

Differential environmental exposure among non-Indigenous Canadians as a function of sex/gender and race/ethnicity variables: A scoping review

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ABSTRACT

OBJECTIVES: To determine the extent, range and types of studies of differential environmental chemical exposures among non-Indigenous Canadians as a function of sex/gender and race/ethnicity.

METHODS: Computerized database searches were performed from November to December 2013 using Medline, Embase, CAB Abstracts, Proquest and Scopus to identify relevant studies of environmental exposures among non-Indigenous adults aged ≥ 18 years in Canada published between 1993 and 2013. Articles were identified for full-text review based on a screening of titles and abstracts and were excluded during this initial review if they focused on environmental exposures in the following populations: 1) Indigenous populations, 2) individuals < 15 years of age, 3) pregnant women and associated negative birth outcomes, or 4) non-Canadian populations. Articles were also excluded if the primary focus was on exposures to environmental tobacco smoke, non-chemical occupational hazards, infectious diseases, noise and/or radiation. A full-text review of 78 identified articles systematically assessed how sex/gender and race/ethnicity were considered.

SYNTHESIS: Although 59% of studies stratified results by sex, less than half of these offered any explanation of differential exposures. Eighteen of the 78 studies (23%) used terms related to race/ethnicity in their participant descriptions. Of the studies that conducted subgroup analyses of exposure results by race/ethnicity ($n=15$), a total of 8 also included subgroup analysis by sex. Overall, 3 of the 78 (3%) articles reviewed analyzed environmental exposures as a function of sex/gender and race/ethnicity.

CONCLUSION: The role of sex/gender and race/ethnicity in influencing environmental exposure levels among non-Indigenous Canadians has not been adequately addressed to date.

KEY WORDS: Environmental health; women; minority health

La traduction du résumé se trouve à la fin de l'article.

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Sex and gender independently influence chemical exposures through various mechanisms, often resulting in differential health effects.^{1,2} Sex can be defined as a multi-dimensional biological construct based on anatomical, physiological and genetic factors that tend to vary less across societies.³⁻⁵ Several studies have found that sex-related features, such as body size, lung size, skin absorption rates, and vascular and inflammatory responses, contribute to unique patterns of exposure and resultant health outcomes among women.^{1,5-7} Hormonal changes affecting the accumulation and mobilization of chemical substances in the body may further influence women's specific vulnerability across the lifespan.^{1,8,9} Gender, a historically specific and culturally defined social construct, refers to norms, roles and values that vary across nation, class, religion, society, and over the life course. Gender-related exposures are modulated by socially derived activities, identities and behaviours. They are also associated with occupation, domestic work, and contextual variables, such as diet, hobbies, and use of personal care products, which may result in enhanced chemical exposures among women.^{1,5}

Race, ethnicity and socio-economic status (SES) have also been associated with disparities in exposure magnitude and health effects, raising questions regarding environmental justice and

equity.¹⁰ In the United States, documented discrepancies in environmental exposures are linked to race and SES through residential proximity to sources of pollution, discriminatory land use practices, higher levels of workplace hazards and increased exposure to toxics, all of which have resulted in higher levels of disease burdens in low-income minority populations.^{11,12} Feminist critiques of environmental justice studies point out that sex and gender have not been adequately accounted for. These authors argue that the field could be greatly enriched by studying potentially compounded vulnerability among minority women.¹³

Although Canadian environmental health research focusing on the uneven distribution and impact of environmental hazards has grown since the 1990s, Masuda et al.¹⁴ argue that there is still an incomplete and fragmented understanding of the larger topic. A number of studies have addressed environmental injustice among Indigenous peoples, a subset of which examine women's risk in Aboriginal communities.¹⁴⁻¹⁶ Environmental injustice and

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inequity among Indigenous groups is considered distinct because of unique histories of colonialism and dispossession, an experience that cannot necessarily be extended to examine other racialized population groups in Canada.¹⁵ Some scholars have indicated that there may be instances of environmental health disparities that exist among non-Indigenous Canadians that have not yet been investigated.¹⁰

Purpose and research questions

The purpose of this scoping review is to identify whether and how issues related to sex/gender and race/ethnicity have been addressed in studies examining environmental exposures among non-Indigenous populations in Canada. The overall aim is to assess our current state of knowledge regarding differential environmental exposures and possible health effects among vulnerable non-Indigenous Canadian subgroups, with a view to identifying gaps in available evidence. This review is guided by the following questions: What studies have examined environmental exposures or outcomes linked to exposures? In particular: Have women and men been compared? Has race and ethnicity been considered? For our purposes, environmental exposure was defined as being an exposure to any human-produced chemical substance, or by-products thereof, with a demonstrated toxic potential upon uptake via ingestion, inhalation and/or dermal routes. This includes chemical substances that may contaminate air, water or food in the environment in which people live and work, such as pesticides, solvents, metals and other chemicals.

