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EFFECTS OF THE BRITISH COLUMBIA PUBLIC HEALTH OFFICER'S HEALTH DETERMINANTS ON THE HEALTH UTILITY INDEX AND THE RICHARDSON-ZUMBO HEALTH PROFILE

by

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ABSTRACT

Richardson and Zumbo questioned the ability of any single score to measure the health status of a population, suggesting a better approach would be to use a multi-dimensional health profile instead. The purpose of this thesis was to examine what effects, if any, determinants of health, identified by the British Columbia Provincial Health Officer and a literature search, would have on the Richardson-Zumbo Health Profile and the Health Utility Index (HUI) in terms of the ability of those measures to be sensitive to underlying changes in the population's health status. Would a profile yield more useful information than a summary score?

Data came from the 1994/95 National Population Health Survey (NPHS) over-sample for the population of Prince George, B.C., consisting of 838 randomly selected individuals (436 female, 402 male).

The key health determinants included income level, educational attainment, employment status, single parenthood, tobacco use, alcohol consumption, gender and age. Indicators closely paralleling these determinants were selected from the 1994/95 NPHS. The five Richardson and Zumbo factors (physical impairment factor, mental ill-health factor, mental well-being factor, general health impairment factor, and social well-being factor) were combined into a Composite Score to create an additional dependent variable.

A bivariate analysis was done between the six non-dichotomous NPHS indicators and the seven dependent variables. Correlations and tests for significance were performed.

A multivariate analysis was then done. Beta values and the Pratt Index for those model predictors identified through stepwise regression were calculated. The multivariate analysis was re-run with the addition of the age and gender NPHS indicators. Beta values and the Pratt Index for those model predictors identified through stepwise regression were calculated.

The results of the analysis yielded no surprises. As expected, being employed, greater income adequacy, and less tobacco consumption were all associated with a higher state of health. Gender was not a significant health determinant except on the social well-being factor where there was an apparent advantage to being female.

Overall, the R^2 of the multivariate analyses were disappointingly low ranging from .017 to .212 on the five Richardson and Zumbo Factors, .097 for the Composite Score and .123 for the HUI. The gain in R^2 when age and gender were added was also minimal ranging from nil to +.058.

The net result of these regressions seems to be that there is a poor fit between the determinants of health and population health status. The HUI was hardly describing population health while the five Richardson-Zumbo scores and the Composite Score fared little better.

This analysis, once again, demonstrates the difficulty of capturing the complex interplay of the myriad of variables that form the construct of health. The challenge to future researchers is to continue to explore profiles that accurately capture the status of the population's health and that are also sensitive to underlying changes as they occur.

Although the Richardson-Zumbo Health Profile did not have strong explanatory power it was, never the less, able to yield more information than the HUI or the Composite Score.

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Dr. David Fish
(1929-2000)

Former Dean of the Faculty of Health and Human Sciences
University of Northern British Columbia

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My wife, Barbara, and two sons, Matthew and Erik, for their patience, understanding, and support over the past seven years despite the family time sacrificed to the program.

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CHAPTER 1

The Health Utility Index endeavours to capture the state of a population's health through a single, summary, numeric measure analogous to the Gross National Product's (GNP) description of the national economy. The health of a population is influenced by many factors commonly referred to as determinants of health. The British Columbia Provincial Health Officer has grouped determinants of health into five broad categories and has suggested indicators that measure those determinants. Richardson and Zumbo proposed a multi-dimensioned health profile to describe the health status of a population.

Using 1994/95 National Population Health Survey over-sample data for the population of Prince George, British Columbia, this thesis will investigate the sensitivity of the Health Utility Index and the Richardson-Zumbo Health Profile to a set of key health determinants considered important by the British Columbia Provincial Health Officer. This first chapter will examine the literature with respect to the major issues discussed in the thesis.

Health, Health Status and the Determinants of Health

In the 1940's, in Canada, data were not available that described or quantified the health status of the population. It was not until the Sickness Survey of 1950/51, conducted by the Dominion Bureau of Statistics, that statistical evidence based on a survey of 40,000 households confirmed the generally held impression that Canadians were not healthy. Self-reported levels of illness (complaint, disability, bed rest or care) were considered unacceptably high. The poorest population cohort bore twice the disability burden of the wealthiest population cohort, raising questions of whether this

was linked with the observation that the wealthy spent 2.8 times more on health expenditures than the poor (Taylor, 1987).

At the time of the 1950/51 Sickness Survey the indicator considered the most sensitive by the Dominion Bureau of Statistics was the infant mortality rate[1] (Taylor, 1987), not just as a measure of child health but also of the social well-being of society (Michalos, 1980[2]; British Columbia Provincial Health Officer, 1998). Health was largely considered the absence of disease following the biomedical disease model[3]. Indeed, in the past, infectious disease[4] was the greatest cause of illness and death thus making the linkage between health and the absence of sickness an obvious and natural one (Epp, 1986). Evans and Stoddart (1994) observe the existence of the huge healthcare (sickness care) industry is evidence of a society which equates the use of healthcare with health.

Bergner (1985) states that until the early 1960's mortality rates were the most relevant and sensitive measures of the health of a population. By the mid-1960's, however, death rates no longer seemed to be sensitive to the changes that were taking place in health and healthcare. The emphasis had, instead, started to shift to measures of morbidity and quality of life to assess health status (Bergner, 1987).

A significant departure from the biomedical disease model came in 1974 with the publication of "A New Perspective on the Health of Canadians" by the Hon. Marc

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[1] In 1901 there were 134 deaths for every 1000 population under the age of one compared with 5.5 deaths/1000 in 1997 (Statistics Canada, 2000). Japan's rate in 1996 was 3.8 deaths/1000 (Federal, Provincial and Territorial Committee on Population Health, 1999).

[2] The infant mortality rate "reflects trends in general mortality, public health, sanitation, housing, and of economic development, as well as practices of infant feeding and care because infants more than any other group depend so completely on environmental conditions and the attention of others for their survival" (p. 131).

[3] Cause (etiology) is followed by lesion (pathology) which is followed by symptom (outcome) (Taylor, 1987).

[4] Nikiforuk (1991) offers a fascinating historical overview of epidemics and plagues.

Lalonde, the then federal Minister of Health. The Lalonde Report, as it is now known, took a broader view of health than just the diagnosis, treatment and cure of disease. Lalonde (1974) put forward the Health Field Concept. It divided health into four areas for analysis and evaluation: human biology, environment, life-style, and healthcare organization. Using the Health Field Concept "any health problem [could] be traced to one, or a combination of the four elements[5]" (p. 33). The Lalonde Report in Canada was followed by similar reports in other countries (Taylor, 1987; Evans and Stoddart, 1994). The common theme among these reports was the idea that health could be improved without continued massive cash infusions into the traditional healthcare system (Marmor, Barer and Evans, 1994)[6]. The Lalonde Report is widely recognized as having had an important effect on the way health is viewed, both in Canada and internationally, by focusing on the health status of the population rather than the healthcare system alone[7] (Taylor, 1987; Evans and Stoddart, 1994; Sutherland and Fulton, 1994; Federal, Provincial and Territorial Committee on Population Health, 1994; Health Canada, 1996, 1998; Institute of Health Promotion Research, University of British Columbia, 1999).

The World Health Organization proposed a similar multidimensional approach to health in 1977 and unanimously adopted its "Health For All by the Year 2000" strategy in 1981[8], recognizing that health does not exist in isolation but is influenced by

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[5] An example is given by Lalonde (1974) whereby lifestyle, environment and healthcare organization were said to contribute to traffic deaths in the proportions of something like 75%, 20% and 5% respectively (p. 33).

[6] Poland, Coburn, Robertson and Eakin (1998) express a concern that the notion of additional healthcare expenditures producing modest improvements in health status, as compared to efforts made in other health determinant areas "provides convenient cover for those who wish to dismantle the welfare state in the name of deficit reduction" (p. 786).

[7] Critics point out, however, that the report was misinterpreted by many resulting in government adopting a narrow lifestyle focus (e.g., Participaction) while largely ignoring other determinants of health (Poland et al., 1998).

[8] The "Health For All by the Year 2000" strategy was adopted by the World Health Assembly and endorsed by the United Nations General Assembly that same year.

environmental, social and economic influences which interact with each other in a complex fashion (World Health Organization, 1981; Taylor, 1987; World Health Organization, Health for All Web-Site).

Health is defined in the preamble to the constitution of the World Health Organization as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (Siddiqui, 1995, p. 226). Originally adopted in 1948, the World Health Organization definition continues to be widely accepted by most healthcare planners, authorities and policy makers (e.g., British Columbia Provincial Health Officer, 1994), and is cited in most of the literature when health is defined. This definition of health was reaffirmed by the World Health Organization in 1978 at Alma Ata and again in its "Global Strategy for Health for All by the Year 2000" (Koivusalo and Ollila, 1997; World Health Organization, 1998). The definition is also posted prominently on the World Health Organization web-site. Beigbeder (1998) points out the World Health Organization constitution raises the "enjoyment of the highest attainable standard of health ... to the level of one of the fundamental human rights" and that since "the health of all peoples is fundamental to the attainment of peace, global health is therefore one of the requirements for world peace" (p. 13).

Hansluwka (1985) reviews the international debate over the World Health Organization definition of health and whether the definition can ever be achieved or does it, rather, serve as a lofty ideal to be striven for but never actualized. Difficulties in defining health arise out of the "vagueness of the concept, the value judgment of the definer, the multidimensionality of the phenomenon and the impossibility of meaningful operationalization" (p. 1208). As The Institute of Health Promotion Research, University

of British Columbia (1999) claims, such definitions seem to classify all human activity as being health-related. Evans and Stoddart (1994) comment that such definitions are, "honoured in repetition, but rarely in application" (p. 28). Bergner (1985) notes that many definitions of health abound but most are variants of the World Health Organization declaration.

Population health is defined by the Federal, Provincial and Territorial Committee on Population Health (1999) as follows:

> Population health refers to the health of a population as measured by health status indicators and as influenced by social, economic and physical environments, personal health practices, individual capacity and coping skills, human biology, early childhood development, and health services. As an approach, population health focuses on the interrelated conditions and factors that influence the health of populations over the life course, identifies systematic variations in their patterns of occurrence, and applies the resulting knowledge to develop and implement policies and actions to improve the health and well-being of those populations. The goal of a population health approach is to maintain and improve the health status of the entire population and to reduce inequities in health status between groups. This requires a thorough, ongoing examination of both health status and the factors that determine or influence health. (pp. 7-8)

The Institute of Health Promotion Research, University of British Columbia (1999) cites the above quoted definition and adds that population health research deals with whole communities or populations and not just individuals or risk groups; looks to greater intersectoral action beyond the health field; seeks to make populations less

dependent on health services and professionals; and looks to the social world for determinants of health. Identifying determinants of health, as opposed to the determinants of illness and disease, is referred to by Catlin and Will (1992) as identifying the risk factors for chronic good health.

In 1986 the then Federal Minister of National Health and Welfare, Jake Epp, released the document "Achieving Health For All: A Framework For Health Promotion" at the annual conference of the Canadian Public Health Association. Building on the Lalonde Report, the Epp Report also recognized the multidimensionality of health with an emphasis on reducing inequities, increasing prevention efforts, and enhancing people's capacity to cope (e.g., chronic conditions, disabilities, and mental health problems). Improvements in health would be achieved through a health promotion framework consisting of three mechanisms: self-care, mutual aid, and healthy environments. Specific implementation strategies were: fostering public participation, strengthening community health services, and coordinating healthy public policy. This framework was not designed to replace the existing healthcare system but to work with it, suggesting the potential of slowing the growth in healthcare costs.

Each year the British Columbia Provincial Health Officer issues an annual report that has a central theme or focus for the year included along with the standard tables and statistics reported each year. The 1994 Annual Report concentrated on the determinants of health. The report promoted the view that the health of a population is influenced by more factors than the healthcare system alone. It grouped the determinants of health into five broad categories: social and economic environment, the physical environment, health services, biological influences, and health behaviours and skills. Within each of the five

determinants of health categories the Provincial Health Officer listed several health indicators used to measure the state of the category. These are displayed in Table 1.

Table 1. Determinant of Health Categories and Indicators

Determinant of Health	**Indicator**
Social and Economic Environment	Infant mortality rate Income disparity ratio Income adequacy Poverty rate Low-income rate Income assistance rate Single-parent family rate Unemployment rate Highest level of education attained Child care Percent of income spent on housing
Physical Environment	Air pollution levels Ultra-violet radiation levels
Biological Influences	Birth defect rates Immunization rates Alcohol use during pregnancy
Health Behaviours and Skills	Tobacco use Alcohol consumption Cholesterol level Hypertension Diet Obesity Inactivity Stress Illicit drug use Accident rate Standardized mortality ratio
Health Services	Health spending Cancer screening rates Hospital utilization rates

(British Columbia Provincial Health Officer, 1994)

There is no unanimous agreement on what the determinants of health are or their relative ranking, but those enumerated by the British Columbia Provincial Health Officer are consistent with the literature as being central to health. There is, however, growing emphasis on self-esteem, social support networks, quality of life issues, early child

development, and the role of gender and culture (Mustard and Frank, 1994; Sutherland and Fulton, 1994; Evans and Stoddart, 1994 (see Figure 1); Decter, 1994; Federal, Provincial and Territorial Committee on Population Health, 1994, 1999; Frank, 1995; Health Canada, 1996[9]; Institute of Health Promotion Research, University of British Columbia, 1999; Denton and Walters, 1999; Edwards, 2000).

