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Researching income and income distribution as determinants of health in Canada: gaps between theoretical knowledge, research practice, and policy implementation

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Abstract

The research identified gaps in Canadian knowledge and research activity concerning the roles that income and its distribution play in Canadians' population health. 241 Canadian research studies on income and health were considered along eight taxonomies: conceptualization of income or its proxies; theoretical underpinnings; income distribution measures; health measures; who/what was studied, pathways mediating between income and health; complexity of these pathways; research design; and presence of policy implications. The study identified the following areas of weakness: (a) poor conceptualization of income and the means by which it influences health; (b) lack of longitudinal studies of the impact of income-related issues upon health across the life-span; (c) lack of linked data bases that allow complex analyses of how income and related issues contribute to health and well-being, and (d) little inter-disciplinary work in identifying pathways mediating the income and health relationship. Advances in health policy to address the health effects of income and its distribution requires a research infrastructure that draws upon recent theoretical developments in the area and is able to access data sources to test these advanced conceptualizations.

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1. Introduction

Tremendous strides are being made in understanding how the organization of societies influences the health of their members. Foremost among these char-

acteristics is how a nation, region, or municipality chooses to distribute income and wealth among its members. In many European nations, income adequacy is a basic component of national and regional health policy [1]. In other Western industrialized nations such as the USA, Australia, and Canada, such concerns are of lower priority [2,3]. Recognising the importance of income adequacy and income distribution as health de-

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terminants, health researchers in Canada frequently include these factors in their research. But how do researchers conceptualize income as influencing health? Is income simply an indicator by which individuals can be made targets of health promotion interventions, because poor people tend to have poorer health status and health habits? Or is income and its distribution an issue to which governments concerned with creating health policy should direct their attention, because there is something inherently health-determining in absolute and relative material deprivation [4]?

Canada has been a leader in conceptualizing societal determinants of health such as income and its distribution [5]. Concepts developed by the Canadian Institute for Advanced Research, Health Canada, and the Canadian Public Health Association – as three examples – have influenced policy developments around the world [6]. But there is increasing evidence that Canada is failing to apply its own population health concepts in health research [7]. There is also concern Canada has fallen well behind other nations in applying research findings related to income and its distribution towards policy development [8]. The result is a deteriorating public policy environment that increasingly focuses on “lifestyle” and biomedical approaches to understanding and promoting health [9].

These issues were recognized by the Institute of Population and Public Health (IPPH), a major funding agency for health research in Canada. In response to an IPPH call for analyses of how Canadian researchers were responding to emerging health research and health policy needs, we carried out an environmental scan and analysis of how income is considered in health research. We compared these findings to exemplary studies on income and health from two nations identified as having advanced policy agendas concerning income and health: UK and Finland [10]. Our findings present a surprising view – considering Canada’s reputation as a leader in population health and health promotion concepts – of the current state of Canadian research infrastructure, conceptualization, and policy application of research findings.

Our findings and analysis have implications for others. For nations with less-developed health research infrastructures, our results identify what is needed to carry out research that identifies the role factors such as income, class, and socioeconomic position play in determining health. For those with more-developed re-

search infrastructures, findings illustrate that research concepts and applications can easily deteriorate into a focus on limited lifestyle and biomedical issues. Our conceptualization of differences in models of health determinants, and the role of income within them, can assist others in designing or interpreting the results of their own local health research activities.

2. Background to the study

This research was part of an IPPH initiative to identify gaps in knowledge of “contextual factors” that influence population health. The initiatives funded included housing, social assistance and workplace environments in addition to income. Our focus on income was especially timely in light of three developments: (1) the increasing international focus on the health effects of income and its distribution [11] (2) the growing inequality among Canadians of income and wealth [12], and (3) evidence that in many Canadian jurisdictions, public health is retreating into increasing reliance upon lifestyle and biomedical approaches to understanding and promoting health [9].

While income is a key determinant of health in many health research agendas, it is frequently simply seen as one of many individual-level risk-factors for disease [13]. Such approaches rarely produce policy implications concerned with the distribution of social and economic resources, but are usually concerned with urging – or coercing – individuals to effect healthy lifestyle changes [14]. Considering the increasing evidence that many behavioural risk-factors account for little variance in health outcomes, and findings that behavioural change programs may be especially difficult to implement with at-risk populations, the application of more complex conceptualizations could be expected [15,16]. These approaches would consider the differential exposures associated with income differences as well as how these effects result from societal distribution of resources among the population [17–19]. There would be focus on structural aspects of society that include social class, hierarchy, and the organization of immediate horizontal structures of society, as well as more distant vertical structures that influence income and resource distribution within a society. This would be important to consider as these structures affect the distribution of general and disease-specific health outcomes amongst

