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ORIGINAL RESEARCH PAPER

ORIGINAL RESEARCH: CLINICAL

Knowledge translation in health and wellness research focusing on immigrants in Canada

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ABSTRACT

INTRODUCTION: Knowledge translation (KT) is a relatively new concept referring to transfers of knowledge into practice in collaboration with multiple sectors that work for the health and wellness of society. Knowledge translation is crucial to identifying and addressing the health needs of immigrants.

AIM: To scope the evidence on KT research engaging immigrants in the host country regarding the health and wellness of immigrants.

METHODS: This study followed a scoping review approach suggested by Arksey O'Malley. We identified relevant studies from both academic and grey literature using structured criteria, charted the data from the selected studies, collated, summarised and report the results.

RESULTS: Analysis of the eligible studies found two types of KT research: integrated KT and end-of-grant KT. Meeting or discussion with community-level knowledge-users were common KT activities among immigrants, but they were involved in the entire research process only if they were hired as members of research teams. Most KT research among immigrants explored cancer screening and used a community-based participatory action research approach. Barriers and enablers usually came from researchers rather than from the community. There was little practice of evaluation and defined frameworks to conduct KT research among immigrants in Canada.

CONCLUSION: This study can help the researchers and other stakeholders of health and wellness of the immigrant population to identify appropriate KT research activities for immigrants and where KT research is required to facilitate the transfer of research knowledge into action.

KEYWORDS: Knowledge translation; knowledge mobilization; immigrants; refugee; health and wellness; Canada; evidence-based practice; Research into practice

Introduction

Knowledge translation (KT) is a complex concept that requires a comprehensive and multifaceted approach and meaningful collaboration among different levels of stakeholders including community members, community organisations, health and social service providers, researchers, and governments.[1–3] A deeper understanding of the multiple factors that influence personal, community, and systemic behaviour for the uptake of

WHAT GAP THIS FILLS

What is already known: Engaging knowledge-users in the research process through knowledge translation is important to increase the uptake of healthy practices and improvement of health-related knowledge among immigrants. Currently, there is a lack of knowledge translation research engaging immigrants.

What this study adds: This study informs practices and provides evidence on knowledge translation research for immigrant health and wellness. Describes how and to what extent knowledge translation research has been conducted among immigrants, as well as possible barriers, enablers, and outcomes of knowledge translation research engaging them. Identifies gaps in knowledge translation research among immigrants.

evidence-based knowledge in practice is warranted.[1] The Canadian Institutes of Health Research (CIHR) defines KT as 'a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically-sound application of knowledge to improve the health of Canadians, provide more effective health services and products, and strengthen the health care system.'[2]

CIHR identifies two general KT frameworks. Integrated KT describes the process whereby knowledge-users and decision-makers, those who use the research findings to make informed decisions about health practices and policymaking, are engaged in the entire research process.[2] Different stages of the research where knowledge-users may engage include identifying the research questions, developing and selecting the research design, collecting data, and interpreting and disseminating the findings. Conversely, end-of-grant KT refers to the one-way transfer of knowledge from the researchers to knowledge-users and decision-makers without the involvement of the latter.[2] Limiting the definition of integrated KT within studies that involve knowledge-users in the entire research process may exclude some research that involves knowledge-users in only one stage of the research, such as planning or designing the research method. Therefore, in this study, we defined integrated KT as the research that actively engaged the knowledge-users at any stage of the research process from planning to dissemination.

There is room for improvement in the transfer of health knowledge into practice.[3] The socio-cultural, organizational, community and individual context in which KT occurs play crucial roles in translating research outcomes and recommendations into action.[4–6] Engaging policymakers and clinicians is easier than engaging community members due to language and socioeconomic barriers.[6] To address health and social inequities, it is essential to meaningfully collaborate with community members and organizations to develop and apply pragmatic programmes and policies that address social, economic, and cultural influencers of health.[7]

Many western countries such as Canada, New Zealand, Sweden, Norway, the United States and others welcome a substantial number of immigrants and refugees.[8,9] Health-related KT is important in these countries where immigrants often face challenges in adjusting to new social and health-care systems and environments.[6,7,10,11] Immigrant communities are also less likely than their native counterparts in western countries to accept relevant research knowledge and translate it into their lifestyle.[6,7,10,11] In general, KT research engaging knowledge-users in the research process and translating the research-obtained knowledge to users is more scarce among immigrants than non-immigrants.[6,7,11] The little KT research among immigrants that exists in the literature is not well developed or well defined.[6,7,11] This may be due to a lack of socio-culturally and economically appropriate KT activities through which knowledge-users are engaged in the research process[12] and is an example of a gap in the systemic response to the needs of immigrants that further creates health inequities.[13,14]

Several immigrant-receiving countries, including Canada, New Zealand, Nordic and some other European countries, have seen diversification in their population fabric derived from immigration[15–17] due to the influx of many refugees surviving wars, political upheaval and economic downturn in their home countries, and inviting economic migrants through skilled migration programmes.[18] The health-care systems of these countries are not designed to address the needs of these widely diverse immigrants and refugees and results in less uptake of evidence-based health

knowledge and practice among them.[19,20] This urges immigrant-oriented KT research to improve and diversify the primary health-care services to meet their needs. Therefore, through this review, we attempted to scope the KT research that has been done to engage immigrants. We identify the nature, content, mode, and settings of KT research regarding the health and wellness of immigrants. We systematically explore the relevant theoretical, empirical, and grey literature on KT among immigrants and refugees with the following specific objectives:[21]

1. Explore the studies on KT among immigrants in Canada;
2. Extract the nature and content of immigrant-oriented KT activities in Canada from the literature;
3. Identify the level and extent of engagement of knowledge-users within the research process during the KT activities;
4. Determine the barriers and enablers of the conduction and effectiveness of KT activities;
5. Capture the outcome of different KT activities; and
6. Identify gaps in research that conduct KT activities among the immigrant population in Canada and potential scope for policy implications.