There can also be many individual health indicators that contribute to a given health determinant. The indicators also interact with one another, just as the determinants are not isolated from one another. The complexity of the multiple interactions of the indicators and the determinants combined with an illusive definition of health makes the quantification of health status so very difficult. One of the recommendations out of the 1994 British Columbia Provincial Health Officer's Annual Report was "to continue efforts to develop and collect the best possible indicators to measure the health of the population" (British Columbia Provincial Health Officer, 1994, p. 71).

Sutherland and Fulton (1994) make an interesting observation with respect to individual versus population health. Healthcare spending and services directed at the individual are easy to measure and evaluate as opposed to policies put in place to help a population. A physician can deal with an individual by using the medical model of diagnosis, treatment and cure. For a population, however, many of the contributors to health are outside the health domain, e.g., sewers, divided highways, adequate street lighting, etc., and are often harder to recognize as contributors to health even though the

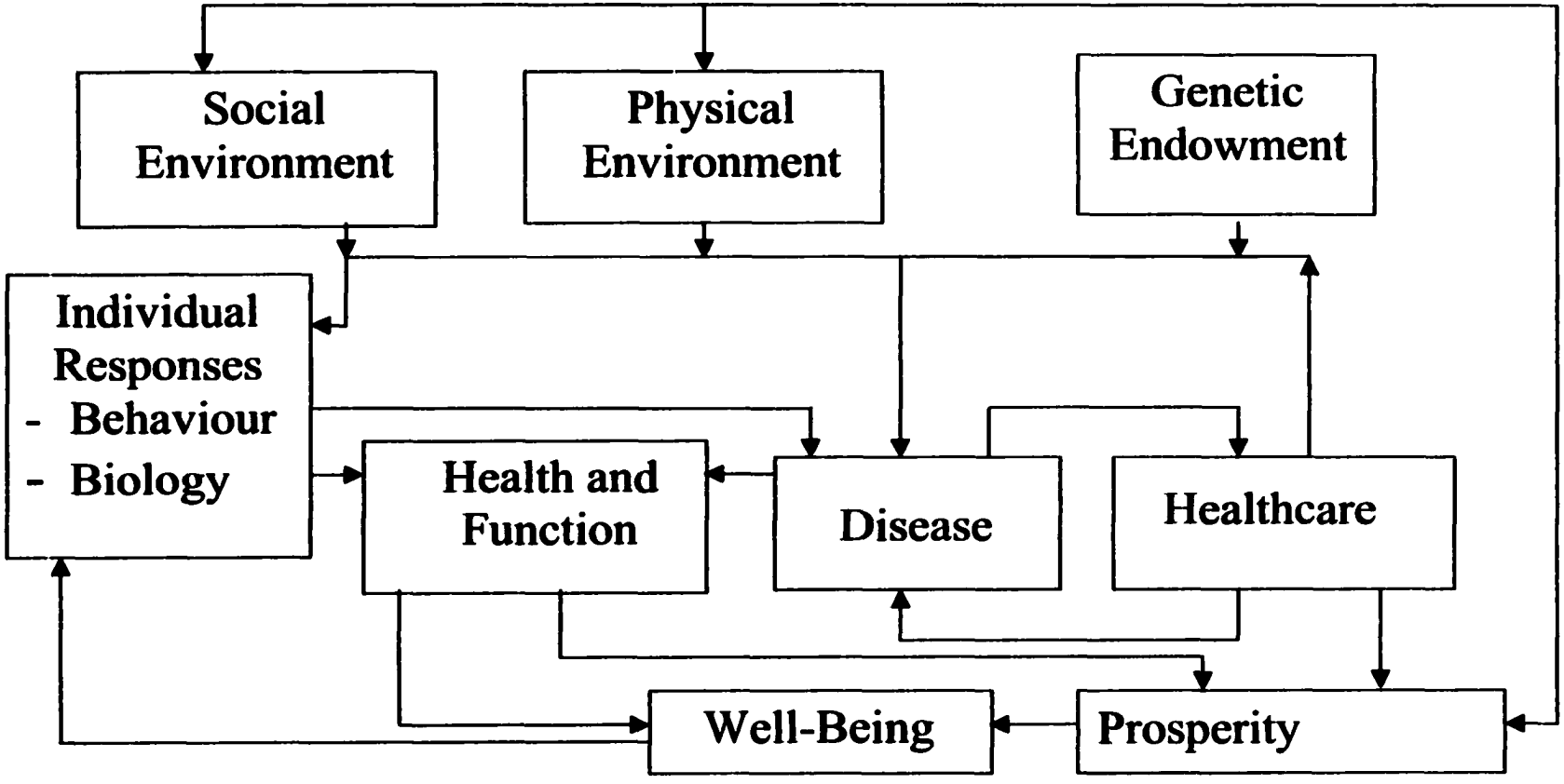
[9] Health Canada (1996) had a view of the health determinant categories similar to that of the British Columbia Provincial Health Officer. The following list was used as a starting point for future population health policy and research directions: income and social status, social support networks, education, employment, working conditions, social environments, physical environments, biology and genetic endowment, personal health and coping skills, health services, and three new areas: healthy child development, gender, and culture.

impact per dollar spent may be greater than service delivered at the level of the individual.

Perhaps as a result of the difficulties in understanding population health versus individual health the 1994 British Columbia Provincial Health Officer's Annual Report also recommended the development of "information and educational materials to increase public understanding about the determinants of health; build understanding about the determinants of health and support for the population health approach among government partners in sectors outside health" (p. 71). In 1995, the year after the Provincial Health Officer's report on the determinants of health, the British Columbia Ministry of Health directed Health Authorities to consider the determinants of health in the preparation of their health and management plans (British Columbia Ministry of Health, 1995).[10]

[10] As a specific example to Health Authorities the British Columbia Ministry of Health in its "Guide to Health and Management Planning for Regions and Communities" suggested the socioeconomic determinants of health contribute 50% towards the health status of a community (e.g., income, employment, working conditions, education, housing, distribution of income and social support); illness treatment 25%, genetics 15%, and the physical environment 10% (British Columbia Ministry of Health, 1995).

Figure 1. Population Health Determinants Flow Diagram



(Evans and Stoddart, 1994, p. 53) based on work done by the Canadian Institute for Advanced Research. Note how healthcare is primarily shown as a response to disease (Frank, 1995). Poland et al. (1998) agree with those who contend the box labeled prosperity would be more properly called equity to get at the concept of income distribution as opposed to absolute levels of income.

Specific Determinants

This thesis will be focusing on specific health status determinants from the 1994 British Columbia Provincial Health Officer's Annual Report. Table 2 indicates the determinants that will be examined further and to which broader determinant of health category they correspond.

Table 2. Health Determinant and Health Determinant Category

Health Determinant	**Health Determinant Category**
Income Level	Social and Economic Environment
Educational Attainment	Social and Economic Environment
Employment Status	Social and Economic Environment
Single Parenthood	Social and Economic Environment
Tobacco Use	Health Behaviour
Alcohol Consumption	Health Behaviour
Gender	Not specifically linked with an individual health determinant but interacts with the other determinants

a) Income Level

The literature shows a definite linkage between income and health. Overall mortality and most forms of morbidity follow a gradient worldwide across socioeconomic classes such that lower income and lower social status is associated with poorer health (Mustard and Frank, 1994; Evans and Stoddart, 1994; Denton and Walters, 1999). Canadians with low incomes are more likely to suffer illnesses and die earlier than Canadians with high incomes[11] (Epp, 1986; British Columbia Provincial Health Officer, 1994; Federal, Provincial and Territorial Committee on Population Health, 1999). In

general, wealthier populations and countries are healthier than poorer ones (Sutherland and Fulton, 1994) and virtually no examples of any society, past or present, are evident where overall health status is inversely related to wealth, income or social class (Hertzman, Frank and Evans, 1994). Denton and Walters (1999) state, "poor health is not simply concentrated among those who are most deprived. Health status declines with each decline in socioeconomic status" (p. 1222).

The British Columbia Provincial Health Officer (1994) went so far as to state that income level and social status seem to be the most important determinants of health. The Federal, Provincial and Territorial Committee on Population Health (1999) did not go quite so far, acknowledging that there is no consensus on which is the best measure of socioeconomic status, noting that some researchers prefer to use education level or occupation. In their report, however, income was used as a proxy for socioeconomic status in most cases.

Many possible explanations are given for the link between higher income levels and increased health. For example, higher incomes allow people to purchase adequate housing[12], food, and other basic needs. Meeting or exceeding basic needs allows for greater security, more control over decision making, and improved supportive social networks which may in turn lead to a more nurturing environment for children, success in school, and so on (British Columbia Provincial Health Officer, 1994). This is not a case of people being unable to work because of illness and thus unable to earn higher incomes, but, rather, that low economic status leads to exposure to unhealthy life conditions and

[11] "Canadian men in the highest quarter of income distribution can expect to live 6.3 years longer and 14.3 more years free of disability than those in the lowest quartile. For women, the differences are 3.0 and 7.6 years respectively" (Federal, Provincial and Territorial Committee on Population Health, 1999, p. 26).

thus poorer health and earlier death (Federal, Provincial and Territorial Committee on Population Health, 1999).

It is noted that "people with very low incomes are more likely to smoke, drink alcohol to overcome stress, take sleeping pills, are less likely to have regular pap smears or to know the causes of heart disease" (British Columbia Provincial Health Officer, 1994, p. 43) and are more likely to go to hospital (Statistics Canada, 2000).

Privilege and increased self-image (Sutherland and Fulton, 1994) accompany higher incomes and social status. The Whitehall study of civil service employees in Britain found that health generally increased with job rank, causing the researchers to conclude that "something related to higher income, social position and hierarchy provides a buffer or defense against disease, or that something about lower income and status undermines defenses" (Federal, Provincial and Territorial Committee on Population Health, 1994, p. 14).

Not only is the level of income significant but it appears to be of even greater importance how equitably wealth is distributed amongst a population, that is, the gap between the rich and the poor (Mustard and Frank, 1994; Decter, 1994[13]; Hertzman, Frank and Evans, 1994[14]; Frank, 1995; British Columbia Provincial Health Officer, 1997; Judge, Mulligan and Benzeval, 1998[15]; Poland et al., 1998; Federal, Provincial and

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[12] Most low-income people are renters, while those in higher income brackets are home owners (British Columbia Provincial Health Officer, 1997).

[13] The poorest 20% of the population would gain 13 additional disability free years if their socioeconomic status was the same as the top 40% of income earners.

[14] Japan, which has the highest life expectancy in the world, has the smallest relative difference between the average incomes of the richest and poorest 20% of the population of any OECD country. Some, however, point to the economic success of Japan as the reason for the rise in life expectancy, once again highlighting the difficulty in disentangling the intertwining factors which contribute to health status (Frank, 1995).

[15] Their paper reviews twelve studies (some of which were also reviews of multiple studies) the primary focus of which was the relationship between measures of income inequality and average levels of population health. All but two studies found evidence of an association. Even so, Judge, Mulligan and Benzeval (1998) are not convinced that a definite association exists citing flawed study design, choice of

Territorial Committee on Population Health, 1999). The greater the disparities between rich and poor, the greater the health consequences. This linkage seems to be constant over time and as the diseases that are responsible for mortality change. One disease merely replaces another and the social gradient remains intact (Frank, 1995).

The Gini Index is a measure of income inequality. The larger the Gini coefficient, the greater the inequality in income distribution in a range between 0, representing equal income for everyone, and 1, representing complete concentration in a single person (Michalos, 1982). According to the Federal, Provincial and Territorial Committee on Population Health (1999), the Gini Coefficient for the income distribution (after taxes) of families in Canada fell from 0.316 in 1970 to 0.300 in 1995.

In an interesting and controversial study done by Ross, Wolfson, Dunn, Berthelot, Kaplan and Lynch (2000) a review of fourteen articles supports the association between income distribution and health status. They specifically compared the relation between mortality and income inequality using census and vital statistics data of 53 Canadian cities in ten provinces and, 282 American cities in 50 states. In the United States there was greater mortality in those areas of greater unequal income distribution while in Canada no such similar association was found. The authors theorize that there may not be an automatic association between income inequality and mortality in jurisdictions, such as Canada, were social policy, such as public funding and universal access, replaces ability to pay. Statistics Canada (2000) notes that the findings of this study run counter to research to date in the United States and internationally. The distribution and

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income measures and questionable data manipulation. The authors do not discount the existence of a possible association and so produced their own study with a view of not replicating the errors of their predecessors. The study's results caused the authors to conclude that income inequality is not a significant

concentration of wealth, two concepts closely linked to income but different from each other, was recommended by the Federal, Provincial and Territorial Committee on Population Health (1999) as an area of further research.

Self-rated health status has been shown to be a reliable predictor of health problems, healthcare utilization, and longevity. There also exists a gradient in self-rated health strongly linked to income. Canadians from the lowest income households were four times more likely to report fair or poor health than those who lived in the highest income households (Federal, Provincial and Territorial Committee on Population Health, 1999). Segovia, Bartlett and Edwards (1989) concluded that self-rated health status is a good summary indicator of health status.

In Canada there continue to be income-related disparities in both infant mortality[16] and low birthweight, and a strong relationship between perceived health status and socioeconomic status (Statistics Canada, 2000). Sutherland and Fulton (1994) and Mustard and Frank (1994) write that equal access to healthcare does not improve health, citing the fifty years of experience with the National Health Service in Great Britain which, although it provides even more comprehensive coverage than Canada's plan, has seen a widening in the health status gap between the rich and the poor. Health Canada (1996) acknowledges universal access to health services in Canada has also not managed to eliminate or even reduce health disparities.

