Understanding barriers and facilitators to HIV testing in Canada from 2009–2019: A systematic mixed studies review

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Abstract

Background: HIV testing is a core pillar of Canada’s approach to sexually transmitted and blood-borne infection (STBBI) prevention and treatment and is critical to achieving the first Joint United Nations Programme on HIV/AIDS (UNAIDS) 90-90-90 target. Despite progress toward this goal, many Canadians remain unaware of their status and testing varies across populations and jurisdictions. An understanding of drivers of HIV testing is essential to improve access to HIV testing and reach the undiagnosed.

Objective: To examine current barriers and facilitators of HIV testing across key populations and jurisdictions in Canada.

Methods: A systematic mixed studies review of peer-reviewed and grey literature was conducted identifying quantitative and qualitative studies of barriers and facilitators to HIV testing in Canada published from 2009 to 2019. Studies were screened for inclusion and identified barriers and facilitators were extracted. The quality of included studies was assessed and results were summarized.

Results: Forty-three relevant studies were identified. Common barriers emerge across key populations and jurisdictions, including difficulties accessing testing services, fear and stigma surrounding HIV, low risk perception, insufficient patient confidentiality and lack of resources for testing. Innovative practices that could facilitate HIV testing were identified, such as new testing settings (dental care, pharmacies, mobile units, emergency departments), new modalities (oral testing, peer counselling) and personalized sex/gender and age-based interventions and approaches. Key populations also face unique sociocultural, structural and legislative barriers to HIV testing. Many studies identified the need to offer a broad range of testing options and integrate testing within routine healthcare practices.

Conclusion: Efforts to improve access to HIV testing should consider barriers and facilitators at the level of the individual, healthcare provider and policy and should focus on the accessibility, inclusivity, convenience and confidentiality of testing services. In addition, testing services must be adapted to the unique needs and contexts of key populations.

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Keywords: HIV, barriers, facilitators, testing, screening, Canada, systematic review, mixed studies, key populations

Introduction

The World Health Organization estimated that approximately 37.9 million people were living with HIV/AIDS worldwide in 2018, including about 1.7 million who were newly infected that year (1). In Canada, more than 63,000 people were living with HIV in 2016, and nearly 23,000 new cases were diagnosed between 2008 and 2017 (2).
HIV testing and diagnosis is a critical first step in the HIV care cascade (HIV diagnosis, linkage to care, antiretroviral therapy initiation and achievement of viral suppression). For people living with HIV who know their status, receiving appropriate treatment reduces the long-term impact of the disease and prevents further transmission (3).

In 2014, the Joint United Nations Programme on HIV/AIDS (UNAIDS) Programme Coordinating Board established the 90-90-90 targets with the goal of ending the AIDS epidemic by 2020. The aim of these targets are for 90% of all people living with HIV to know their HIV status, 90% of all people diagnosed with HIV to receive appropriate antiretroviral therapy (ART) and 90% of all people receiving ART to achieve viral suppression (4,5). Canada has yet to achieve the first of these targets, and an estimated 14% of Canadians living with HIV in 2016 were unaware of their status (2).

Although HIV testing coverage in Canada continues to expand, testing rates vary considerably across Canada (6). Regional testing rates may be influenced by jurisdictional policies and programs determining accessibility of testing and the types of testing available (e.g. point-of-care testing) (7). Certain populations are also known to be disproportionately affected by HIV, including gay, bisexual and other men who have sex with men (gbMSM), transgender individuals, people who inject drugs (PWID) and sex workers (8–12). Owing to the intersection of stigma, discrimination and social determinants of health, these populations are often marginalized and underserved, leading to greater likelihood of HIV acquisition and transmission, and limited access to and uptake of testing (13,14). The differential distribution of these populations across Canada may contribute to regional variation in HIV testing (2).

A comprehensive overview of the barriers and facilitators of HIV testing that exist across key populations and jurisdictional boundaries in the current Canadian context is currently lacking. This knowledge is essential to orient public health policies and action toward the undiagnosed and mitigate the health impact of HIV in Canada. Two reviews describe the barriers and facilitators to HIV testing in the Canadian context (7,15) and identified many barriers and facilitators to testing at the level of the individual (e.g. low risk perception, fear), healthcare provider (e.g. time constraints, insufficient resources) and institution/policy (e.g. cost/accessibility of testing) (7,15–17). However, these reviews were not systematic, do not cover the last decade and did not examine trends in HIV testing in key populations and in specific jurisdictions. Moreover, few studies conducted in Canada were identified in these reviews.

The objective of this systematic mixed studies review is to examine the barriers and facilitators to HIV testing that have been reported across populations and jurisdictions in Canada throughout the last decade and to conduct a narrative synthesis of identified works.

### Methods

#### Search strategy

A systematic mixed studies review was conducted (18) of barriers and facilitators to HIV testing in Canada in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (19) (appendix available upon request). Based on a pre-specified protocol and in collaboration with information specialists, the reviewers developed an electronic search strategy to identify original quantitative, qualitative and mixed-methods studies reporting on barriers and facilitators to HIV testing in Canada and published between January 1, 2009 and December 9, 2019 (appendix available upon request). Medline, Embase, PsycInfo, ProQuest Public Health, ProQuest Sociology Collection and Scopus were searched for peer-reviewed publications, and Google and Google Scholar for grey literature, government and non-governmental organization reports, and dissertations. Government webpages from each province/territory were also searched, and partners of regional offices of the Public Health Agency of Canada were consulted to retrieve other relevant works. In addition, the reference lists of included studies were manually searched for relevant publications.

#### Eligibility criteria

Studies were eligible for inclusion if they were original quantitative and/or qualitative studies reporting on barriers and/or facilitators to HIV testing in one or more Canadian province or territory; published between January 2009 and November 2019; and written in French or English. There were no restrictions in terms of the study sample size, type of study population or the study context/setting. Studies were excluded if they reported barriers and facilitators to testing for multiple sexually transmitted and blood-borne infections (STBBI) without reporting results for HIV separately, or if study data were collected prior to 2009.

#### Study selection and data collection

Two reviewers independently screened the titles and abstracts of all identified studies. Potentially relevant records were then retrieved for independent full-text review by both reviewers. Disagreements between reviewers at screening and full-text review stages were resolved by consensus.

The two reviewers independently extracted data from included studies using a piloted data extraction form that was created based on a sample of two quantitative and four qualitative studies selected for their high-quality reporting. For all included publications, the study province/territory, study aim(s), study design, population, sample size, data collection method, years of data collection, inclusion/exclusion criteria and basic demographic data of study participants including the age, sex or gender, sexual orientation and race/ethnicity were extracted. For quantitative studies, the analytical method, study exposure(s), outcome(s), covariates and main effect measures of
identified barriers and facilitators to HIV testing were extracted. For qualitative studies, the analytical method and identified themes pertaining to barriers and facilitators to HIV testing were extracted.

