PORT COLBORNE

CHAP
COMMUNITY HEALTH
ASSESSMENT PROJECT

CHAP A Report

A Self-Reported Health Assessment of the Port Colborne Community (2003)

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CHAP A Report: Self-Reported Health Assessment

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ACKNOWLEDGEMENTS

This section will be completed upon finalization of this report.

ABBREVIATIONS

AD	Atopic Dermatitis
ADHD	Attention Deficit Hyperactivity Disorder
ANOVA	Analysis of Variance
AR	Allergic Rhinitis
BMI	Body Mass Index
BP	Bodily Pain (HRQOL)
CaMos	Canadian Multi-centre Osteoporosis Study
CBRA	Community-Based Risk Assessment
CCHS	Canadian Community Health Survey
CDC	Centers for Disease Control and Prevention
CF	Cystic Fibrosis
CFS	Chronis Fatigue Syndrome
CHAP	Community Health Assessment Project
CI	Confidence Interval
CoCs	Chemicals of Concern
COPD	Chronic Obstructive Pulmonary Disease
CP	Cerebral Palsy
EA	Enumeration Area
ECRHS	European Community Respiratory Health Survey
ETS	Environmental Tobacco Smoke
GEE	Generalized Estimating Equation
GH	General Health (HRQOL)
GSA	Geographic Study Area
HIN	Household Identification Number
HRQOL	Health-Related Quality of Life
IRB	Institutional Review Board
ISAAC	International Study of Asthma and Allergies in Childhood
MCS	Mental Component Summary Score
MCS	Multiple Chemical Sensitivity
MH	Mental Health (HRQOL)
MOE	Ontario Ministry of the Environment
NHANES	National Health and Nutritional Examination Survey
NLSCY	National Longitudinal Survey of Children and Youth
NPHS	National Population Health Survey
OR	Odds Ratio
PC	Port Colborne

PCS	Physical Component Summary Score
PF	Physical Functioning (HRQOL)
PLC	Public Liaison Committee
PPM	Parts per million
QID	Questionnaire Identifier
RE	Role Emotional (HRQOL)
RP	Role Physical (HRQOL)
SAS	Statistical Analysis System (software)
SEM	Standard Error of the Mean
SES	Socioeconomic Status
SF	Social Functioning (HRQOL)
SF-36	Medical Outcomes Study Short-Form 36
SRHQ	Self-Reported Health Questionnaire
VI	Vitality (HRQOL)

ORGANIZATION OF THE REPORT

This report presents the results of CHAP Study A, A Self-Reported Health Assessment of the Port Colborne Community (2003). This report has been divided into seven chapters. Chapters 3 through 7 all begin with a summary of the chapter's contents. Both the adult and child/adolescent questionnaires are discussed in each chapter.

Chapter 1, Introduction, provides background information on the CHAP series of integrated studies, the rationale and objectives of the present study, and the strengths and limitations of this study.

Chapter 2, Methods, describes the elements of the study design, including the development of a sampling frame, the recruitment strategy and the development of geographic study areas. Other components of this chapter include a description of the survey questionnaire, the details of data collection, entry, and storage and the security framework which surrounded this process. The general limitations that are implicated in this type of study are also introduced. The types of statistical analyses performed in the study are also briefly described.

Chapter 3, Survey Response, presents the socio-demographic characteristics of the participants. The overall response rates are also described in terms of representativeness. Limited demographic information on those who chose not to participate in the survey is also presented here.

Chapter 4, Profile of Participants, describes the profile of all participants based on a variety of characteristics, including demographics, residency in Port Colborne, socioeconomics and lifestyle. These characteristics, among others, are generally referred to as determinants of health, as they are widely recognized to be associated with current health status.

The results of this study are presented in four subsequent chapters. Each chapter addresses one of the four study objectives. A synopsis of the methods used in each analysis is provided after the summary and at the beginning of each chapter. A discussion of the results is provided at the end of each chapter (where appropriate).

Chapter 5, Health Status and Measures in Port Colborne, provides estimates of the prevalence of an extensive listing of health conditions and symptoms among adults and youth currently living in Port Colborne. The results are presented graphically by sex. Results by age group are described in the text. Detailed tables of the specific age and sex estimates are included in the appendix.

Chapter 6, The Health of the Port Colborne Community in Context, compares the prevalence of health outcomes presented in Chapter 5 with data from other survey populations. The findings in this chapter focus primarily on the ways in which the

health of Port Colborne is different than what may be expected based on evidence from other populations.