Methods

This scoping review was conducted following a methodology developed by Arksey and O'Malley (2005) and Levac *et al.* (2010).[22,23] We followed the five-step approach they outlined: scoping, searching, screening, data charting, and data analysis. Additionally, we followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) criteria to carry out and report this review.[24]

Review stages

Identifying the research question

The research team held several informal meetings involving citizen researchers to develop the research questions and decide on the definitions and terminologies around KT (see Table 1 for definitions). This developed the following research questions: What do we know about KT among immigrants in Canada?; What types of KT activities have been studied concerning Canadian immigrants' health and wellness?; and Who are the partners of KT activities among immigrants in Canada?

Identifying relevant studies

Inconclusiveness about what constitutes knowledge and KT has caused confusion in KT research

Table 1. Definitions of KT-related terms used in the study

Knowledge Translation (KT)	'A dynamic and iterative process that includes synthesis, dissemination, exchange and ethically-sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the health care system.'[2]
Integrated Knowledge Translation (integrated KT)	If the knowledge-users are actively engaged in any stage of the research process including developing the research questions, selecting the research design, collecting data, interpreting and disseminating the finding, it is considered as integrated Knowledge Translation (integrated KT).[2]
End-of-grant Knowledge Translation (end-of-grant KT)	Informing knowledge-users about the knowledge that was obtained through a research project without engaging the knowledge-users in the research process. For example, peer-reviewed journals, policy briefs, interactive educational sessions with patients, media engagement, etc.[2]
KT research	A research or scientific study that engages knowledge-users in the research process or translates the research-obtained knowledge to the knowledge-users after the completion of the research.
KT activities	Particular research activities through which knowledge-users were engaged in the research. For example, a group discussion to develop research questions, a meeting session to decide on the research methodology, a community event where research findings were disseminated, etc.
Knowledge-users or decision-makers	A knowledge-user is a person who can apply research evidence to make informed decisions about policies, programmes and practices. Examples include, but are not limited to a practitioner, a policy-maker, a researcher of other disciplines, an educator, a health-care administrator, a community leader or an individual in a health charity, patient group, private-sector organisation, community organisation, or media outlet.

development. Patients' perspectives, health professionals' experiences, knowledge synthesis through systematic reviews, and dissemination of knowledge through activities such as publications, conferences, and communication platforms are all forms of KT.[25] To identify the studies relevant to our research questions, we conducted a search of academic and grey literature databases (Table 2) using keywords based on the following three key terms: 'knowledge translation', 'immigrants' and 'Canada' (Table 3). We connected keywords for each term with 'OR' and later collectively linked all keywords for each main terms using the Boolean operator 'AND'. We also reviewed the reference lists of reviews and relevant primary papers to identify further records. We restricted the search to English-language papers and did not place time restrictions.

Study selection

To obtain relevant articles, we defined inclusion and exclusion criteria corresponding to our research question. For initial title and abstract screening, we focused on reports about Canadian immigrants and refugees. We excluded publications about Canadian-born populations, including indigenous people and second-generation immigrants. Based on the insights from our internet scan, we generated further eligibility criteria following the PICOS[26] (population, intervention, comparisons, outcomes and study design) framework (Table 4).

Systematic reviews were not included, but were used to find potential primary studies. All records were screened in Endnote (Clarivate Analytics, Philadelphia, PA, USA). Both screenings were conducted by two reviewers and disagreements were resolved through consensus.

Data extraction, charting and synthesis

We extracted the following information about each study: author(s); publication year; type, objective and location of the study; population size and age; study sample; KT target group (i.e. knowledge-users or decision-makers), modes, partners, and providers; outcome measures, limitations, and directions for future research (Table 5). Two reviewers tested the charting independently and the study team revised it during the search. Differences in data charting were resolved by discussion with a third reviewer. We undertook descriptive analyses to outline relevant studies and to detect research scope. Finally, the research team analysed and discussed results to identify key themes and findings. NC extracted data.

Interpretation and reporting results

We analysed the data and reported findings following the strategy suggested by others.[22,23] Table 6 presents specific content and language of KT activities, specific types of KT activities involving knowledge-users, nature of the programme and partnership with knowledge-users (engaged or partnered individuals or organizations), and settings of KT activities. We outlined the processes of KT used among immigrants in Canada and

Table 2. Databases searched

For published articles	For grey literature
1. MEDLINE (Ovid)	1. Google Scholar
2. PubMed	2. Google
3. Embase	3. ProQuest (Theses and dissertations)
4. CINAHL Plus with Full-text	4. GreyHubHealth Sciences Online (HSO)
5. PsycINFO	5. Turning Research Into Practice (TRIP)
6. Sociological Abstracts	6. OAIster (WorldCat)
7. Social Services Abstracts	7. Canadian Institute for Health Information (CIHI)
8. Social Work Abstracts	8. Public Health Agency of Canada (PHAC)
9. SocINDEX with Full-text	9. Health Canada
10. EBM Reviews (All including Cochrane)	10. National Institutes of Health
11. Web of Science	11. AHS Institute
12. CRI (Canadian Research Index)	
13. Canadian business & current affairs database	
14. Canadian Electronic Library	