Quality appraisal
Two investigators independently assessed the quality of included works using the Mixed Methods Appraisal Tool (MMAT) (20,21). The MMAT has been validated to critically appraise the methodological quality of studies with diverse designs. The tool includes five questions requiring “yes,” “no” or “can’t tell” answers. The questions are adapted to each type of study design and assess the appropriateness of the study design for the research question, the likelihood of bias and the appropriateness of measurements and analyses.

Based on the responses to these questions, a five-point quality score was created, assigning one point for each “Yes” response. Studies with four or more “Yes” answers were considered strong in quality, studies with three “Yes” answers were considered moderate in quality and studies with two or fewer “Yes” answers were considered weak in quality. Disagreements in the score were assigned by both reviewers were resolved by consensus. No studies were excluded based on their quality, as the objective of this review was to synthesize all available evidence on barriers and facilitators to HIV testing in Canada. (Appendix available upon request).

Data analysis
Barriers were defined as any obstacle or reason given by study participants for declining or being unable to access HIV testing. Conversely, facilitators were defined as any reason that study participants gave for accepting or being able to access an HIV test. Sociodemographic characteristics and behaviours (e.g. age, sex/gender, sexual behaviours) that were associated with decreased or increased HIV testing uptake were considered barriers and facilitators, respectively. To avoid repetition, sociodemographic characteristics that operate both as barriers and facilitators to HIV testing are presented in terms of characteristics associated with increased testing.

Identified barriers and facilitators to HIV testing were analyzed using a convergent qualitative synthesis design in which quantitative data are transformed into qualitative findings (18,22). The results were then integrated using inductive thematic synthesis in which themes are derived from the data without a predefined coding frame. The synthesis was guided by a conceptual framework developed by Deblonde et al. (2010) (17) that categorizes determinants of HIV testing according to the level at which they occur: the individual-level; the healthcare provider-level; and the institutional or policy level. To meet research objectives, an overall synthesis of results was conducted followed by a synthesis by key population and by jurisdiction.

Results
Study selection and characteristics
The initial search yielded 1,694 peer-reviewed studies and 49 grey literature records. After the removal of duplicates and publications not meeting eligibility criteria based on their title/abstract, 156 manuscripts were retained for full-text review. Of these, 33 peer-reviewed studies (23–55) and 10 grey literature records (6,56–64) were retained (Figure 1).

Table 1 shows the characteristics of included studies. Included studies were conducted in British Columbia (n=12) (23,24,26, 27,30,32,34,37,38,43,50,52); Manitoba (n=1) (39); Ontario (n=10) (35,36,40,44–47,51,60,64); Québec (n=5) (29,41,49,58,61); Nova Scotia (n=4) (31,42,56,59); and Newfoundland and Labrador (n=1) (25). Seven studies included multiple provinces/territories (Atlantic provinces (28,62), all of Canada (6,33,48,54,57)) and two did not specify a province/territory (53,55). Of the 43 publications, 42 were cross-sectional studies and one was a cohort study. Of these, 20 were quantitative, 13 were qualitative and 10 were mixed methods studies.

Quality appraisal
Most of the included publications were of strong quality (n=32; 74%), while some were moderate (n=6; 14%) or weak quality (n=5; 12%). (Appendix available upon request). The weakest element in the qualitative studies was a lack of the detail necessary for an evaluation of whether the data substantiated the interpretation of results. The weakest element in the quantitative studies was the risk of non-response bias, which is expected as many of these studies were conducted in hard-to-reach populations. The weakest element in the mixed methods studies was a lack of consideration of divergence between qualitative and quantitative results.
| Citation and location | Years of data collection | Study population | Sample size | Age (years) | Male (%) | Study type | Research question | Quality score (/5) |
|-----------------------|--------------------------|------------------|-------------|-------------|----------|------------|-------------------|--------------------|
| Peer-reviewed literature |                          |                  |             |             |          |            |                   |                    |
| Anderson et al., 2016 (23) | 2011–2014 | Migrant sex workers, managers and business owners of indoor sex work venues | 46 | Median: 42 (IQR: 24–54) | 2 | Qualitative: Semi-structured interviews with thematic analysis | Assess the impact of criminalization of sex work on HIV/STI prevention | 5 |
| Armstrong et al., 2019 (24) | 2012–2014 | gbMSM | 535 | Median: 30 (IQR: 24–39) | 100 | Quantitative: Questionnaire (self-administered) | Determine the reasons for HIV testing and never having tested, and explore correlates of testing | 4 |
| Boyd et al., 2019 (25) | 2006–2016 | Patients diagnosed with HIV | Qualitative: 58 Qualitative: 10 | Categorical: 20–29 (20.7%), 30–39 (19.0%), 40–49 (41.4%), 50+ (19.0%) | 91.4 | Mixed methods: Semi-structured interviews with thematic analysis, and retrospective chart review | Determine the timeliness of HIV testing, missed opportunities for testing, and barriers to HIV testing | 4 |
| Brondani et al., 2016 (26) | 2010–2015 | General population | 519 | Categorical: 19–24 (15 %), 25–44 (74%), 45+ (11%) | 71.3 | Quantitative: Questionnaire (self-administered) | Identify patients’ response to, and attitudes toward opt-out HIV rapid screening in a dental setting | 3 |
| Deering et al., 2015 (27) | 2010–2012 | Women sex workers | 435 | Median 35 (IQR: 38–42) | 0 | Quantitative: Questionnaire (self-administered) | Assess prevalence and correlates of accessing HIV testing | 5 |
| Dube et al., 2017 (28) | NR | Stakeholders including policy makers, healthcare providers and youth | 68 | NR | NR | Qualitative: Semi-structured interviews and focus-group discussions with thematic analysis | Explore the scope and accessibility of existing youth-oriented HIV and HCV prevention | 5 |
| Engler et al., 2016 (29) | 2012–2013 | Heterosexual clients of an MSM-oriented clinic | 202 | NR | 72.8 | Quantitative: Questionnaire (self-administered) | Understand the HIV prevention and sexual health service needs of heterosexual women clients of an MSM-oriented clinic | 3 |
| Feng et al., 2018 (30) | 2015–2016 | General population | 114 | NR | 31.2 | Mixed methods: Focus groups and individual interviews, and questionnaire (self-administered) | Determine the feasibility and acceptability of point-of-care HIV screening in dental hygiene settings | 4 |
| Gahagan et al., 2011 (31) | 2009–2010 | General population | Quantitative: 15,518 Qualitative: 50 | NR | 38 | Mixed methods: Semi-structured interviews with thematic analysis, and regional HIV laboratory surveillance data | Explore the individual and structural barriers and facilitators to HIV counselling and testing | 4 |
Table 1: Summary of included studies reporting on barriers and facilitators to HIV testing in Canada, 2009–2019