Table 1

Taxonomies employed in the analysis of Canadian studies on income and health

Conceptualizing income or proxies: What is the justification for including income in the study?
Theoretical underpinnings: What structures mediate the income and health relationship?
Income measures: How is income or its proxies measured?
Outcome measures: How is health measured?
Study samples: Who or what phenomena are being studied?
Pathways: What pathways are presented to explain the income and health relationship?
Complexity of pathways: How sophisticated are the pathways presented?
Research design: What is the methodology used to study the income and health relationship?
Implications for policy: What types of policy implications do the researchers present?

different population groups [20–22]. What then, is the state of Canadian health research in regards to income, its distribution, and related health effects?

3. Methodology

We identified the total population of 241 Canadian studies from 1995–2002 that applied any one (or more) indicator of income, income distribution, socioeconomic status, poverty status, or other related measures to explain the health outcomes of individuals or populations. Health outcomes included direct indicators of health such as self-rated health, quality of life, morbidity or mortality, or determinants of health such as employment status, child development indicators, child's school performance, or food security.

Research in community health, economics, medicine, nursing, political science, population health, psychology, public health, social policy, social work, sociology of health, and social work were reviewed. Studies were collected from academic journals, research institutes and funding agencies. National funding institutes provided lists of publications and funded research. Several institutions and researchers were contacted to identify health-related research that included income and its distribution. The search strategy is appended as an Appendix. Each study was reviewed and coded for a number of conceptual and methodological taxonomies. Table 1 provides these dimensions. Fifty Canadian studies (20% sample) were rated for each of these eight categorical taxonomies

among three raters. There was a 72% inter-coder agreement. Sources of any disagreements in rating were identified and resolved in discussion with the principal investigator (DR). The conclusions reached were then applied to the remaining studies. The Results section describes the taxonomies and provides findings.

4. Results

4.1. Conceptualizing the Income and health relationship

We observed a spectrum of approaches towards specifying the income and health relationship, ranging from narrow and simple approaches to the broad and complex. At one end of the spectrum, health researchers simply noted the association between income and health measures without providing any explicit rationale for including income as a relevant variable. At the other end of the spectrum, health researchers provided complex, usually causative models, with extensive rationales as to why income is relevant to health. There are three dominant causative models for understanding the 'why' of the income and health relationship: materialist, neo-materialist, and social comparison [21,23].

4.1.1. Materialist models—individual income as a determinant of health

The materialist explanation for the income and health relationship is that individuals of differing incomes are exposed to varying degrees of positive and negative exposures to health risk-factors/conditions over the course of their lifetimes. These exposures accumulate to produce positive or negative health outcomes. The findings of steeped differences among social classes and incomes groups results since: “[T]he social structure is characterized by a finely graded scale of advantage and disadvantage, with individuals differing in terms of the length and level of their exposure to a particular factor and in terms of the number of factors to which they are exposed” ([24], p. 102).

4.1.2. Neo-materialist approach—individual income and social infrastructure as determinants of health

Many jurisdictions with inequitable income distributions show poorer population health. These jurisdic-

tions have both greater numbers of people with low incomes and also invest less resources in public infrastructure, in addition to the greater incidence of poverty that is typical of unequal jurisdictions: “[T]he effect of income inequality on health reflects a combination of negative exposures [to risk-factors/conditions] and lack of resources held by individuals, along with systematic under-investment across a wide range of human, physical, health, and social infrastructure” ([23], p. 1202).

4.1.3. Social comparison approach—hierarchy and social distance as determinants of health

In this approach, health effects related to income are not primarily due to material deprivation, but rather to citizens’ interpretations of their standings in the social hierarchy [25]. That is, psychosocial effects of perceived position in the hierarchy produces stress and poor health. These perceptions can also lead to individuals taking on additional employment responsibilities (‘keep up with the Joneses’) that threaten health, and coping behaviours such as overeating and use of alcohol and tobacco. At the communal-level, the widening and strengthening of hierarchy weakens social capital and social cohesion. Increasing distrust and suspicion of others weakens support for communal structures such as education and social service systems, thereby weakening population health.

4.1.4. Materialist/social comparison approaches—combinations of social comparison and materialist theorizations

Researchers can also draw upon all three sets of conceptualisations in their work (Table 2).

4.1.5. Findings

Of the 241 Canadian studies reviewed, approximately two thirds had no explicit theoretical conceptualization of income as an influence on health. Of those that made explicit their theoretical basis for using income as part of their study, materialist and neo-material conceptualizations were most common.