Table 3. Keywords searched

Keywords for 'knowledge translation' Translational medical research [MeSH] OR 'Knowledge translation' [keyword] OR 'Evidence-Based Practice' [MeSH, keyword] OR 'evidence-informed practice' [keyword] OR information dissemination [MeSH] OR dissemination [keyword] OR 'organizational innovation' [MeSH, keyword] OR 'implementation research' [keyword] OR 'research utilization' [keyword] OR 'research design' [MeSH, keyword] OR 'research use' [keyword] OR 'knowledge utilization' [keyword] OR 'knowledge transfer' [keyword] OR 'knowledge mobilization' [keyword] OR 'knowledge exchange' [keyword] OR 'Knowledge Management' [MeSH, keyword] OR Translational Medical Research [MeSH] OR Diffusion of Innovation [MeSH] OR Professional Practice [MeSH] OR Guideline Adherence [MeSH] OR Social Change [MeSH] OR 'knowledge uptake' [keyword] OR 'knowledge action' [keyword] OR 'knowledge integration' [keyword] OR ['knowledge implementation' [keyword] OR 'knowledge dissemination' [keyword] OR 'knowledge adoption' [keyword] OR adopt* adj3 knowledge OR disseminat* adj3 knowledge OR implement* adj3 knowledge OR integrat* adj3 knowledge OR uptake adj3 knowledge OR translat* adj3 knowledge OR transfer* adj3 knowledge OR management* adj3 knowledge; exchange adj3 knowledge OR mobiliz* adj3 knowledge OR utilis* adj3 knowledge
Keywords for immigrant Immigrant* [keyword] OR emigrant* [keyword] OR alien* [keyword] OR 'emigrants and immigrants' [MeSH] OR 'Undocumented immigrant*' [keyword, MeSH] OR Newcomer* [keyword] OR refugees [MeSH] OR Refugee* [keyword,] OR asylum [keyword] OR 'asylum seeker' [keyword] OR displaced [keyword] OR resettle [keyword] OR Humanitarian [keyword] OR entrant [keyword] OR settle [keyword] OR 'displaced person' [keyword] OR 'displaced population' [keyword] OR 'internally displaced person' [keyword] OR 'war population' [keyword] OR 'forced migra*' [keyword] OR refugee camps [MeSH] OR 'refugee camp' [keyword] OR foreigner* [keyword] OR 'foreign worker*' [keyword] OR 'temporary foreign worker*' [keyword OR 'transients and migrants' [MeSH] OR transient* [keyword] OR migrant* [keyword]
Keywords for Canada Canada* [keyword, MeSH] OR Alberta [keyword, MeSH] OR Ontario [keyword, MeSH] OR 'British Columbia' [keyword, MeSH] OR Saskatchewan [keyword, MeSH] OR Manitoba [keyword, MeSH] OR Quebec [keyword, MeSH] OR 'New Brunswick' [keyword, MeSH] OR 'Nova Scotia' [keyword, MeSH] OR 'Prince Edward Island' [keyword, MeSH] OR 'Newfoundland and Labrador' [keyword, MeSH] OR Nunavut [keyword, MeSH] OR Yukon [keyword] OR 'Yukon territory' [MeSH] OR 'Northwest Territories' [keyword, MeSH]

Table 4. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
1. Original research 2. On immigrants and refugees 3. In Canada 4. Research with knowledge translation or mobilisation component with or without a partnership with the knowledge-users 5. *Populations*: Researchers, community organisations, system-level organisations, provider-level organisation, individual partners, academics, providers whoever were involved in the knowledge translation approach 6. *Interventions*: Interventions creating and transferring knowledge collaborating with knowledge-users or vertically from researchers to the knowledge-users or decision-makers 7. *Comparison:* Studies compared, evaluated, assessed or planned any KT activities were included 8. *Outcomes*: Outcomes included but not limited to improved knowledge and health practices, attitudes, beliefs, partnership formation, and behaviours 9. *Study designs:* Eligible study designs included but were not limited to randomised controlled trials, observational studies (retrospective, prospective or cohorts), surveys, qualitative research, case studies or mixed-method results	1. Assessed the knowledge among the knowledge-users and concluded that KT was needed without having described it 2. Focused on translational research (i.e. from wet laboratory to clinical application) or collaborations between physicians and industry 3. Publications in the form of editorials, reviews, opinion articles, proceedings or conceptual analyses 4. If the description of the partnership lacked detail such that it was unclear if there was a knowledge translation approach or knowledge-users participated in research activities

arranged them in process modes. We identified KT activities that were used for engaging knowledge-users at each level of the research (planning and conceptualization, data collection, interpretation, and dissemination). Further analysis revealed nested concepts or categories that illustrated particular

