Vaccines for all: A formative evaluation of a multistakeholder community-engaged COVID-19 vaccine outreach clinic for migrant communities

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ARTICLE INFO

ABSTRACT

Background: Racialized, low-income, and migrant populations experience persistent barriers to vaccines against COVID-19. These communities in East and Northeast Calgary were disproportionately impacted by COVID-19, yet faced vaccine access barriers. Diverse multi-stakeholder coalitions and community partnerships can improve vaccine outreach strategies, but how stakeholders perceive these models is unknown.

Methods: We conducted a formative evaluation of a low-barrier, community-engaged vaccine outreach clinic in Calgary, Alberta, Canada, on June 5–6, 2021. We delivered an online post-clinic survey to clinic stakeholders, to assess whether the clinic achieved its collectively derived pre-specified goals (effective, efficient, patient-centered, and safe), to asses whether the clinic model was scalable, and to solicit improvement recommendations. Survey responses were analyzed using descriptive statistics and thematic analysis.

Results: Overall, 166/195 (85%) stakeholders responded. The majority were from non-healthcare positions (59%), between 30 and 49 years of age (87/136; 64%), and self-identified as racialized individuals (96/136; 71%). Respondents felt the clinic was effective (99.2%), efficient (96.9%), patient-centered (92.3%), and safe (90.8%), and that the outreach model was scalable 94.6% (123/130). There were no differences across stakeholder categories. The open-ended survey responses supported the scale responses. Improvement suggestions describe increased time for clinic planning and promotion, more multilingual staff, and further efforts to reduce accessibility barriers, such as priority check-in for people with disabilities.

Conclusion: Diverse stakeholders almost universally felt that this community-engaged COVID-19 vaccine outreach clinic achieved its goals and was scalable. These findings support the value of community-engaged outreach to improve vaccine equity among other marginalized newcomer communities.

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1. Introduction

Globally, migrants in high income countries face disproportionately higher COVID-19 infection rates, worse outcomes, and lower vaccination rates compared to non-migrants (Berardi et al., 2022; Büyüm et al., 2020; Edmonds and Flahault, 2021; European Centre for Disease Prevention, 2021; World Health Organization, 2021; Fabreau et al., 2022; Balakrishnan, 2021). In Canada, migrants (defined collectively as immigrants, temporary foreign workers, refugees, and asylum claimants) experience many social vulnerabilities, leading to disproportionate negative impact of COVID-19, decreased access to COVID-19 information, and lower COVID-19 vaccine acceptance, compared to non-migrants (Statistics Canada, 2021). These vulnerabilities include overrepresentation in high-risk employment settings, language and cultural barriers, racism and discrimination including structural racism, poor housing conditions, low socioeconomic status, reduced health literacy, limited healthcare access, deportation fears, and mistrust of health institutions, governments, and media (Edmonds and Flahault, 2021; Statistics Canada, 2021; Tuyisenge and Goldenberg, 2021; Patrice and Lamboni, 2020; Reverby, 2021; McFadden et al., 2022; Abba-Aji et al., 2022).

While lower vaccinaton rates among migrants have resulted in the labeling of migrant and racialized communities as "vaccine hesitant" (Statistics Canada, 2021), further inspection reveals that the historical health system injustices endured by racialized communities and reduced vaccine accessibility likely contribute significantly to the observed lower vaccination rates (Tuyisenge and Goldenberg, 2021; Reverby, 2021). Failure to address these social vulnerabilities and resulting health disparities can then lead to discriminatory narratives which hold migrants responsible for rising case numbers and prolonged waves of COVID-19 (Hudes, 2020). These narratives can persist, despite the overwhelming evidence which suggests that upon arrival, migrants in Canada are healthier than non-migrants, due to the "healthy immigrant effect" (Vang et al., 2016). This illustrates the damaging effects of structural racism (Reverby, 2021), and its impacts on the health and well-being of migrants.