| Citation and location | Years of data collection | Study population | Sample size | Age (years) | Male (%) | Study type | Research question | Quality score (/5) |
|-----------------------|--------------------------|------------------|-------------|-------------|----------|------------|-------------------|--------------------|
| Gilbert et al., 2013 (1,32) All provinces | 2006–2012 | MSM | NR | NR | 100 | Quantitative: HIV testing laboratory surveillance data | Examine the impact of NAAT HIV testing and social marketing campaign on diagnosis of acute HIV infection among MSM | 2 |
| Gilbert et al., 2013 (2,33) All provinces | 2011–2012 | MSM | 8,388 | Median: 43 (IQR: 18–84) | 100 | Quantitative: Questionnaire (self-administered) | Assess the perceived advantages and disadvantages of Internet-based testing among MSM | 5 |
| Holtzman et al., 2016 (34) Vancouver, British Columbia | 2010–2011 | MSM living outside major urban centres | 153 | Mean: 39.7 (SD: 15.4) | 100 | Quantitative: Questionnaire (self-administered) | Investigate behaviours and predictors of HIV testing among MSM living outside major urban centres | 5 |
| Iqbal et al., 2014 (35) Ontario | 2011 | Women in labour | 92 | Mean: 32 (SD: 4.4) | 0 | Quantitative: Questionnaire (self-administered) | Assess attitudes and opinions surrounding point-of-care HIV testing | 2 |
| Kesler et al., 2018 (36) Toronto, Ontario | 2010–2012 | MSM | 150 | Median: 44.5 (IQR: 37–50) | 100 | Quantitative: Questionnaire (self-administered) | Quantify the potential impact of nondisclosure prosecutions on HIV testing and transmission among MSM | 4 |
| Knight et al., 2016 (1,37) Vancouver, British Columbia | 2013 | Young men | 50 | Mean: 21.7 (SD: NR) | 100 | Qualitative: Semi-structured interviews with critical discourse analysis | Explore the values that influence decisions and motivations to voluntarily access HIV testing | 4 |
| Knight et al., 2016 (2,38) Vancouver, British Columbia | 2013 | Young men | 50 | NR Presumed to be the same as Knight et al., 2016 (37) | 100 | Qualitative: Semi-structured interviews with grounded theory analysis | Determine how HIV-related stigma is experienced differentially across subgroups of young men within voluntary and routine testing practices | 5 |
| Lau et al., 2017 (39) Winnipeg, Manitoba | 2016 | Patients admitted to inpatient care | 144 | Median: 58 (IQR: 42–68) | 48 | Quantitative: Questionnaire (interviewer-administered) | Evaluate the attitudes toward routine point-of-care HIV testing in patients admitted to inpatient care | 3 |
| Lazarus et al., 2016 (40) Ottawa, Ontario | 2013 | PWID | 550 | Median: 43 (IQR 34–50), No: 39 (IQR: 30–48) | 78.2 | Quantitative: Questionnaire (interviewer-administered) | Determine the factors associated with the uptake of community-based HIV point-of-care testing | 4 |
| Lessard et al., 2015 (41) Montréal, Québec | 2013–2014 | Immigrant MSM | 40 | Mean: 33 (SD: 10) | 100 | Mixed methods: Phone interview with thematic analysis | Analyze factors contributing to immigrant MSM’s use of a community-based rapid HIV testing | 3 |
Table 1: Summary of included studies reporting on barriers and facilitators to HIV testing in Canada, 2009–2019 (continued)

| Citation and location | Years of data collection | Study population | Sample size | Age (years) | Male (%) | Study type | Research question | Quality score (/5) |
|-----------------------|--------------------------|------------------|-------------|-------------|----------|------------|-------------------|--------------------|
| Lewis et al., 2013 (42) Halifax, Nova Scotia | 2011 | General population | 258 | 78.1% 20–40 | 53.5 | Quantitative: Questionnaire (self-administered) | Gauge community demand for rapid point-of-care HIV testing | 4 |
| Markwick et al., 2014 (43) Vancouver, British Columbia | 2011–2012 | PWID | 600 | 50.8% >48 | 67.5 | Quantitative: Questionnaire (interviewer-administered) | Characterize PWID’s willingness to receive peer-delivered voluntary counselling and HIV testing | 4 |
| O’Byrne & Bryan, 2013 (44) Ottawa, Ontario | NR | Individuals who identify as gay, bisexual, transsexual, two-spirited, queer or questioning | 721 | Mean: 37.8 (SD: 12.1) | 97.2 | Quantitative: Questionnaire (self-administered) | Examine sexual practices and STI/HIV testing and diagnosis histories | 5 |
| O’Byrne et al., 2013 (1,45) Ottawa, Ontario | NR | MSM | 441 | Mean: 38.0 (SD: 13.1) | 100 | Quantitative: Questionnaire (self-administered) | Investigate impact of nondisclosure prosecutions and HIV prevention | 5 |
| O’Byrne & Watts, 2014 (46) Ottawa, Ontario | NR | Gay male youth | 8 | Mean: 23.3 (SD: NR) | 100 | Qualitative: Semi-structured interviews with thematic analysis | Explore perceptions of stigma in health care in gay male youth | 5 |
| O’Byrne et al., 2013 (2,47) Ottawa, Ontario | NR | MSM | 27 | Categorical: 19–30 (48%), 31–40 (30%), 41–50 (13%), 51–60 (9%) | 100 | Mixed methods: Semi-structured interviews with thematic analysis | Examine HIV testing and attitudes of MSM following regional media releases about a local nondisclosure prosecution | 4 |
| Pai et al., 2018 (48) All provinces | 2015 | Stakeholders involved in HIV self-testing initiatives across Canada | 183 | NR | NR | Mixed methods: Questionnaire (self-administered), open-ended questions and comments | Identify the concerns, opportunities and challenges to implementing HIV self-testing in Canada | 4 |
| Pai et al., 2014 (49) Montréal, Québec | 2011–2012 | Students from a university health clinic | 145 | Median: 22 (IQR: NR) | 39.8 | Mixed methods: Questionnaire (self-administered), open-ended questions | Investigated the feasibility of offering an unsupervised self-testing strategy to Canadian students | 5 |
| Rich et al., 2017 (50) Vancouver, British Columbia | 2012–2014 | Gay, bisexual and queer transgender men | 11 | Median: 26 (IQR: 25–28) | 100 | Qualitative: Semi-structured interviews with thematic analysis | Explore sexual HIV risk for transgender men in an environment of publicly funded universal access to healthcare including HIV testing and treatment | 5 |
Table 1: Summary of included studies reporting on barriers and facilitators to HIV testing in Canada, 2009–2019 (continued)