Chapter 7, A Closer Look Inside the Community of Port Colborne, examines whether there are differences in self-perceived health, quality of life, health conditions and associated symptoms across the study regions of Port Colborne. Specifically, the survey responses of participants from GSA 3 and GSA 4 were compared to those of participants from GSAs 1, 2 and 5. Additional analyses were conducted to compare how self-reported health status varied according to length of residence in GSA 3. Shorter-term residents were defined as having lived in GSA 3 for less than 20 years, and longer-term residents were defined as having lived in GSA 3 for more than 20 years.

Chapter 8, Sample Size for Case-Control Studies, presents the total number of cases that might be available for future case control studies if such studies are warranted. The identification of a suitable subset of individuals with selected conditions was one of the objectives of CHAP Study A.

Chapter 9, General Discussion, summarizes the study in terms of its strengths and limitations. The interpretation of the study results must be considered in light of these issues.

Chapter 10, Summary and Recommendations, provides a synopsis of the study results, in the context of the established limitations of the survey, as well as recommendations for future steps.

Executive Summary

Background

The city of Port Colborne, Ontario is located on the northern shore of Lake Erie with a population of approximately 18,500 residents. Soil sampling conducted in the city by the Ontario Ministry of the Environment has found elevated levels of four chemicals of concern (CoCs): nickel, arsenic, cobalt and copper. This contamination has been attributed to the operation of an INCO nickel refinery between 1918 and 1984. Although a previous Ministry of the Environment report suggested that it is unlikely the observed levels of contamination could affect the health of Port Colborne residents, no study has directly evaluated the health of all residents. Continued community concerns about the potential human health effects resulting from this contamination led to the development of the Community Health Assessment Project (CHAP), an integrated series of health assessment studies. In this report, we discuss the findings of a general health survey in which all current residents of Port Colborne were invited to participate.

Research objectives

The objectives of this study were to 1) characterize the health of the community of Port Colborne, 2) compare the health of Port Colborne residents to a normative population, 3) explore differences in health between regions of Port Colborne defined by measured soil contamination levels, and 4) identify a subset of individuals for possible future case-control studies. The design features of the case-control studies would better permit an evaluation of the potential association between exposure to the CoCs and human health.

Study Design and Methods

This study is a cross-sectional survey that targeted all individuals who were resident in Port Colborne in 2003. Packages containing both adult and child/adolescent questionnaires were mailed to each household on the sampling frame. Each member of the household was invited to participate, with adult members being asked to complete the questionnaires on behalf of children/adolescents who lived in the same dwelling. The adult questionnaire collected information about socio-demographic characteristics, lifestyle behaviours (such as smoking, alcohol use and obesity), place of current residence, length of residence in Port Colborne, occupational information and impressions about the community. The adult questionnaire also included a series of questions related to health status (SF-36), lifetime prevalence for many health conditions and symptom data for selected health conditions. Similarly, the child/adolescent questionnaire collected information about health status, respiratory health and other health conditions.

There were a total of 7,576 households on the final sampling frame. Of these households, 44.7% completed at least one questionnaire. Using available Canadian census data for Port Colborne, we estimated the response rates for adults and children/adolescents to be 41.6% and 35.1%, respectively. Our findings are based on responses from 7,379 individuals (5,983 adults and 1,396 children/adolescents).

Health of the Port Colborne community

Overall, nearly 80% of participants rated their health as being "good" to "excellent". As expected, there were some sex and age-related differences in perception of health, Health Related Quality Of Life and the prevalence of some health conditions.

Health of the Port Colborne community in context

Compared to the general population of Ontario, adult participants were more likely to perceive their health as 'poor' and to score lower on Health Related Quality Of Life measures (SF-36). Many of the participants' responses to questions related to medical health status were compared to Ontario population data from the Canadian Community Health Survey (see listing of odds ratios below). Unlike the Ontario data, which measured whether participants 'currently have' a given condition (point prevalence), the survey participants were asked whether they had ever had the condition (lifetime prevalence). No known current Canadian lifetime prevalence data were available for comparisons. This difference in wording has implications for the interpretation of the comparisons. Estimates of lifetime prevalence are higher than estimates of point prevalence. Thus, although adult Port Colborne participants were more likely to report several physician-diagnosed conditions, which included asthma, chronic bronchitis, cancer and some cardiovascular, digestive, musculoskeletal, endocrine and rheumatic conditions, it is probable that these reports overestimate the true difference between the two populations.

Parents in Port Colborne were more likely to perceive their children's health as 'poorer' in comparison to reference populations (National Longitudinal Study of Children and Youth Ontario and others). Compared to Ontario data from the National Longitudinal Study of Children and Youth Ontario, participants in Port Colborne were more likely to report that their children had been diagnosed with asthma and experienced some but not other asthma-related symptoms, but there were no differences in the reporting of dermatological symptoms (compared to aggregate International Study of Asthma and Allergies data).