Table 5. Study characteristics

Study	Objective	Location	Target population	Methods	Study type	Population size	Age (years)
Dyck (1993)	It discusses the implications of the daily activities of immigrant mothers for translating health promotion principles into practice	Vancouver, British Columbia	Punjabi –mother of a child	Interviews	Qualitative	15	26–40
Choudhry (2002)	To facilitate the creation of emancipatory knowledge and self-understanding regarding health-promoting practices	Toronto, Ontario	Punjabi and Gujrati women	Community-based participatory action research, Focus groups	Qualitative	11	40–68
Bhagat (2002)	A project to improve perinatal care for a specific community	Vancouver, British Columbia	Punjabi mothers	Community organisation model	Qualitative	NR	NR
Maiter (2008)	Discussed value of reciprocity during participatory research	Toronto and Waterloo, Ontario	Somali, Polish, Chinese, Latino and Punjabi	Community-based participatory action research,	Qualitative	NR	NR
Taylor (2008)	Assessed hep-B knowledge; collected input from community organisations to develop a hep-B educational module for ESL curriculum	Vancouver, British Columbia	Chinese immigrants	Community-based surveys and focus groups	Mixed method	Survey 551; Focus group: 56	18–64
Taylor (2009)	To enrich ESL curricula with hep-B education materials and evaluate the outcome	Vancouver, British Columbia	Chinese immigrant ESL students	Randomised controlled trial	Qualitative	325	18 and over
Ochocka (2010)	This CURA study represents 5 years of simultaneous research and knowledge transfer in a participatory action framework	Toronto and Waterloo, Ontario	Multicultural and ethnic origins	Community-based participatory action research	Qualitative	NR	NR
Todd (2011)	How colon cancer information presented in Chinese immigrants' first versus the second language affects health literacy skills	Southern Ontario	Chinese immigrants	Questionnaires	Quantitative	110	50–81
Ashdown (2014)	To promote healthy sexuality to high-risk youth (immigrant and street-involved)	Winnipeg, Manitoba	Street-involved immigrant youth	Intrinsic case study approach	Qualitative	80	15–19
Ostashewski (2015)	This narrates a web portal for community-engaging research collaboration and dissemination of research	Cape Breton, Nova Scotia	Multicultural and ethnic origins	Narrative analysis	Qualitative	NR	NR
Anderson (2015)	How Canada Food Guide is comprehended by newcomer mothers, for future redevelopment and reconceptualisation	Toronto, Ontario	Latina and Tamil immigrants; mothers of children	Interviews	Qualitative	32	Tamils: 23–44 Latinas: 21–46

(Continued)

Table 5. (Continued)

Study	Objective	Location	Target population	Methods	Study type	Population size	Age (years)
Lofters (2015)	To engage knowledge-users to build community support for cancer screening interventions	Peel Region, Ontario	South Asians	Case study approach	Qualitative	NR	NR
McKillop (2016)	To explore visual approaches for making health and safety messages more understandable	Greater Toronto Area, Ontario	South Asian newcomers	Interviews	Qualitative	7	31–50
Poureslami (2016)	To develop and assess culturally specific educational materials in supporting self-management practices	Vancouver, British Columbia	Symptomatic COPD Chinese immigrant patients	RCT	Quantitative	Total: 161 RCT: 91	<75: 37 people; >75: 54 people
Dunn (2017)	To assess the impact of a community-based breast and cervical cancer education and screening programme	Toronto, Ontario	Women from multiple ethnic origins	Matched cohort study	Quantitative	1993	21–74
Ford-Jones (2017)	This reflects on volunteers' roles in educational health care programme	Greater Toronto Area, Ontario	South Asian	Surveys, Key-informant interviews	Qualitative	22	NR
Tai-Wai Li (2017)	To assess two group interventions in reducing HIV stigma	Greater Toronto Area, Ontario	African, Caribbean, Asian and Latino	Questionnaire	Quantitative	100	≥18
Zou (2017)	Test the feasibility and effects of a culturally sensitive dietary intervention	Greater Toronto Area, Ontario	Chinese immigrants	RCT	Quantitative	60	62 (mean)

NR, not reported; CURA, Community-University Research Alliance; COPD, chronic obstructive pulmonary disease; ESL, English as a second language; RCT, randomised controlled trial; hep-B, hepatitis B virus or disease.

Table 6. Description of KT activities in included studies according to WIDER criteria[45]

Study	Content of KT	KT Mode activities	Settings	Language of KT materials	Level of knowledge-user engagement	Partners from knowledge-users
Dyck (1993)	Occupational health	• Influencing factors of KT	NR	Punjabi	NA	NA
Choudhry (2002)	Factors and issues for health promotion to immigrant women	• Workshops • Community presentation • Conference presentation	Multiple community settings (including community health centre)	Gujrati and Punjabi	Planning, research execution and dissemination	Key members of a community group -SASWAP and a group of professionals -ICNSS
Bhagat (2002)	Health concerns regarding pregnancy	• Community event • Skits for TV • Educational sessions • Hospital tour	Multiple community settings	Punjabi	Planning, research execution and dissemination	Public health nurses from the SA community, managers, community outreach workers and an academic
Maiter (2008)	Community mental health	• Community meetings • Displays at events • Information sessions • Community media outlets • Newsletters and updates to policymakers, politicians, funders, and the media • Conferences • Community forums	Multiple community settings	Community language	Planning, research execution and dissemination	Academics, community-based research centre, community-based mental health or health organisations, umbrella organisations, cultural-linguistic communities
Taylor (2008)	Hep-B	• Using ESL curriculum	NR	Chinese translation	Planning	Collaborating community-based organisations, ESL teachers, ESL students
Taylor (2009)	Hep-B	• Using ESL curriculum	Community settings	Chinese translation	Dissemination	Trained ESL teachers, ESL students, community organisations
Ochocka (2010)	Community mental health	• Bulletins • Professional theatre productions • Round table • Community forums • Conference presentation • Peer-reviewed articles	Centre for Community-Based Research	NR	Planning, research execution and dissemination	Five ethno-cultural community members, community researchers, interdisciplinary academics, leading practitioners (from mental health and settlement sectors)
Todd (2011)	Colon cancer	• Information sheet	Community recreation centres for older adults	Mandarin and English	Dissemination	NR
Ashdown (2014)	STIs and sexual health	• Workshop	NR	English	Dissemination	NR
Ostashewski (2015)	NR	• Web Portal	NR	NR	Dissemination	NR