The World Health Organization (WHO) defines vaccine hesitancy as a continuum mediated not only by confidence in vaccine effectiveness, but also by constraints, calculation, complacency, and collective responsibility (Betsch et al., 2018; MacDonald et al., 2015). This nuanced understanding of vaccine hesitancy therefore requires health systems to employ equity-focused vaccine strategies, given that traditional age-based vaccination campaigns are unable to address the complex reasons for the observed vaccine disparities among migrant and non-migrant populations in high income countries (Reverby, 2021; Bibbins-Domingo et al., 2021).

Community-based Participatory Research (CBPR) is a recognized methodology for advancing social change and reducing health disparities through equitable multi-stakeholder participation and knowledge sharing across sectors (Cacari-Stone et al., 2014). CBPR emphasizes building relationships to create meaningful partnerships between community members and institutions (Cook et al., 2019; Israel et al., 1998). Through the intentional disruption of power asymmetries and the meaningful consideration of various ways of knowing, rather than assuming the primacy of 'expert' academic discourse, CBPR is a post-colonial response to health inequities and racial disparities that promotes transformative social action (Akwataghibe et al., 2022; Sánchez et al., 2021; Tremblay et al., 2018). Vaccine delivery strategies, therefore, may benefit from applying CBPR methods to prioritize community engagement and diverse stakeholder participation, to address the persistent vaccine access inequities among migrant populations (Burgess et al., 2021; Fernández and Shorett, 2021; Quinn and Andrasik, 2021).

Global and national health organizations have recommended interdisciplinary vaccine equity strategies to address the social vulnerabilities that reduce vaccine access among migrant populations (World Health Organization, 2021; World Health Organization, 2020; MacDonald et al., 2021; Arya et al., 2021). In addition, the Royal Society of Canada has called for increased collaboration across four sectors to enhance vaccine acceptance: People and Communities; Health Care Workers; Health Care System and Local Public Health Units; and all government levels (MacDonald et al., 2021). However, how these models are perceived across stakeholder groups, and their collective improvement suggestions for community-based vaccine outreach models, is lacking. Given the varied perspectives, resources, and constraints among diverse stakeholder groups, the best practices for design, coordinaton, implementation and improvement of community-engaged COVID-19 vaccine outreach strategies remain unclear (MacDonald et al., 2021). To address these gaps we performed a formative evaluation to gather perspectives from a multistakeholder cohort of staff members who participated in the first community-engaged vaccine clinic for COVID-19 in Calgary, Alberta, Canada.

2. Materials and methods

2.1. Context

In June 2021, a multistakeholder, community-partnered COVID-19 vaccine outreach clinic was organized and launched in a marginalized region of Calgary, a major metropolitan center in Alberta, Canada. In Alberta, the health system is divided into regions known as local geographic areas (LGAs), which are cared for by "Primary Care Networks" (PCNs) which facilitate coordination between physicians and other health care professionals (Alberta Primary Care Networks, 2019). The provincial healthcare system that oversees all healthcare in Alberta is Alberta Health Services (AHS). Approximately 23.5% of the population in Alberta self-identify as a visible minority or racialized, and 21.2% are recent immigrants (Government of Alberta, 2018). The clinic targeted the Upper Northeast, East, and Lower Northeast LGAs of Calgary, which contain a large population of racialized residents, (Government of Alberta, 2018) including migrants, many of whom worked in frontline public-facing occupations (Statistics Canada, 2021). These LGAs also contain some of the lowest income neighbourhoods in the province (Government of Alberta, 2018). Throughout the pandemic, these communities were disproportionately affected by COVID-19, with higher per capita infection rates (Alberta Health Services, 2021), and approximately 20–25% lower first dose vaccinations, compared to the city's highest income neighbourhoods (Alberta Health Services, 2021; Tait, 2021; Fedor, 2021; Gibson, 2021). In fact, by May 2021, the East and Northeast regions of Calgary experienced the highest per capita COVID-19 infection rates and lowest rates of vaccination uptake in the city (Alberta Health Services, 2021; Tait, 2021; Fedor, 2021; Gibson, 2021).