4.2. Theorizing mechanisms that mediate the income and health relationship

A related dimension is how researchers identify specific mechanisms by which income and health come to be related. Individualistic analyses focus upon the income-related characteristics of individuals and how these are associated with health. These may be educational levels, occupational classification, personal indicators of control and empowerment, or attitudes and values. An individual perspective limits consideration to individual risk-factors with little, if any, mention of structural issues.

Structural approaches consider how horizontal, vertical, or both kinds of structures mediate the income and health relationship. Horizontal structures, for example, could be examined to see how neighbourhood characteristics interact with an individual’s income to influence health. Income would be related to an individual’s ability to gain employment, access services, or provide a safe environment. Similarly, a neighbourhood with many low-income people may have low levels of social capital or community psychosocial resources, such as organizations that work to build social cohesion within the residents of a community.

Table 2
How Canadian studies conceptualize the income and health relationship ($n = 241$)

Concept	Description of conceptualization	%
Social comparison	Level in the hierarchy determines health through individual processes of social comparison	1
Materialist	Socioeconomic indicators such as income, wealth, educational attainment and occupational group serve as indicators of material advantage that accumulate over the life-span	19
Neo-materialist	Degree of income inequality at a specified geographic level is related to health via inter alia expenditure on public goods such as health insurance, social welfare, supports for the unemployed and those with disabilities	12
Combined conceptualization	Combination of social comparison and materialist conceptualizations.	4
No concept explicated		64

Table 3
How Canadian studies theorize the mechanisms mediating the income and health relationship ($n = 241$)

Theorizations	Description of theorization	%	
Structural/organizational	Theory relates to exogenous social forces (external to the individual)	Horizontal and vertical structures: studies that theorize community issues within a vertical or broader social framework	14
		Horizontal structures: e.g., community issues/local structures/cohesion/social capital	16
		Vertical structures: government policies, resource allocation, income distribution, political ideology, policies related to unionization density, and other structural issues	10
		Theory is exogenous but general and implicit	21
Individualistic	Theory relates to endogenous factors (specific to the individual—e.g. behaviors, genetics). This could also include research on “risk groups”—e.g. people who smoke	21	
No theory explicated	Strictly empirical, offers no theoretical constructs for the income and health relationship	18	

Vertical structures would be the political, economic, and social forces that determine how income and other resources are distributed to individuals, thereby affecting health. Focus on employment, training, income, social welfare or tax policies within a jurisdiction would constitute such an analysis. Table 3 shows how Canadian researchers theorize the mechanisms mediating the income and health relationship. An implicit structural approach is where structural factors are discussed, but done in a broad and diffuse way.

4.2.1. Findings

Less than half of Canadian studies offer explicit structural theorizations of the income health relationship. The predominant approaches are individualistic, implicit (diffuse) or no theorization of the income and health relationship. Most studies do not consider the interrelationships between health status and structural issues such as working conditions, employment status, family or housing conditions, or the political, economic, and social environments that create these conditions.

4.3. Income and income proxy measures

The measurement of income or its proxies reflects the theoretical frameworks within which the income and health relationship is conceptualized and researched.

4.3.1. Overall distribution of income at a population level

Studies can consider the overall distribution of resources – usually income – within a population such as a nation, state/province, region, city, or community. Measures include the Gini coefficient, Theil, and the Robin Hood Index (see [26] and [10] for discussion of these indices). Researchers may also choose to calculate the percentage of income attained by a particular proportion of the population, e.g., lowest 50%. The focus on these sorts of indicators has been stimulated by the income inequality hypothesis that income inequality within a jurisdiction in economically advanced countries is a determinant of population health.

The three schools of thought described above have different explanations of why income inequality may be related to health. The materialist school argues that unequal jurisdictions have more people at the lower end of the income distribution where income plays a greater role in health. The neo-materialist school argues that these jurisdictions not only have greater numbers of lower income people, but also invest less in social infrastructure thereby creating poorer population health. The social comparison school argues that the primary issues are hierarchy and lack of social cohesion. In unequal jurisdictions, perceived lower position in the hierarchy creates health-threatening responses and creates environments that

weaken social cohesion and social support. A recent review of these various conceptualizations is available [27].

4.3.2. Ecological or aggregate area-level measures

Here, income or its proxies are treated as area measures. These include neighbourhood/metropolitan median income, area unemployment rates, average education level attained, average occupational class, average number of owner occupied dwellings, among others. These also include area poverty indicators. Poverty is frequently defined internationally as income less than 50% of the jurisdictions' median income and one criterion is to calculate the percentage of a population in poverty in a jurisdiction. Other poverty calculations are possible. Ecological measures are useful for assessing contextual effects that accrue in addition to effects associated with individual characteristics. Although not preferred, use of aggregate data becomes necessary if individual-level data is not available.