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but only modest determinant of population health in rich industrialized countries for which good income distribution data are available.

[16] According to Statistics Canada (2000) income-related differences in infant mortality in 1996 were nearly three times as large as regional differences.

b) Educational Attainment

Higher levels of educational attainment relate directly to greater health in terms of higher self-rated health status, greater positive health behaviours, decreased activity limitation, increased opportunities for income and job security, and generally a greater sense of well-being (British Columbia Provincial Health Officer, 1994; Health Canada, 1996; Federal, Provincial and Territorial Committee on Population Health, 1999). People with less than a secondary school education are more likely to go to hospital than people with higher levels of educational attainment (Statistics Canada, 2000).

Having less than a grade nine education is considered a proxy measure for illiteracy and limited education (British Columbia Provincial Health Officer, 1994). In the 1996/97 National Population Health Survey, only 19% of respondents with less than a high school education rated their health as "excellent" compared with 30% of university graduates. People with low literacy skills often feel alienated, have difficulty finding and accessing health information and services, and have reduced employment opportunities. As a result, they suffer poorer health than those who have higher literacy skills. Among Canadians with the lowest levels of prose literacy, 47% lived in low-income households, compared with 8% of Canadians with the highest levels of prose literacy (Breen, 1998; Federal, Provincial and Territorial Committee on Population Health, 1999).

Generally, income levels rise with greater educational attainment. People with limited educational attainment have higher unemployment rates and lower employment participation rates than those with higher levels of education. University graduates in Canada experienced one-third the unemployment of people with less than a high school education, and had over three times the level of employment participation rate (Federal,

Provincial and Territorial Committee on Population Health, 1999). Chappell (1998) writes, "education is emerging as a key tool for grassroots empowerment, as individuals must have the capacity to seek and acquire information, and they must possess the analytic skills to ferret through that information in order to make informed choices" (p. 90).

Educational attainment is linked to employment, which is linked to income level; all three are important determinants of health. It is difficult to disassociate one health determinant from another.

c) Employment Status

Mustard and Frank (1994) and Avison (1998) report on studies done in the United States, Denmark, and by the World Health Organization that all conclude mortality (including suicide and death by accidents), and morbidity (mental and physical ill-health), increase with unemployment. Specifically, unemployed persons exhibit greater psychological distress, anxiety, depressive symptoms, panic, substance abuse, disability days, health problems, and hospitalizations than those who are employed.

Employment provides not only money, but also a sense of identity and purpose, social contacts and opportunities for personal growth. When unemployed, the effects on health go beyond the person who is unemployed but also extend to the family unit and the community in general. Those negative impacts are not immediately reversed upon reemployment (Hunt, McEwen and McKenna, 1986; Mustard and Frank, 1994; Sutherland and Fulton, 1994; British Columbia Provincial Health Officer, 1994[17], 1997;

[17] The British Columbia Provincial Health Officer (1994) also comments that the northern regions of the province generally have the highest unemployment rates in British Columbia.

Health Canada, 1996[18]; Avison, 1998; Denton and Walters, 1999[19]; Federal, Provincial and Territorial Committee on Population Health, 1999).

d) Single Parenthood

The proportion of families headed by lone (single) parents is considered an indicator of socioeconomic conditions. "The living conditions of single-parent families have been associated with a number of problems, including poor housing conditions, behavioral problems in children, overload of parental responsibilities[20], loneliness, dissatisfaction with social situation[21], and health problems" (British Columbia Provincial Health Officer, 1994, p. 28).

In 1995, almost 50% of single-parent mother-led families were in low-income situations (Federal, Provincial and Territorial Committee on Population Health, 1999). Statistics Canada calculates poverty or straitened circumstances, also called the low-income cutoff, as being when a family spends more than 56% of its income on food, shelter, and clothing. In 1991, and again in 1996, almost one child in five under six years of age lived below the low-income cutoff (British Columbia Provincial Health Officer, 1994, 1998), 43% of whom lived in female lone-parent families (British Columbia Provincial Health Officer, 1994); 59% lived in lone-parent families headed by either gender (British Columbia Provincial Health Officer, 1998).

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[18] Health Canada (1996) grouped underemployment and stressful work in the same category as unemployment.

[19] The literature explores more than the employed / unemployed dichotomy also examining degree of job security, full-time versus part-time employment, type of shifts worked, decision making latitude, psychological demands.

[20] Denton and Walters (1999) comment on the stress arising from women's unpaid work in the home especially when coupled with participation in the paid workforce.

[21] Denton and Walters (1999) refer to the association between health and social support today being as compelling as the association was between health and tobacco use in the 1960's.

e) Tobacco Use

According to the British Columbia Provincial Health Officer (1994) smoking is the leading preventable cause of death in the province, accounting for one-fifth of all deaths in the province. As a cause of early death, smoking far outweighs suicide, motor vehicle crashes, AIDS and murder combined (Federal, Provincial and Territorial Committee on Population Health, 1999).

Smoking is a known risk factor for heart disease, stroke, cancer, chronic obstructive pulmonary disease, diabetes, and birth defects (Federal, Provincial and Territorial Committee on Population Health, 1994). Smoking among women is linked to lower fertility, cancer of the cervix, osteoporosis, and menstrual and menopausal problems; exposure to second-hand smoke is linked to breast cancer (Health Canada Web-Site, Women's Health Bureau, 2000). Denton and Walters (1999) cite the argument that the most disadvantaged women smoke due to the tensions in their lives caused by their disadvantaged state. Smoking is a means by which they cope with their day to day stress.

People with very low incomes are more likely to smoke (British Columbia Provincial Health Officer, 1994) and smokers are more likely to be hospitalized than non-smokers (Statistics Canada, 2000). Overall, men are still more likely than women to smoke and to smoke heavily (Federal, Provincial and Territorial Committee on Population Health, 1999).

Evans and Stoddart (1994) issue a warning, however, to be aware of so-called lifestyle determinants of health. The implication that tobacco use is an individual choice may lead to victim blaming and obscure the observation that the use of tobacco is a

strongly socially conditioned practice. Smoking was once a sign of status, an activity engaged in by the rich and famous, whereas there is now a strong negative correlation contributing to the social gradient now observed with respect to mortality and income level. Marmor, Barer and Evans (1994) also remind us that individual choice when applied "to the consumption of a toxic substance that is also addictive, and to which people typically become addicted during early adolescence" (p. 223) is particularly inappropriate.

f) Alcohol Consumption

Excessive alcohol consumption can lead to a range of health and social problems. Drinking alcohol during pregnancy has been linked to lower birth weights and other negative outcomes (Federal, Provincial and Territorial Committee on Population Health, 1994).

Alcohol consumption increases with income; people in higher income brackets tend to be heavier drinkers. Lower income earners are less likely than upper income earners to consume any alcohol at all. However, among lower income earners who do drink alcohol, their rate of heavy drinking tended to slightly exceed that of higher income earners (Federal, Provincial and Territorial Committee on Population Health, 1999). The British Columbia Health Officer (1994) states that people with very low incomes are more likely to drink to overcome stress.

g) Gender[22]

The most basic health indicator difference between men and women is life expectancy. According to the Federal, Provincial and Territorial Committee on Population Health (1999) a male Canadian child born in 1996 could expect to live to age 75.7 years; 81.4 years for a female child. Men are far more likely than women to die before age 70, mainly because of gender differences in deaths due to heart disease, cancer, suicide and unintentional injuries. Rates of potential years of life lost are almost twice as high for men than women. Suicide rates among young men are high in Canada, compared to other countries. Boys and young men tend to experience more unintentional injuries and more severe injuries than girls and young women. Although living longer, women are more likely to suffer from long-term activity limitations and chronic conditions such as osteoporosis, arthritis and migraine headaches. Young women are particularly likely to feel depressed.

The British Columbia Health Officer's Annual Report for 1995 (1996) included a special report on women's health. Specific observations included:

- Women are poorer than men. Women earn 70% of what men earn (true worldwide not just in British Columbia). Women earn less than men in all occupational categories. Women's earnings are lower than men's whatever their educational qualifications.
- Lone-parent families headed by women have the lowest incomes of all family types.

[22] Health Canada (1996) defines gender as "a social construct rooted more in human culture than biological differences between the sexes. Gender refers to the array of society-determined roles, personality traits, attitudes, behaviours, values, relative power and influence that society ascribes to the two sexes on a differential basis" (Appendix D).

- More than one woman in five aged 65 years and older is living below the low-income cut-off.
- Women who work outside the home continue to carry primary responsibilities for household duties.
- Most unpaid informal caregivers (73%) are women.

Despite these negative statistics, the health status of women, as measured by the indicators of life expectancy, is substantially better than that of men. This is referred to as the women's health paradox (British Columbia Provincial Health Officer, 1996). It may be partially explained by the fact that women tend to smoke and drink less, are less likely to be employed in risky occupations, and are protected from heart disease by naturally occurring estrogens. It is suspected that women benefit from better social support networks, better communication skills, a greater willingness to seek assistance, and a greater aptitude for caregiving (British Columbia Health Officer, 1996).

National Population Heaith Survey

Based on a recommendation from the National Health Information Council in 1991, the National Population Health Survey was conducted in four data gathering periods between June 1994 and March 1995. The survey was conducted by telephone and obtained data from 26,430 households in every province and territory[23] with a final response rate of 88%. The survey was to be conducted every two years over the course of two decades in order to obtain longitudinal data. Eight Hundred Fifty households in Prince George were part of the 1994/95 survey. This was a one-time inclusion with no longitudinal follow-up planned (Statistics Canada, 1995; Tambay and Catlin, 1995).

The stated objectives of the National Population Health Survey were to:

- aid in the development of public policy by providing measures of the level, trend and distribution of the health status of the population;
- provide data for analytic studies that will assist in understanding the determinants of health;
- collect data on the economic, social, demographic, occupational and environmental correlates of health;
- increase the understanding of the relationship between health status and healthcare utilization, including alternative as well as traditional services;
- provide information on a panel of people who will be followed over time to reflect the dynamic process of health and illness;
- provide the provinces and territories and other clients with a health survey capacity that will permit supplementation of content or sample;

[23] The NPHS target population excluded persons living on Indian reserves, on Canadian Forces Bases and in some remote areas (Tambay and Catlin, 1995).

- allow the possibility of linking survey data to routinely collected administrative data such as vital statistics, environmental measures, community variables, and health services utilization.

(Statistics Canada, 1995, p. 6)

Survey content was selected according to the following criteria:

1) Information should relate to, and help monitor, the health goals and objectives of the provinces and territories. Where health goals have not been established, for example, at the national level, policy and programs could be considered in the selection of survey content.

2) The information should not duplicate data available from other sources.

3) With a view to increasing the understanding of health and its determinants, information collected should provide new knowledge in areas that have not been adequately studied.

4) The survey should focus on behaviours or conditions amenable to prevention, treatment, or intervention.

5) The survey should collect information about conditions that impose the greatest burden, in terms of suffering or cost, on affected individuals, the general population, or the healthcare system.

6) The survey should collect information on factors related to good health, not just those related to illness.

(Statistics Canada, 1995, p. 7)

Wolfson (1994) sees population health surveys such as the National Population Health Survey as an important beginning towards gathering self-reported data on the

health-related problems of the individual and how those problems might relate to socioeconomic or cultural variations. Such new information and knowledge will be made even more powerful if it can be linked back to the existing traditional databases which contain vast detail on the individuals' utilization of the healthcare system.

Health Utility Index

The literature of the mid-1980's (Hansluwka, 1985; Bergner, 1985) commented that there was a shift away from individual health indicators towards the creation of health profiles and of single aggregated indices for the measurement of health status. Such profiles and indices would be useful for the comparison of groups across time. In order for them to be meaningful, however, the critical components of health would need to be identified and included, which assumes that health can be measured on a single continuum. Bergner (1985) calls this the single-continuum dilemma. Hansluwka (1985) was more pessimistic about the success of such an approach, stating that while specific views differ, the majority are inclined to agree that it is not possible to construct a single index of health capable of "summarizing the various aspects of health in a way similar to the Gross Domestic Product concept" (p. 1208). Richardson and Zumbo (2000) note that interpretation of a summary statistic would be problematic since improvement or worsening of individual components of the index would be hidden (see also Bergner, 1987). Wolfson (1994), however, points out that despite the flaws and imperfections of the Gross National Product as a measure of the economy, no one suggests we would be better off without the index and concludes, "the best should not be the enemy of the good" (p. 291) and as such the pursuit of a comprehensive health index continues.

One such aggregate index is the Health Utility Index. Richardson (1999) provides a concise history of the development of the Health Utility Index:

> The first index in the series, the HUI-Mark I, was designed to evaluate outcomes associated with neonatal intensive care of very low birthweight infants. Health status was classified using the following four attributes: physical function, role function, socio-emotional function and health problems, each with four to eight levels of functioning. The second index in the series, the HUI-Mark II, was developed for use in a cost-utility analysis of childhood cancer treatments (comparing aggressive with intent to cure versus palliative treatments). It described health status using the following set of attributes: sensation, mobility, emotion, cognition, self-care, pain, and fertility .... The third and most recent index, the HUI-Mark III, has been labeled a measure of functional health status for the general population. The eight attributes selected to describe health status for the HUI-Mark III are vision, hearing, speech, ambulation, dexterity, emotion, cognition and pain[24]....
>
> Despite being extensively used to measure population health status for over five years, a multi-attribute utility function specific to the HUI-Mark III has yet to be developed. Instead, each of the HUI-Mark III attribute scores have been translated into corresponding scores on the HUI-Mark II attribute system and the HUI-Mark II utility function then applied to generate a HUI-Mark III score. While the translation process was based on the best estimate of the McMaster research team, the differences between the two attribute classification systems

resulted in a number of compromises. First, the three HUI-Mark III sensation variables (vision, hearing and speech) had to be combined into a single sensation variable. Second, the closest counterpart to the HUI-Mark III dexterity attribute was the self-care attribute. Lastly, the HUI-Mark III does not contain an attribute comparable to fertility....