This vaccine clinic occurred when first vaccine doses were widely available for residents 12 years and older, and the second vaccine dose campaign had begun (Alberta Health Services, 2022). A multi-stakeholder group, initiated by the Calgary East Zone Newcomers Collaborative (CNC), included healthcare workers, physicians, community organizations, health system and public health employees, administrators, municipal and provincial government officials, university investigators and research staff, resettlement organizatioins, and community volunteers worked closely to co-design and implement the clinic. The CNC is a collective of immigrant services, community-based organizations, healthcare workers, and service providers, who support migrants and newcomers, and is funded by the municipal, provincial, and federal governments (Centre for Newcomers, 2023). Vaccines for this clinic were provided by the province, and the city provided in-kind support operationally.

Collaboratively, these stakeholders identified clinic objectives and pre-specified the overarching goal to conduct an *effective, efficient, patient centered, and safe* community-engaged COVID-19 vaccination clinic. We conducted a formative evaluation to assess stakeholder perceptions

on whether this goal was achieved, scalability of the clinic, perceived barriers and facilitators to clinic implementation, and suggestions for improvement.

2.2. Intervention

Leveraging the diverse multistakeholder partnerships, the clinic aimed to reduce multiple community-identified accessibility barriers including: (1) accessibility (i.e., time or operation, location, and transportation); (2) cultural (i.e., language, health and digital literacy, and community mistrust); and (3) convenience (i.e., walk-up assembly-line model, family-based vaccinations, and childcare provision). The clinic utilized a free, walk-up model that did not require appointments and was open to all regardless of immigration status or health care coverage, with an emphasis on reaching community members in the East and Northeast areas of the city. The municipal government offered free public transit to and from the vaccination site, and ride-share vouchers were provided to individuals unable to access public transportation or taxis. To maximize accessibility, services were available in 16 languages (*Appendix A*) and the clinic operated extended hours for two days (Saturday and Sunday) between 08:00 and 22:00. Community agencies concurrently provided food hampers and additional social support to clinic attendees.

2.2.1. Clinic structure

The vaccine clinic employed a "hockey hub" model in a large city-owned recreation center, centrally located within the target communities and co-located near a public transit hub. The "hockey hub" model (Grey Bruce Health Unit, 2021; Grey Bruce Health Unit, 2021) utilized an arena to operate an assembly line-style clinic, where vaccinators moved through rows of seated patients with mobile vaccine carts (McCutcheon and Van Dijk, 2021) (*Appendix B*). Vaccinations and post-vaccination care were delivered by physicians supplied with carts that contained pre-filled vaccine syringes and other necessary materials.

Staff did not gather immigration or passport information, which could trigger feelings of anxiety and apprehension, potentially leading people to leave the clinic prior to receiving their vaccine. Cultural brokers and international medical graduates (IMGs) provided real-time interpretation services across multiple languages and cultures throughout the clinic. Undocumented community members or those without provincial healthcare coverage were supported to confidentially complete clinic registration to obtain a vaccine.

2.2.2. Operational clinic data

While this paper focuses on responses from the clinic's healthcare staff, community and city staff, and volunteers, it represents only one component of a broader investigation clinic data and patient perspectives. In total, 2280 first dose COVID-19 vaccinations were delivered, with a 2-min median wait time (Hassan et al., 2022). This clinic was successful in reaching the target populations in East and Northeast Calgary, as over 69% of participants resided in these areas. Finally, patients reported near universal agreement that the clinic was convenient, safe, and provided a preferred method of vaccination for second doses (Hassan et al., 2022).

2.3. Measures

We conducted a formative evaluation to assess: whether the vaccine clinic achieved its pre-specified goals, operational barriers and facilitators, whether clinic stakeholders perceived it to be scalable, and to solicit improvement suggestions. We employed an anonymous 16-item online survey, in English, to collect both scale and open-ended responses among all clinic stakeholders.

Survey participation was voluntary and no incentives were used. In all, five of the 16 questions collected demographics. The remaining 11 questions consisted of six closed-ended multiple choice questions (i.e.,

Yes, No, Not sure) regarding whether the vaccine clinic met its pre-defined objectives, scalability for future clinics, and respondents' willingness to participate in future clinics, and five open-ended questions regarding the staff's perceptions and suggestions for improvement. The survey took approximately three to four minutes to complete, and invitations were sent after each vaccine clinic day with a clickable link directing participants to the survey webpage (Qualtrics; Provo, UT, USA).