(Continued)

Table 6. (Continued)

Study	Content of KT	KT Mode activities	Settings	Language of KT materials	Level of knowledge-user engagement	Partners from knowledge-users
Anderson (2015)	Maternal nutrition and healthy food choices	• Canada Food Guide	NR	English	Dissemination	NR
Lofters (2015)	Cancer screening	• Through community advisory group	NR	Community language	Planning, research execution and dissemination	Provincial authority for cancer screening programs, local public health organisation, and a local South Asian community service organisation
McKillop (2016)	Health and safety at work	• Text-based poster • Drawing or visual image-based poster	Community health centre	English	Dissemination	NR
Poureslami (2016)	COPD knowledge and inhaler technique usage for by COPD patients	• Lay video (role-played by patients) • Clinician-made video • Pamphlet	Clinic	Cantonese and Mandarin	Planning	COPD patients
Dunn (2017)	Cervical and breast cancer screening	• Group education session (PowerPoint)	Community settings	Visual imagery with simple English	Dissemination	Potential peer leaders, CARES staffs
Ford-Jones (2017)	Cardiovascular risk assessment and education	• Educational materials and talks • Connecting patients to dietitian and nurses	NR	English and community languages	Dissemination	Universities, voluntary social services agency, volunteers, five local organisations, municipal government, a national disease-focused voluntary organisation
Tai-Wai Li (2017)	Coping with HIV-related social stigma and removing this stigma	• Group discussion	NR	Community language	Dissemination	NR
Zou (2017)	Hypertension	• Refrigerator poster • Classroom session • Follow-up telephone talk by a registered nurse	Community centre	Mandarin	Dissemination	NR

WIDER, Workgroup for Intervention Development and Evaluation Research; NR, not reported; NA, not applicable; integrated KT, Integrated Knowledge Translation; end-of-grant KT, End-of-grant Knowledge Translation; SASWAP, South Asian Senior Women's Association of Peel; ICNSS, Inter-Cultural Neighbourhood Social Services; SA, South Asian; ESL, English as a Second Language; CARES, Cancer Awareness: Ready for Education and Screening; COPD, chronic obstructive pulmonary disease; Hep-B, hepatitis B virus or disease.

themes. We also extracted the factors influencing successful conduct of KT research and reported outcomes (Table 7).

Results

The search of academic databases conducted up until 31 August 2019 yielded 10,524 citations. After removing duplicates, 8,618 articles remained. The screening of titles and abstracts ensured the rejection of 8,512 articles. The remaining 106 were selected for full-text review. The author and one reviewer examined the articles for inclusion and exclusion criteria: 18 articles were eligible for inclusion. We used a PRISMA flow chart to track the number of studies at each stage of the review (Figure 1).

Study characteristics

Location

Eleven of the 18 studies were conducted in Ontario, five in British Columbia, and one study in each of Nova Scotia and Manitoba.

Target immigrant group

Most studies (8/18) included immigrants from multiple ethnic origins in their KT activities. Overall, Chinese immigrants were the most frequently studied ethnicity group (5/18), followed by Punjabi immigrants (4/21). Some studies reported their study population as a much broader ethnic identity; namely, South Asians (3), Latin (1), African (1), Asian (1) and Caribbean (1). The rest included Tamil (Sri Lankan) (1), Somalis (1), Polish (1), and Gujrati (1) participants.

Immigrant status

All studies were conducted among immigrants. Refugees were part of one study, but no research was specifically focused on refugees, temporary migrants or undocumented migrants.

Study type and methods

A range of research methods were used in these 18 studies. Most were qualitative (13/18); four were quantitative and one was mixed-methods. Qualitative studies used a community-based participatory action research approach ($n = 3$), a randomised-controlled trial ($n = 2$), case study ($n = 2$), interviews ($n = 4$), qualitative report ($n = 1$), and community organisation model ($n = 1$). Quantitative studies included a randomised-controlled trial ($n = 1$), matched cohort study ($n = 1$), and questionnaires ($n = 2$). The only mixed-method study used community-based surveys and focus group discussions to conduct their research.

Time period

Among the 18 articles, 15 studies were published between 2008 and 2018. Only three studies were published before 2008, in 1993 ($n = 1$) and 2002 ($n = 2$).

Content of KT

The focus of the KT research varied from specific health content, such as the proper use of the inhaler for chronic obstructive pulmonary disease (COPD)[27] to broad initiatives for applied health services research to increase health behaviours such as cancer screening.[28] Cancer screening, including breast, cervical and colon cancer, was the most common focus, with three studies in this area.[28–30] Two studies were conducted on hepatitis B in Chinese immigrants, and it was found that they possess a greater risk of this condition.[31,32] Two articles focused on maternal health-related issues,[33,34] health and safety at work,[35,36] and community mental health.[37,38] Other topics were the focus of KT research only once.

Nature of KT activities

We categorized the 18 articles according to the CIHR classifications of integrated KT and end-of-grant KT.[2] Nine studies fit into the integrated KT approach. These involved the knowledge-users in the research process at any of the stages: planning and conceptualization, data collection, interpretation and dissemination, or implementation. Nine other studies used the end-of-grant KT approach. They did not actively engage knowledge-users in any of the research stages, but transferred knowledge vertically to knowledge-users, explored influencing factors, or compared and evaluated the outcomes that were included as the end-of-grant KT approach in this study.