A closer look inside the Port Colborne community

Lifestyle behaviours varied by study region within Port Colborne; residents in the geographical area surrounding the nickel refinery (GSA 3) were more likely to report characteristics potentially associated with poor health (e.g., cigarette smoking and

passive smoke exposure, alcohol use, lower income and obesity). Residents of GSA 3 were more likely to perceive their health as 'poor' and scored lower on self-reported Health Related Quality of Life measures. There was a higher prevalence of self-reported symptoms of asthma, eczema and contact allergy, chronic fatigue syndrome and hypothyroidism in GSA 3 residents relative to other areas (GSAs 1, 2 and 5), but no difference in self-reported physician-diagnoses of the related conditions (e.g., asthma, chronic bronchitis, eczema, contact allergy and hypothyroidism) or most cardiovascular conditions. There were significant regional differences in self-reported diabetes, arthritis, multiple chemical sensitivities, ulcers, peripheral neuropathy and birth defect. In addition, longer-term residents (>20 years) of GSA 3 were more likely to report hyperthyroidism, chronic fatigue syndrome, multiple chemical sensitivities, diabetes, arthritis, high blood pressure, peripheral neuropathy, migraines, ulcers and cancer (excluding skin cancer) relative to those who had never resided in GSA 3 (see listing of odds ratios below).

Identification of subjects for possible case-control studies

The numbers of individuals who reported either having or not having selected diseases, and consented to being contacted for the purposes of possibly participating in future research are provided in Chapter 8.

Study limitations

The findings from this study must be interpreted cautiously due to a number of limitations. This study cannot determine, and was not designed to determine, any causal relationship between potential exposure to contamination and health status. Due to the low response rate, the sample of participants who responded to the survey may not be representative of the general Port Colborne population. Individuals who had health problems may have been more likely to respond to the survey, leading to an overestimation of disease prevalence. Because self-reported disease status was not confirmed using objective measures, the reported prevalence of health conditions may not correspond to actual disease prevalence. Individuals who are aware of the concern surrounding CoC contamination may be more likely to report symptoms and conditions than those who were not aware of the issue or who did not have concerns surrounding their place of residence. Although adjustments were made for some risk factors, not all of the potential risk factors associated with specific diseases were assessed, and regional differences in disease status may be due to differences in these underlying risk factors rather than to CoC contamination.

Conclusions

- The study design precludes a determination of a cause and effect relationship between potential CoC exposure and health status.
- There are uncertainties with respect to generalizing the results from the participants to the community of Port Colborne due to lower than expected response rates.
- While cancer is an important health outcome among residents, this study is poorly equipped to evaluate patterns of cancer incidence in Port Colborne or between regions because it relies on self-reported measures of prevalence. Further, since cancer has a high mortality rate, only a study that measures the history of cases can attempt to understand the patterns of disease in the community.
- Due to differences in the type of prevalence estimated by this study and those of comparison populations (lifetime vs. current), it is difficult to determine whether the prevalence of health conditions among Port Colborne residents differ from prevalence reported for the Ontario population with regard to specific health conditions.
- Comparisons across regions of Port Colborne show that more residents of GSA 3 reported a number of symptoms for many health conditions, but differences were not observed for the reporting of conditions associated with these symptoms. Regional differences were observed for an assortment of other health conditions.

Recommendations

Given the self-reported nature of the questionnaire and the fact that no objective assessment of disease was performed, for conditions where differences were noted, further research would be required to validate the diagnosis and explore whether there is any association to the CoCs. Biological tests would be needed to quantify the level of CoCs in the participants. These research questions could be answered with case control studies that would be designed specifically for such purposes. That is, to assess the relationship between exposures to the CoCs, as measured by characterization of lifetime exposure and levels in biological fluids or materials and medically confirmed health outcomes.

The SRHQ was not designed to address elevations in cancer rates. Because cancer ranked as the highest disease of concern to the community, a study comparing the rates of cancer incidence and mortality in Port Colborne residents to a suitable referent population is recommended to more fully understand patterns of recent and past cancer occurrence in the community. The proposed study outlined in Protocol D of the CHAP permits an historical examination of this question involving both current cancer victims and those who have died from the disease.