| Citation and location | Years of data collection | Study population | Sample size | Age (years) | Male (%) | Study type | Research question                                                                                                                                                                                                 | Quality score (/5) |
|-----------------------|--------------------------|------------------|-------------|-------------|----------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Scheim & Travers, 2017 (51) Ontario | 2013 | Transgender MSM | 40 | Categorical: 18–24 (25%), 25–34 (48%), 35–44 (23%), 45+ (5%) | 100 | Qualitative: Semi-structured interviews with thematic analysis | Identify trans MSM’s perspectives on barriers and facilitators to HIV and STI testing                                                                                                                                  | 5                 |
| Stenstrom et al., 2016 (52) Vancouver, British Columbia | 2009–2011 | Tertiary care emergency patients | 1,402 | Mean: 43.3 (SD: 11.6) | 58.4 | Quantitative: Questionnaire (self-administered) | Estimate the acceptability of point-of-care HIV testing in an emergency department                                                                                                                                     | 4                 |
| Stephenson et al., 2014 (53) Not specified | 2011–2012 | Male Facebook users indicating an interest in men | 344 | Categorical: 18–24 (42%), 25–34 (26%), 35–44 (13%), 45+ (19%) | 100 | Quantitative: Questionnaire (self-administered) | Examine the associations between individual characteristics and willingness of MSM couples to use couples’ voluntary HIV counselling and testing                                                                 | 5                 |
| Worthington et al., 2015 (54) All provinces/territories | 2011 | General population | 2,139 | Categorical: 16–29 (23.3%), 30–59 (50.8%), 60+ (25.9%) | 48.2 | Quantitative: Questionnaire (self-administered and interviewer-administered) | Describe voluntary HIV testing in the general population and examine individual knowledge, behaviours and sociodemographic factors associated with testing | 5                 |
| Worthington et al., 2016 (55) Not specified | NR | Nurses | 40 | NR | NR | Mixed methods: Semi-structured interviews with thematic analysis | Assess the impact of an HIV care mentorship intervention on knowledge, attitudes and practices with nurses and PLWHIV                                                                                                                                                  | 4                 |
| Grey literature                                                                                                                  |                                                                                                                 |                                                                                       |                                                                                                                 |                                                                                                                       |
| Barbour, 2017 (56) Halifax, Nova Scotia | NR | Indigenous communities | 6 | NR | 50 | Qualitative: Semi-structured interviews with thematic analysis | Obtain community knowledge and understanding of the perceived barriers/facilitators associated with the access/acceptability of HIV testing within Indigenous populations                                                                 | 5                 |
| CATIE (Community AIDS Treatment Information Exchange), 2016 (57) All provinces/territories | 2016 | Stakeholders working in HIV programming | 65 | NR | NR | Qualitative: Deliberative group dialogue | Produce key priority directions in HIV testing and linkage programming to improve the ability to reach the undiagnosed and link them to care                                                                 | 2                 |
### Table 1: Summary of included studies reporting on barriers and facilitators to HIV testing in Canada, 2009–2019 (continued)

| Citation and location | Years of data collection | Study population | Sample size | Age (years) | Male (%) | Study type | Research question | Quality score (/5) |
|-----------------------|--------------------------|------------------|-------------|-------------|-----------|------------|-------------------|-------------------|
| Grey literature (continued) | | | | | | | | |
| Centre Sida amitié, 2019 (58) Laurentides, Québec | NR | PLWHIV, PWID, expert partners | 196 | NR | NR | Qualitative: Questionnaire (self-administered and interviewer-administered) | Generate recommendations for communities to attain the 90-90-90 targets | 2 |
| Gahagan et al., 2012 (59) Halifax, Nova Scotia | 2011 | Clients of the Halifax Sexual Health Centre | 258 | NR | NR | Mixed methods: Questionnaire (self-administered), open-ended questions | Assess performance of Anonymous HIV Testing Program, gauge clients’ interest in rapid point-of-care HIV testing and willingness to pay a fee to have this testing option | 3 |
| Konkor, 2019 (60) London/Ottawa/Toronto/Windsor, Ontario | 2018–2019 | Heterosexual men of ACB communities | 156 | Categorical: 16–19 (14%), 20–29 (32%), 30–39 (26%), 40–49 (16%), 50+ (12%) | 100 | Quantitative: Questionnaire (self-administered) | Identify the factors that influence uptake of HIV testing services among heterosexual ACB men | 4 |
| Messier-Peet et al., 2018 (61) Montréal, Québec | 2017–2018 | gbMSM | 551 | NR | 100 | Quantitative: Questionnaire (self-administered) | Investigate factors associated with not being tested for HIV among gbMSM at high-risk for HIV | 4 |
| Our Youth, Our Response, 2014 (62) Atlantic provinces | 2011–2013 | Stakeholders from government, community and research sectors, health service providers and clients of community organizations | 69 | Categorical: 16–25 (16%), 26–35 (20%), 36–45 (19%), 46–55 (20%), 56+ (19%) | 45.4 | Mixed methods: Interviews and focus groups with thematic analysis | Develop evidence-based recommendations for stakeholders in government, community and research sectors on prevention, policy and programming approaches needed to help mitigate the impact of HIV/HCV | 4 |
| PHAC, 2018 (63) All provinces/territories | 2010–2012 | PWID | 2,687 | Mean: 39.4 (SD: NR) | 68.2 | Quantitative: Questionnaire (interviewer-administered) | To inform HIV prevention and control efforts, public health policy development, and program evaluation | 4 |
| Vannice, 2016 (64) Ottawa, Ontario | NR | Women in ACB communities | 10 | Range: 18–60 | 0 | Qualitative: Semi-structured interviews with thematic analysis | Examine the experiences, perceptions and knowledge regarding HIV testing among ACB women | 3 |
| Wertheimer, 2011 (6) All provinces/territories | 2009–2010 | Service providers | Quantitative: 75 Qualitative: 15 | NR | NR | Mixed methods: Questionnaire (self-administered online), individual interviews | Identify the barriers that affect women’s access to HIV testing | 2 |

Abbreviations: ACB, African, Caribbean and Black communities; gbMSM, gay, bisexual and other men who have sex with men; HCV, hepatitis C virus; HIV, human immunodeficiency virus; IQR, interquartile range; MSM, men who have sex with men; NAAT, nucleic acid amplification testing; NR, not reported; PHAC, Public Health Agency of Canada; PLWHIV, people living with HIV; PWID, people who inject drugs; SD, standard deviation; STI, sexually transmitted infection
Synthesis of results
The following narrative synthesis of results summarizes identified barriers and facilitators overall and by key population and jurisdiction. Sociodemographic characteristics and behaviours associated with HIV testing are presented separately because they represent individual-level drivers of testing uptake rather than external barriers/facilitators.

Overview of barriers and facilitators to HIV testing
At the level of the individual, several barriers to HIV testing emerged across multiple contexts: fear of receiving a positive result (6,25,39,56,58,64); stigma surrounding HIV and behaviours or identities perceived to be associated with HIV (23,31,38,41,56,58,60,64); the perception of being at low risk for exposure to HIV (6,24,26,50,51,61,62); insufficient knowledge of HIV and testing options (56,61,64); difficulty accessing testing services, for example, limited clinic opening hours, difficulty getting an appointment (23,28,41,58,60,64); and insufficient confidentiality in testing services (28,41,42,56,58,64). Certain sociodemographic characteristics were identified as being associated with increased testing, including engaging in behaviours associated with HIV (e.g. increased number of sexual partners, injection drug use) (24,27,40,54,60,63) and having been previously tested for STBBI (24,25,38).