4.3.3. Individual assessment of income

Income of individuals – or their families – is the focus. Individuals classified into groups based on their income levels have their health status compared. Individuals can be classified by an absolute criteria such as income less than \$10,000, \$11–\$15,000, \$16–\$20,000, etc. Individuals can be placed into income quintiles, deciles, or other indicator such as high, medium, or low income, as determined by the researcher. Income level can be based on individual income, household income, market income, pre-tax income, or post-tax transfer income. Distinctions can be made between employment or transfer income.

4.3.4. Individual assessment on a non-income but related indicator

Individuals can be classified on a non-income category such as social class, occupational grouping, employment status, or education level. Health status is then assessed as a function of the group to which the individual has been allocated. These alternative measures frequently serve as proxies for income but can also allow for more complex conceptualization of how social class structure or educational opportu-

nities create differential exposures to material conditions.

4.3.5. Individual poverty measures—relative and absolute

Internationally, poverty is usually defined as income less than 50% of a jurisdiction's median income. Those so classified have their health status compared to others. A Canadian example of a relative measure of poverty is the Statistics Canada Low Income Measure (LIM), calculated as 50% of median family adjusted for family size and composition [28].

The Statistics Canada low income cut-off (LICO) measure is a measure of adjusted absolute poverty. This measure calculates the percentage of income an average family spends on necessities—that is, food, clothing, and shelter. It then establishes the point at which a family spends 20% points more on these, adjusted for family and community size [29]. Human Development Resources Canada's Market Basket Measure is an absolute measure of low income and assigns costs to a basket of goods and services – including food, shelter, clothing, and transportation – and incorporates a multiplier to cover other necessities [30]. This measure has just been released; few if any studies have applied it. Table 4 shows how Canadian researchers measure income and its proxies.

4.3.6. Findings: income distribution

Only a few Canadian studies examine the distribution of income within an area.

4.3.7. Ecological measures

About one-in-five Canadian studies apply ecological measures alone or in combination with other measures. Average income or its proxy (e.g. socioeconomic status, education levels, etc.) is more frequently applied than ecological poverty measures. Canadian studies probably rely on ecological measures since few available data sets link income and other socioeconomic measures to individual mortality and morbidity data.

4.3.8. Income group measures

The most common Canadian approach to studying the income–health relationship is to group individuals on the basis of absolute income into sets of a whole such as deciles, quintiles, or quartiles or other such

Table 4
How Canadian researchers measure income, income distribution and income inequality, and employ income proxies ($n = 241$)

Term	Description of income or related measures	%	
Individual measures	(a) Income group only	Income of individuals is the focus of measurement. Income is measured as income groupings such as quintiles, deciles, or other grouping such as high medium or low income	10
	(b) Other group only	According to where individuals fall within various social class groupings, such as employment grade, employment status, occupational class, educational level and housing tenure	3
	Combined (a) and (b)	Use of multiple individual indicators	37
	LICO-type	Adjusted absolute measure used to identify individuals	4
	Selection variable	Income used as a selection variable to study aspects of health and well-being, e.g. eating habits of low-income people	13
Ecological or aggregate measures	Income distribution measures	Overall distribution of income at a population of either nations, states/provinces/regions, cities, communities, or neighborhood/metropolitan area	3
	Ecologic income group only	Income is measured as an area measure. It may be the median or average income, or percentage of individuals identified as being in poverty within an area or jurisdiction	7
	Ecological other group only	A measure other than income is used as an area measure. Can be median, average, or percentage of individuals residing within a jurisdiction with particular levels of education, class status, or housing tenure rates	1
	Ecological poverty measures only	Relative poverty measure such as statistics Canada income adequacy and low income measure (LIM) e.g. % <50% median income	0
		Adjusted absolute measure such as the Statistics Canada Low Income Cut-Off (LICO) measure, e.g. % <LICO	1
Ecological combination	Measures of both income and other group measure	6	
Combinations	Individual income and individual poverty measures		8
	Ecological income and poverty measures		3
	Ecological income and individual income		6

measures (e.g. high versus low income). Studies frequently combine income with additional measures of socioeconomic status.

4.3.9. Other group measures

These usually involve occupational status or employment grade. Canadian researchers usually use such measures in tandem with another income measure. These measures are rarely used alone or as proxies for income in Canadian research.

4.3.10. Poverty measures

About one quarter of Canadian studies look at low-income populations, and most use adjusted absolute measures of poverty such as the LICO.