While the National Population Health Survey contains a detailed assessment of the psycho-social components of health (e.g., social support, self-esteem, perceived stress), the HUI-Mark III relies on an extremely limited selection of health status indicators. Of the 31 questions used to derive the HUI-Mark III attribute scores, only three questions directly assess mental functioning and none appear to examine social functioning. The apparent paucity of items assessing mental and social well-being raise doubts concerning the ability of the HUI-Mark III to provide a valid assessment of health status for use in the National Population Health Survey. More specifically, it appears that the HUI-Mark III is primarily a measure of physical functioning incapable of adequately assessing the mental and social dimensions of health.

Given the dimensionality of the World Health Organization definition of health and recent literature citing stress, self-esteem and social support as the most important factors in explaining today's health gradients, it seems appropriate to incorporate indicators of mental and social well-being into the summary measure of health status used in the National Population Health Survey. The failure to include such indicators would not only limit the ability of the summary

[24] Each of the eight functional attributes has six levels of classification (except speech, emotion and pain with only 5) ranging from no impairment to complete impairment. A full table is reproduced in Boyle,

measure to provide a comprehensive description of health status, but more importantly, would substantially limit its ability to provide information on a large proportion of health determinants thought to achieve their effects through changes in mental and/or social functioning. (pp. 8-12)

Contrast the description of the Health Utility Index provided by Richardson (1999) with the description provided by Statistics Canada (1995):

The Health Utility Index is a generic health status index that is able to synthesize both quantitative and qualitative aspects of health. The system developed at McMaster University's Centre for Health Economics and Policy Analysis, the Comprehensive Health Status Measurement System (CHSMS), provides a description of an individual's overall functional health, based on eight attributes: vision, hearing, speech, mobility (ability to get around), dexterity (use of hands and fingers), cognition (memory and thinking), emotion (feelings), and pain and discomfort.

In addition to describing functional health status levels, the CHSMS is the basis for a provisional Health Utility Index (HI). The HI is a single numerical value for any possible combination of levels of these eight self-reported health attributes. The HI maps any one of the vectors of eight health attribute levels into a summary health value between 0 and 1. For instance, an individual who is near-sighted, yet fully healthy on the other seven attributes, receives a score of 0.95 or 95% of full health.

The Health Utility Index value also embodies the views of society concerning health status. These views are termed societal preferences, since

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Furlong, Feeny, Torrance and Hatcher (1995) and Richardson (1999).

preferences about various health states are elicited from a representative sample of individuals.

The specific HI calculated here is provisional. The societal preferences were derived from the small-scale Childhood Cancer Study using a precursor of the CHSMS and were adapted for use with the Ontario Health Survey. Some adjustments were also made to the health attributes reported in the Ontario Health Survey. Consequently, the HI results are preliminary and approximate. This version of the CHSMS, however, was tested for consistency[25] and was deemed to provide a realistic appraisal of individual health status.

(Statistics Canada, 1995, p. 28)

This difference in outlook is what prompted Richardson's (1999) review and statistical examination of the Health Utility Index as a summary measure of health status for use in the National Population Health Survey.

Richardson-Zumbo Health Profile

Richardson (1999) followed by Richardson and Zumbo (2000) studied how well the Health Utility Index was able to describe the health status of the population as a single summary (GNP-like) measure. Data were taken from the 1994/95 National Population Health Survey over-sample of 838 residents of the Prince George / Northern Interior region of British Columbia. Seventeen variables from the 1994/95 National Population Health Survey were selected for exploratory factor analysis in order to see if,

[25] Boyle et al. (1995) in a test-retest study of the reliability of the Health Utility Index-Mark III state the reliability was substantial for the attributes of vision, ambulation and emotion; moderate for hearing, cognition and pain; speech and dexterity had the lowest estimates of reliability. Bergner (1987) in an examination of the McMaster Health Index Questionnaire stated it could be expected to show a skewness of scores because of being designed to assess a dysfunctional population. Hunt, McEwen and McKenna (1986) commenting on the McMaster Health Index Questionnaire, precursor to the Health Utility Index,

and how well, they would identify the broader dimensions of health i.e., physical health, mental health, social and role functioning, and general perceptions of well-being. The variables are[26]:

1 - Health Status: Vision Attribute
2 - Health Status: Hearing Attribute
3 - Health Status: Speech
4 - Health Status: Mobility Attribute
5 - Health Status: Dexterity Attribute
6 - Health Status: Emotion Attribute
7 - Health Status: Cognition Attribute
8 - Health Status: Pain and Discomfort Attribute
9 - Adjusted Specific Chronic Stress Index
10 - Work Stress Index
11 - Self-esteem index
12 - Mastery index
13 - Sense of Coherence scale
14 - Distress score
15 - Perceived social support index
16 - Average frequency of contact index
17 - Derived health description index

Various statistical measures supported the use of factor analysis. Following further statistical examination and manipulation it was found that the 17 variables loaded on to five factors [27] as displayed in Table 3.

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state that for physical function items the validity is robust but considerably weaker for social and emotional items.

[26] Complete descriptions of the 17 indicators, including the survey questions, excerpted from Statistics Canada (1995) are included in Appendix A.

Table 3. Richardson-Zumbo Factors, Indicators and Loading

Factor	Indicator	Loading
1 - Physical Impairment	Dexterity	+
	Speech	+
2 - Mental Ill-Health	Emotion	+
	Chronic Stress	+
	Mastery	-
	Coherence	-
	Distress	+
3 - Mental Well-Being	Emotion	-
	Work Stress	-
	Self-Esteem	+
	Mastery	+
4 - General Health Impairment	Vision	+
	Hearing	+
	Mobility	+
	Cognition	+
	Pain	+
	Health Description	-
5 - Social Well-Being	Emotion	-
	Social Support	+
	Frequency of Contact	+

(Richardson and Zumbo, 2000, p. 183)

For example, the physical impairment factor was primarily comprised of dexterity and speech health status attributes. Both indicators were positively correlated with the factor i.e., as speech and dexterity problems increase in severity so does physical

[27] The pattern matrix with the 5 factors and the respective indicator loading is provided in Appendix B.

impairment. In the mental ill-health factor, mastery is negatively correlated, i.e., as one's sense of control over life's situations worsens, mental ill-health increases.[28]

The next phase was to run a multiple regression of the Health Utility Index scores on to the five Richardson and Zumbo Factors to determine the relative proportion of variation in the Health Utility Index accounted for by each factor. A relative Pratt index was also generated to determine the relative contribution of each factor to the regression. The results are displayed in Table 4.

Table 4. Correlation of Health Utility Index with Richardson-Zumbo Factors[29]

Factor	Correlation with Health Utility Index	Beta-Weight	Relative Pratt Score
Physical Impairment	-.301	-.083	3.6%
Mental Ill-Health	-.403	-.008	0.5%
Mental Well-Being	.379	.031	1.7%
General Health Impairment	-.775	-.655	72.2%
Social Well-Being	.518	.301	22.2%

(Richardson and Zumbo, 2000, p. 186)

Note. R^2 was 70.2%

Based on these findings it would seem that the only factors contributing to any significant degree to scores on the Health Utility Index are general health impairment at 72.2% and social well-being at 22.2% of explained variation.

Richardson and Zumbo (2000) concluded that the Health Utility Index used by the National Population Health Survey fails to capture the multi-dimensionality of health. Most of the explained variation comes from states of ill-health and is unable to differentiate among various levels of well-being. It was hypothesized that this should not

[28] It is important to review and understand the definitions of the indicators in order to understand the correlations, many of which are double negatives.

be too surprising since the Health Utility Index was initially developed to measure the health status of a paediatric oncology population whose state of ill-health would be much higher than the general population. The general population tended to rate its health at or near the highest health level states almost all of the time. Commenting on health assessment measures designed to examine the absence of ill-health, Bergner (1987) writes that even if they include some measures of good health, the measures do not, as an overall measure, assess positive health or its gradations.

Richardson and Zumbo (2000) suggested as future research directions the integration of Health Utility Index scores and additional health indicators into a health profile in order to provide a better summary description of the construct of health status and how the various health determinants interact with one another.

[29] See Appendix C for a Table showing correlations between all the dependent variables.

CHAPTER 2 - METHODS

The objective of this thesis is to investigate the sensitivity of the Health Utility Index and the Richardson-Zumbo Health Profile to a set of key health determinants considered important by the Provincial Health Officer of British Columbia (1994). Six indicators were selected from the 1994/95 National Population Health Survey that correspond to significant determinants of health described in the British Columbia Provincial Health Officer's 1994 Annual Report. Based on the literature review, age and gender were also selected. Table 5 displays the National Population Health Survey indicators chosen and the corresponding Provincial Health Officer's health determinant. No indicators were selected from the domains of physical environment, biological influences or health services.

Table 5. National Population Health Survey Indicators and PHO Health Determinants

NPHS Indicator	**PHO Health Determinant**
1- Single Parenthood	Social and Economic Environment
2- Derived Variable for Working Status	Social and Economic Environment
3 - Derived Highest Education Level Attained	Social and Economic Environment
4 - Derived Income Adequacy	Social and Economic Environment
5 - Type of Smoker	Health Behaviours and Skills
6 - Derived Type of Drinker	Health Behaviours and Skills
7 - Age	Nil
8 - Gender	Nil

The National Population Health Survey variables (Statistics Canada, 1995) are explained as follows:

1 - Single Parenthood is a dichotomous indicator we created which segregates Derived Type of Household into two categories:

0 OTHER

1 SINGLE PARENT

Where, 0 OTHER is comprised of:

1 Couple With Children < 25 defined as a married or common-law couple with at least one partner being the parent of the dependent child. No other relationships are allowed.

2 Couple With Children>25 With or Without Other child(ren) defined as a married or common-law couple with no dependent< 25 years old. Any other relationships are allowed.

3 Single defined as an unattached individual living alone. Household size=1.

4 Single With Others defined as unattached individuals living together. There cannot be a marital/common-law or parental relationship but other relationships such as siblings are allowed.

5 Couple With Dependent Child(ren)<25 And Other Relatives defined as at least one partner must be the parent of one child < 25 years old in the household. Other relationships are allowed.

6 Couple Alone defined as married or common-law couple alone. No other relationships are permitted. Household size=2.

9 Other Household Types defined as all other household types.

And, 1 SINGLE PARENT is comprised of:

7 Single parent With Dependent Child(ren) < 25 where one child must be less than 25 years old. No other relationships are permitted.

8 Other Single-parent Households where one child must be less than 25 years old. Other relationships are permitted.

2 - Derived Variable for Working Status is a derived indicator based on the respondent's recent employment history where:

1 CURRENTLY WORKING

2 NOT CURRENTLY WORKING - BUT HAD A JOB

3 DID NOT WORK DURING LAST 12 MONTHS

5 NOT APPLICABLE

9 NOT STATED

A higher score indicates greater unemployment.

3 - Derived Highest Education Level Attained is a derived variable based on the responses to questions EDUC-Q1 to EDUC-Q4.

EDUC-Q1 Excluding kindergarten, how many years of elementary and high school have/has ... successfully completed?

EDUC-Q2 Have/has ... graduated from high school?

EDUC-Q3 Have/has ... ever attended any other kind of school such as university, community college, business school, trade or vocational school, CEGEP or other post-secondary institution?

EDUC-Q4 What is the highest level of education that ... have/has attained?

___ Some trade, technical, vocational school or business college

___ Some community college, CEGEP or nursing school

___ Some university

___ Diploma or certificate from trade, technical or vocational school, or business college

___ Diploma or certificate from community college, CEGEP, or nursing school)

___ Bachelor's or undergraduate degree or teacher's college (e.g., B.A., B.Sc., LL.B.)

___ Masters (e.g., M.A., M. Sc., M.Ed.)

___ Degree in medicine, dentistry, veterinary medicine or optometry (M.D., D.D.S., .M.D., D.V.M., O.D.)

___ Earned doctorate (e.g., Ph.D., D.Sc., D.Ed.)

___ Other (Specify_____)

The responses were assigned to one of the following categories:

1 NO SCHOOLING

2 ELEMENTARY SCHOOL

3 SOME SECONDARY SCHOOL

4 SECONDARY SCHOOL GRADUATION

5 OTHER BEYOND HIGH SCHOOL

6 SOME TRADE SCHOOL ETC.

7 SOME COMMUNITY COLLEGE

8 SOME UNIVERSITY

9 DIPLOMA/CERTIFICATE TRADE SCHOOL

10 DIPLOMA/CERTIFICATE COM. COL,CEGEP

11 BACHELOR DEGREE (INCLUDES LLB)

12 MASTER/DEGREE IN MEDICINE/DOCTORATE

96 NOT APPLICABLE

99 NOT STATED

A higher score indicates more schooling.