METHODS

Literature search

A structured search of peer-reviewed, published studies across multiple disciplinary fields was conducted between November and December, 2013. Relevant English-language articles over a 20-year period (1993-2013) were identified using the following five online databases: Medline, Embase, CAB Abstracts, Proquest (Environmental Sciences and Pollution Management) and Scopus.

Key words were categorized by topic (e.g., environmental exposure, environmental pollution, environmental contaminants), exposure type (e.g., air pollution, pesticides, chemicals), references to exposure by sex or gender (e.g., female, women, gender) or any reference to race or ethnicity (e.g., race, ethnicity, immigrant, visible minority, ethnic origin) with a geographical limitation of Canada, including major cities and provinces. The review focused on Canadian environmental health research as distinct from that of the United States, the latter having an established environmental justice literature due to multiple historical factors, including segregation, civil rights and labour movements.¹¹ Further, studies limited to adult populations were considered.

Definitions of race and ethnicity are problematic, especially in Canadian research. Statistics Canada has used multiple terms in its various studies, including visible minority, immigrant status, ethnic identity, ethnicity, country of origin, birthplace and cultural identity, all of which have certain limitations.¹⁷ After extensively searching for an appropriate definition of

Box 1. Relevance and exclusion criteria for article screening by title and abstract

Relevance criteria

- Is this article about environmental exposures* in human populations?
- OR is this article about any health outcome directly related to an environmental exposure?
- AND does this article include female and male human participants?
- OR does article include only female human participants?
- OR does the article include mention of race/ethnicity/immigrant/visible minority participants and environmental exposures?

* **Environmental exposure defined as exposure to any human-produced toxic substance such as chemicals, industrial by-products, pesticides, insecticides, fungicides and radioactive waste or any chemical substance or pollutant that may contaminate air, water or food in the environment in which people live and work, including pesticides, solvents, metals and other chemicals.**

Exclusion criteria

- Studies focusing on Aboriginal peoples
- Studies focusing on infants, babies and children of pre-reproductive age (<15 years)
- Studies of pregnant women focused specifically on fetal or birth outcomes
- Studies focusing on environmental tobacco smoke
- Studies considering electromagnetic field (EMF) exposures
- Studies relating to non-chemical occupational hazards
- Studies focusing on molecular or cellular abnormalities and resulting health outcomes
- Studies outside of Canada
- Food-borne exposure studies such as E. coli, salmonella, botulism, etc.
- Infectious disease studies such as SARS, influenza, HIV, etc.
- Studies related to noise exposure or noise pollution
- Studies on UV exposure or other forms of radiation

race/ethnicity to guide this review, the following, taken from the field of social epidemiology, was adopted:

*"Race/ethnicity is a social, not biological, category, referring to social groups, often sharing cultural heritage and ancestry, that are forged by oppressive systems of race relations, justified by ideology, in which one group benefits from dominating other groups, and defines itself and others through this domination and the possession of selective and arbitrary physical characteristics (for example, skin colour)."*¹⁸

For our purposes, race/ethnicity will include any reference to non-majority, non-Indigenous populations, including immigrant groups, visible minorities, ethnic identity, country of origin, ancestry, etc., recognizing that there is considerable heterogeneity among various communities. Given the breadth of this approach, the heterogeneous nature of various race/ethnically-based communities may become obscured to some extent, with the potential inclusion of White Caucasians, who are not the focus of this review.

Search results

Studies were included in the review if they met all of the relevance and exclusion criteria, described in Box 1. The first author reviewed all search results by title ($n=1,158$), with two alternate reviewers assessing a different random selection of 10% of studies by title (Figure 1). The reviewers demonstrated a high level of agreement regarding the decision to include/exclude each study (kappa 18%) by title. Screening by title and abstract followed ($n=217$) with the first author reviewing all articles and each additional reviewer assessing half of remaining articles based on specific criteria (Box 1), resulting in a 16% difference. Full-text articles ($n=114$) were further screened by all three reviewers for the relevance criteria, resulting in a total of 78 articles eligible for in-depth assessment.

