2	3	2	2	2	1	2	1	2	3	3	2	1	2	2	1
103	4	1	1	1	1	2	1	1	2	1	1	2	2	3	2	1	2	1	2	2	1	2	2	4	2	2	2	2	1
104	1	1	2	2	2	2	1	1	1	1	3	2	2	2	1	2	2	2	2	2	2	2	2	3	2	2	2	2	2
105	4	2	2	2	2	2	1	2	3	2	1	2	2	2	3	2	2	2	2	2	2	2	1	1	2	2	2	1	2
106	1	1	1	2	1	2	1	1	2	2	3	2	2	3	3	2	2	1	2	2	1	2	1	1	1	1	1	1	2
107	3	1	2	2	2	2	1	1	1	1	2	2	1	2	2	1	2	2	2	2	2	2	1	3	2	1	2	2	1
108	2	2	2	2	2	2	1	1	1	2	3	2	1	2	3	1	2	2	2	2	2	2	1	3	2	2	2	2	2
109	4	1	2	2	2	2	1	1	1	1	2	2	2	3	1	2	2	2	2	2	2	2	1	2	2	2	2	2	1
110	1	1	2	2	2	2	1	1	1	1	3	2	2	2	1	1	2	2	2	2	2	2	2	3	2	2	2	3	1
111	2	1	1	2	1	2	1	1	1	1	2	2	2	2	3	2	2	2	2	2	2	2	2	3	2	2	2	1	2
112	4	1	2	1	2	2	1	1	2	1	1	1	2	3	1	1	1	1	1	2	1	1	1	1	2	1	1	1	1
113	1	1	1	2	1	2	1	1	1	2	3	2	1	2	3	2	2	2	2	2	2	2	2	2	2	2	2	3	2
114	4	2	2	2	2	2	1	1	1	1	1	2	1	2	3	2	2	2	2	2	2	2	1	4	2	2	2	2	1

115	4	1	2	1	1	2	1	1	1	1	1	2	2	2	2	1	2	2	2	2	2	2	1	3	2	2	2	1	1
116	4	1	2	1	2	2	1	1	3	1	3	2	2	2	3	2	1	1	2	2	2	2	1	1	1	2	2	1	1
117	4	1	2	2	2	2	1	1	1	1	1	2	2	3	1	1	2	2	2	2	2	2	3	3	2	2	2	3	3
118	3	1	1	1	1	2	1	1	1	1	2	2	1	2	3	2	2	2	2	2	2	2	1	3	2	2	2	1	2
119	2	2	2	2	2	2	1	1	1	1	3	2	2	2	2	2	2	2	2	2	2	2	1	3	2	2	2	1	2
120	1	1	2	2	2	2	1	1	1	1	3	1	2	3	3	1	2	2	2	2	2	2	1	1	2	2	2	1	1
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APPENDIX F

LIST OF FIGURES

Figure 1A

Maximal Oxygen Consumption

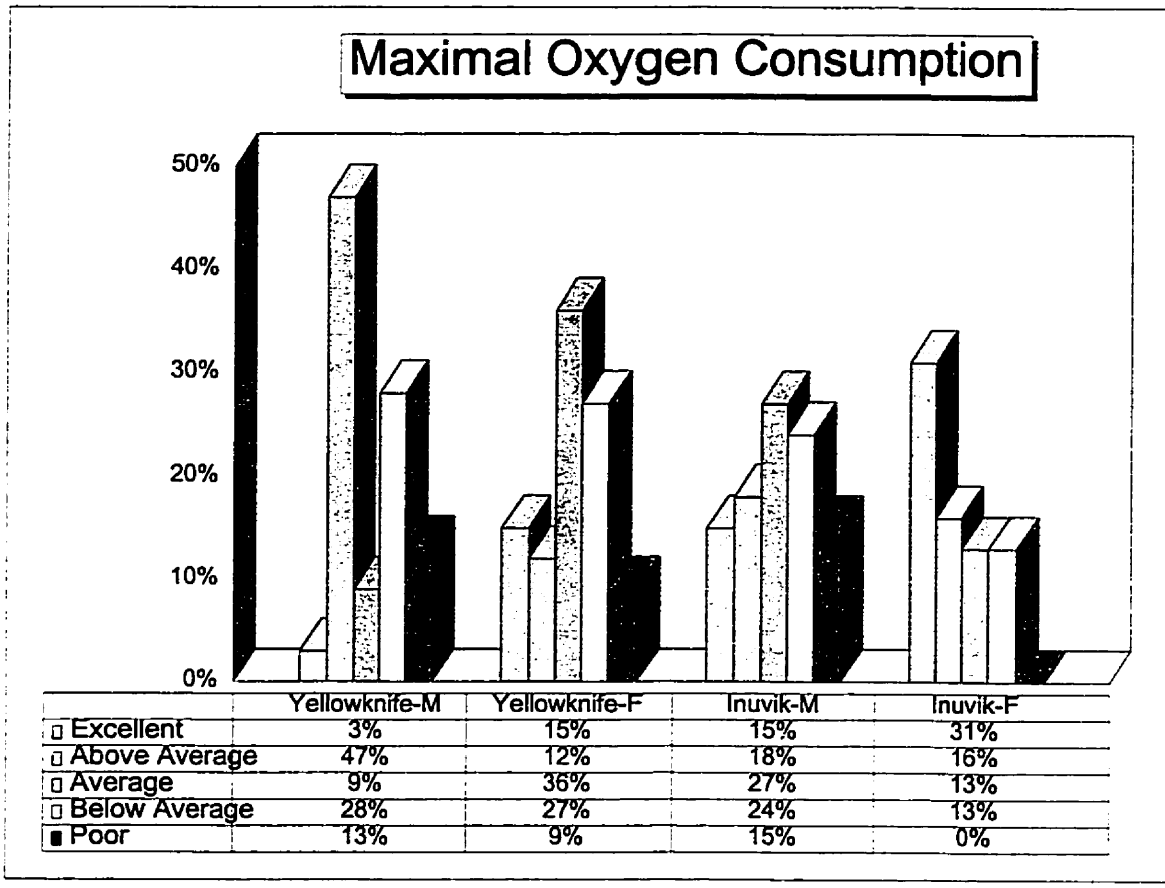
Inuvik

	Excellent	Above Average	Average	Below Average	Poor	Total
Male	5	6	9	8	5	33
Female	10	5	4	13	0	32

Yellowknife

	Excellent	Above Average	Average	Below Average	Poor	Total
Male	1	15	3	9	4	32
Female	5	4	12	9	3	33