4.3.11. Health outcomes

Social/community outcomes include a wide range of indicators. Morbidity measures are about incidence of expert-identified disease. Mortality measures are concerned with death rates. Methodological studies try out a new measure or examine comparative measures (Table 5).

4.3.12. Findings

The majority of Canadian studies use physical morbidity measures. But there is also wide use of measures of social community measures. Researchers frequently apply health care utilization, and lifestyle indicators. Very few studies are able to link income-related measures to mortality, a distinct weakness apparent in Canadian health research.

Table 5
Health outcome measures used in Canadian studies ($n = 328$)^a

Term	Description of health outcome measures	%	
Health status	Social/community	Community belonging, employment patterns, family functioning/status, child behaviour/development (school performance), access to resources/food insecurity/literacy, quality of life, etc.	20
	Morbidity: mental health	Chronic mental health conditions/psychological well-being, social support or isolation, affective disorders, work-related stress, suicide rates/survival time after suicide, eating disorders	16
	Morbidity: physical health	Illness or disease state, reported symptoms, measures of restricted activities, physical functioning, self assessed health, etc.	35
	Mortality	Life expectancy, premature mortality, SMRs, infant mortality, etc.	12
Health Care utilization	Equity and access to services, utilization of hospitals, physician, specialist services, insurance, prescription drugs	26	
Others	Methodological studies	10	
Lifestyle/behaviour	Prerequisites to health: beliefs, attitudes and value	3	
	Diet, alcohol, physical activity, smoking, etc.	15	
Studies that used more than one type of health outcome measure		22	

^a More than one type of measure applied in 52 of 241 studies.

5. Who or what phenomena are being studied and what data sets are being used?

5.1. Unit of analysis

The availability of carefully collected data sets allows for the analysis of the income and health relationship at the individual level. When such data are unavailable, area-level ecological analyses using income, socioeconomic status, or employment levels collected from census data are used (Table 6).

Table 6
Unit of analysis used in Canadian studies of income and health ($n = 260$)^a

Unit of analysis	Description of unit of analysis	%
Individual	Studies that look at only individuals	58
Household	Studies that use the family as unit of comparison	20
Community	Ecological studies of areas	29
Province	Province wide comparisons	7
Nation	Nation wide comparisons	2
More than one unit used		6

^a More than one type of unit studied in 15 of 241 studies.

5.1.1. Findings

The most common unit of analysis for research is the individual. Canadian researchers also apply household measures. Researchers often analyze individual census data aggregated to neighbourhoods. The provincial level of analysis is rare and there are three studies where the nation is the unit of analysis. Only a few studies use more than one unit of analysis. Approximately a quarter of the studies focused on children and youth and two in three focused on adults and older persons. Only 10% looked specifically at the whole population and even fewer studies focus on low-income populations.

5.2. Pathways by which income affects health

How does income get “under the skin” to influence health? How does income come to be related to health? How do income differences come about in the first place? These are questions about pathways between cause and effect. Biological pathways are the physiological mechanisms that researchers use to show how income gets “under the skin” to influence health. Materialist analyses describe how differences in income lead to differential exposures to health damaging or health

Table 7
Pathways outlined as responsible for the income and health relationship ($n = 406$)^a

Pathway	Description of pathways	%
Biological	Make up of the individual, e.g., genetics, physiological processes, characteristics of individual such as age, gender, family history	10
Materialist	Impact of elements of the individual's environment, e.g. hazards at work, housing quality, exposure to pollutants, impact of unemployment or employment status on ability to purchase goods	33
Social class	Social class/group, ethnicity, educational attainment, occupational group	29
Psychosocial stress	Stress, depression, anxiety, lead to disease or related health outcome	22
Psychosocial comparison	Emotional response caused by individual comparison and experience of relative deprivation	4
Behavioural/risk-factor	Smoking, drinking, exercise, general lifestyle	28
Gender analysis	A description of why or how an individual's gender influences their health status; usually but not always oriented to females	13
Political–economic analysis	An analysis based on the point of view that it is the societal structures (e.g., neo-liberalism, global economy, racism, welfare state decline, privatization, sexism, lack of access to education) that creates inequalities	22
More than one pathway applied		44
No pathways indicated		29

^a More than one type of pathway presented in 106 of 241 studies. No pathways explicated in 70 of 241 studies.

enhancing elements in living and working conditions. Psychosocial pathways are the explanations related to either the experience of belonging to a particular social class or the experiences of stress associated with differing levels of income and how these come to be related to health.