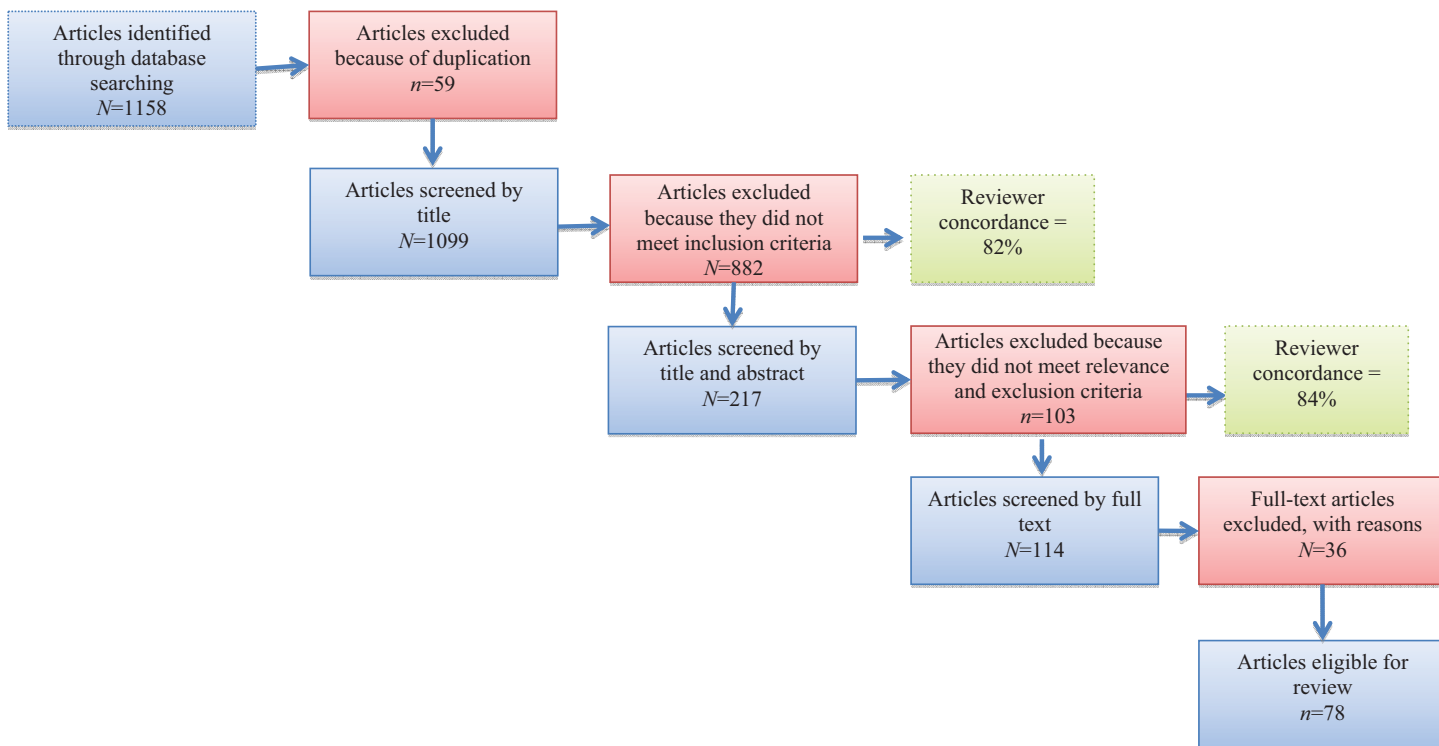


Figure 1. Flow chart of the summary of the study selection on the basis of relevance.

* Two independent reviewers conducted article screening by title only (82% concordance) and article screening by titles and abstracts for 217 references (84% concordance). The articles eligible for full-text review ($n=78$) were assessed by pairs of reviewers independently using a checklist tool designed to verify the consistency in the eligibility criteria and to assess the content for analysis by sex/gender and race/ethnicity, resulting in 84% concordance.