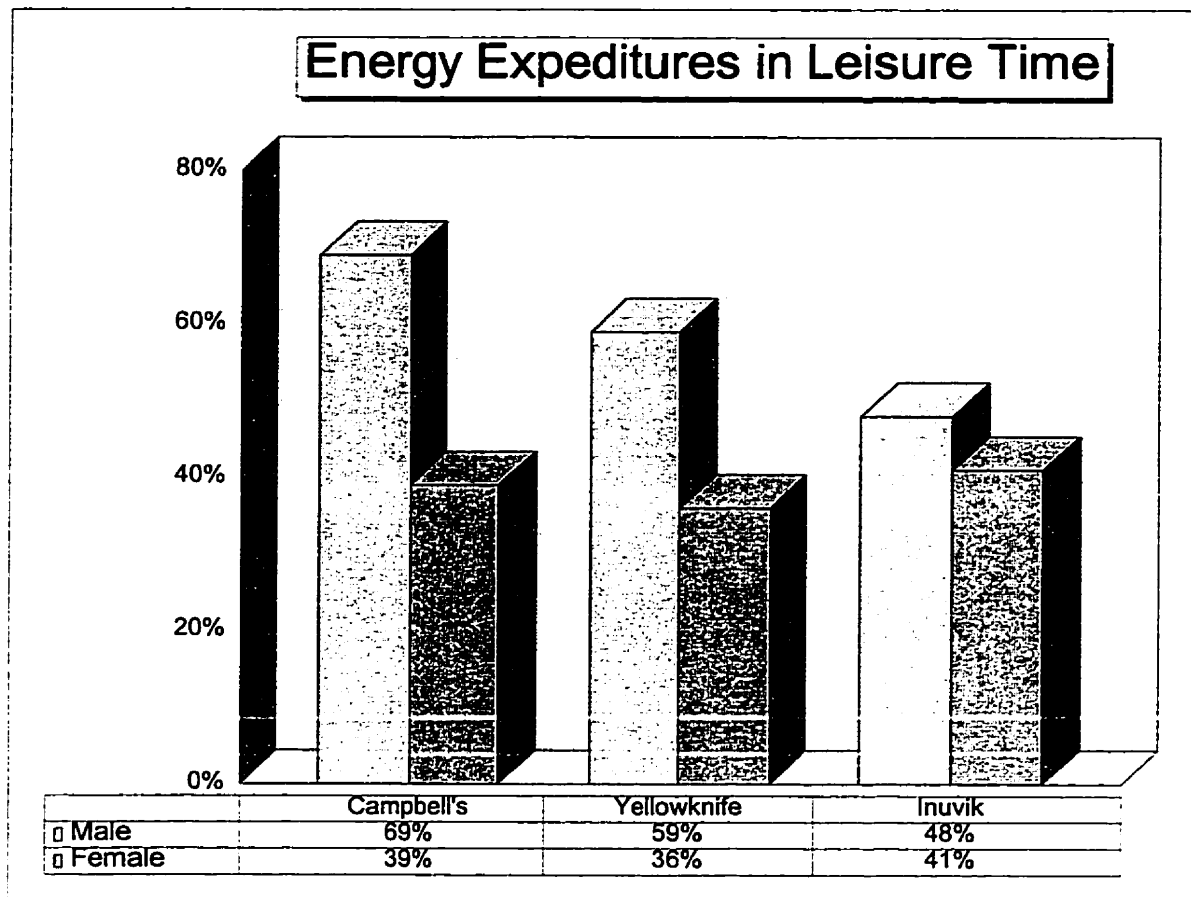
Figure 1B



	Yellowknife-M	Yellowknife-F	Inuvik-M	Inuvik-F
Excellent	3%	15%	15%	31%
Above Average	47%	12%	18%	16%
Average	9%	36%	27%	13%
Below Average	28%	27%	24%	13%
Poor	13%	9%	15%	0%

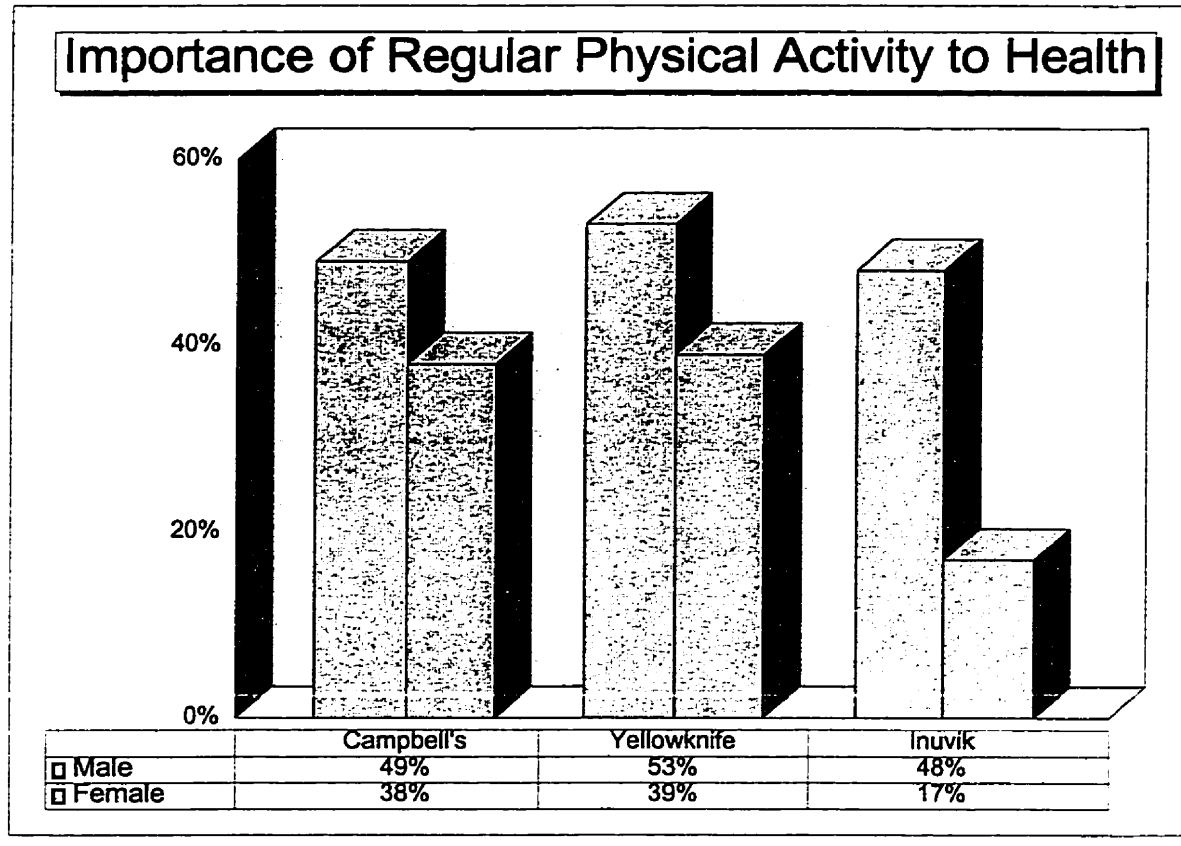
Based on data from the Canada Fitness Survey, 1981

Figure 2



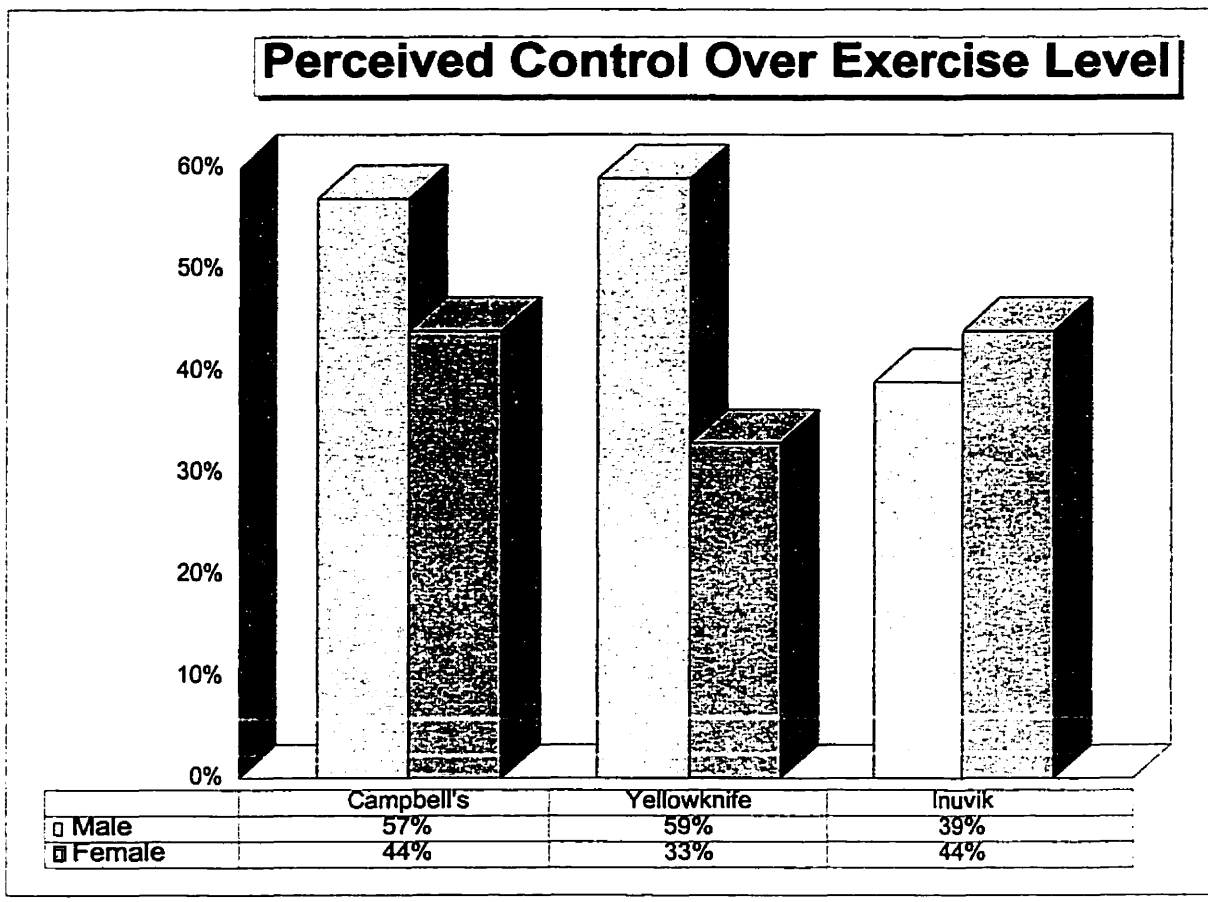
The Active Population, total energy expanded =+kcal/kg/day
Campbell's Survey, 1988