This study's primary objective was to evaluate a public health operation deemed urgent considering the COVID-19 pandemic. Consistent with the standards set out in the Tri Council Policy Statement 2018 (Chapter 2, Article 2.5), which describe quality improvement and evaluation studies as activities that do not require full ethics review (Canadian Institutes of Health Research, 2018), the University of Calgary's Conjoint Health Research Ethics Board provided an exemption from a full Research Ethics Board review for this study. Finally, we followed the Standards for Quality Improvement Reporting Excellence (SQUIRE 2.0) guidelines in this quality improvement study (SQUIRE, 2015).

2.4. Analysis

2.4.1. Scale responses

We utilized descriptive statistics and proportions to characterize participants' demographic characteristics and survey responses. To capture the diverse multi-stakeholder partnerships involved, we stratified the responses into three main staff role categories: (1) healthcare staff (physicians, nurses, PCN staff, research team members and AHS staff); (2) city and community agency (City of Calgary staff and community agency partners); and, (3) community volunteers. Respondents who did not specify their staff role during the clinic were excluded from this analysis. Duplicate entries were identical and therefore removed. Due to the diversity of stakeholders, we suspected that responses would differ significantly based on perspectives, lived experiences and priorities among the coalition of partners. Therefore, we performed Chi-square tests across our stratifications of interest to test this assumption, based upon staff role (i.e., healthcare, city, volunteers) using the statistical software Stata/IC version 16 (StataCorp LLC,; College Station, TX, USA) (StataCorp, 2019).

2.4.2. Open-Ended responses

We performed an iterative thematic analysis on all open-ended survey responses. We started with a deductive strategy to sort the responses into categories, followed by an inductive approach to analyze the categorized responses. For the deductive strategy, three independent researchers coded a subset of the survey responses using the *a priori* clinic objectives as the main structure for initial coding: (1) *effective* (able to reach vaccination goals); (2) *efficient* (clinic structures that improved efficiency); (3) *patient-centered* (structure that benefited patients or prioritized patients' unique needs); and (4) *safe* (factors that promoted staff, patients', and volunteers' safety). Any coding discrepancies were reconciled by consensus. The three investigators agreed on the themes: facilitators, barriers, and improvement suggestions, which emerged from the open-ended responses. Investigators then used line-by-line coding to further group responses into subthemes under the four initial objective. We updated the codebook iteratively as new subthemes became relevant and were agreed upon. We also collected standout quotes to represent the diversity of clinic stakeholders involved. We used NVivo 12 software (released March 2018) (QSR International Pty Ltd., 2018) to conduct the thematic analysis.

2.4.3. Data integration

We analyzed the scale responses first, followed by the open-ended responses. The major themes were then compared to provide clarity and meaning. We also considered survey respondents' clinic roles alongside the open-ended responses to further explain the scale

responses.

3. Results

3.1. Response rate

We sent 195 invitations to clinic healthcare providers, staff and volunteers and received a total of 166 surveys (166/195; 85.1% overall response rate) (Fig. 1). Three surveys were empty and were dropped from the analysis. Of the 163 remaining surveys (163/195; 83.6% completion rate), we identified 22 duplicate entries from individuals who completed the survey twice, after each clinic day. After removing duplicates for the quantitative analysis, we identified 141 individual responses. Finally, since scale responses were stratified by role within the clinic, we excluded the 4 respondents who did not specify their role, for a total of 137 responses included in the quantitative analysis (137/195; 70.3% response rate). Duplicate respondents provided different open-ended responses for each clinic day; therefore, we included all 163 responses in our qualitative analysis (163/195; 83.6% response rate). The open-ended feedback response rate was 90.1% (127/141).

3.2. Survey respondents demographics

Sixty-six percent (91/137) of survey respondents were female and most belonged to the following age ranges: 30–39 years (38/136, 27.9%), 40–49 years (49/136, 36.0%), and 50–59 years (28/136, 20.6%) (Table 1). While 29.4% of respondents self-identified as White (40/136), 70% self-identified as racialized (non-white), with 21.3% as South Asian (29/136), 13.2% as Filipino (18/136) and 11.8% as Black African (16/136). The remaining respondents (4/136) 2.9% belonging to other racialized minority groups presented in Table 1.