At the level of the healthcare provider, common barriers were identified as HIV-related stigma from healthcare providers (46,57); perception that a patient is at low risk of HIV exposure (6,64); and reluctance/refusal to offer testing for individuals who were not perceived to be at risk (38,58). Many studies reported healthcare providers suggesting an HIV test (25,26,58) and that non-stigmatizing healthcare practices (23,50,51) facilitated testing.

At the institutional or policy level, the criminalization of certain behaviours (e.g. sex work, drug use, HIV nondisclosure) (23,57) and the lack of resources and adequate healthcare infrastructure in rural and remote regions (28,56,58,62) represent structural barriers to testing. Conversely, policies and institutional practices that increase the accessibility, convenience and confidentiality of testing (e.g. broad range of testing options, reducing wait times, low-cost testing) (6,23,25–27,29,41,49–51,58,62) and integrate testing with routine healthcare services (25,31,38,51,58,63,64), educational/promotional campaigns (6,28,32,62,64) and intersectoral collaboration (6,28,62) were reported as facilitators to testing.

Results by key population
A large number of studies focused on gbMSM (n=15) (24,32–34,36–38,44–47,50,51,61), reflecting the historical epidemiology of HIV in Canada. Other key populations include sex workers (n=2) (23,27), PWID (n=3) (43,58,63), immigrant populations (n=3) (23,41,60), Indigenous communities (n=1) (56), and African, Caribbean and Black communities (n=2) (60,64). Results are summarized by key population to highlight the unique needs and context of each population in Table 2.

Table 2: Barriers and facilitators to HIV testing by key population in Canada, 2009–2019

| Population type | Provinces reporting on population | Barriers                                                                                                                                                                                                 | Facilitators                                                                                                                                                                                                 |
|-----------------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| gbMSM (including two-spirited, queer, trans or questioning) | All provinces | • Fear of positive result (51)  
• Shame associated with requesting HIV testing and responding to the pre-test questionnaire (e.g. disclosure of sexual information) (41)  
• Lack of anonymous testing (44,47)  
• Lack of confidentiality in testing services (41)  
• Lack of knowledge of trans identities and health-related concerns among testing providers (51)  
• Limited availability and accessibility of HIV testing (31) (e.g. limited clinic opening hours (41))  
• Low risk perception of HIV acquisition and/or transmission (24,50,51)  
• Criminalization of HIV nondisclosure (36,45,47)  
• Stigma and discrimination with regard to gender, sexuality, sexual identity, sexual relationships and monogamy (31)  
• Stigmatization by healthcare professionals (46) | • Having a strong network among gbMSM in the community (50)  
• gbMSM, queer and trans-competent sexual health care (50)  
• Integrating HIV testing with other routine health services (31)  
• Internet-based HIV testing (33)  
• Social media campaigns promoting HIV testing (32) |
Table 2: Barriers and facilitators to HIV testing by key population in Canada, 2009–2019 (continued)

| Population type | Provinces reporting on population | Barriers                                                                 | Facilitators                                                                 |
|-----------------|----------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Sex workers (including managers and business owners of sex work venues) | British Columbia                | • Criminalization of sex work (23)                                        | • Mobile HIV prevention programs (27)                                       |
|                  |                                  | • Criminalization of third parties (managers/owners) creating harmful practices within sex work venues (e.g. restrictions on condom use, rejecting testing in the workplace) (23) | • Health outreach workers offering STBBI testing in sex work venues (23)     |
|                  |                                  | • Collaboration between public health outreach and law enforcement (e.g. arriving on site together) resulted in a mistrust of health outreach workers and a reluctance to allow them on site (23) | • Non-judgmental and non-stigmatizing attitudes of health outreach workers enabling open discussions about sexual health issues (23) |
|                  |                                  | • Occupational stigma resulting in difficulties accessing primary health care and sexual health services (23) |                                                                             |
|                  |                                  | • Fear of sex worker status becoming known (e.g. reluctance to request frequent tests from family doctors) (23) |                                                                             |
| PWID             | All provinces                    | • Low risk perception, lack of interest or perceived urgency (63)          | • Peer-delivered post-test counselling (43)                                  |
|                  |                                  | • Fear of a positive diagnosis (63)                                       | • Regularly seeking HIV/STBBI testing (63)                                   |
|                  |                                  | • Feeling healthy (63)                                                    | • Testing integrated with routine medical care (63)                         |
|                  |                                  | • Issues getting tested (e.g. accessibility of testing services) (63)      | • Testing suggested by healthcare provider (63)                             |
|                  |                                  | • Feeling that nothing could be done in the case of a positive diagnosis (63) | • Potential recent exposure (e.g. through sex, drug use) (63)                |
| Immigrant populations | British Columbia, Ontario, Québec | • Shame associated with requesting HIV testing and responding to the pre-test questionnaire (e.g. disclosure of sexual information) (41) | • Availability of translators or multilingual health services (23)         |
|                  |                                  | • Concerns about confidentiality (e.g. being seen in the clinic or receiving services from a member of their close-knit community, preference to answer questions on paper/electronic devices) (41) |                                                                             |
|                  |                                  | • Difficulties accessing primary health care and sexual health services due to lack of health insurance, linguistic and cultural barriers (23,27,41,60) |                                                                             |
| Indigenous communities | Nova Scotia                  | • Geographic barriers to accessing health care in rural and remote communities; absence of primary health care and HIV testing services; inconsistent access to medical transportation (56) | • Normalization of HIV testing increasing both accessibility and acceptability; shifting away from targeted testing based on behaviour, sexuality and risk toward integration of testing into routine medical care (56) |
|                  |                                  | • Lack of trust between clients and healthcare providers (56)             | • Increasing availability of testing; offering HIV testing within Indigenous reserves; increasing access to medical transportation (56) |
|                  |                                  | • Lack of knowledge about HIV (risk factors, risk reduction strategies, modes of transmission, treatment) and HIV testing (feasibility, available types, benefits) (56) | • Reducing wait time for results by offering point-of-care testing (56)     |
|                  |                                  | • HIV stigma relating to injection drug use (56)                          | • Harm reduction service centres integrating HIV testing (56)               |
|                  |                                  | • Low risk perception; denial of potential risk linked to certain behaviours (e.g. injection drug use) (56) | • Education about HIV (modes of transmission, risk factors) and HIV testing (available types, testing as prevention); sessions delivered by HIV/AIDS service organizations (56) |
|                  |                                  | • Fear of positive result and loss of community acceptance (56)           | • Collaboration between healthcare providers and HIV/AIDS service organizations to build trust (56) |
|                  |                                  | • Stigma and homophobia; perceptions of HIV as a “gay disease,” associations with promiscuity, hierarchy of stigmatized behaviours, more social stigma is associated with homosexuality than injection drug use, linked to differential perception of HCV and HIV (56) | • Practices and protocols that are acceptable to the community (56)         |
|                  |                                  | • Issues with confidentiality within small communities, belief that “people will know” (56) | • Combined education about other STBBIs (e.g. HCV) (56)                      |
Several barriers to HIV testing were common across key populations. These included the fear of a positive diagnosis (23,41,51,56,64); experiences of HIV-related stigma (41,56), the perception of being at low risk for exposure to HIV (24,50,51,56,63); limited accessibility of testing services (23,27,41,56,60,64); and insufficient knowledge about HIV (56,64). Other common barriers represent particularly significant obstacles to testing for marginalized populations, including stigma relating to behaviours or identities perceived to be associated with HIV (e.g. sexual behaviours, sexual orientation, sex work, injection drug use) (23,24,31,41,46,50,51,56,60,64) and insufficient confidentiality in testing services, including the lack of anonymous testing and concerns about privacy in small or remote communities (23,41,44,47,56,64).