Figure 3



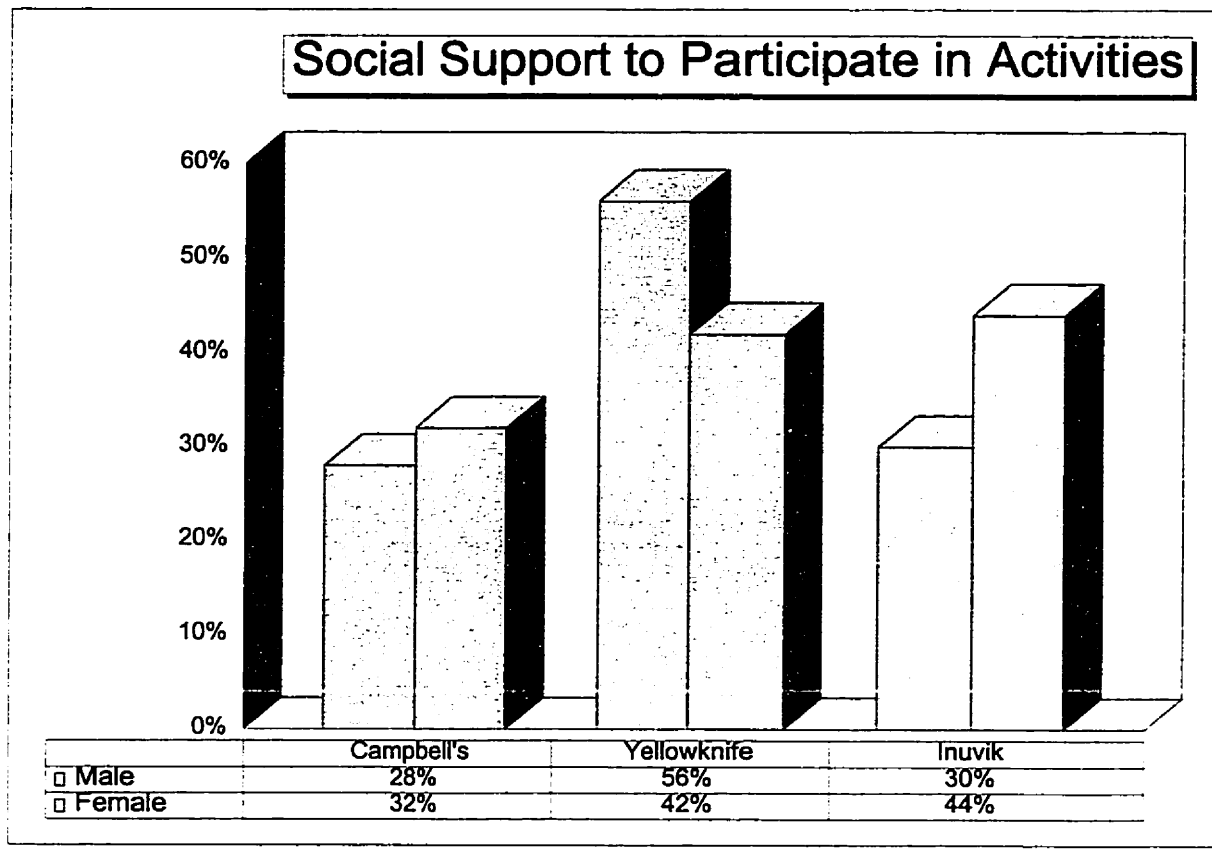
Rate regular activity as important , Campbell's Survey , 1988

Figure 4



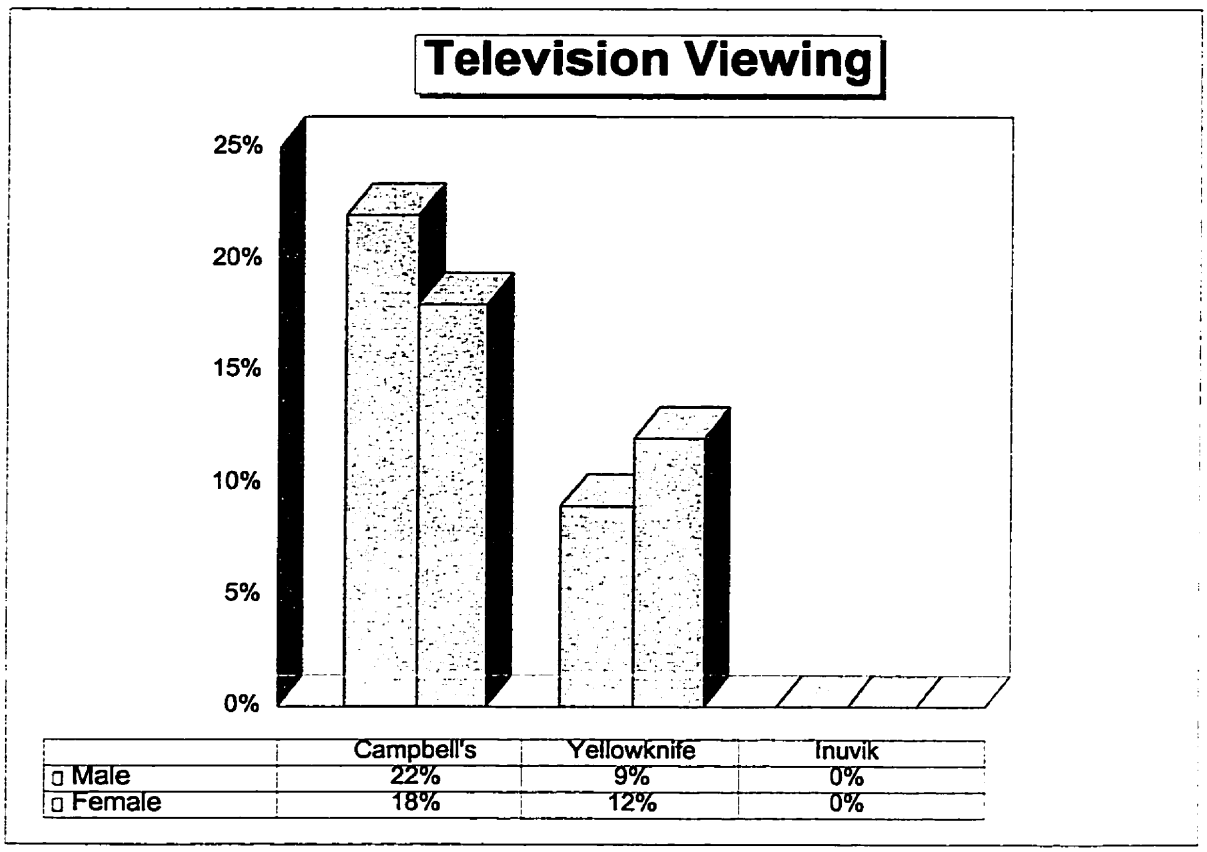
Rate Control as High (Campbell's Survey, 1988)