Behavioural/cultural explanations focus on health-related behaviours associated with particular income levels. Gender analyses examine how gender mediates the income and health relationship. Political–economic analyses are about the political, economic, and social forces that influence income and income distribution and the societal structures that mediate the income and health relationship.

5.2.1. Findings

Close to a third of Canadian studies do not explicate any pathways. The most common pathways applied are materialist, class-related (cultural), behavioural risk-factor, and stress-related. More than one-in-ten studies apply some form of gendered analysis focused on division of labour in the workforce and the home. About one-in-five apply a political/economic analysis to consider the relationship between income and health (Table 7).

5.3. Complexity of identified pathways

The research team provided a rating as to each study's degree of sophistication in specification of pathways. Sophisticated were those studies that drew upon the latest developments in income and health research, and specified the interconnected nature of pathways. Undeveloped ratings were for those studies that simply noted the relationship with virtually no explication of the means by which income leads to health outcomes. Intermediate ratings were for those studies that noted the relationship and provided a cursory explication of pathways (Table 8).

Table 8
Sophistication of pathways presented as explaining the income and health relationship ($n = 241$)

Level	Description of criteria	%
Sophisticated	Explicit conceptualizations of causal relationships and interconnectedness of pathways	20
Intermediate	Identifies pathways but has little explanation of causal relationships and interconnectedness	45
Undeveloped	No theoretical constructs or pathways explicated	35

5.3.1. Findings

Close to half of Canadian studies were ranked as being of intermediate complexity in their explanation of pathways meaning they simply noted the connection between a pathway (e.g. people with little education have worse health than those with higher education) and offered little insight into causal factors or interconnections of pathways. A third were

undeveloped, and only one-in-five were considered as being sophisticated.

5.4. Research design

Research design is about the structure applied for collecting data and has both methodological and conceptual components. A key element is the temporal

Table 9
Quantitative research designs and temporal dimensions employed in Canadian studies of income and health (n = 241)

Temporality	Research design	Description of design	%		
Longer term –Longitudinal	Longitudinal (social sciences term)/prospective (epidemiological term) follows the same cohort over time	Life course	Data collection over time concerning same set of individual characteristics or attributes	0.5	
		Limited duration	Data collection over time, follows same cohort over a limited duration, e.g. 10 or 20 years or from beginning of illness to a definite end point such as becoming well or death	10	
Longer term –Cross-sectional	Sequential cross-sectional		Repeated measurements over time with different cohorts of people but with the same characteristics. i.e. looking at 20 year old, 40 year old, and 60 year old women with breast cancer in 1960 and examining if a different set of 20, 40 and 60 yr olds have cancer in 1980	4	
			Historical–time lag/time series or time sequential	Data collection over time concerning historical effects on one age group (several different cohorts e.g. 80 year olds in 1960, 80 year olds in 1980, and 80 year olds in 2000)	1
			Retrospective	Extent to which individual will exhibit a variable prior to incidence of disease or illness	
Present	Cross-sectional/contemporaneous		Look at people in outcome i.e., in jail, to see how they got there by examining school records or asking them about their past	4	
			Asking individuals how many fruits and vegetables they ate in last five years		
Multi-method	Used two or more longitudinal, longer term, and cross-sectional methods		Data is collected at one point in time with single or multiple samples and multiple cohorts and age groups	59	
			Experimental—to determine whether treatment given had any real effect— did treatment function as a cause	1	
Other	Qualitative and mixed method (qualitative & quantitative) Methodological			5	
				10	
				6	

Table 10
Policy implications contained in Canadian studies of income and health ($n = 227$)^a

Term	Description of policy implications	%
Political–economic structural systemic	Globalization, political and economic governmental policies, e.g. welfare, taxation, general redistribution of wealth, work programs, etc.	21
Social determinants of health	Education, employment, inclusion, child and parent issues, food security, housing, access to services, racial and ethnic issues. Also includes issues of medicare, privatization and provision of public services	42
Health care services	Medical model approaches to health care practices and policies (e.g. physician behaviour and skills) and access to services	19
Lifestyle (individual-level)	Health promotion initiatives and prevention strategies aimed at healthy lifestyles such as restriction of smoking in public buildings or education about healthy eating	18
No implications	No policy recommendations provided	36
Multiple	More than one type of implication presented	20

^a More than one type of policy implication presented in 48 of 241 studies. Eighty-six of 241 studies provided no policy implications.

dimension. Longitudinal designs follow the same individuals over time. Studies may have a temporal dimension but do not follow the same individuals over time, i.e. sequential cross-sectional or historical time lag designs. Sequential cross-sectional research methods identify historical effects of time or place. These are composed of a series of cross-sectional studies that take a picture of the same research subject matter at different time intervals.