Odds ratios estimated from comparisons of disease prevalence			
Condition or Symptom	**Port Colborne vs. Ontario**	**GSA 3 vs. GSAs 1, 2, and 5**	**GSA 3 Resident of >20 years vs Never Resident**
Respiratory conditions			
Asthma (current)	**1.13 (1.06, 1.21)**	0.88 (0.65, 1.21)	1.07 (0.76, 1.51)
Chronic bronchitis	**3.48 (3.26, 3.72)**	1.19 (0.90, 1.58)	1.28 (0.97, 1.69)
Nasal allergies / Hay Fever	not available	0.92 (0.75, 1.13)	1.08 (0.89, 1.33)
Emphysema	0.88 (0.74,1.05)	not available	1.27 (0.78, 2.05)
Sinusitis	0.88 (0.74,1.05)	not available	1.27 (0.78, 2.05)
Rhinitis	not available	1.12 (0.87, 1.45)	1.24 (0.96, 1.60)
Skin conditions			
Eczema	not available	1.00 (0.73, 1.37)	1.24 (0.89, 1.73)
Contact dermatitis	not available	0.94 (0.60, 1.49)	1.48 (0.96, 2.26)
Psoriasis	not available	1.00 (0.69, 1.43)	1.17 (0.81, 1.69)
Rosacea	not available	0.58 (0.36, 0.94)	0.98 (0.64, 1.50)
Endocrine and musculoskeletal / rheumatic conditions			
Thyroid problem	**1.70 (1.58, 1.83)**	0.93 (0.69, 1.26)	**1.40 (1.05, 1.87)**
Hypothyroidism	not available	0.91 (0.63, 1.31)	1.30 (0.92, 1.86)
Hyperthyroidism	not available	1.06 (0.59, 1.91)	**1.90 (1.11, 3.27)**
> 5 Hypothyroid symptoms	not available	**1.65 (1.34, 2.03)**	**1.67 (1.32, 2.10)**
Chronic fatigue syndrome	1.19 (0.99, 1.42)	1.10 (0.51, 2.37)	**3.46 (1.73, 6.93)**
8 Chronic Fatigue Syndrome symptoms	not available	**2.14 (1.38, 3.33)**	**1.88 (1.07, 3.30)**
Multiple chemical sensitivities	1.09 (0.94, 1.26)	1.23 (0.72, 2.11)	**2.10 (1.24, 3.57)**
Diabetes	**1.29 (1.19, 1.40)**	1.05 (0.75, 1.47)	**1.49 (1.10, 2.01)**
Arthritis or rheumatism	**1.19 (1.13, 1.25)**	1.13 (0.92, 1.40)	**1.38 (1.11, 1.72)**
Cardiovascular conditions			
High blood pressure	**1.91 (1.83, 1.99)**	1.03 (0.84, 1.27)	**1.35 (1.09, 1.67)**
Heart disease	0.83 (0.77, 0.90)	1.12 (0.79, 1.59)	0.96 (0.69, 1.34)
Heart attack	**1.19 (1.04, 1.38)**	1.00 (0.65, 1.52)	0.86 (0.56, 1.30)
Angina	**2.33 (2.01, 2.69)**	1.25 (0.91, 1.72)	1.07 (0.78, 1.47)
Congestive heart failure	**1.46 (1.25, 1.72)**	1.45 (0.92, 2.28)	1.18 (0.74, 1.90)
Digestive disorders			
Stomach or intestinal ulcers	**2.66 (2.51, 2.83)**	**1.53 (1.18, 1.99)**	**1.72 (1.32, 2.25)**
Gastroenteritis	not available	1.37 (0.85, 2.22)	1.60 (0.99, 2.57)
Jaundice	not available	0.97 (0.63, 1.50)	1.18 (0.73, 1.92)
Food allergies	**1.27 (1.19, 1.35)**	**0.66 (0.46, 0.95)**	0.95 (0.67, 1.36)
Bowel disorder	**1.41 (1.30, 1.54)**	1.20 (0.80, 1.78)	0.99 (0.65, 1.52)
Neurological conditions			
Migraines	**1.72 (1.64, 1.80)**	1.17 (0.92, 1.50)	**1.34 (1.03, 1.74)**
Peripheral neuropathy	not available	**1.46 (1.10, 1.95)**	**1.49 (1.10, 2.03)**
Cancer			
All cancers	**3.59 (3.38, 3.82)**	1.13 (0.57,1.52)	1.16 (0.88, 1.53)
Additional conditions			
Glaucoma	**1.56 (1.42, 1.73)**	1.09 (0.72, 1.66)	1.18 (0.80, 1.75)
Urinary incontinence	**1.43 (1.32, 1.56)**	1.33 (0.93, 1.92)	1.38 (0.96, 1.99)