Table 7. Barriers to, enablers and outcomes of KT

Measures	Themes	Barriers	Study (N)	References
Barriers to KT	*Knowledge-user related*	• Effect of the intervention decreases over time	2	28,29
		• Older age of knowledge-users decreases uptake of knowledge	1	31
		• Financial instability of newcomers holds them back from participating in KT	1	34
		• Household structure, divisions of labour within a family, childcare strategies and parenting concerns influence KT participation	1	36
	Researcher or provider related	• Facilitators from the same cultural background embarrass the knowledge-users for sexual health-related KT	1	43
		• Using the same language for sexual health-related terms by the facilitators embarrasses the participants	1	43
		• Exclusive use of biomedical concepts during knowledge transfer	1	33
		• Short duration of study term is insufficient for impactful KT	1	34
		• Failure to engage more physicians as active partners	1	34
		• Failure to maintain reciprocity-equality between knowledge providers and users	1	38
	Partner related	• Limited expertise on health knowledge of the partner organisations	1	28
		• Financial constraints of the partner organisations	2	28,42
		• Relying on volunteers to sustain a KT research	1	42
		• High turnover and lack of volunteers	1	42
		• Engagement of the partners attenuates over time	1	29
	Systemic barriers	• Transportation and scheduling difficulties for volunteers to conduct KT	1	42
		• Lack of funding to support KT activities	1	37
Enablers of KT	*Knowledge-user related*	• Higher educated participants can better uptake knowledge	2	27,30
		• Younger participants can better uptake knowledge	1	27
		• Self-confidence of the participants aids KT engagement	1	39
		• Acculturation eases KT participation	1	30
		• Rapport and trust between researchers and knowledge-users	1	36
	Researcher or provider related	• Turning over the power to the community members	2	34,37
		• Appropriately developed education materials	1	27
		• Reinforcement to continue the effect of an intervention	1	29
		• Use of Canadian facilitator during sexual health-related KT	1	43
		• Use of English terms related to sexual health during relevant KT activities	1	43
		• Familiarity of the providers with relevant cultural norms	1	43
		• Focus on community-side issues	1	34
		• Regular contact with partners	1	28
		• Engaging and empowering the participants	1	41

(Continued)

Table 7. (Continued)

Measures	Themes	Barriers	Study (N)	References
	Partner related	• Self-confidence of the partners from knowledge-users	1	39
		• Remuneration to the volunteers	1	42
		• Large organisations conducting or partnering with KT	1	42
	Systemic enablers	• Change in structural level such as flexible funding to support culturally appropriate KT research		37
		• Universal health insurance covering the cost of the health practice of interest of a particular KT research (such as cancer screening)	1	29
Outcomes of KT	*For knowledge-users*	• Developed and improved understanding of the respective content of KT	4	27,29,31,40
		• Empowered the participants to create and share knowledge	3	39,41,43
		• Boosted confidence of the knowledge-users	1	43
		• Participants were mobilised to sustain KT research and further work on the issues	1	34
		• Decreased social stigma (HIV or AIDS-related)	1	41
	For researcher and providers	• Participants valued the KT activity	1	43
		• Satisfaction within KT providers seeing a positive outcome of the participants	1	42
	For partners	• Built partner organisations' capacity to implement evidence-based interventions	1	28
	Systemic	• Inspired innovative KT activities to address gaps and barriers in policy and practice	1	37

Range of KT activities

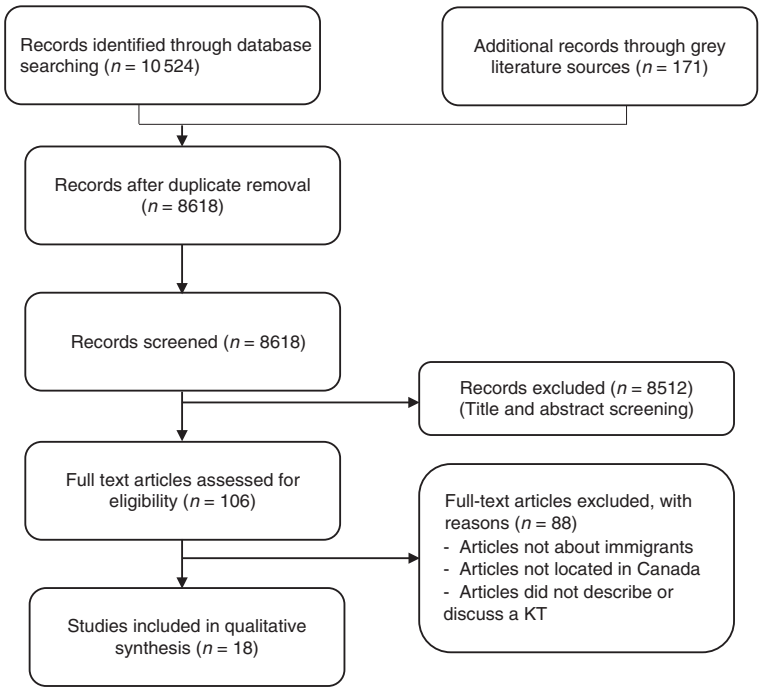
Several studies used multiple activities (presented in Table 6). Discussions in the form of meetings or roundtables were the most frequent method used across all studies. Five studies used meetings to engage immigrants in the integrated KT research.[32,34,37–39] Meetings with immigrants were not held in any of the studies using end-of-grant KT approaches.

Information or education sessions for community members was the next most common approach for integrated KT, used by three studies.[29,34,38] They engaged community peer-leaders and outreach workers in the research process as session co-facilitators,[29,34] or hired community researchers to conduct the information sessions independently.[38] Hiring community researchers was a strategy to include the communities in every step of the study as it demonstrates respect for the community's culture.[38,40] Two end-of-grant KT research studies used this approach, with researchers[41] and a registered nurse[40] conducting sessions for community participants.