Figure 5



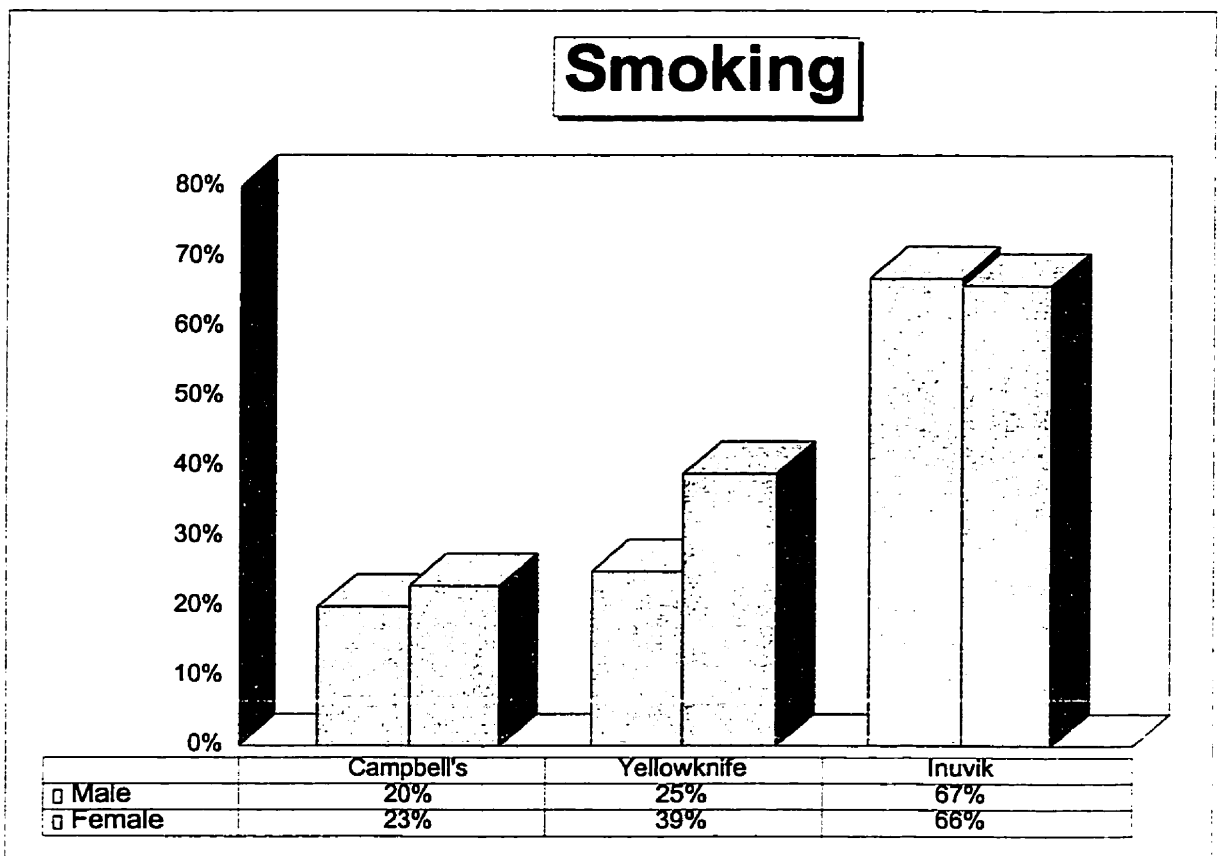
Encouraged to be Active (Campbell's Survey, 1988)

Figure 6



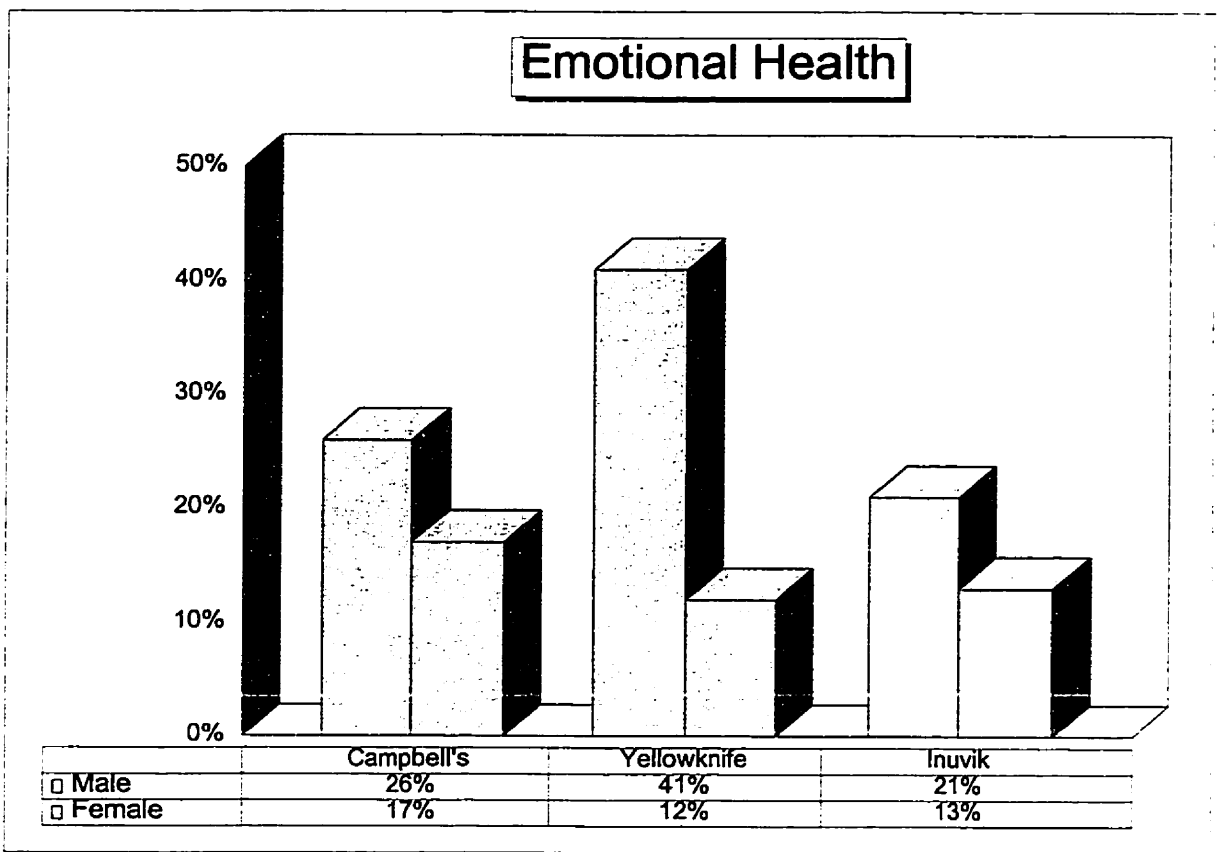
15+ Hours/Week (Campbell's Survey, 1988)