Assessment

A full-text article assessment tool was developed based on Doull et al.'s¹⁹ sex- and gender-based analysis (SGBA) of cardiovascular systematic reviews. Although the content of the current scoping review differs, this SGBA tool was deemed most relevant to questions assessing sex/gender in research studies. Since no comparable assessment tool was found that examined the inclusion of race/ethnicity, the questions were adapted accordingly. The full-text assessment was completed by the first author and independently by the two other reviewers, who each assessed half of the full-text articles ($n=78$). Again, the article assessment concordance between reviewers was high at 84%. Differences were discussed between the first author and each reviewer to reach consensus prior to further analysis.

SYNTHESIS

Study characteristics

Assessment in Relation to Sex/Gender

A total of 38 articles (49%) referred to the terms sex, gender, male, female, men or women in their respective background sections (Table 1). Fifteen of 78 studies (19%) identified sex/gender as being relevant to the research question. Female sex-specific (i.e., reproductive organs) health outcomes, such as breast cancer or endometriosis, were the sole focus of most of these studies. Of those which examined differences between males and females in terms of exposures or health outcomes, 46 articles (59%) presented stratified results by sex. Forty-three (55%) delineated study findings in terms of sex. While 37 articles

(47%) reported differences in exposures and/or health outcomes between males and females, 25 (32%) discussed possible explanations for the observed differences. Few studies examined the implications of these differences for either policy purposes ($n=4$ (5%)) or further research ($n=14$ (18%)).

Assessment in Relation to Race/Ethnicity

Terms relating to race/ethnicity were largely absent from the background of all studies reviewed but for three (4%), which also identified race/ethnicity as being relevant to their research questions (Table 2). Eighteen studies (23%) made reference to race/ethnicity in descriptions of their samples either through direct usage of these terms or in reference to linguistic and/or cultural background or country of birth. All of these references were considered to apply to the category of race/ethnicity. Only 9 of the 78 (12%) studies under review justified the exclusion of some groups. Overall, a low number of articles completed any subgroup analysis based on race/ethnicity ($n=15$ (19%)) or presented findings comparing racial/ethnic groups ($n=14$ (18%)). Eleven of the 78 studies (14%) concluded that differences in exposure or outcome existed as a function of race/ethnicity, with 7 (9%) offering explanations for the observed differences. Policy and future research implications of race/ethnicity were explored in 1 (1%) and 4 (5%) of the articles respectively.

Assessment of Relevance by Sex/Gender and Race/Ethnicity

Of the studies that conducted subgroup analysis of exposure results by race/ethnicity ($n=15$ (19%)), a subset of 8 (10%) also included subgroup analyses by sex. Eight studies (10%) concluded that differences existed in either exposure or outcome

Table 1. Analysis by sex and gender (*n*=78)

Full-text review – analysis questions by sex and gender	Yes (n, %)	No (n, %)	NA* (n, %)
Background			
Are the terms sex/gender/male/female/men/women used in background?	38 (49)	40 (51)	0
Are sex/gender identified as relevant or not to research question?	15 (19)	63 (81)	0
Did background discuss why sex/gender differences may be expected?	7 (9)	69 (88)	2 (3)
Methods			
Are the terms sex/gender/male/female/men/women used in description of sample?	57 (73)	21 (27)	0
Was there justification or explanation for the exclusion of some groups?	39 (50)	32 (41)	7 (9)
Results and analysis			
Did the article stratify results by data by sex/gender/male/female/men/women?	46 (59)	12 (15)	20 (26)
Were any subgroup analyses completed?	65 (83)	8 (10)	5 (6)
Were subgroup analyses by sex completed?	39 (50)	19 (24)	20 (26)
Did the article make mention that subgroup analyses by sex could not be done?	5 (6)	49 (63)	24 (31)
Did results distinguish between findings for males/females/men/women?	43 (55)	14 (18)	21 (27)
Discussion and conclusions			
Did the article report conclusions (in either exposure or outcome) that are different for men and women?	37 (47)	20 (26)	21 (27)
Did the article provide any possible explanation for observed difference in exposure or outcome between men and women?	25 (32)	31 (40)	22 (28)
Did the article address sex/gender implications for policy and regulation?	4 (5)	74 (95)	0
Did the article address sex/gender implications for research?	14 (18)	64 (82)	0

* NA = not applicable.