Other barriers were unique to key populations. Legislation that criminalizes HIV nondisclosure and sex work are barriers to testing among gbMSM (36,45,47) and sex workers (23), respectively. In addition, insufficient knowledge about the health-related concerns and needs of certain populations (e.g. gbMSM/transgender identities, sex workers) by healthcare providers is an obstacle to testing in these populations (23,51,56,60). Many populations also face distinct issues of accessibility, such as limited availability of multilingual health services and lack of health insurance among immigrant populations (23,41,60), and geographic barriers to health care in rural and remote Indigenous communities (56).

Despite the diverse contexts of these populations, several common facilitators emerged. Offering HIV testing in a broad range of modalities (e.g. anonymous testing, unsupervised self-testing) and settings (e.g. mobile clinics, point-of-care testing) (23,27,33,56) as well as the integration of members of key populations with lived experience (e.g. peer-delivered post-test counselling, community-based outreach initiatives) (43,56,64) were frequently identified as means to improve the accessibility and acceptability of HIV testing services to key populations.

Finally, some facilitators were uniquely relevant for certain key populations. Healthcare practices that are inclusive and non-stigmatizing were identified as important facilitators by queer and transgender communities (50,51). The availability of translators or multilingual health services facilitated testing for immigrant populations (23). Among the African, Caribbean and Black community, enabling social connections with people living with HIV and educational initiatives focused on navigating cultural silences around HIV facilitated testing (64).

### Results by jurisdiction

Identified sociodemographic characteristics associated with HIV testing, and barriers and facilitators to HIV testing are summarized by jurisdiction in Table 3.

Although jurisdictions share many common barriers and facilitators to HIV testing, several trends emerged in particular jurisdictions. Studies conducted in British Colombia highlight the criminalization and stigmatization of sex work and issues related to immigrant status as major barriers to HIV testing (23,24,27). Studies conducted in Ontario feature cultural barriers and issues of stigma and fear of behaviours associated with HIV more prominently than other jurisdictions (38,60,64). Studies conducted in the Atlantic provinces uniquely highlight youth-adapted services as a key facilitator (28,62). Differences in the barriers and facilitators to HIV testing across jurisdictions...
Table 3: Sociodemographic characteristics associated with increased HIV testing, barriers and facilitators of HIV testing by jurisdiction in Canada, 2009–2019

| Province/territory | Individual level | Healthcare provider level | Policy level |
|--------------------|------------------|---------------------------|--------------|
| **British Columbia** |                  |                           |              |
| Sociodemographic characteristics and behaviours associated with increased HIV testing | • Younger age (24,34)  
• Being more educated (34)  
• White race/ethnicity (24)  
• Living in an urban area (24,50)  
• Engaging in risk behaviours (increased number of anal sex partners, inconsistent condom use, not engaging in serosorting (24,27), PWID (27)) | • NA | • NA |
| **Barriers** | • Stigmatization of sex work (23)  
• Immigrant status (lack of health insurance, linguistic and cultural barriers) (23,24,27)  
• Low risk perception (of HIV acquisition and/or transmission) (24,26,50)  
• Internalized homophobia (34) | • NA | • Criminalization of sex work (23)  
• Collaboration between public health agencies and law enforcement creating mistrust of health outreach workers (23) |
| **Facilitators** | • Having a strong network in the gbMSM community (50)  
• Having been previously tested for other STBBIs (24) | • gbMSM, queer and trans-competent sexual health care and HIV testing (50)  
• HIV testing initiated/offered by healthcare providers (26)  
• Non-judgmental and non-stigmatizing attitudes of healthcare providers (23) | • Availability of translators or multilingual health services (23)  
• Mobile HIV prevention programs (27)  
• Convenient and low-cost testing (e.g. free-of-charge, receiving results on site (26,30))  
• Offering various HIV testing modalities: oral swab (26), couples voluntary HIV counselling and testing (53), peer-delivered post-test counselling (43)  
• Offering HIV testing in different settings: sex work venues (23), dental hygiene clinics (26,30), emergency departments (52)  
• Social media campaigns promoting HIV testing (32) |
| **Manitoba** |                  |                           |              |
| **Barriers** | • Fear of positive result; preferring not to know (39)  
• Low risk perception (39) | • NA | • NA |
| **Ontario** |                  |                           |              |
| Sociodemographic characteristics and behaviours associated with increased HIV testing | • Older age (40)  
• Male sex/gender (40)  
• Having more experience with testing (38)  
• Being an immigrant (60)  
• Full-time employment; higher income (60)  
• Engaging in risk behaviours (use of condoms, having multiple sexual partners, injecting drugs, sex work, having spent time in jail, drug use in jail (40,60)) | • NA | • NA |
### Table 3: Sociodemographic characteristics associated with increased HIV testing, barriers and facilitators of HIV testing by jurisdiction in Canada, 2009–2019 (continued)

| Province/territory | Individual level | Healthcare provider level | Policy level |
|--------------------|------------------|---------------------------|--------------|
| **Ontario (continued)** | | | |
| **Barriers** | • Cultural barriers (labelling of women who test as promiscuous) (64) • Difficulty accessing health/ testing facilities (not knowing where to get an HIV test) (60,64) • Fear of the testing process, the length of time to wait for the results, fear of positive results; preferring not to know (35,51,64) • Fear of negative reaction from partner(s) upon disclosure of status (35,64) • Lack of confidentiality in testing services (35,64) • Insufficient knowledge HIV (transmission, testing, treatment) (64) • Low risk perception (37,51) • Misconception that HIV testing is associated with low masculinity (38,60) • Potential nondisclosure prosecution (36,45,47) • Stigma (grounded in taboos surrounding sexuality) and discrimination of same-sex sexual behaviour, PWID or alcohol use (38,60,64) • Needing to convince healthcare providers by revealing stigmatizing identities/behaviours (38) • Perceiving an offer of testing as a form of stereotyping or profiling (38,60,64) | • Lack of knowledge of trans identities and health-related concerns among healthcare providers (51) • Stigma from healthcare professionals (46) • Low risk perception among healthcare providers (64) | • NA |
| **Facilitators** | • Anonymous testing (44,47,64) • More information on the testing process (35) • More information on mother to child HIV transmission (35) • Individualized prevention approach (35) | • Access to trusted testers (51) • Gender-responsive interventions (51) | • Integrating HIV testing with routine care (de-stigmatize and normalize HIV testing) (38,51,64) • Increasing HIV knowledge and education in the community (e.g. via television and radio), particularly from government health agencies (64) • Providing social connections with PLWHIV (64) |
| **Québec** | | | |
| **Sociodemographic characteristics and behaviours associated with increased HIV testing** | • Higher number of sexual partners (61) | • NA | • NA |
| **Barriers** | • Fear of positive result, of being judged or rejected, and of disclosing status to partner(s) (58) • Shame associated with requesting HIV test and responding to the pre-test questionnaire (e.g. disclosure of sexual information) (41,58) | • NA | • Lack of health resources in rural regions (58) |
Table 3: Sociodemographic characteristics associated with increased HIV testing, barriers and facilitators of HIV testing by jurisdiction in Canada, 2009–2019 (continued)