The community forum was also used to engage knowledge-users in the research process, allowing people to contribute to the development of study frameworks, initiatives, or projects intended to benefit their community.[37,38] Although conferences are usually used to disseminate research findings, Ochocka *et al.* used community conferences to develop the framework of their project, as well as engage knowledge-users in the research phases in a process similar to community forums.[37]

An English as a Second Language (ESL) programme was used by one research group to translate knowledge among Chinese immigrants.[31,32] They partnered with five Chinese community organisations running ESL programmes and through the programme instructors, they conveyed Hep-B-related knowledge to students. Another study

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart to track the number of studies at each stage of the study.



partnered with community organisations and through immigrant volunteers, provided educational materials and talks to the knowledge-users.[42] One study found the translation of COPD-related information either by other COPD patients' role-playing video or a physician-made instructional video was more effective than reading an educational pamphlet.[27] One research team recruited selected women from communities (Punjabi and Gujrati) to conduct workshops with fellow women in their respective communities. The participants themselves were enabled to plan, organise, promote, and conduct their separate workshops autonomously.[39]

Different activities used to disseminate the knowledge gathered from their research were conducted in both the integrated KT and end-of-grant KT approaches, with knowledge-users being involved in the dissemination phase of the research process in the integrated KT research, and the researchers vertically disseminating knowledge to the knowledge-users in the end-of-grant KT research. For instance, in one integrated KT study, skits were aired on television and team members, including community participants, made appearances in many television and radio programmes to keep the issue in the community's view.[34] Examples of KT dissemination in end-of-grant KT studies included a sexual health workshop comprising a game, story, open question time, lecture with diagrams, demonstration, and related hands-on and reading-aloud activities to achieve positive outcomes among immigrant youth.[43]

One study evaluated the effectiveness of the Canada Food Guide on the transfer of knowledge about maternal nutrition among immigrants and found them ineffective in KT for certain immigrant groups. The authors advised updating these resources with culturally and linguistically appropriate materials for immigrant women.[33]

Partners

We report the partners of the KT activities in Table 6. We categorized them into two groups, community level and provider level. Most of the KT researchers worked with multiple partners to accomplish their research goals; these were both community- and provider-level partners (Table 6).

Community-level partners

Most cases involved various community organisations of diverse immigrant groups, including: ethnocultural community organisations ($n = 3$),[28,38,39] community organisations providing ESL services ($n = 2$),[31,32] community-based mental health organisations ($n = 1$),[38] and umbrella organisations in mental health and diversity ($n = 1$).[38] Others included: community-based peer-leaders ($n = 1$),[29] ESL teachers ($n = 2$),[31,32] ESL students ($n = 2$),[31,32] COPD patients ($n = 1$),[25] community development officers ($n = 1$),[39] community outreach workers ($n = 1$),[34] community researchers ($n = 1$),[37,38] and a community-based research centre ($n = 1$).[38]

Provider-level partners

Four studies partnered with interdisciplinary and inter-university academics to design and execute their research.[34,37,38,44] Other provider-level partners included public health nurses,[39] a provincial authority for the cancer screening programme,[28] a designated public health organisation,[28] hospitals,[33,34] and health service providers and practitioners.[28,29,37]

KT research settings

We examined the settings of KT activities for Canadian immigrants according to the Workgroup for Intervention Development and Evaluation Research (WIDER) recommendation.[45] The WIDER criteria are a checklist to measure, compare and evaluate KT research activities.[45] Overall, most studies were conducted in community settings such as restaurants, community and religious centres, allowing the researchers to engage with communities and involve them in the research process (see Table 6). Three studies were set in health-care settings and eight studies did not report their study settings.[27,35,39]

Level of KT activities

No research explicitly mentioned that their KT activities or any of its component strategies were based on an established KT model or framework.[1] However, three studies used the Community-Based Participatory Action Research framework. We included them as CIHR identifies this as a form of integrated KT.[2] Community-Based Participatory Action Research works towards the same goal as integrated KT to engage knowledge-users in research so that both researchers and knowledge-users can generate evidence to help implement research outcomes.[46]

Table 6 shows the level of intervention identified for each KT activity. Most studies of both integrated KT and end-of-grant KT designs engaged knowledge-users at the dissemination level (Table 6). Only two activities (hiring community-researchers[38,47] and creating a project steering community for research guidance)[38] were used to engage knowledge-users throughout the research process. KT activities that were used at the dissemination level include educational sessions, workshops, information videos, posters, community media, telephone talks and bulletins.

Influencing factors: barriers and enablers of KT

The studies variably reported barriers and enablers to executing their KT research or interventions among Canadian immigrants. Nine studies reported 17 barriers and most of them were unique. Ten studies reported 19 enablers, which were also mostly unique. We identified four categories of barriers and enablers of KT: knowledge-users, researchers or providers, partners (organisation or individual), and systemic (Table 7). Most reported barriers and enablers were related to the KT researchers or providers, followed by partners, knowledge-users, and systems.