Table 2. Analysis by race and ethnicity (*n*=78)

Full-text review – analysis questions by race and ethnicity	Yes (n, %)	No (n, %)	NA* (n, %)
Background			
Are the terms ethnicity/race/visible minority or immigrant used in the background?	3 (4)	75 (96)	0
Are ethnicity/race/visible minority or immigrant identified as relevant to the research question?	3 (4)	75 (96)	0
Did background discuss why differences between groups may be expected?	3 (4)	75 (96)	0
Methods			
Are the terms ethnicity/race/visible minority or immigrant used in description of sample?	18 (23)	60 (77)	0
Was there justification or explanation for the exclusion of some groups?	9 (12)	71 (91)	0
Results and analysis			
Were subgroup analyses by ethnicity/race/visible minority or immigrant status completed?	15 (19)	63 (81)	0
Did the article make mention that subgroup analyses by ethnicity/race/visible minority or immigrant status or race could not be done?	2 (3)	74 (95)	2 (3)
Did results distinguish between findings by ethnicity/race/visible minority or immigrant status?	14 (18)	64 (82)	0
Discussion and conclusions			
Did the article report conclusions (in either exposure or outcome) that are different by ethnicity/race/visible minority/immigrant status?	11 (14)	67 (86)	0
Did article provide any possible explanation for observed difference in exposure or outcome between ethnic or racial groups?	7 (9)	71 (91)	0
Did the article address implications for policy and regulation relevant to ethnicity or race?	1 (1)	77 (99)	0
Did the article address implications for research relevant to ethnicity or race?	4 (5)	74 (95)	0

* NA = not applicable.

by race/ethnicity. Of these, a subset of 6 (8%) reported differences in exposure or outcome by sex/gender.

Use of Terms

The terms sex/gender were used interchangeably in all but 2 studies, which explicitly noted a distinction between the terms.^{20,21} In the background to their study, Abdelouahab et al.²⁰ point out that exposures and health outcomes may be modulated by the sex-based, biological differences between males and females, as well as through gender-based roles and expectations. Sex- and gender-based differences were also confirmed and discussed in the findings and conclusions of their study. In their study on the role of sex/gender influences on air pollutant exposures, Oaimo and Luginaah²¹ provided a detailed explanation of how biological and cultural differences might result in greater levels of exposures and health outcomes. The remaining articles did not distinguish between sex and gender, terms which were most often used as simple variable labels.

Overall, few studies included any reference to race/ethnicity, and in those that did, variable names and categories differed widely. No consistent language was used to describe 'non-White' populations in the studies reviewed. Half of these articles included some kind of explanation to substantiate usage of racial or ethnic categories. However, none made reference to existing validated terms used in other publications or expressed concern

regarding the lack of established standards. One article used the term 'recent immigrant' to account for an identified "healthy immigrant effect" without further explanation,²² while others referred to either birth outside Canada or 'foreign-born participants'. Several articles used groupings such as Asian, Asian-Canadian, Euro-Canadian, Caucasian, among others.

DISCUSSION

The results of this scoping review reveal a scarcity of research conducted in Canada examining the intersection of sex/gender, race/ethnicity and environmental health. Only 3 of the 78 articles reviewed made mention of a combination of sex/gender and race/ethnicity as it related to elevated exposure.²²⁻²⁴ Hence, categories of sex/gender and race/ethnicity will be discussed separately.

Sex/Gender

Despite including male and female participants and reporting results differentiated by sex, less than half of the 78 articles provided detailed explanations or hypotheses of observed differences in exposure. For the few studies that did discuss unequal results between men and women, occupational exposures were the most common reason for any observed difference. One study reported that male and female workers in swine operations may respond differently to inhaled

contaminants, concluding that environmental exposures may result in excess respiratory outcomes among females due to smaller lung size, as well as greater inflammatory responses.²⁵ In other occupationally-based studies reporting differential exposure, links to gendered employment were not discussed. For instance, increased risk of developing systemic lupus erythematosus (SLE) was associated with work in nail salons, dental practices and outdoor work, all of which tend to be gendered.²⁶ The two other occupational health studies reviewed acknowledged that numbers of female participants were small and that more research was needed.^{27,28}

Several authors have proposed recommendations for including sex and gender in occupational health research that goes beyond simply including female participants. Specific suggestions included incorporating both sexes in the research questions, choosing appropriate variables that would enable accurate exposure and outcome information by gender, accounting for differences in the workplace environment due to a traditional tendency for segregation of tasks, as well as many recommendations for data analysis.^{1,2} Very few of the studies reviewed seemed to incorporate these recommendations, although many of them were published prior to the date when these suggestions were published.