| Province/territory | Individual level | Healthcare provider level | Policy level |
|--------------------|------------------|--------------------------|--------------|
| **Québec (continued)** | | | |
| **Barriers** | Lack of confidentiality in testing services (41,58) | Healthcare providers never refusing a request for HIV testing from a patient (58) | Integrating HIV testing with routine healthcare without a pre-test questionnaire (e.g. on sexual behaviours) (58) |
| | Insufficient knowledge of HIV testing services, locations and recommendations (61) | Unsupervised oral self-testing (48) | Accessible, confidential, convenient (no need for appointment) testing services, including non-nominal testing, rapid testing (29,41,58) |
| | Limited access to healthcare providers (61) | | Offering a variety of HIV testing modalities: unsupervised oral self-testing (49) |
| | Limited opening hours of HIV testing clinics (41) | | Offering HIV testing in various settings: in the community, at the pharmacy (58) |
| | Low risk perception (61) | | Prevention efforts based on harm reduction principles, focusing on the person as well as the virus (58) |
| | Testing not covered by public health insurance (58) | | Safe HIV testing setting (58) |
| | HIV stigma (58) | | |
| **Facilitators** | NA | | |
| | Increasing availability and accessibility of HIV testing services (31,56) | | |
| | Being able to pay for point-of-care testing (42) | | |
| **Nova Scotia** | | | |
| **Sociodemographic characteristics and behaviours associated with increased HIV testing** | Female sex/gender (31) | NA | NA |
| **Barriers** | Fear of positive test result, of rejection and of being associated with promiscuity and PWID (56) | NA | Geographic barriers to accessing health care in rural and remote communities; absence of primary health care and HIV testing services in smaller communities; inconsistent access to medical transportation (56) |
| | Lack of confidentiality in testing services (42,56) | | |
| | Insufficient knowledge about HIV and testing (56) | | |
| | Stigma and discrimination with regard to gender, sexuality, sexual identity, sexual relationships and monogamy (31,56) | | |
| **Facilitators** | Increasing availability and accessibility of HIV testing services (31,56) | NA | Integrating HIV testing with routine health services (e.g. systematic prenatal HIV testing) (31) |
| | Being able to pay for point-of-care testing (42) | | Normalizing of HIV testing (56) |
| **Newfoundland and Labrador** | | | |
| **Sociodemographic characteristics and behaviours associated with increased HIV testing** | MSM (heterosexual men diagnosed later than MSM) (25) | NA | NA |
| **Barriers** | | | |
| | | | Availability of rapid testing (42) |
### Table 3: Sociodemographic characteristics associated with increased HIV testing, barriers and facilitators of HIV testing by jurisdiction in Canada, 2009–2019 (continued)

| Province/territory | Individual level | Healthcare provider level | Policy level |
|---------------------|------------------|---------------------------|--------------|
| **Newfoundland and Labrador (continued)** | | | |
| **Barriers** | • Hospital settings (e.g. patients in STBBI clinics diagnosed earlier than those in hospitals) (25) • Fear of diagnosis; denial of risk (25) • Negative interactions with the healthcare system (25) • Stigma surrounding HIV and testing | • NA | • Insufficient knowledge of HIV among the general population (fear of HIV, misconceptions about HIV and drug use) • Lack of adequate support for PLWHIV (25) |
| **Facilitators** | • Having been tested for other STBBIs previously (25) | • HIV testing initiated/proposed by healthcare providers (25) | | |
| **Atlantic provinces** | | | |
| **Barriers** | • Difficulty accessing timely, gender-appropriate and youth-adapted HIV testing services (28) • Lack of accessibility and confidentiality in small community settings (e.g. personal relationships between family and healthcare professionals) (28,62) • Low risk perception; lack of HIV knowledge (62) | • NA | • Lack of personnel and resources for collaboration between Atlantic provinces (62) • Lack of guiding policy for programs, resulting in discordance across sectors (28) |
| **Facilitators** | • HIV testing for youth in dedicated sexual health centres • Increasing awareness, education and information about HIV; highlighting the importance of prevention, reducing misconceptions related to HIV to reduce stigma (28,62) | • Continuing education to deliver pre and post-test counselling and referrals to appropriate health services following testing (62) • Increasing awareness, education and information about HIV; highlighting the importance of prevention, reducing misconceptions related to HIV to reduce stigma (28,62) | • Access to nonjudgmental and gender-responsive approaches (services without gender-based stereotypes or inequities) (28) • Education and promotional materials adapted to youth (e.g. age-appropriate content, peer mentoring, social media, phone and Internet-based programs, art-based projects) (62) • Increase awareness, education and information about HIV; highlighting the importance of prevention, reducing misconceptions related to HIV to reduce stigma (28,62) • Increasing the number and types of testing sites, (e.g. clinics in schools, mobile testing sites) and modalities (e.g. point-of-care, anonymous testing) (62) • Inter-organizational and intersectoral collaboration (28,62) • Youth engagement in the development and implementation of HIV/HCV prevention initiatives (28,62) |
| **Canada-wide or unspecified provinces/territories** | | | |
| **Sociodemographic characteristics and behaviours associated with increased HIV testing** | • Younger age (54) • Being in a sexual minority group (54) • Female sex/gender (54) • Having casual partners (54,63) • Potential exposure due to drug use (63) | • NA | • High jurisdictional HIV prevalence (54) |
Table 3: Sociodemographic characteristics associated with increased HIV testing, barriers and facilitators of HIV testing by jurisdiction in Canada, 2009–2019 (continued)