Outcomes

Table 7 lists the outcomes of the KT activities within four categories: for knowledge-users, for researchers, for partners, and for the system. Eleven studies reported overlapping outcomes that contributed to nine types of outcomes in total. All outcomes were positive. Four studies explicitly reported that their KT activities developed and improved understanding of the respective KT content.[27,29,31,40] Three other studies concluded that their KT activities empowered participants to create and share knowledge within their communities.[27,31,39] Studies did not report the outcomes as short- or long-term, but we interpreted most reported outcomes as

short-term. Only one study was able to mobilise knowledge-users to sustain their KT activities and to engage them further to work on these issues.[34]

Discussion

In this review, we show the breadth and depth of KT among immigrant and refugee populations of Canada. This synthesis of the current literature provides insight into the importance of collaborating with immigrant knowledge-users, practitioners, researchers, and stakeholders of immigrant health and wellbeing in knowledge translation. This scoping review generated a knowledge base of the range of KT research activities among immigrants, the contents of the conducted KT activities, the nature and goal of the approaches and the depth of the engagement of knowledge-users in these approaches. We also identified barriers and enablers to KT research with immigrants and the outcomes of these studies. Twenty-two types of KT activities were identified from studies that followed either of the two broad approaches: integrated KT and end-of-grant KT.

As the KT research demands input from the knowledge-users, 'meetings' or 'discussions' were the most common KT activity, probably due to its feasibility. In particular, 'meetings' or 'discussions' were chosen for planning and conceptualising research to help researchers ensure their work is acceptable and appropriate for the particular community and their culture. However, knowledge-users were involved through the entire research process only if they were hired as community researchers or made part of an advisory group or project-steering committee. They were paid incentives for their long-term commitment to the research. For dissemination-focused research in both integrated KT and end-of-grant KT streams, information or education sessions were commonly used, creating a learning environment for knowledge-users where they can question the providers and researchers and clarify the research.

We found cancer screening to be the most common content of KT research among immigrants. This may be because cancer screening rates are lower in immigrant groups than in non-immigrant groups, necessitating exploration of barriers to cancer screening and effective KT practices.[48,49]

Across the articles in this review, most did not report any KT theories or frameworks that they might have used. Only three studies applied frameworks such as Community-Based Participatory Research. This suggests that knowledge translation to the immigrant community requires extensive involvement within the community during the research process. Community-Based Participatory Research is a practice rooted in social justice[46] and has demonstrated success in community engagement. It is also recognised by CIHR as a useful KT framework.[2] It is a suitable model for the transfer of research knowledge to the immigrant community.

Most research partners were community-level partners, likely because the target knowledge-users of most of these studies were immigrant community members and their acceptance of the research is facilitated by the involvement of community organisations as partners. Community partnerships in research facilitate trust among community members, resulting in greater authenticity and credibility of research findings in the community's eyes.[50]

Most barriers and enablers to effective KT were related to the researchers, indicating that researchers could be more attentive to conducting KT research among immigrant populations and give more control of the research process to knowledge-users. Among our eligible studies, we did not find any research with negative outcomes; however, most reported outcomes were short-term and one study indicated a decline in effects over time. Future research should consider long-term outcomes while planning KT research.

Many studies were inconsistent in describing and reporting their KT activities, which made it challenging to identify KT activities and code themes. The number of eligible studies was low and some KT activities were undertaken in only one study, which does not permit any generalisable inferences based on their results. We did not include evaluation in our review as our goal was to explore all the KT research activities on immigrant populations. However, we noted that only a few studies evaluated the outcomes of their KT activities, as advocated by guidelines, for the inclusion of an evaluation process to determine the success and worthiness of the KT activity.[51]

Another gap we found in the KT research is that there was no description of underlying theories of frameworks for KT. There are several recommended KT models, theories, and frameworks that give research a solid structure for planning, implementation, dissemination, evaluation, scalability and outcomes.[52] The involvement of knowledge-users was also under-described across the studies. According to a few studies, when the researchers hired community researchers, they were involved in the whole process;[29,34,38] however, they did not describe clearly how they were engaged in the data analysis or interpretation process. This review concurs with other studies reporting that research remains largely researcher-driven[53,54] and knowledge-users are often not truly involved as integral partners.[55]

The strengths of this review include its comprehensive literature search strategy covering most possible keywords and multidisciplinary databases. This strategy helped include research evidence on knowledge translation from a wide perspective and across diverse methodologies and objectives. The members of the research team are experienced and include a trained librarian to ensure the search strategy and extraction of data were appropriate. We also engaged citizen researchers and community representatives in the research group while formulating research questions.

The exclusion of non-English studies, in particular excluding French-language studies when this is an official language of Canada, may be considered a limitation of the study. Moreover, knowledge translation is a complex concept and the nature and range of activities associated with knowledge translation made it difficult to extract the evidence. It is also a new concept and its definition and interpretation may vary according to whether it is used in the health-care or social justice context or in a different context. The primary search delivered over 8000 studies, which was reduced to 106 by a diligent title and abstract screening process. Finally, the synthesis and interpretation of the data may not be clear due to the scarcity of research focusing on immigrant community knowledge translation in Canada. Despite these various limitations, this study is novel in synthesising a practical knowledge base that will help develop a strategic approach to effective knowledge translation within various groups of immigrant populations.

Addressing immigrant and refugee health is a critical challenge to any host country. Although this review searched for articles on KT research engaging immigrants in Canada, the findings can be relatable and implementable to other immigrant-receiving countries, especially those welcoming refugees, asylum seekers, and economic migrants from all over the world such as New Zealand, Sweden, Norway, Germany, and some other European countries.[18] The growing number of immigrants and refugees often poses challenges to the primary health-care system of these countries to accommodate their diversified needs.[56] The knowledge of applied KT research and activities among immigrants in Canada, the level of engagement in the KT activities, their barriers and enablers, as well as outcomes gained from this scoping review will inform taking up appropriate KT activities and help the overall improvement of the primary health-care services in these host countries.

Competing interests

The authors declare no competing interests.

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