Dietary consumption was the second most often reported reason for differences in exposure between women and men. Two studies reported lower contaminant levels among females due to behavioural and biological factors. Cole et al.^{23,24} explained that lower rates of fish consumption, as well as higher fat metabolism and excretion of contaminants through childbirth and breastfeeding practices, contributed to lower contaminant levels in females. Kearney et al.²⁹ reported similar results with males experiencing higher measured contaminant levels. Reimar et al.³⁰ stated that higher fruit consumption among females was associated with a lower risk of developing bladder cancer, while higher fatty food consumption among males led to an increased risk.

Oiamo and Luginaah²¹ reported that “biological and cultural differences between men and women were influential in predicting symptoms of air pollution exposure.” They point out that genetic differences can affect inflammatory responses to allergens, as well as sex hormones influencing immune responses causing chemical hypersensitivity.

Finally, Abdelouahab et al.²⁰ and Bushnik et al.³¹ made reference to toxicokinetic and pharmacokinetic factors that could result in unequal exposures, but did not provide details as to what this means. Of the studies that concluded differential exposures or outcomes between men and women, almost half offered very little explanation of their findings, although this might be explained by the lack of emphasis on sex/gender in the research purpose of these studies.

Race/Ethnicity

Overall, if race/ethnicity was considered, it often appeared as an afterthought, rather than being purposely included as an integral part of the research design, perhaps because race/ethnicity data have not routinely been collected in Canadian health care contexts or in national population health surveys.^{32,33} Small sample sizes also might have contributed to the lack of

distinction among participants. For instance, Cooper et al.²⁶ noted that participants in their study of occupational and non-occupational exposures in relation to risk of SLE had originated from more than 40 countries. As such, disaggregating results by country of origin would have generated very small numbers per grouping, posing problems of statistical validity and of maintaining confidentiality of participants. The authors opted to categorize study participants according to their geographical origin along the lines of broad regional groupings, an approach which has been increasingly criticized in the ethnic studies and migration literature. Rather, a growing need for granularity in classifications of ethnicity, referred to as the ‘validity-utility’ trade-off, is emphasized.³⁴

Studies that demonstrated differential findings as a function of race/ethnicity ($n=11$) most often attributed these to differences in dietary exposure (e.g., fish consumption), with the populations of interest having originated primarily from Asia.^{23,24,29,35} Birth outside of Canada was also associated with increased risk of exposure to several contaminants such as lead and mercury in articles analyzing Cycle 1 of the Canadian Health Measures Survey (CHMS), a nationally representative biomonitoring study.^{33,36,37} It has been proposed that regulatory differences in countries of origin and imported food contribute to elevated levels of specific contaminants.³⁷ In another study,²⁶ age at the time of immigration was linked to risk of developing SLE.

Limitations

Scope limitations include the exclusion of non-Indigenous studies and the restriction of eligible studies to published peer-reviewed literature. As a result of the latter, some relevant grey literature may have been overlooked. Also, the article assessment was based on a non-validated tool developed for applying a sex- and gender-based analysis of systematic reviews of cardiovascular disease. Although the questions were modified for the purposes of this review, the tool was originally designed to address topics such as dietary, exercise and psychological interventions for cardiovascular disease, as well as interventions for improved adherence to treatments, effects of drugs and surgical procedures. The diverse nature of environmental health studies and the differences in fields necessitated, however, that the questions be adapted to make them relevant to the current scoping review.

Research directions

This review has identified a number of gaps in available research on how environmental exposures are influenced by sex/gender and race/ethnicity in non-Indigenous Canadians; gaps which are highlighted as important foci for future research. This includes research opportunities to examine how unequal environmental exposures and health outcomes are influenced by occupationally-related differences. Premji et al.³⁸ analyzed Canadian census and job-related data and concluded that a higher proportion of immigrant and minority women were employed in higher-risk occupations. Given this, greater attention should be paid to an examination of how immigrant and minority women may experience a disproportionate burden in exposures due to higher rates of employment in certain ‘at risk’ occupations.