| Province/territory | Individual level | Healthcare provider level | Policy level |
|--------------------|------------------|---------------------------|--------------|
| **Barriers**       |                  |                           |              |
| • Anxiety and fear (due to long time between testing and obtaining results, being judged, sickness and death, family or community violence) (6,63) | • HIV-related stigma (57) | • HIV-related stigma and criminalization of HIV nondisclosure (57) |
| • Difficulty accessing health/ testing services (limited medical facilities) (6,63) | • Lack of trust in healthcare providers due to historical context of racism, colonization and homophobia (57) |                           |
| • Geographical barriers to accessing health care (6) | • Low risk perception by healthcare providers (6) |                           |
| • Difficulty accessing testing services (63) |                             |                           |
| • Lack of confidentiality in testing services (6) |                             |                           |
| • Lack of pre and post-test counselling (6) |                             |                           |
| • Lack of trust in healthcare providers due to historical context of racism, colonization and homophobia (6,57) |                             |                           |
| • Low risk perception, lack of interest, feeling healthy (6,63) |                             |                           |
| • HIV-related stigma and criminalization of HIV nondisclosure (57) |                             |                           |
| **Facilitators**   |                  |                           |              |
| • High self-perceived HIV knowledge (54) | • Training and sensitizing healthcare providers (6) | • Anonymous testing (6) |
| • Routine testing for HIV (63) | • Healthcare providers suggesting an HIV test (63) | • Integrating HIV testing into routine medical care (63) |
| • Unsupervised oral-self testing (48) | • Availability of different testing modalities: rapid testing (6), couples voluntary HIV counselling and testing (53), Internet-based HIV testing (33), unsupervised oral-self testing (48) | • Enhancing the capacity of health service providers (e.g. clinics, AIDS service organizations, community organizations) (6) |

Abbreviations: AIDS, acquired immunodeficiency syndrome; gbMSM, gay, bisexual and other men who have sex with men; HCV, hepatitis C virus; HIV, human immunodeficiency virus; MSM, men who have sex with men; NA, not applicable; PLWHIV, people living with HIV; PWID, people who inject drugs; STBBI, sexually transmitted and blood-borne infection.

Note: Missing provinces/territories indicate that no barriers or facilitators were documented in the available peer-reviewed or grey literature in these jurisdictions in the last decade.
were driven primarily by differential presence of key populations across jurisdictions and reflect regional public health priorities.

Discussion

In this systematic mixed studies review, it included results from 43 studies conducted in Canada to document and understand recent and emerging barriers and facilitators to HIV testing in the last decade. The principal motivation was to orient future research and public health action toward reaching the first global HIV target in Canada, taking into consideration key populations and jurisdictional contexts. Another motivation was to identify specific areas for intervention to improve access to HIV testing in a broad range of contexts, including providing accessible, low-cost and convenient testing, ensuring confidentiality, reducing HIV-related stigma, improving education about HIV (e.g. modes of transmission, testing, treatments), normalizing offering HIV testing and integrating testing into routine healthcare practices.

Common barriers emerge across key populations and jurisdictions, including low risk perception, fear and stigma surrounding HIV, lack of knowledge of HIV and testing, insufficient patient confidentiality, limited access to cultural and linguistically appropriate services and lack of resources for testing (7,15). This review identified several emerging innovative practices, including integrating HIV point-of-care testing in a variety of new settings including Internet-based HIV testing (33), sex work venues (27), dental care (26,30), emergency rooms (52), pharmacies (59) and in mobile testing units (26,27). Several innovative testing modalities were also identified: couples voluntary HIV counselling and testing (53), oral swab and oral-self testing (26,49) and peer-delivered post-test counselling (43). Gender-based approaches (28), queer and transgender-competent healthcare providers and adapted interventions and approaches (50), age-adapted education and promotion material, testing sites (e.g. school-based clinics for youth) and youth engagement in the development and implementation of HIV prevention initiatives were also clearly identified as important facilitators (62).

The evidence summarized above highlights the importance of adapting public health policy and programming to the unique contexts of each jurisdiction, including the distribution of key populations and burden of disease. Potential strategies for improving access to HIV testing among key populations include increasing the accessibility of HIV testing by expanding available testing options and promoting health outreach initiatives for hard-to-reach populations. In addition, ensuring inclusive and non-stigmatizing healthcare services and integrating the knowledge of members of these communities are essential to improve the acceptability of HIV testing to key populations. Policy makers and healthcare providers should also consider the intersectionality of identities and experiences in order to better understand the specific drivers of HIV testing in each population (65). These results underscore the importance of adopting a person-centred approach to HIV testing and the need to reach people where they are.

Many of the barriers and facilitators identified in this review operate at the institutional/policy level, potentially indicating an increased focus on up-stream determinants of HIV testing in the last decade. This recent trend underscores the importance of public health action at the systemic level and suggests that HIV testing initiatives could be enhanced by leveraging the expertise of a range of stakeholders including community partners, primary health care, harm reduction services and public health authorities. Expanding intersectoral partnership and collaboration may offer important opportunities to bridge testing gaps and ensure equitable access to HIV testing.

The Pan-Canadian Framework recognizes the importance of testing in achieving global STBBI targets and outlines specific opportunities for action that align with the facilitators identified in this review (66). As outlined in the Government of Canada STBBI action plan (67), improving access to STBBI testing is a core component of a coordinated approach to reducing the impact of STBBI in Canada, with a particular focus on populations that are disproportionately affected by STBBI. This review contributes to existing knowledge of the drivers of HIV testing in Canada and highlights several important gaps and opportunities that can be used to inform public health action toward this goal.

Strengths and limitations

A major strength of this work is the systematic mixed studies review design, which synthesizes quantitative and qualitative data in order to answer complex research questions such as the identification of determinants of HIV testing (18). The inclusion of multiple forms of evidence creates a rich synthesis of extant barriers and facilitators by combining diverse perspectives (i.e. population-level data and individual experiences) and produces results that are directly relevant to decision-makers (22). In addition, the broad scope allows for the identification of emerging and lesser known barriers and facilitators, as well as population and jurisdiction-specific trends in HIV testing in Canada, informing targeted public health action (68).

Nevertheless, this review has limitations. It is possible that some relevant works were not identified by our search strategy and so certain barriers/facilitators may be absent from this synthesis. In addition, the intrinsic nature of the data made it impossible to assess the causal nature of any of the identified barriers or facilitators.

This review may also be limited by publication bias, as published literature reflects historical and regional contexts and priorities, potentially resulting in gaps in the literature to do with non-priority populations and settings. As such, although this review presents results across populations and jurisdictions, some key populations (e.g. PWID, sex workers, immigrants, Indigenous communities and African, Caribbean and Black communities)
and some provinces (e.g. Alberta, Manitoba, Saskatchewan) and the territories are underrepresented, potentially limiting the generalizability of results. In addition, emerging key populations may be missing.

Finally, the scope of this review was limited to barriers and facilitators of HIV testing and may omit other important shared barriers and facilitators to testing for other STBBI.

Conclusion
HIV testing acts as the gateway for HIV treatment and prevention and is a core pillar of Canada’s efforts to reduce the health impact of HIV and other STBBI. This work provides a comprehensive and detailed understanding of the barriers and facilitators to HIV testing in Canada and highlights several important factors that can be leveraged to increase HIV testing. The results provide key evidence to influence practice, policy and future research toward achieving global HIV targets.

Authors’ statement
CL and CBF contributed equally to this work: conceptualization, development of search strategy, screening of identified works for inclusion, quality appraisal, data extraction, analysis and interpretation of data and manuscript preparation.

Competing interests
The authors have no conflicts of interest to declare.

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