4 - Derived Income Adequacy is based on household income and the size of the household where:

1	Lowest income	Less than $10,000	1 to 4 persons
		Less than $15,000	5 or more persons
2	Lower middle income	$10,000 to $14,999	1 or 2 persons
		$10,000 to $19,999	3 or 4 persons
		$15,000 to $29,999	5 or more persons
3	Middle income	$15,000 to $29,999	1 or 2 persons
		$20,000 to $39,999	3 or 4 persons
		$30,000 to $59,999	5 or more persons
4	Upper middle income	$30,000 to $59,999	1 or 2 persons
		$40,000 to $79,999	3 or 4 persons
		$60,000 to $79,999	5 or more persons
5	Highest Income	$60,000 or more	1 or 2 persons
		$80,000 or more	3 persons or more
9	Unknown	Not stated	Not applicable

A higher score indicates greater income adequacy.

5 - Type of Smoker is based on questions SMOK-Q2, Q4a, Q5:

SMOK-Q2 At the present time do/does ... smoke cigarettes daily, occasionally or not at all?

SMOK-Q4a Have/has you/he/she ever smoked cigarettes at all?

SMOK-Q5 Have/has you/he/she ever smoked cigarettes daily?

The responses were assigned to one of the following categories:

1	Daily smoker	SMOK-Q2 = 1
2	Occasional smoker but former daily smoker	SMOK-Q2=2 AND SMOK-Q5=1
3	Always an occasional smoker	SMOK-Q2=2 AND SMOK-Q5=2
4	Former daily smoker	SMOK-Q2=3 AND SMOK-Q4A=1AND SMOK-Q5=1
5	Former occasional smoker	SMOK-Q2=3 AND SMOK-Q4A=1AND SMOK-Q5=2
6	Never smoked	SMOK-Q2=3 AND SMOK-Q4A=2
9	Not stated	Not stated

A lower score indicates greater smoking frequency.

6 - Derived Type of Drinker is based on questions ALCO-Q2 and ALCO-Q5B:

ALCO-Q2 During the past 12 months, how often did you/he/she drink alcoholic beverages?

__ Every day

__ 4-6 times a week

__ 2-3 times a week

__ Once a week

__ 2-3 times a month

__ Once a month

__ Less than once a month

ALCO-Q5B Did you/he/she ever have a drink?

___ Yes

___ No

The responses were assigned to one of the following categories:

1	Regular drinker: a drink at least once a month	ALCO-Q2<7
2	Occasional drinker: less than one drink a month	ALCO-Q2=7
3	Don't drink now: did not have a drink in the last 12 months	ALCO-Q5B=1
4	Abstinent (never drank)	ALCO-Q5B=2
9	Not stated	Not stated

A lower score indicates greater frequency of alcohol consumption.

7- Age created grouped age cohorts:

1	12 TO 14 YEARS
2	15 TO 19 YEARS

3 20 TO 24 YEARS

4 25 TO 29 YEARS

5 30 TO 34 YEARS

6 35 TO 39 YEARS

7 40 TO 44 YEARS

8 45 TO 49 YEARS

9 50 TO 54 YEARS

10 55 TO 59 YEARS

11 60 TO 64 YEARS

12 65 TO 69 YEARS

13 70 TO 74 YEARS

14 75 TO 79 YEARS

15 80 YEARS OR OLDER

A higher score indicates greater age.

8 - Gender is a dichotomous variable.

1 MALE

2 FEMALE

Data for analysis were extracted from the full 1994/95 National Population Health Survey data set specific to the Prince George over-sample. The five Richardson and Zumbo factors (physical impairment factor, mental ill-health factor, mental well-being factor, general health impairment factor, and social well-being factor) were also combined into a Composite Score to create an additional dependent variable such that:

Composite of 5 Factors = sum (social well-being, mental well-being) - sum (physical impairment, mental ill-health, general health impairment).

The negative scales (physical impairment, mental ill-health, general health impairment) were reverse-coded so that the Composite of 5 Factors would measure health in a manner that a large positive number would mean healthier, as in a positive aspect of health.

The two dichotomous indicators, Single Parent and Gender were examined against the seven dependent variables (Health Utility Index, Composite of 5 factors, physical impairment factor, mental ill-health factor, mental well-being factor, general health impairment factor, and social well-being factor). The sample size, means and standard deviations were calculated. T-tests were performed to determine if the differences in the means were statistically significant.

A bivariate analysis was done between the six non-dichotomous National Population Health Survey indicators (working status, highest level of education attained, income adequacy, type of smoker, type of drinker, and age) and the seven dependent variables (Health Utility Index, Composite of 5 factors, physical impairment factor, mental ill-health factor, mental well-being factor, general health impairment factor, and social well-being factor). Correlations and tests for significance were performed resulting in a 6 x 7 matrix.

A Multivariate analysis was then done on the 6 x 7 matrix. Beta values[30] and the Pratt Index[31] for those model predictors identified through stepwise regression were

[30] "When all variables are standardized to have means of zero and standard deviations of one, the standardized regression coefficients (Betas) measure the percent of movement in the dependent variable when a predictor variable moves one full unit and every other predictor in the set is held constant" (Michalos, 1996, p. 55).

[31] "The Pratt Index quantifies the relative contribution each explanatory variable makes to the overall regression equation by partitioning the model R^2 into that proportion attributable to each explanatory variable. The scores are additive and will therefore sum to 1.0" (Richardson, 1999, p. 32).

calculated. The Multivariate analysis was re-run with the addition of the age and gender National Population Health Survey indicators. Beta values and the Pratt Index for those model predictors identified through stepwise regression were calculated for this 8 x 7 matrix.

$$\text{Pratt Index} = \frac{\text{Beta} * \text{corr}_{xy}}{R^2} * 100$$

CHAPTER 3 - RESULTS

A. Bivariate Analysis

The two dichotomous indicators, Single Parent and Gender, were examined against the seven dependent variables: Health Utility Index, Composite of 5 Factors, physical impairment factor, mental ill-health factor, mental well-being factor, general health impairment factor, and social well-being factor. The sample size, means and standard deviations were calculated. T-tests were performed to determine if the differences in the means were statistically significant. See Table 6.

Single Parent

The sample size for Health Utility Index was 833, and 838 for the other six dependent variables (Composite of 5 Factors, physical impairment factor, mental ill-health factor, mental well-being factor, general health impairment factor and social well-being factor). Single-parent households accounted for 11.2% (93/833) and 11.1% (93/838) of the samples respectively. A statistically significant difference in the means as determined by t-test was found in four of the dependent variables: Composite of 5 Factors $p = .002$, mental-ill health $p < .001$, mental well-being $p = .006$, and social well-being $p = .017$. Single parents were found to have a lower Composite Score (mean = -.863 versus mean = .108), greater mental ill-health (mean = .496 versus mean = -.062), less mental well-being (mean = .878 versus mean = .029), and less social well-being (mean = -.168 versus mean .021) than the not single-parent cohort. There were no statistically significant differences found for the dependent variables: Health Utility Index, physical impairment, or general health impairment.

Gender

The sample size for Health Utility Index was 833, and 838 for the other six dependent variables (Composite of 5 Factors, physical impairment factor, mental ill-health factor, mental well-being factor, general health impairment factor and social well-being factor). Females accounted for 52.2% (435/833) and 52.0% (436/838) of the samples respectively. A statistically significant difference in the means as determined by t-test was found in two of the dependent variables: mental-ill health $p = .017$, and social well-being $p = .048$. Females were found to have greater mental ill-health (mean =-.077 versus mean = .071) and greater social well-being (mean = -.051 versus mean = .047) than the males in the sample. There were no statistically significant differences found for the dependent variables: Health Utility Index, Composite of 5 Factors, physical impairment, mental well-being, or general health impairment.

Table 6. Reporting n, Means, and Standard Deviations for the Dependent Variables

Dependent Variable →	Health Utility Index	Composite of 5 Factors	1 - Physical Impairment Factor	2 - Mental Ill-Health Factor	3 - Mental Well-Being Factor	4 - General Health Impairment Factor	5 - Social Well-Being Factor
Single Parent	Single Parent n = 93 Mean = .903 Std. Dev. = .115 Not Single Parent n = 740 Mean = .893 Std.Dev. = .130 n.s.	Single Parent n = 93 Mean = -.863 Std. Dev. = 2,67 Not Single Parent n = 745 Mean = .108 Std.Dev. = 2.79 t (836) = 3.17, p = .002	Single Parent n = 93 Mean = -.062 Std. Dev. = .117 Not Single Parent n = 745 Mean = .008 Std.Dev. = 1.5 n.s.	Single Parent n = 93 Mean = .496 Std. Dev. = .963 Not Single Parent n =745 Mean = -.062 Std.Dev. = .869 t (836) = 5.76, p < .001	Single Parent n = 93 Mean = -.236 Std. Dev. = .878 Not Single Parent n = 745 Mean = .029 Std.Dev. = .871 t (836) = 2.77, p = .006	Single Parent n = 93 Mean = .024 Std. Dev. = .666 Not Single Parent n = 745 Mean = -.003 Std.Dev. = .771 n.s.	Single Parent n = 93 Mean = -.168 Std. Dev. = .751 Not Single Parent n = 745 Mean = .021 Std.Dev. = .715 t (836) = 2.39, p = .017
Gender	Males n = 398 Mean =. 898 Std. Dev. = .129 Females n =435 Mean = .890 Std.Dev. = .127 n.s.	Males n = 402 Mean = .092 Std. Dev. = 2.77 Females n = 436 Mean = -.085 Std.Dev. = 2.82 n.s.	Males n = 402 Mean = .014 Std. Dev. = 1.199 Females n =436 Mean = -.013 Std.Dev. = .759 n.s.	Males n = 402 Mean = -.077 Std. Dev. = .817 Females n = 436 Mean = .071 Std.Dev. = .960 t (836) = 2.39, p = .017	Males n = 402 Mean = -.042 Std. Dev. = .816 Females n =436 Mean = -.039 Std.Dev. = .925 n.s.	Males n = 402 Mean = -.039 Std. Dev. = .769 Females n =436 Mean = .036 Std.Dev. = .751 n.s.	Males n = 402 Mean = -.051 Std. Dev. = .723 Females n =436 Mean = .047 Std.Dev. = .717 t (836) = 1.98, p = .048

Note. n.s. denotes that the t-test was not statistically significant.

A bivariate analysis was then done between the six non-dichotomous National Population Health Survey indicators (derived variable for working status, derived highest level of education attained, derived income adequacy, type of smoker, derived type of drinker, and age cohort) and the seven dependent variables (Health Utility Index, Composite of 5 Factors, physical impairment factor, mental ill-health factor, mental well-being factor, general health impairment factor and social well-being factor). Correlations and tests for significance were performed. See Table 7.

Working Status

Statistically significant correlations were found to exist between working status and Health Utility Index (-.269, $p < .001$), Composite of 5 Factors (-.204, $p < .001$), physical impairment factor (+.106, $p < .01$), mental well-being factor (-.122, $p < .001$), general health impairment factor (+.338, $p < .001$), and social well-being factor (-.077, $p < .05$). Increasing levels of unemployment were related to lower Health Utility Index scores, lower Composite scores, and less mental and social well-being while also indicating greater physical and general health impairment. No statistically significant correlation was found between working status and mental ill-health factor.

Highest Level of Education Attained

Statistically significant correlations were found to exist between highest level of education attained and Composite of 5 Factors (+.101, $p < .01$), mental well-being factor (+.121, $p < .001$), and general health impairment factor (-.107, $p < .01$). Higher levels of educational attainment were related to higher Composite scores and greater mental well-being while also indicating a lower level of general health impairment. No statistically significant correlations were found between highest level of education attained and

Health Utility Index, physical impairment factor, mental ill-health factor or social well-being factors.

Income Adequacy

Statistically significant correlations were found to exist between income adequacy and Health Utility Index (+.110, $p < .001$), Composite of 5 Factors (+.182, $p < .001$), mental ill-health factor (-.171, $p < .001$), mental well-being factor (+.156, $p < .001$), general health impairment factor (-.181, $p < .001$) and social well-being factor (+.106, $p < .01$). Higher levels of income adequacy were related to greater Health Utility Index scores, higher Composite scores and greater levels of mental and social well-being while also indicating lower levels of both mental ill-health and general health impairment. No statistically significant correlation was found between income adequacy and physical impairment factor.

Type of Smoker

Statistically significant correlations were found to exist between type of smoker and Health Utility Index (+.152, $p < .001$), Composite of 5 Factors (+.222, $p < .001$), mental ill-health factor (-.199, $p < .001$), mental well-being factor (+.179, $p < .001$), general health impairment factor (-.177, $p < .001$) and social well-being factor (+.188, $p < .001$). The less a person smokes tobacco, the greater their Health Utility Index and Composite scores and levels of mental and social well-being, as well as lower levels of mental ill-health and general health impairment. No statistically significant correlation was found between type of smoker and physical impairment factor.

Type of Drinker

Statistically significant correlations were found to exist between type of drinker and Health Utility Index (-.095, $p < .01$), Composite of 5 Factors (-.085, $p < .01$), physical impairment factor (+.099, $p < .01$), mental well-being factor (-.073, $p < .05$) and general health impairment factor (+.147, $p < .001$). The less alcohol a person drinks, the lower their Health Utility Index and Composite scores and lower mental well-being, as well as greater levels of physical and general health impairment. No statistically significant correlations were found between type of drinker and mental ill-health factor or social well-being factor.

Age

Statistically significant correlations were found to exist between age and Health Utility Index (-.250, $p < .001$), physical impairment factor (+.070, $p < .05$), mental ill-health factor (-.187, $p < .001$), mental well-being factor (+.072, $p < .05$) and general health impairment factor (+.349, $p < .001$). Increasing age is related to lower Health Utility Index scores, and greater physical and general health impairment while also indicating less mental ill-health and greater mental well-being. No statistically significant correlation was found between age and Composite of 5 Factors or social well-being factor.