Figure 7



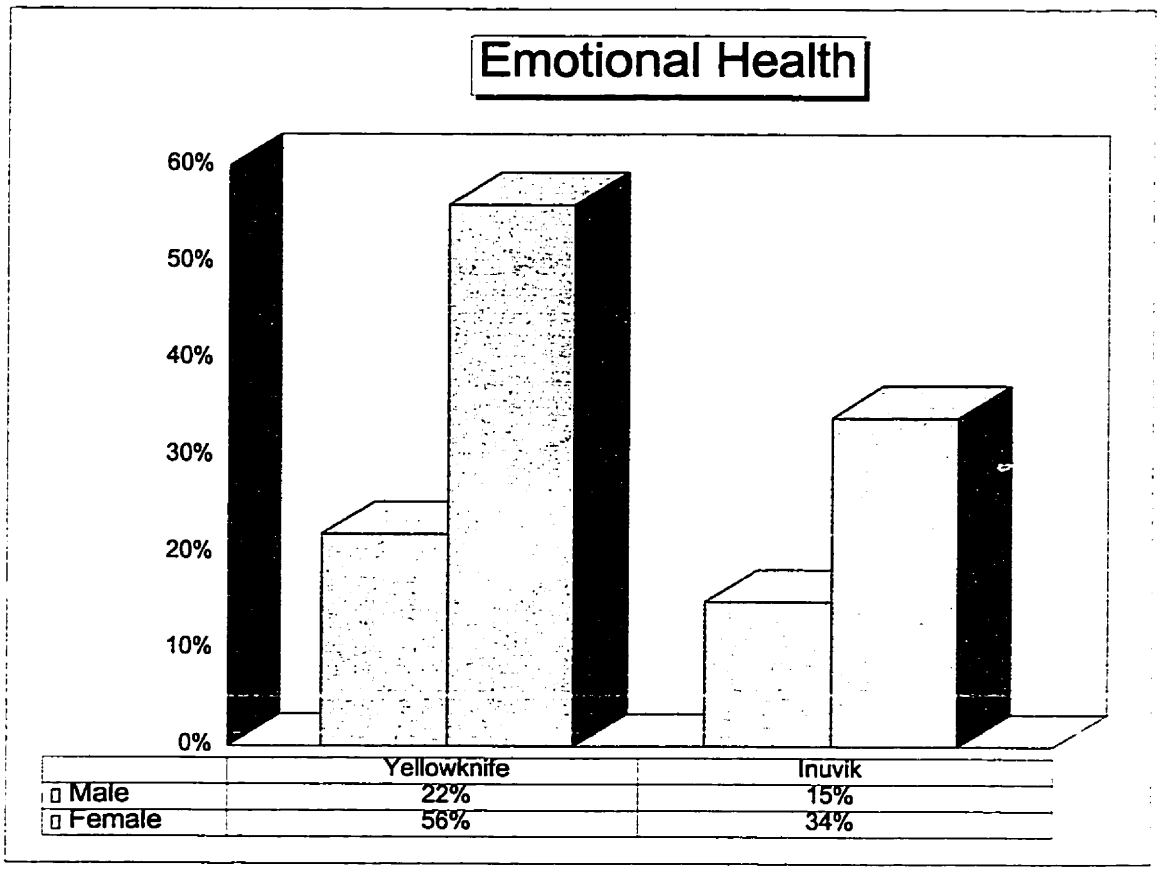
Current Cigarette Smokers (Campbell's Survey, 1988)

Figure 8A



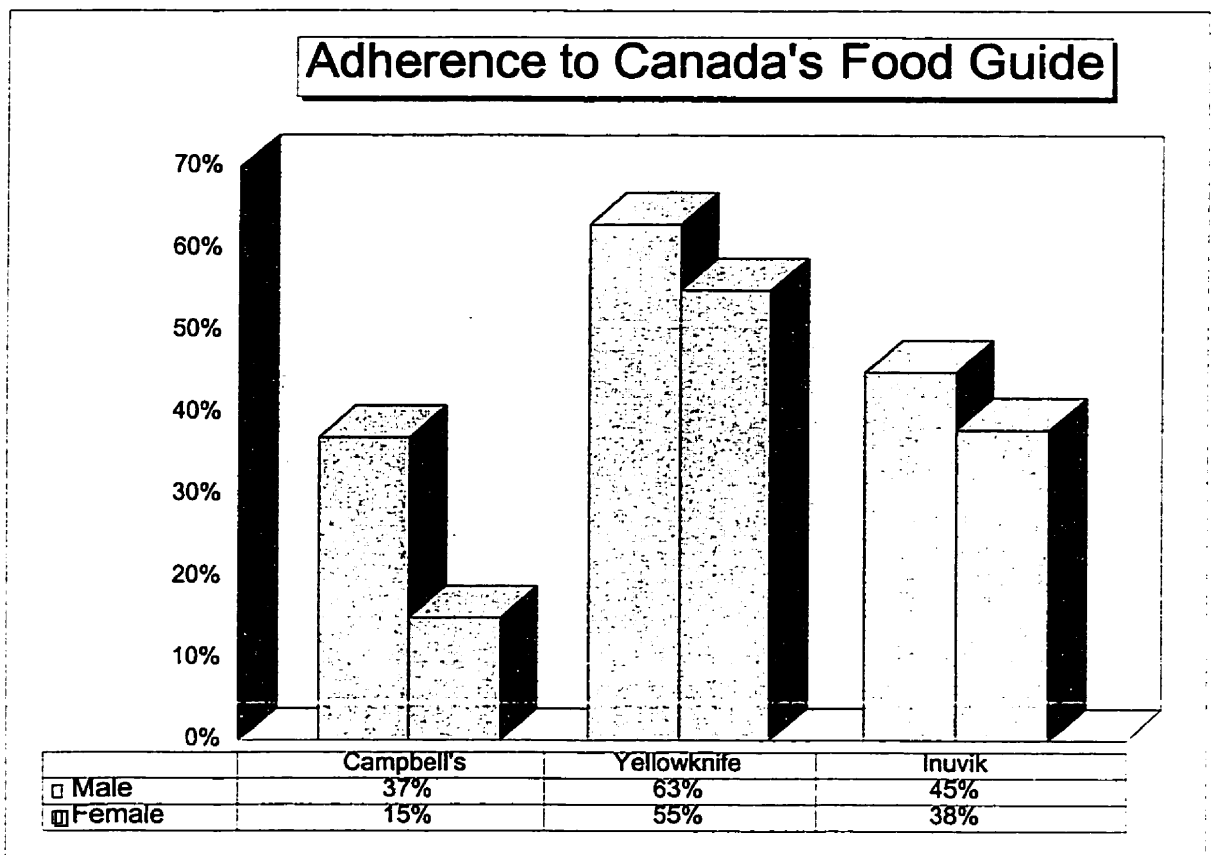
Positive Well-Being (Affect Balance Scale Campbell's Survey, 1988)

Figure 8B



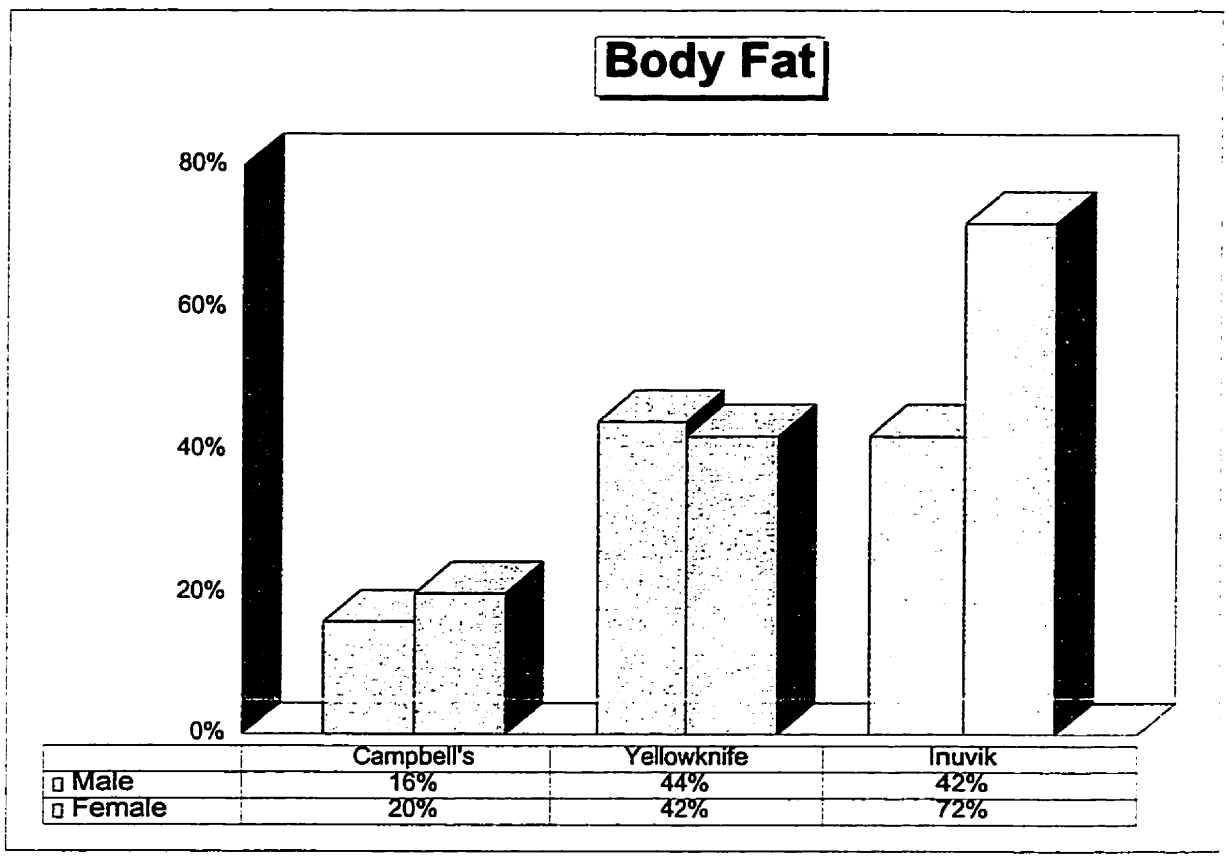
Depression (Depression Scale, Campbell's Survey, 1988)