Longitudinal studies can be concerned with one stage of life, the overall life course, or the course of generations. Inter-generational studies consider how, in childhood, socioeconomic issues affecting the parents can influence the health status of individuals in later life.

Other types of designs are methodological and qualitative. Methodological studies identify and test research or measurement approaches. Qualitative studies use ethnographic and other qualitative approaches to study the lived experience of people (Table 9).

5.4.1. Findings

Only recently have Canadian researchers had access to well-developed health-related longitudinal data. Canadian researchers rarely draw upon longer-term studies. Of the longitudinal studies applied, only one study was explicitly guided by life course considerations.

A small proportion of the studies reviewed used qualitative and mixed method designs. These studies had approximately equal representation across ethnographic, phenomenological, participatory action, case study, grounded theory, and more complex designs.

5.5. Implications for policy development

Does the research outline implications for policy development such as a need to address the social determinants of health, consider political and economic issues, or shape the delivery of health services? Or are researchers' recommendations limited to policies designed to shape health-related behaviours of individuals? (Table 10)

5.5.1. Findings

Most Canadian studies provide policy implications. Researchers were most likely to identify implications related to social determinants of health, health care services and lifestyle issues. For example, a number of researchers made recommendations for social and health policies that increase access to social programs and benefits, and create mechanisms that better distribute income and wealth. Only one-in-five studies provide political–economic analyses of issues. However, over one third provide no policy implications and an additional one-in-five limit implications to behavioural risk-factor issues.

6. Discussion

Our research findings illustrate numerous ways in which Canadian research on income and health could be enhanced. The particular areas of weakness are (a) conceptualization of how income and its distribution contribute to population health; (b) lack of longitudinal studies of the impact of income and income-related issues upon health across the life-span; and (c) few linked data bases that allow complex analyses of how income and related issues influence health. Along with a lack of conceptualization of the income health relationship, studies frequently do not consider policy implications of the income and health relationship. There is little inter-disciplinary work that examines the political and economic forces that influence how income is distributed among Canadians; there are even fewer concerned with identifying the biological pathways by which income influences health. The emphasis upon individual-behavioural risk-factors as pathways between income and health is at odds with contemporary materialist and neo-materialist explanations and findings of how income and other social determinants of health have direct effects upon health.

In our extensive report on our study findings [10], we noted that exemplary income and health research in the UK is often characterized by materialist and life-span perspectives, longitudinal studies, and extensive policy analyses that consider political, economic, and social issues (see for example [24,31–39]). We also noted that Finnish work is especially sensitive to macro-level issues, makes use of comprehensive linked data bases, and benefits from having government agencies receptive to concepts that link income and other social determinants of health to the health of citizens (see for example [36,40–47]).

7. Special areas of need

7.1. Need for better conceptualization of non-market economic resources and how these factors interact with market income to influence health over the life-span

Income is important because it provides opportunities to meet basic needs and participate in activities

normally expected of members within a society. Societies and jurisdictions differ in the extent to which these needs and participation opportunities are dependent on income alone. To illustrate, when housing availability and affordability are determined solely by the marketplace, income will be an especially important determinant of housing insecurity as well as a number of other determinants of health such as food security, early childhood development, etc. [48]. When the state intervenes to provide such basic needs to citizens, income may be less of a determinant of individual and population health.

A life-span perspective to the study of income and health is essential [49]. Advantage and disadvantage accumulate across the life-span, yet very little Canadian research considers this. Canadian researchers are limited in their ability to do so by the lack of linked data bases between census data, disease registries, and health and other surveys. Life-span conceptualizations of health and its determinants can draw attention to macro-level issues, such as the importance that income distribution plays across the life-span [50,51].

When researchers consistently identify income and income distribution as key factors influencing health, policymakers are more likely to take note of findings. The UK and Finnish studies we identified as exemplary frequently recognized income, and income proxies, as a product of deeper structural and systemic influences. Canadian studies tend to see income as cause. Political economy perspectives that require inter-disciplinary activities would help provide clear implications for policy development. Some work in Canada has begun to address these issues but it is an extremely undeveloped area (see [18,19,52–56]).

7.2. Development of neo-materialist perspectives

Particularly important is how income and income distribution interacts with the presence of social infrastructure, such as social and health services, to influence health. Most of this work is in the conceptualization stage with little empirical research on these issues [57,58]. Such work has a strong spatial component; an expertise held by medical geographers. This is an area ripe for inter-disciplinary work that could identify horizontal and vertical structures influencing health.