Table 7. Bivariate Correlations

Dependent Variable → **Model Predictors ↓**	**Health Utility Index** n =773	**Composite of 5 Factors** n = 776	**1 - Physical Impairment Factor** n =776	**2 - Mental Ill-Health Factor** n =776	**3 - Mental Well-Being Factor** n =776	**4 - General Health Impairment Factor** n =776	**5 - Social Well-Being Factor** n =776
Derived Variable for Working Status	Corr. = -.269 ***	Corr. = -.204 ***	Corr. = +.106 **	Corr. = +.051 n.s.	Corr. = -.122 ***	Corr. = +.338 ***	Corr. = -.077 *
Derived Highest Level of Education Attained	Corr. = +.042 n.s.	Corr. = +.101 **	Corr. = -.019 n.s.	Corr. = -.055 n.s.	Corr. = +.121 ***	Corr. = -.107 **	Corr. = +.038 n.s.
Derived Income Adequacy	Corr. = +.110 ***	Corr. = +.182 ***	Corr. = -.008 n.s.	Corr. = -.171 ***	Corr. = +.156 ***	Corr. = -.181 ***	Corr. = +.106 **
Type of Smoker	Corr. = +.152 ***	Corr. = +.222 ***	Corr. = -.017 n.s.	Corr. = -.199 ***	Corr. = +.179 ***	Corr. = -.177 ***	Corr. = +.188 ***
Derived Type of Drinker	Corr. = -.095 **	Corr. = -.085 **	Corr = +.099 **	Corr. = -.013 n.s.	Corr. = -.073 *	Corr. = +.147 ***	Corr. = +.036 n.s.
Age Cohort	Corr. = -.250 ***	Corr. = -.028 n.s.	Corr. = +.070 *	Corr. = -.187 ***	Corr. = +.072 *	Corr. = +.349 ***	Corr. = +.040 n.s.

Note. * denotes $p < .05$, ** denotes $p < .01$, *** denotes $p < .001$, n.s. denotes that the test of the correlation was not statistically significant.

B.1 Multivariate Analysis Without Age and Gender

A Multivariate analysis was then done between the six National Population Health Survey indicators (single-parenthood, derived variable for working status, derived highest level of education attained, derived income adequacy, type of smoker, and derived type of drinker) and the seven dependent variables (Health Utility Index, Composite of 5 Factors, physical impairment factor, mental ill-health factor, mental well-being factor, general health impairment factor and social well-being factor). Beta values and the Pratt Index scores for those model predictors identified through stepwise regression were calculated. See Table 8.

Health Utility Index

Stepwise regression identified the derived variable for working status and type of smoker as significant model predictors for the dependent variable Health Utility Index. That is, in the presence of the six predictors taken together, only two influenced the dependent variable. Greater unemployment and more tobacco consumption are related to a lower Health Utility Index Score. Employment status is responsible for 75.9% (Beta = -.268) of the R-squared value (R^2 = .095) and smoking 23.8% (Beta = +.149).

Composite of 5 Factors

Stepwise regression identified the derived variable for working status, derived income adequacy, and type of smoker as significant model predictors for the dependent variable Composite of 5 Factors. That is, in the presence of the six predictors taken together, only three influenced the dependent variable. Greater unemployment, less income adequacy and more tobacco consumption are related to a lower Composite of 5 Factors score. Employment status is responsible for 34.7% (Beta = -.165) of the R-

squared value (R^2 = .097), income adequacy 18.0% (Beta = +.096) and smoking 47.8% (Beta = +.209).

Physical Impairment Factor

Stepwise regression identified the derived variable for working status and derived type of drinker as significant model predictors for the dependent variable physical impairment factor. That is, in the presence of the six predictors taken together, only two influenced the dependent variable. Greater unemployment and less alcohol consumption are related to greater physical impairment. Employment status is responsible for 54.9% (Beta = +.088) of the R-squared value (R^2 = .017) and drinking 46.0% (Beta = +.079).

Mental Ill-Health Factor

Stepwise regression identified single parent, the derived variable for income adequacy and type of smoker as significant model predictors for the dependent variable mental ill-health factor. That is, in the presence of the six predictors taken together, only three influenced the dependent variable. Being a single parent, lower income adequacy and greater tobacco consumption are related to greater mental ill-health. Single-parenthood is responsible for 35.6% (Beta = +.156) of the R-squared value (R^2 = .085), income adequacy 23.7% (Beta = -.118) and smoking 40.7% (Beta = -.174).

Mental Well-Being Factor

Stepwise regression identified the derived variable for income adequacy, type of smoker and derived type of drinker as significant model predictors for the dependent variable mental well-being factor. That is, in the presence of the six predictors taken together, only three influenced the dependent variable. Greater income adequacy, less tobacco consumption and greater alcohol consumption are related to greater mental well-

being. Income adequacy is responsible for 34.2% (Beta = +.125) of the R-squared value (R^2 = .057), smoking 55.3% (Beta = +.176) and drinking 10.4% (Beta = -.081).

General Health Impairment Factor

Stepwise regression identified the derived variable for working status, type of smoker and derived type of drinker as significant model predictors for the dependent variable general health impairment factor. That is, in the presence of the six predictors taken together, only three influenced the dependent variable. Increasing levels of unemployment, greater tobacco consumption and less alcohol consumption are related to greater general health impairment. Employment status is responsible for 68.7% (Beta = +.313) of the R-squared value (R^2 = .154), smoking 21.6% (Beta = -.188) and drinking 9.8% (Beta = +.313).

Social Well-Being Factor

Stepwise regression identified the derived variable for income adequacy and type of smoker as significant model predictors for the dependent variable social well-being factor. That is, in the presence of the six predictors taken together, only two influenced the dependent variable. Greater income adequacy and less tobacco consumption are related to greater social well-being. Income adequacy is responsible for 21.5% (Beta = +.085) of the R-squared value (R^2 = .042) and smoking 79.7% (Beta = +.178).

Table 8. Multivariate Analysis Where Only the Model Predictors Identified Through Stepwise Regression are Indicated

Dependent Variable → Model Predictors ↓	Health Utility Index n = 773	Composite of 5 Factors n = 776	1 - Physical Impairment Factor n = 776	2 - Mental Ill-Health Factor n = 776	3 - Mental Well-Being Factor n = 776	4 - General Health Impairment Factor n = 776	5 - Social Well-Being Factor n = 776
Single Parent				Beta = +.156 Pratt = 35.6%			
Derived Variable for Working Status	Beta = -.268 Pratt = 75.9%	Beta = -.165 Pratt = 34.7%	Beta = +.088 Pratt = 54.9%			Beta = +.313 Pratt = 68.7%	
Derived Highest Level of Education Attained							
Derived Income Adequacy		Beta = +.096 Pratt = 18.0%		Beta = -.118 Pratt = 23.7%	Beta = +.125 Pratt = 34.2%		Beta = +.085 Pratt = 21.5%
Type of Smoker	Beta = +.149 Pratt = 23.8%	Beta = +.209 Pratt = 47.8%		Beta = -.174 Pratt = 40.7%	Beta = +.176 Pratt = 55.3%	Beta = -.188 Pratt = 21.6%	Beta = +.178 Pratt = 79.7%
Derived Type of Drinker			Beta = +.079 Pratt = 46.0%		Beta = -.081 Pratt = 10.4%	Beta = +.103 Pratt = 9.8%	
R^2	.095	.097	.017	.085	.057	.154	.042
F	F (2, 770) = 40.220	F (3, 772) = 27.745	F (2, 773) = 6.764	F (3, 772) = 23.917	F (3, 772) = 15.528	F (3, 772) = 46.937	F (2, 773) = 17.144
Sig.	p < .001	p < .001	p = .001	p < .001	p < .001	p < .001	p < .001

B.2 Multivariate Analysis Including Age and Gender

The Multivariate analysis was then repeated using the six National Population Health Survey indicators (single-parenthood, derived variable for working status, derived highest level of education attained, derived income adequacy, type of smoker, and derived type of drinker) plus age and gender, and the seven dependent variables (Health Utility Index, Composite of 5 Factors, physical impairment factor, mental ill-health factor, mental well-being factor, general health impairment factor and social well-being factor). See Table 9.

Health Utility Index

As in the previous analysis, stepwise regression identified the derived variable for working status and type of smoker as model predictors for Health Utility Index, but this time age was also identified. That is, in the presence of the eight predictors taken together, only three influenced the dependent variable. Again, greater unemployment and more tobacco consumption are related to a lower Health Utility Index Score. Increasing age also leads to a lower Health Utility Index score. Employment status is responsible for 45.3% (Beta = -.207, previous Pratt = 75.9%) of the R-squared value (R^2 = .123 versus .095 previously), smoking 18.2% (Beta = +.147, previous Pratt = 23.8%), plus age 36.2% (Beta = -.178).

Composite of 5 Factors

As in the previous analysis, stepwise regression identified the derived variable for working status, derived income adequacy and derived type of smoker as model predictors for the Composite of 5 Factors. That is, in the presence of the eight predictors taken together, only three influenced the dependent variable. Age and gender had no significant

influence. Greater unemployment, less income adequacy and greater tobacco consumption are related to lower a Composite score. Employment status is responsible for 34.7% (Beta = -.165) of the R-squared value (R^2 = .097), income adequacy 18.0% (Beta = +.096), and smoking 47.8% (Beta = +.209), all unchanged from the previous analysis.

Physical Impairment Factor

As in the previous analysis, stepwise regression identified the derived variable for working status and derived type of drinker as model predictors for the physical impairment factor. That is, in the presence of the eight predictors taken together, only two influenced the dependent variable. Age and gender had no significant influence. Greater unemployment and less alcohol consumption are related to greater physical impairment. Employment status is responsible for 54.9% (Beta = +.088) of the R-squared value (R^2 = .017) and drinking 46.0% (Beta = +.079), both unchanged from the previous analysis.

Mental Ill-Health Factor

As in the previous analysis, stepwise regression identified single parent, the derived variable for income adequacy, and type of smoker as significant model predictors for the mental ill-health factor, but this time age was also identified. That is, in the presence of the eight predictors taken together, only four influenced the dependent variable. Again, being a single parent, lower income adequacy and greater tobacco consumption are related to greater mental ill-health. Lower age, however, is also related to increased mental ill-health. Gender had no significant influence. Single parenthood is responsible for 19.6% (Beta = +.115, previous Pratt = 35.6%) of the R-squared value (R^2 = .114 versus .085 previously), income adequacy 20.9% (Beta = -.139, previous Pratt =

23.7%), and smoking 30.9% (Beta = -.177, previous Pratt = 40.7%), plus age 28.5% (Beta = -.174).

Mental Well-Being Factor

As in the previous analysis, stepwise regression identified the derived variable for income adequacy, type of smoker and derived type of drinker as significant model predictors for the mental well-being factor, but this time the derived variables for working status and age were also identified. That is, in the presence of the eight predictors taken together, five influenced the dependent variable. Again, greater income adequacy, less tobacco consumption and greater alcohol consumption are related to greater mental well-being. Increased employment and age are also related to greater mental well-being. Gender had no significant influence. Income adequacy is responsible for 19.1% (Beta = +.092, previous Pratt = 34.2%) of the R-squared value (R^2 = .075 versus .057 previously), smoking 42.7% (Beta = +.179, previous Pratt = 55.3%), drinking 7.5% (Beta = -.077, previous Pratt = 10.4%), plus employment 18.2% (Beta = -.112) and age 12.3% (Beta = +.128).

General Health Impairment Factor

As in the previous analysis, stepwise regression identified the derived variable for working status, type of smoker and derived type of drinker as significant model predictors for the general health impairment factor but this time age was also identified. That is, in the presence of the eight predictors taken together, four influenced the dependent variable. Again, increasing levels of unemployment, greater tobacco consumption and lower levels of alcohol consumption are related to greater general health impairment. Greater age is also related to greater general health impairment.

Gender had no significant influence. Employment status is responsible for 36.4% (Beta = +.228, previous Pratt = 68.7%) of the R-squared value (R^2 = .212 versus .154 previously), smoking 15.4% (Beta = -.184, previous Pratt = 21.6%), drinking 6.2% (Beta = +.089, previous Pratt = 9.8%, plus age 42.3% (Beta = +.257).

Social Well-Being Factor

As in the previous analysis, stepwise regression identified the derived variable for income adequacy and type of smoker as significant model predictors for the social well-being factor but this time gender was also identified. That is, in the presence of the eight predictors taken together, only three influenced the dependent variable. Again, greater income adequacy and less tobacco consumption are related to greater social well-being. Being female is also related to greater social well-being. Age had no significant influence. Income adequacy is responsible for 20.3% (Beta = +.094, previous Pratt = 21.5%) of the R-squared value (R^2 = .049 versus .042 previously), smoking 68.7% (Beta = +.179, previous Pratt = 79.7%), plus gender 11.2% (Beta = +.082).