Figure 9



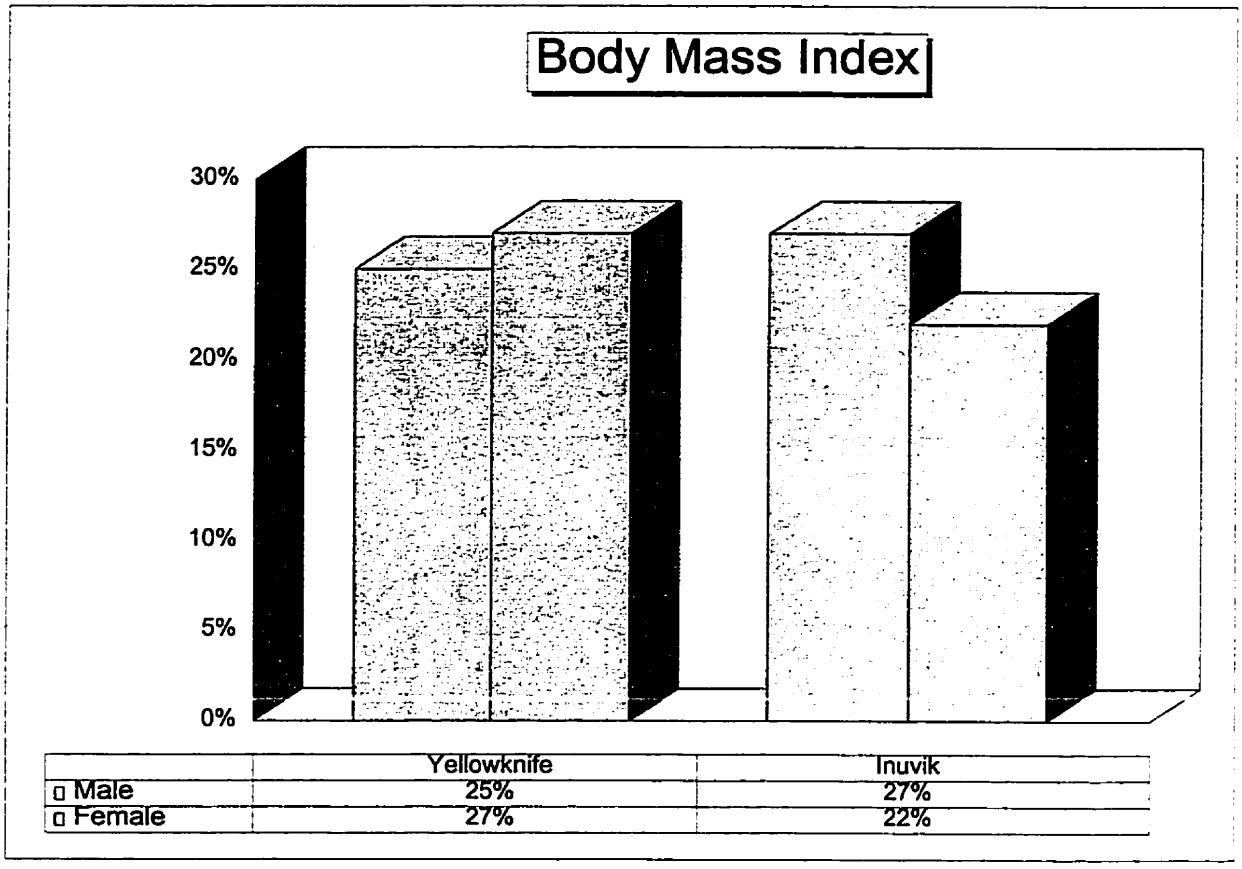
High Adherence to Canada's Food Guide (Campbell's Survey, 1988)

Figure 10



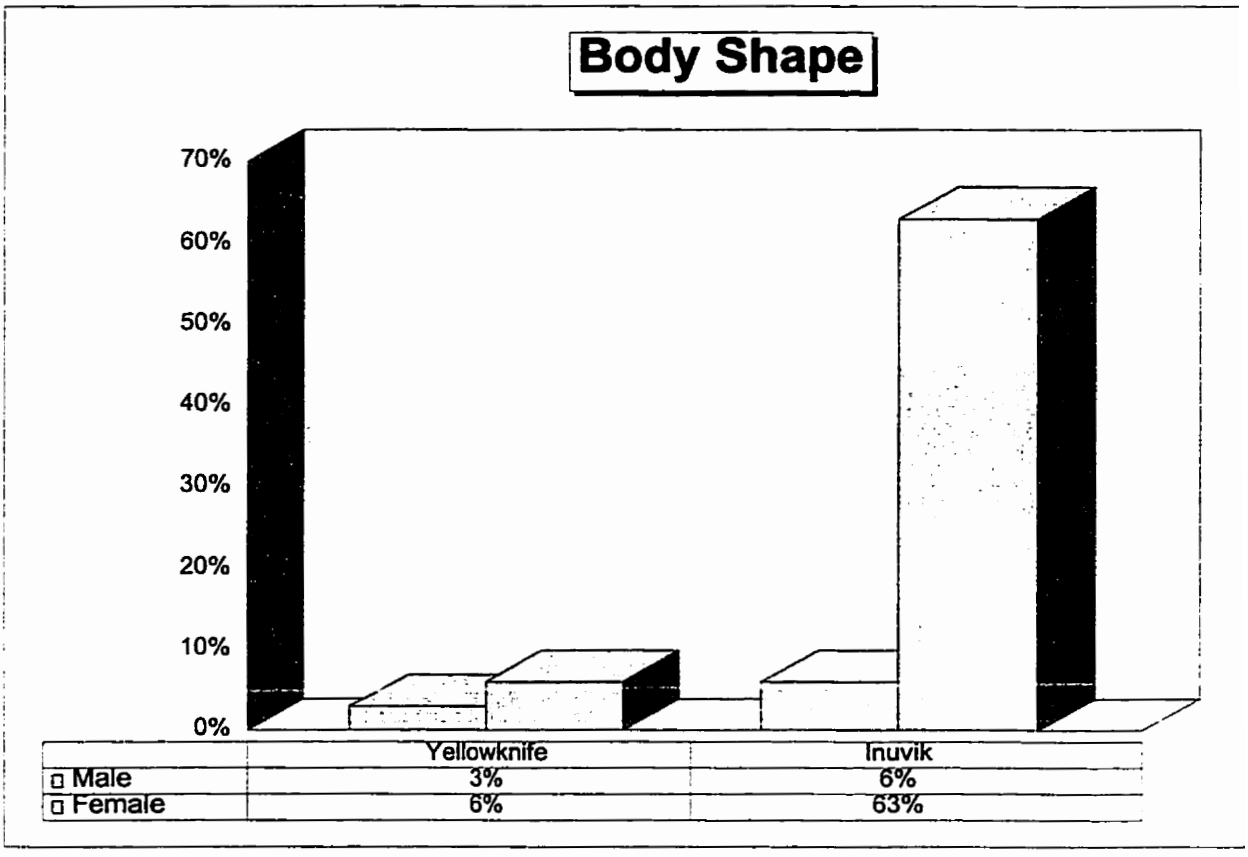
Sum of Skinfolds (SOS), Excessive (Campbell's Survey, 1988)