Data on exposure levels in countries of origin would also help us understand how pre-migratory risk factors may result in

adverse health effects post-migration.³⁹ A greater reliance on the use of hazardous pesticides (e.g., DDT) to minimize the transmission of vector-borne diseases, for instance, may result in a higher body burden of certain contaminants relative to those residing in industrialized countries such as Canada. Global shifts of the production of high-volume chemicals to developing countries may also result in comparatively higher population exposures in host regions.⁴⁰

Another potential area of future research is the study of settlement patterns of major immigrant groups in Canada to determine whether neighbourhood-level factors could contribute to environmental health inequality. Statistics Canada reports that two thirds of Canada's foreign-born population reside in three urban metropolitan areas.⁴¹ Although certain authors have stated that historically distinct patterns of immigration and multiculturalism have prevented US-style racial segregation in Canada, residential enclaves of highly concentrated immigrant groups exist in Canadian urban centres. Some studies have concluded that there are unusual patterns of proximity to environmental risks and demographic variables such as race and socio-economic status warranting further examination.¹⁰

Environmental health research should be broadened to investigate the possible health impacts – largely neglected to date – of other types of contaminant exposures among newcomers, including those through food products, cosmetics or traditional health remedies suspected or known to contain elevated levels of contaminants. Recent findings on elevated mercury levels in Ayurvedic medicines, skin lightening products and arsenic levels in rice are some examples.⁴²⁻⁴⁶

Analysis of exposure to environmental chemicals with respect to race/ethnicity has been applied to data from the U.S. National Health and Nutrition Examination Survey.⁴⁷ While this may not be replicable in the CHMS due to small numbers, biomonitoring of suspected vulnerable subpopulations in Canada would provide a more representative and informative picture of baseline levels of chemical exposure in the Canadian population. This could be accomplished with a more inclusive conceptualization and operationalization of race/ethnicity variables. This type of study should proceed with community-level involvement so as not to increase stigmatization among potentially excluded groups.

CONCLUSION

The paucity of peer-reviewed publications that have examined differences in environmental exposures and related health outcomes as a function of sex/gender, particularly among visible minorities and recent immigrants, indicates gaps of importance in Canadian non-Indigenous environmental health research. Given current demographic trends in Canada and growing populations of immigrants, environmental health studies need to characterize factors modulating disparities in contaminant exposures and outcomes among minority populations. Further research in this field with more inclusive populations of interest (e.g., female, marginalized, newcomer communities) to enhance our understanding of factors contributing to vulnerability, will aid in the identification and prioritization of needed interventions.

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RÉSUMÉ

OBJECTIFS : Déterminer le nombre, la portée et les types d'études sur l'exposition différentielle aux produits chimiques dans l'environnement dans la population canadienne non indigène en fonction du sexe/du genre et de la race/de l'ethnicité.

MÉTHODE : Des recherches informatisées ont été effectuées de novembre à décembre 2013 dans les bases de données Medline, Embase, CAB Abstracts, Proquest et Scopus pour repérer les études pertinentes sur l'exposition environnementale des adultes non indigènes de ≥ 18 ans au Canada publiées entre 1993 et 2013. Les articles à examiner en version intégrale ont été choisis par filtrage des titres et des résumés; durant cet examen initial, on a exclu les articles portant sur l'exposition environnementale dans les populations suivantes : 1) populations indigènes, 2) personnes < 15 ans, 3) femmes enceintes et issues négatives de la grossesse associées ou 4) populations non canadiennes. Nous avons aussi exclu les articles dont le thème principal était l'exposition à la fumée secondaire du tabac, aux dangers professionnels non chimiques, aux maladies infectieuses, au bruit et/ou aux rayonnements. Un examen du texte intégral de 78 articles recensés a systématiquement évalué si le sexe/le genre et la race/l'ethnicité y étaient pris en compte.

SYNTHÈSE : Bien que 59 % des études aient stratifié leurs résultats selon le sexe, moins de la moitié de ces études proposaient des explications des écarts dans les niveaux d'exposition. Dix-huit des 78 études (23 %) employaient des termes liés à la race/l'ethnicité dans leurs descriptions des participants. Sur les études ayant effectué des analyses de l'exposition par sous-groupe racial/ethnique ($n=15$), 8 incluaient aussi une analyse selon le sexe. Globalement, 3 des 78 articles examinés (3 %) analysaient l'exposition environnementale en fonction du sexe/du genre et de la race/de l'ethnicité.

CONCLUSION : L'influence du sexe/du genre et de la race/de l'ethnicité sur les niveaux d'exposition environnementale dans la population canadienne non indigène n'a pas été convenablement abordée jusqu'à maintenant.

MOTS CLÉS : santé environnementale; femmes; santé des minorités