Table 9. Multivariate Analysis Where Only the Model Predictors Identified Through Stepwise Regression are Indicated (Plus Age and Gender)

Dependent Variable → Model Predictors ↓	Health Utility Index n =773	Composite of 5 Factors n = 776	1 - Physical Impairment Factor n =776	2 - Mental Ill-Health Factor n =776	3 - Mental Well-Being Factor n =776	4 - General Health Impairment Factor n =776	5 - Social Well-Being Factor n =776
Single Parent				Beta = +.115 Pratt = 19.6%			
Derived Variable for Working Status	Beta = -.207 Pratt = 45.3%	Beta = -.165 Pratt = 34.7%	Beta = +.088 Pratt = 54.9%		Beta = -.112 Pratt = 18.2%	Beta = +.228 Pratt = 36.4%	
Derived Highest Level of Education Attained							
Derived Income Adequacy		Beta = +.096 Pratt = 18.0%		Beta = -.139 Pratt = 20.9%	Beta = +.092 Pratt = 19.1%		Beta = +.094 Pratt = 20.3%
Type of Smoker	Beta = +.147 Pratt = 18.2%	Beta = +.209 Pratt = 47.8%		Beta = -.177 Pratt = 30.9%	Beta = +.179 Pratt = 42.7%	Beta = -.184 Pratt = 15.4%	Beta = +.179 Pratt = 68.7%
Derived Type of Drinker			Beta = +.079 Pratt = 46.0%		Beta = -.077 Pratt = 7.5%	Beta = +.089 Pratt = 6.2%	
Age Cohort	Beta = -.178 Pratt = 36.2%			Beta = -.174 Pratt = 28.5%	Beta = +.128 Pratt = 12.3%	Beta = +.257 Pratt = 42.3%	
Gender							Beta = +.082 Pratt = 11.2%
R^2	.123	.097	.017	.114	.075	.212	.049
F	F (3,769) = 35.815	F (3, 772) = 27.745	F (2,773) = 6.764	F (4,771) = 24.722	F (5,770) = 12.477	F (4,771) = 51.967	F (3,772) = 13.269
Sig.	$p < .001$	$p < .001$	$p = .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$
Gain	+.028	Nil	Nil	+.029	+.018	+.058	+.007

CHAPTER 4 - CONCLUSION

Richardson and Zumbo (2000) examined the Health Utility Index as a measure of health status for use in the 1994/95 National Population Health Survey. Their results demonstrated "that the use of the [Health Utility Index] as the sole summary measure of health status ... [was] problematic ... [since it did] not appear to discriminate between the many different levels of positive health experienced by the vast majority of the general population ... [and it was] more or less insensitive to variation in key indicators of mental well-being" (p. 188). Richardson and Zumbo questioned the ability of any single score to measure the health status of a population suggesting a better approach would be to use a multi-dimensional health profile instead.

Utilizing the Richardson-Zumbo Health Profile and the Health Utility Index, we attempted to examine the effect determinants of health identified by the British Columbia Provincial Health Officer and the literature search would have on those measures in terms of their ability to be sensitive to underlying changes in the population's health status. Would a profile yield more useful information than a summary score?

We began by examining the literature and the 1994 Annual Report of the British Columbia Provincial Health Officer for significant determinants of health. The 1994 British Columbia Provincial Health Officer Annual Report was a focus for two reasons. First, the report's theme in 1994 was Determinants of Health and, second, 1994/95 was the year of the National Population Health Survey for which the Prince George data set was available. The results of the literature review and the Provincial Health Officer's Annual Report were similar and yielded the following eight health determinants for analysis: single parenthood, age, gender, employment status, education, income

adequacy, tobacco use, and alcohol consumption. Indicators closely paralleling these determinants were selected from the National Population Health Survey.

Since single parenthood and gender are dichotomous variables they were examined against the six dependent variables from the work of Richardson and Zumbo namely, the Health Utility Index, and the five factors of the Richardson-Zumbo Health Profile: physical impairment, mental ill-health, mental well-being, general health impairment, and social well-being. A Composite Score, being the summation of the five Richardson and Zumbo Factors, was also constructed and examined. Sample size, means and standard deviations were calculated and t-tests were performed to determine if the differences in the means were statistically significant.

A bivariate analysis was then done between the six non-dichotomous National Population Health Survey indicators (derived variable for working status, derived highest level of education attained, derived income adequacy, type of smoker, derived type of drinker, and age cohort) and the seven dependent variables (Health Utility Index, Composite of 5 Factors, physical impairment factor, mental ill-health factor, mental well-being factor, general health impairment factor and social well-being factor). Correlations and tests for significance were calculated.

A multivariate analysis was then done, first including the six health determinants identified by the Provincial Health Officer and then again with eight health determinants through the inclusion of age and gender. The model predictors identified through stepwise regression were identified. Beta values, Pratt scores, R-squared values, and tests for significance were calculated as was the difference in R-squared values between the two multivariate analyses.

The results of the analysis yielded no surprises. As expected, being employed, greater income adequacy and less tobacco consumption were all associated with a higher state of health. All these were intuitively plausible and consistent with the literature.

Gender was not a significant health determinant except on the social well-being factor where there was an apparent advantage to being female. Being a single parent was only significant on the mental ill-health factor where being a single parent was associated with greater mental ill-health. There was no apparent significant association between education level and any of the dependent variables. Of interest was the improvement in mental well-being and the decrease in mental ill-health with increasing age while youth, as expected, was associated with higher Health Utility Index scores and less general health impairment.

One exception that was counter intuitive was the apparent health advantage gained by alcohol consumption on the physical impairment, mental well-being and general health impairment factors. Before one asserts the benefits to health of alcohol consumption, however, the underlying indicator needs to be more closely examined. The National Population Health Survey derived variable for Derived Type of Drinker had the heaviest class of drinker consuming one or more drinks per month. Clearly this washes out any differences which may occur between a heavy drinker and the person who has but one drink per month.[32]

[32] The Derived Type of Drinker variable could have captured higher levels of alcohol consumption by including the results from National Population Health Survey questions ALCO-Q3, Q4 and Q5 which captured number of times when more than five drinks were consumed on one occasion, the greatest number of drinks on one occasion, and how many drinks the person had on each of the last seven days. Schwarz & Strack (1999) suggest asking open ended questions is better than giving the respondent a range of responses to choose from. They suggest that "respondents assume the list of response alternatives reflects the researcher's knowledge of the distribution of the behaviour .... [and] accordingly, they use the range of the response alternatives as a frame of reference in estimating their own behavioral frequency" (p. 73).

Overall, the R^2 of the multivariate analyses were disappointingly low ranging from .017 to .212 on the five Richardson and Zumbo Factors, .097 for the Composite Score and .123 for the Health Utility Index. The gain in R^2 when age and gender were added was also minimal ranging from nil to +.058.

The net result of these regressions seems to be that there is a poor fit between the determinants of health and population health status. The determinants do not seem to be determining much which, unfortunately, was the problem we started with. The Health Utility Index was hardly describing population health while the five Richardson-Zumbo scores and the Composite Score fared little better.

The general health impairment R-squared (R^2 = .212) was the highest of all dependent variables; made up of the following National Population Health Survey indicators: vision, hearing, mobility, cognition, pain, and health description.[33] This would suggest a nice, overview, summary-type variable that could on its own or in a profile be examined as a good health status indicator.

Does this mean the determinants of health are unimportant? Clearly not. What this analysis once again demonstrates is the difficulty in capturing the complex interplay of a myriad of variables that form the construct of health. Given the multi-faceted nature of health it seems even less useful to attempt to develop a single summative measure of health even though, as Hunt McEwen and McKenna (1986) assert, health policy makers are usually more interested in a single global number which can summarize the health status of a population into a summary statistic akin to the way the Gross National Product is an indicator of the health of the economy.

[33] See Table 3, Appendix A, and Appendix B for the factor loadings and the survey questions underlying the general health impairment factor.

The challenge to future researchers is to continue to explore profiles that accurately capture the status of the population's health and that are also sensitive to underlying changes as they occur. For although the Richardson-Zumbo Health Profile did not have strong explanatory power it was, never the less, able to yield more information than the Health Utility Index or the Composite Score.

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APPENDIX A

17 National Population Health Survey Variables Selected for Exploratory Factor Analysis

1 - Health Status: Vision Attribute

Based on HSTAT-Q1 to HSTAT-Q5.

HSTAT-Q1 Are/Is ... *usually* able to see well enough to read ordinary newsprint *without* glasses or contact lenses?
HSTAT-Q2 Are/Is you/he/she *usually* able to see well enough to read ordinary newsprint *with* glasses or contact lenses?
HSTAT-Q3 Are/Is you/he/she able to see at all?
HSTAT-Q4 Are/Is you/he/she able to see well enough to recognize a friend on the other side of the street *without* glasses or contact lenses ?
HSTAT-Q5 Are/Is you/he/she *usually* able to see well enough to recognize a friend on the other side of the street *with* glasses or contact lenses?

DVVISFG - Derived Vision Attribute

1 NO VISUAL PROBLEMS
2 PROBLEMS CORRECTED BY LENSES
3 PROBLEM SEEING DISTANCE/NOT CORRECTED
4 PROBLEM SEEING CLOSE/NOT CORRECTED
5 PROBLEM SEEING CLOSE and DISTANCE/NO SIGHT
99 NOT STATED

A higher score indicates more severe problems.

2 - Health Status: Hearing Attribute

Based on HSTAT-Q6 to HSTAT-Q9.

HSTAT-Q6 Are/Is ... *usually* able to hear what is said in a group conversation with at least three other people *without* a hearing aid?
HSTAT-Q7 Are/Is you/he/she *usually* able to hear what is said in a group conversation with at least three other people *with* a hearing aid?
HSTAT-Q7a Are/Is you/he/she able to hear at all?
HSTAT-Q8 Are/Is you/he/she *usually* able to hear what is said in a conversation with one other person in a quiet room *without* a hearing aid ?
HSTAT-Q9 Are/Is you/he/she *usually* able to hear what is said in a conversation with one other person in a quiet room *with* a hearing aid?

DVHEAFG - Derived Hearing Attribute

1 NO HEARING PROBLEMS

2 PROBLEM HEARING/CORRECTED
3 PROBLEM HEARING/NOT CORRECTED
99 NOT STATED

A higher score indicates more severe problems.

3 - Health Status: Speech Attribute

Based on HSTAT-Q10 to HSTAT-Q13.

HSTAT-Q10 Are/Is ... *usually* able to be understood *completely* when speaking with strangers in your own language?
HSTAT-Q11 Are/Is you/he/she able to be understood *partially* when speaking with strangers?
HSTAT-Q12 Are/Is you/he/she able to be understood *completely* when speaking with those who know you/him/her well?
HSTAT-Q13 Are/Is you/he/she able to be understood *partially* when speaking with those who know you/him/her well?

DVSPEFG - Derived Speech Attribute

1 NO SPEECH PROBLEMS
2 PARTIALLY/ NOT UNDERSTOOD
9 NOT STATED

A higher score indicates more severe problems.

4 - Health Status: Mobility Attribute

Based on HSTAT-Q14 to HSTAT-Q20.

HSTAT-Q14 Are/Is ... *usually* able to walk around the neighbourhood *without* difficulty and *without* mechanical support such as braces, a cane or crutches?
HSTAT-Q15 Are/Is you/he/she able to walk at all?
HSTAT-Q16 Do/Does you/he/she require mechanical support such as braces, a cane or crutches to be able to walk around the neighbourhood?
HSTAT-Q17 Do/Does you/he/she require the help of another person to be able to walk?
HSTAT-Q18 Do/Does you/he/she require a wheelchair to get around?
HSTAT-Q19 How often do/does you/he/she use a wheelchair?
HSTAT-Q20 Do/Does you/he/she need the help of another person to get around in the wheelchair?

DVMOBFG - Derived Mobility Attribute

1 NO MOBILITY PROBLEMS

2 MOBILITY PROBLEMS/NO AID
3 PROBLEMS/MECHANICAL SUPPORT
4 PROBLEMS/CANNOT WALK
99 NOT STATED

A higher score indicates more severe problems.

5 - Health Status: Dexterity Attribute

Based on HSTAT-Q21 to HSTAT-Q24.

HSTAT-Q21 Are/Is ... *usually* able to grasp and handle small objects such as a pencil and scissors?
HSTAT-Q22 Do/Does you/he/she require the help of another person because of limitations in the use of hands or fingers?
HSTAT-Q23 Do/Does you/he/she require the help of another person with:
___ Some tasks?
___ Most tasks?
___ Almost all tasks?
___ All tasks?
HSTAT-Q24 Do/Does you/he/she require special equipment, for example, devices to assist in dressing because of limitations in the use of hands or fingers?

DVDEXFG - Derived Dexterity Attribute

1 NO DEXTERITY PROBLEMS
2 DEXTERITY PROBLEMS/NO HELP
3 DEXTERITY PROBLEMS/NEED HELP
99 NOT STATED

A higher score indicates more severe problems.

6 - Health Status: Emotion Attribute

Based on HSTAT-Q25.

HSTAT-Q25 Would you describe yourself/... as being *usually*:
___ Happy and interested in life?
___ Somewhat happy?
___ Somewhat unhappy?
___ Unhappy with little interest in life?
___ So unhappy that life is not worthwhile?

DVEMOF94 - Derived Emotion Attribute

1 HAPPY AND INTERESTED IN LIFE

2 SOMEWHAT HAPPY
3 SOMEWHAT UNHAPPY
4 UNHAPPY WITH A LITTLE INTEREST IN LIFE
5 SO UNHAPPY THAT LIFE IS NOT WORTHWHILE
9 NOT STATED

A higher score indicates less perceived happiness.

7 - Health Status: Cognition Attribute

Based on HSTAT-Q26 to HSTAT-Q27.

HSTAT-Q26 How would you describe your/his/her *usual* ability to remember things? Are/Is you/he/she:
___ Able to remember most things?
___ Somewhat forgetful?
___ Very forgetful?
___ Unable to remember anything at all?
HSTAT-Q27 How would you describe your/his/her *usual* ability to think and solve day to day problems? Are/Is you/he/she:
___ Able to think clearly and solve problems?
___ Having a little difficulty?
___ Having some difficulty?
___ Having a great deal of difficulty?
___ Unable to think or solve problems?