Figure 11



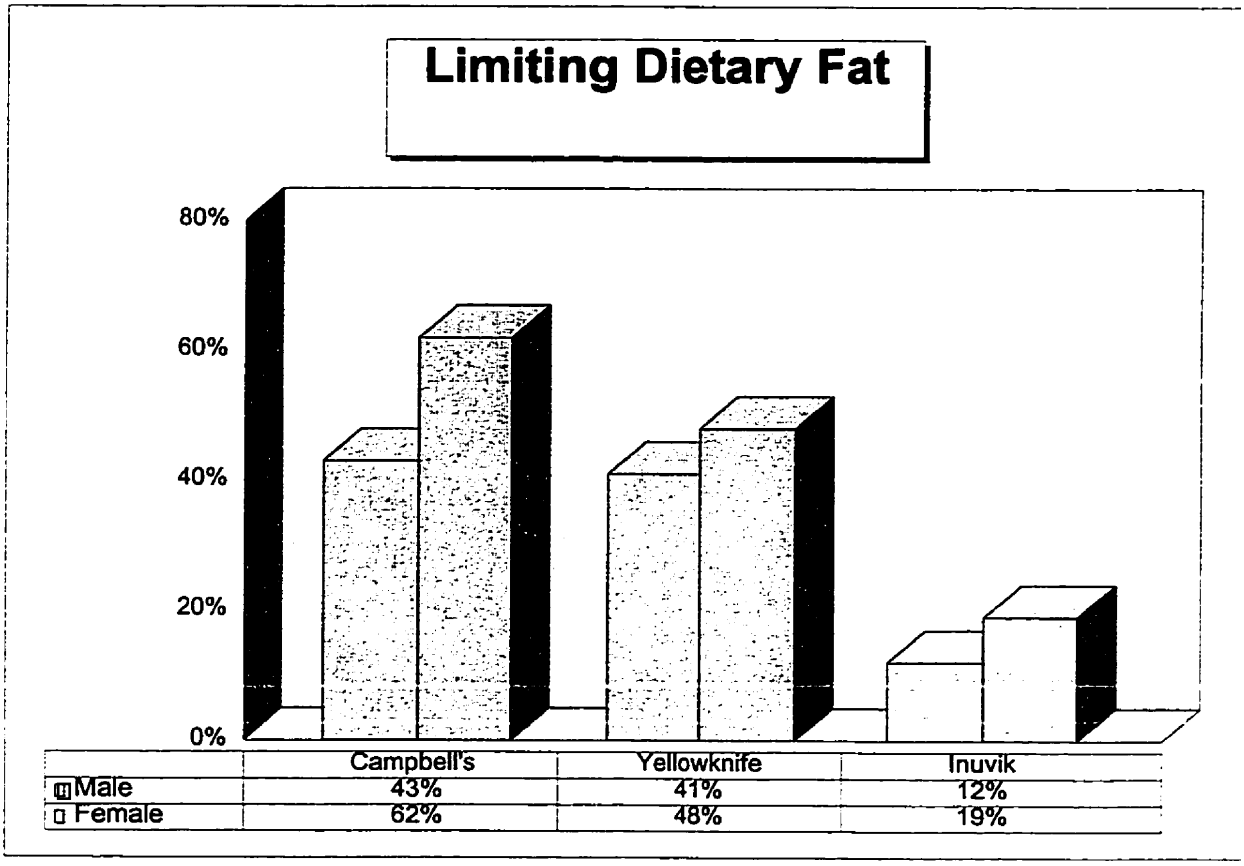
Excessive (Campbell's Survey, 1988)

Figure 12



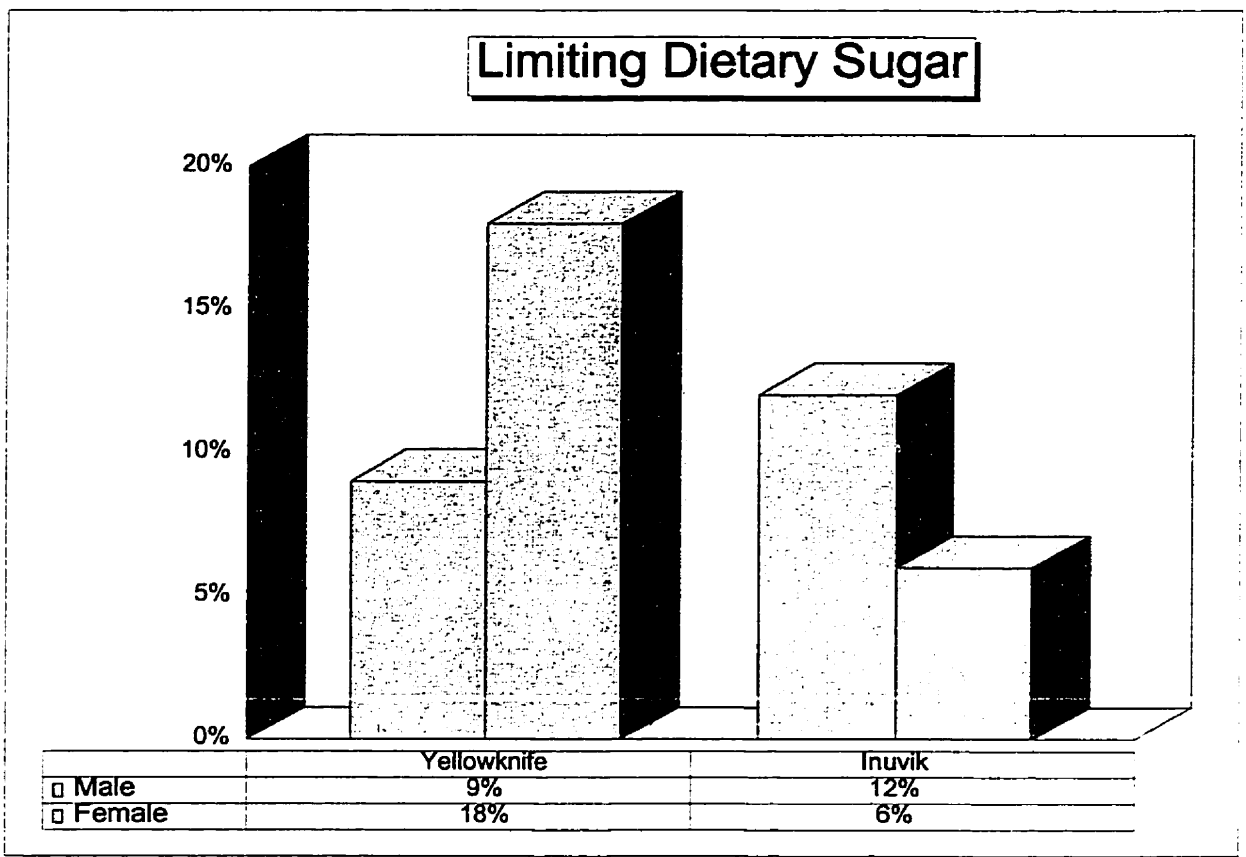
Excessive Waist/Hip Girth Ratio (Campbell's Survey, 1988)