7.3. Establish linked data bases

Our review of the UK and Finnish work indicated a clear importance of linked databases. In these nations, researchers are able to produce robust findings of the influences upon health of factors such as income and income distribution across the life-span. Canadian researchers are overly reliant upon cross-sectional studies that make such advanced conceptualizations of the causes and distribution of disease difficult.

7.4. Dissemination of report findings

While Canada has been a leader in conceptualizing the importance of factors such as income and its distribution to health, there is ample evidence that governments and policymakers are retreating from using and applying these concepts [9]. Three recent reports on health in Canada acknowledge the importance of income and its distribution and related concepts but fail to develop the policy implications of these findings [59–61]. Similarly, the new Healthy Living Initiative of the federal and provincial governments clearly represents a retreat from advanced conceptualization of the influences on population health to simplistic lifestyle approaches that stress the importance of making healthy lifestyle choices [62].

Our analysis of Canadian health research on income and health makes such failures in Canadian policy development understandable. When researchers limit their discussion of determinants of health to behavioural and individual risk-factors, advanced conceptualizations of health determinants and subsequent applications to health policy become unlikely. The development of advanced research programs appears to be a necessary but not sufficient condition for the creation of advanced health policy. If such research is present, its application also depends on receptivity of governmental officials to the concepts and implications of such analyses [63–65].

The application of political/economic and gender analyses by some Canadian researchers is a strong aspect of the Canadian research arena [19,52]. Receptivity to these concepts by policymakers is more advanced in Canada than in the USA, but much further behind than in many European nations [1].

In Canada, policy implications that suggest change in how a society distributes wealth and income remain controversial [7,49]. This is particularly the case since emphasis on the market economy as the prime provider of basic needs is increasing in Canada [66–68].

The background context of politics facilitates the translation of research findings into policy. The level of political will within a society for equitable income distribution can be a strong facilitator or barrier for the translation of research findings into policy. Researchers concerned with income and health issues should strive to promote political debate on social issues that relate to health. In this manner, receptive policy environments can be created that will make the task of carrying out, and implementing findings from income and health research into the development of broad public and social policy more likely [69].

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Appendix A. Document search strategy

The search strategy involved a search for Canadian journals using CISTI and the internet was searched for Canadian journal databases. Search terms included the following keywords: “income”, “poverty”, “inequality”, “social class”, “socioeconomic”, “socioeconomic”, “socioeconomic status”, “health”, “illness”, “cancer”, “pregnancy”, “well-being”, “disease”, “cardiac”, “morbidity”, “mortality”, “dental”, “health care”, “hospitalization”, “hospital”, “physician”, “medical”, “medicine”, “depression”, “mental”, “asthma”, “diabetes”, “Canada”, “Canadian”, “UK”, “United Kingdom”, “Britain”, “British”, “England”, “Finland”, and “Finnish”. The search included a perusal of Webspirs, Publine, and Elsevier. Databanks searched under Webspirs include: Geography, Medline, Pais International, Psycinfo, Social Work Ab-

stracts, and Sociological Abstracts. Also, specific searches of the *British Medical Journal*, *International Journal of Epidemiology* and *Journal of Epidemiology and Community Health* were performed.

A search by researcher name in Webspirs and Publine for research in non-Canadian journals and by internet (department) was performed. An internet search of national and provincial research institutes and university research units for relevant current research and past publications was also performed. These included the following university departments: sociology, women's studies, psychology, epidemiology, geography, political science). Their publications list and current research were retrieved.

Researchers were contacted by e-mail if their documents were not available in an electronic format on-line or in hard-copy published journals available in the libraries of York University, Dalhousie University, and University of Saskatchewan. Provincial and national funding agencies were asked for a list of funded research since 1995. National and provincial policy departments and agencies were searched via web search and e-mail contact for relevant research and policy initiatives.

For the collection of the Finnish studies, Webspirs and Publine and the internet were searched using the keywords noted above. Finnish researchers were e-mailed for information (and to obtain research documents if needed). An internet search of Finnish academic departments, research institutes, and policy institutes for income/health-related documents was performed. For the collection of British studies an electronic search of Elsevier Journal database as well as specific electronic journal searchers of *British Medical Journal*, *Social Science and Medicine*, *International Journal of Epidemiology*, *Journal of Epidemiology and Community Health*, and *International Journal of Health Services* was performed. Pinnacle government and UK research institute documents such as the Acheson inquiry into health inequalities were gathered. A less exhaustive search of British research was performed compared to that taken in searching for Finnish studies because a large number of British studies had previously been gathered by one of the principal investigators. All relevant documents found were entered into an Endnote™ citation library, used for sorting and specifying which empirical studies were to be reviewed.

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