DVCOGFG - Derived Cognition Code

1 NO COGNITIVE PROBLEMS
2 NO MEMORY PROBLEMS
3 SOMEWHAT FORGETFUL
4 DIFFICULTY THINKING
5 VERY FORGETFUL/UNABLE TO REMEMBER
99 NOT STATED

A higher score indicates more severe problems.

8 - Health Status: Pain and Discomfort Attribute

Based on HSTAT-Q28 and HSTAT-Q29.

HSTAT-Q28 Are/Is ... *usually* free of pain or discomfort?
HSTAT-Q29 How would you describe the *usual* intensity of your/his/her pain or discomfort?
___ Mild

___ Moderate
___ Severe

DVPASF94 - Severity of Pain Code

1 NO PAIN OR DISCOMFORT
2 MILD PAIN/DISCOMFORT
3 MODERATE PAIN/DISCOMFORT
4 SEVERE PAIN/DISCOMFORT
9 NOT STATED

A higher score indicates more severe problems.

9 - Adjusted Specific Chronic Stress Index

To adjust DVCSI294 according to the number of questions.
DVCSI394 = (DVCSI294 * 16) / # of questions answered yes, no or don't know in DVCSI294 e.g., single with children: (DVCSI294 * 16) ÷ 14 In this third index, the range of scores of the second index, DVCSI294 is adjusted as if all the items were relevant to each respondent. DVCSI294 based on CSTRESS-Q1 to Q4 and CSTRESS-Q12 to Q18.

CSTRESS-Q1 You are trying to take on too many things at once.
CSTRESS-Q2 There is too much pressure on you to be like other people.
CSTRESS-Q3 Too much is expected of you by others.
CSTRESS-Q4 You don't have enough money to buy the things you need.
CSTRESS-Q12 Your work around the home is not appreciated.
CSTRESS-Q13 Your friends are a bad influence.
CSTRESS-Q14 You would like to move but you cannot.
CSTRESS-Q15 Your neighbourhood or community is too noisy or too polluted.
CSTRESS-Q16 You have a parent, a child or partner who is in very bad health and may die.
CSTRESS-Q17 Someone in your family has an alcohol or drug problem.
CSTRESS-Q18 People are too critical of you or what you do.

DVCSI394 - Derived adjusted specific chronic stress index

0 0
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8

9 9
10 10
11 11
12 12
13 13
14 14
15 15
16 16
96 NOT APPLICABLE
99 NOT STATED

A higher score indicates a greater number of chronic stressors.

10 - Work Stress Index

Sum of all items in WSTRESS-Q1

WSTRESS-Q1 Now I'm going to read you a series of statements that might describe your job situation. Please tell me if you STRONGLY AGREE, AGREE, NEITHER AGREE NOR DISAGREE, DISAGREE, or STRONGLY DISAGREE with each of the following:
a) Your job requires that you learn new things
b) Your job requires a high level of skill
c) Your job allows you freedom to decide how you do your job
d) Your job requires that you do things over and over
e) Your job is very hectic
f) You are free from conflicting demands that others make
g) Your job security is good
h) Your job requires a lot of physical effort
i) You have a lot to say about what happens in your job
j) You are exposed to hostility or conflict from the people you work with
k) Your supervisor is helpful in getting the job done
l) The people you work with are helpful in getting the job done

MIN = 0, MAX = 48
Respondents 15 and over who were currently employed were asked to evaluate their work situation. The 12-item index, based on a larger pool of items from Karasek, reflects respondents' perceptions about various dimensions of their work including job security, social support, monotony, physical effort required and extent of participation in decision-making.

DVWSI194 - Derived work stress - sum of all items

0-45 INDEX SCORE
96 NOT APPLICABLE
99 NOT STATED

Higher scores indicate greater work stress.

11 - Self-esteem index

Sum of all items of ESTEEM-Q1

ESTEEM-Q1
a) You feel that you have a number of good qualities.
b) You feel that you're a person of worth at least equal to others.
c) You are able to do things as well as most other people.
d) You take a positive attitude toward yourself.
e) On the whole you are satisfied with yourself.
f) All in all, you're inclined to feel you're a failure.

MIN = 0, MAX = 24
The self-esteem index reflects the amount of positive feelings an individual holds about his/herself. Scores on the index are based on a subset of items from the self-esteem Rosenberg scale (1969). The six items factored into one dimension in the factor analysis done by Pearlin and Schooler (1978).

Respondents' answers are based on a 5 point scale:
0 = Strongly disagree
1 = Disagree
2 = Neither agree nor disagree
3 = Agree
4 = Strongly agree
(Scores was reversed for item F.)

DVESTI94 - Derived Self Esteem Scale - sum of all items

1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10
11 11
12 12
13 13
14 14
15 15

16 16
17 17
18 18
19 19
20 20
21 21
22 22
23 23
24 24
99 NOT STATED

Higher scores indicate greater self-esteem.

12 - Mastery index

Sum of all items of MAST-Q1

MAST-Q1
a) You have little control over the things that happen to you.

b) There is really no way you can solve some of the problems you have.
c) There is little you can do to change many of the important things in your life.
d) You often feel helpless in dealing with problems of life.
e) Sometimes you feel that you are being pushed around in life.
f) What happens to you in the future mostly depends on you.
g) You can do just about anything you really set your mind to.

MIN = 0, MAX = 28

The index which measures sense of mastery is based on the work of Pearlin and Schooler (1978). It measures the extent to which individuals believe that their life-chances are under their control.

Respondents' answers are based on a 5 point scale:

0 = Strongly agree
1 = Agree
2 = Neither agree or disagree
3 = Disagree
4 = Strongly disagree
(Scores were reversed for items F and G.)

DVMASI94 - Derived Mastery Scale - sum of all items

1 1
2 2

3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10
11 11
12 12
13 13
14 14
15 15
16 16
17 17
18 18
19 19
20 20
21 21
22 22
23 23
24 24
25 25
26 26
27 27
28 28
96 NOT APPLICABLE
99 NOT STATED

Higher scores indicate superior mastery.

13 - Sense of Coherence scale

Sum of SCOH-Q1 to SCOH-Q13

SCOH-Q1 How often do you have the feeling that you don't really care about what goes on around you?
SCOH-Q2 How often in the past were you surprised by the behaviour of people whom you thought you knew well?
SCOH-Q3 How often have people you counted on disappointed you?
SCOH-Q4 How often do you have the feeling you're being treated unfairly?
SCOH-Q5 How often do you have the feeling you are in an unfamiliar situation and don't know what to do?
SCOH-Q8 Many people -- even those with a strong character -- sometimes feel like sad sacks (losers) in certain situations. How often have you felt this way in the past?

SCOH-Q9 How often do you have the feeling that there's little meaning in the things you do in your daily life?
SCOH-Q10 How often do you have feelings that you're not sure you can keep under control?
SCOH-Q11 Until now your life has had no clear goals or purpose or has it had very clear goals and purpose?
SCOH-Q12 When something happens, you generally find that you overestimate or underestimate its importance or you see things in the right proportion?
SCOH-Q13 Is doing the things you do every day a source of great pleasure and satisfaction or a source of pain and boredom?

The 13-item version of the sense of coherence scale developed by Antonovsky was used in the NPHS. It denotes the extent to which individuals perceive events as comprehensible, manageable and meaningful. The concept of manageability is addressed in questions Q3, Q4, Q8, and Q10. Items Q1, Q9, Q11, and Q13 measure meaningfulness and items Q2, Q5, Q6, Q7, Q12 are related to the comprehensibility dimension.
Score was reversed for questions SCOHQ1, Q2, Q3, Q8, Q13

DVSCI94 - Derived Sense of Coherence Scale

4-78 INDEX SCORE
96 NOT APPLICABLE
99 NOT STATED

Higher scores indicate a stronger sense of coherence.

14 - Distress score

Sum of questions MHLTH-Q1A to MHLTH-Q1F

MHLTH-INTa Now some questions about mental and emotional well-being. During the past month , about how often did you feel:
MHLTH-Q1a ... so sad that nothing could cheer you up?
___ All of the time
___ Most of the time
___ Some of the time
___ A little of the time
___ None of the time
MHLTH-Q1b ... nervous?
MHLTH-Q1c ... restless or fidgety?
MHLTH-Q1d ... hopeless?
MHLTH-Q1e ... worthless?
MHLTH-Q1f During the past month, about how often did you feel that everything was an effort?

The items and scoring used to derive the distress score are based on the work of Kessler and Mroczek (from Michigan University). The index is based on a subset of items from the Composite International Diagnostic Interview (CIDI). The CIDI is a structure diagnostic instrument that was designed to produce diagnoses according to the definitions and criteria of both DSM-III-R and the Diagnostic Criteria for Research of the ICD-10.

DVMHDS94 2 Derived Mental Health - Distress Scale

0 0
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10
11 11
12 12
13 13
14 14
15 15
16 16
17 17
18 18
19 19
20 20
21 21
22 22
23 23
24 24
99 NOT STATED

Higher scores indicate more distress.

15 - Perceived social support index

Sum of all true responses from questions SOCSUP-Q3 to SOCSUP-Q6

SOCSUP-Q3 Do you have someone you can confide in, or talk to about your private feelings or concerns?
SOCSUP-Q4 Do you have someone you can really count on to help you out in a crisis situation?

SOCSUP-Q5 Do you have someone you can really count on to give you advice when you are making important personal decisions?
SOCSUP-Q6 Do you have someone that makes you feel loved and cared for?

The perceived social support index is composed of four items which reflect whether respondents feel that they have someone they can confide in, someone they can count on, someone who can give them advice and someone who makes them feel loved.

DVSSI194 - Derived Social Support Index

0 0
1 1
2 2
3 3
4 4
9 NOT STATED

A higher score indicates greater perceived social support.

16 - Average frequency of contact index

Based on SOCSUP-Q7A to SOCSUP-Q7H

SOCSUP-Q7A How often did you have contact with your parents or parents-in-law?
SOCSUP-Q7B How often did you have contact with your grandparents?
SOCSUP-Q7C How often did you have contact with your daughters or daughters-in-law?
SOCSUP-Q7D How often did you have contact with your sons or sons-in-law?
SOCSUP-Q7E How often did you have contact with your brothers or sisters?
SOCSUP-Q7F How often did you have contact with other relatives (including in-laws)?
SOCSUP-Q7G How often did you have contact with your close friends?
SOCSUP-Q7H How often did you have contact with your neighbours?

The average frequency of contact index measures the average number of contacts in the past 12 months with family members and friends who are not part of the household and with neighbours.

DVSSI394 = CONTACT /NETSIZE

CONTACT is an approximate value indicating the number of contacts for all categories (SOCSUP-Q7A to SOCSUP-Q7H).
NETSIZE is a combined value indicating the existence of possible persons to be contacted (sum of flags indicating 'yes' to parents, 'yes' to grandparents, etc.).

DVSSI394 - Derived average frequency of contacts

0 0
1 1
2 2
3 3
4 4
5 5
6 6
99 NOT STATED

A higher number indicates more contacts.

17 - Derived health description index

Based on GENHLT-Q1.

GENHLT-Q1 In general, would you say ... r/'s health is:
___ Excellent?
___ Very good?
___ Good?
___ Fair?

___ Poor?

DVGHI94 - Derived health description index

0 POOR
1 FAIR
2 GOOD
3 VERY GOOD
4 EXCELLENT

A higher score indicates better health.

(Statistics Canada, 1995)

APPENDIX B

The 5 Richardson-Zumbo Factors with Corresponding Indicator Loadings

1 - Physical Impairment Factor

Ind #		Loading
3	Health Status: Speech Attribute	.447
5	Health Status: Dexterity Attribute	1.0

2 - Mental Ill-Health Factor

6	Health Status: Emotion Attribute	.230
9	Adjusted Specific Chronic Stress Index	.657
12	Mastery Index	-.240
13	Sense of Coherence Scale	-.685
14	Distress Score	.665

3 - Mental Well-Being Factor

6	Health Status: Emotion Attribute	-.246
10	Work Stress Index	-.208
11	Self-Esteem Index	.838
12	Mastery Index	.565

4 - General Health Impairment Factor

1	Health Status: Vision Attribute	.257
2	Health Status: Hearing Attribute	.284
4	Health Status: Mobility Attribute	.437
7	Health Status: Cognition Attribute	.244
8	Health Status: Pain and Discomfort Attribute	.451
17	Derived Health Description Index	-.527

5 - Social Well-Being Factor

6	Health Status: Emotion Attribute	-.422
15	Perceived Social Support Index	.355
16	Average Frequency of Contact Index	.476

(Richardson and Zumbo, 2000, p. 183)

APPENDIX C: Correlations Between Dependent Variables

Dependent Variables	Health Utility Index	1 - Physical Impairment Factor	2 - Mental Ill-Health Factor	3 - Mental Well-Being Factor	4 - General Health Impairment Factor	5 - Social Well-Being Factor
Health Utility Index	1.000 n.s.					
1 - Physical Impairment Factor	-.301 **	1.000 n.s.				
2 - Mental Ill-Health Factor	-.403 **	.019 n.s.	1.000 n.s.			
3 - Mental Well-Being Factor	.379 **	-.024 n.s.	-.628 **	1.000 n.s.		
4 - General Health Impairment Factor	-.775 **	.280 **	.312 **	-.280 **	1.000 n.s.	
5 - Social Well-Being Factor	.518 **	-.114 **	-.566 **	.526 **	-.285 **	1.000 n.s.

Note. ** denotes correlation is significant at the $p < .01$ level, n.s. denotes that the test of the correlation was not statistically significant.

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