Figure 13



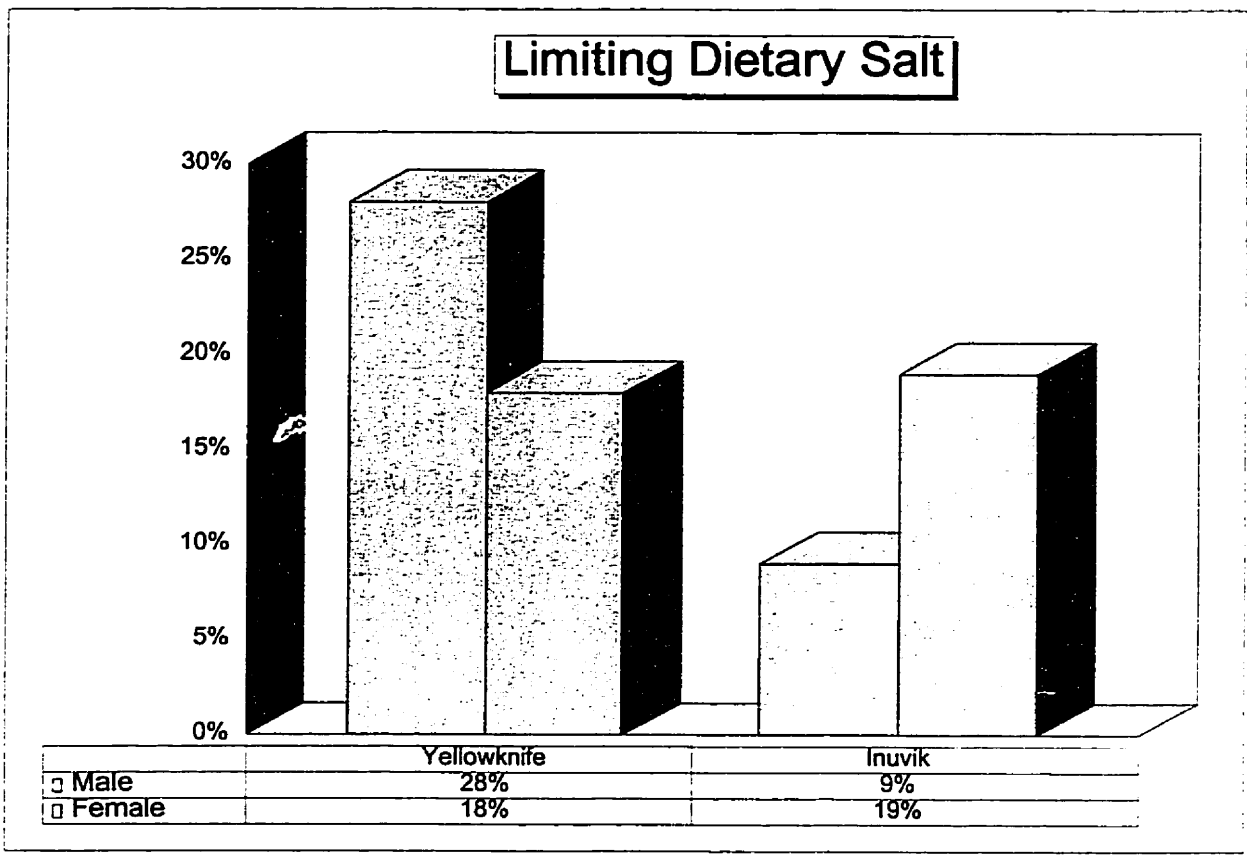
Campbell's Survey, 1988

Figure 14



Campbell's Survey, 1988

Figure 15



Campbell's Survey, 1988

APPENDIX G

GLOSSARY OF TERMS

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GLOSSARY OF TERMS

Physical fitness: In an applied sense, can be looked upon as "a set of attributes of functional capacity that are related to the ability to perform physical activity" (CSTF, 1987). These attributes are the specific components of fitness: body composition, aerobic fitness, muscular strength, flexibility, and muscular endurance.

Body Mass Index (BMI): An adiposity index (body weight) calculated by dividing body weight (kg.) by the height squared (m.) (CSTF, 1987).

Sum of Skinfolds (SOS): An adiposity index (body fat) calculated by the sum of five skinfolds measurements (triceps + biceps + subscapular + iliac crest + medial calf) (CSTF, 1987).

Sum of Trunk Skinfolds (SOTS): An adiposity index (fat distribution) calculated by the sum of two trunk skinfolds (subscapular + iliac crest) (CSTF, 1987).

Waist to Hip Ratio (WHR): An adiposity index (fat distribution) calculated by dividing the waist girth by the hip girth (CSTF, 1987).

Well-being: Refers to a feeling, a conscious perception, an awareness by the whole person that his or her components and processes are not only under control, but working together harmoniously as a unit.

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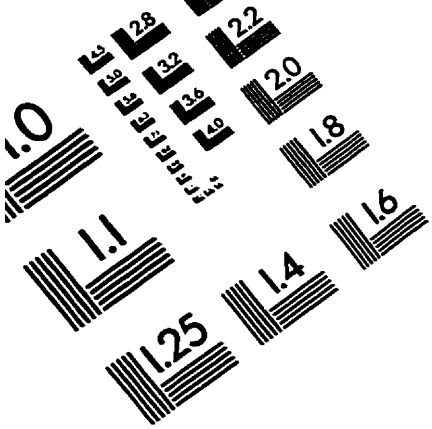

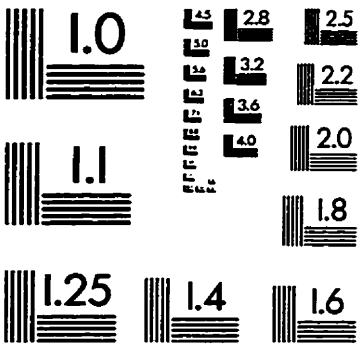

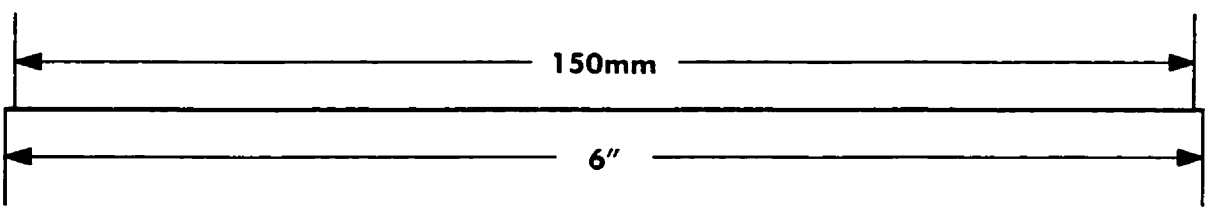

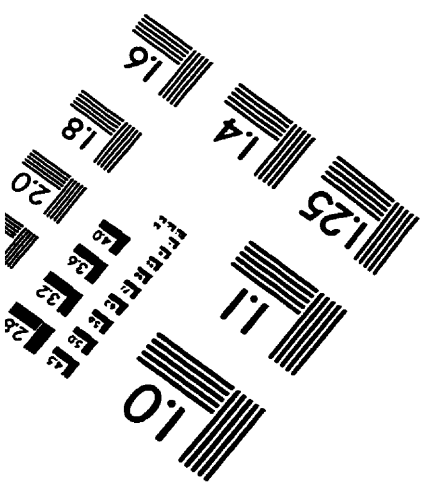

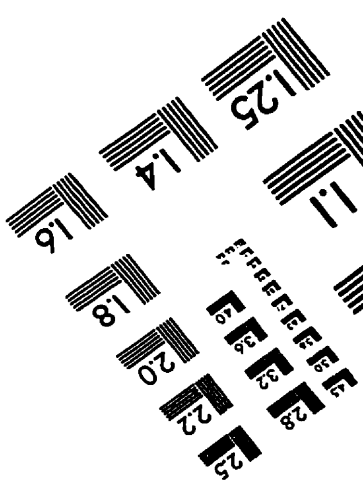

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