Respondents represented 10 different clinic roles across three categories: healthcare (56/137; 41%), city and community workers (43/137; 31%), and volunteers (38/137; 28%) (Table 2). Overall, the majority of the staff cohort (59%) were from non-healthcare professions. Table 2 presents the breakdown of self-identified clinic roles among study participants.

3.3. Survey scale responses

Table 3a-e summarize the post-clinic survey responses. We found no significant response differences across participant groups (Table 3). Respondents almost universally felt that the clinic met its prespecified objectives – that it was effective (99.2%, 129/130), efficient (96.9%, 124/128), safe (90.8%, 118/130), and patient-centered (92.3%, 120/130). Overall, 94.6% (123/130) of respondents felt the outreach vaccination clinic model could be effectively scaled up to other work-sites, neighbourhoods, and locations (Table 4). Finally, 96.1% of the staff (124/129) indicated they would participate in future outreach vaccination clinics (Table 4).

Table 2
Vaccination clinic staff roles.

Staff Roles		Total *n* = 137 (%)
Healthcare	Family physician	14 (10.2)
	PCN Staff	11 (8.1)
	Nurse	11 (8.1)
	Specialist Physician	8 (5.8)
	Evaluation Team	6 (4.4)
	Team lead	4 (2.9)
	AHS Staff	2 (1.5)
	Total	**56 (40.9)**
City & Community	City of Calgary staff	4 (2.9)
	Community Agency Partner	39 (28.5)
	Total	**43 (31.4)**
Volunteers	Volunteer	38 (27.7)

Table 1
Clinic staff cohort characteristics.

Factor	Total		Staff City/Community		Healthcare		Volunteers		P-Value*
	N	%	N	%	N	%	N	%	
Sex									
Male	46	33.6	14	32.6	19	33.9	13	34.2	0.99
Female	91	66.4	29	67.4	37	66.1	25	65.8	
Total	137	100.0	43	100.0	56	100.0	38	100.0	
Gender									
Men	46	33.6	14	32.6	19	33.9	13	34.2	0.99
Women	91	66.4	29	67.4	37	66.1	25	65.8	
Total	137	100.0	43	100.0	56	100.0	38	100.0	
Identity									
White	40	29.4	10	23.3	25	45.5	5	13.2	0.20
South Asian	29	21.3	7	16.3	10	18.2	12	31.6	
Filipino	18	13.2	6	14.0	6	10.9	6	15.8	
Black African	16	11.8	8	18.6	4	7.3	4	10.5	
Arab	8	5.9	4	9.3	2	3.6	2	5.3	
Chinese	6	4.4	2	4.7	2	3.6	2	5.3	
Latin American	5	3.7	3	7.0	2	3.6	0	0.0	
West Asian	5	3.7	1	2.3	1	1.8	3	7.9	
Multiple categories	5	3.7	1	2.3	1	1.8	3	7.9	
Southeast Asian	2	1.5	1	2.3	1	1.8	0	0.0	
Korean	1	0.7	0	0.0	1	1.8	0	0.0	
Other	1	0.7	0	0.0	0	0.0	1	2.6	
Total	136	100.0	43	100.0	55	100.0	38	100.0	
Age									
<18	1	0.7	0	0.0	0	0.0	1	2.6	0.05
20–29	9	6.6	1	2.3	2	3.6	6	15.8	
30–39	38	27.9	16	37.2	14	25.5	8	21.1	
40–49	49	36.0	11	25.6	26	47.3	12	31.6	
50–59	28	20.6	11	25.6	11	20.0	6	15.8	
60–69	11	8.1	4	9.3	2	3.6	5	13.2	
Total	136	100.0	43	100.0	55	100.0	38	100.0	

*P-values were attained by Chi Square analysis between City, Healthcare, Volunteers.

Table 3

a-3d joint display of scale responses and open-ended responses for stakeholder post-clinic questionnaire: effective, efficient, patient-centered, and safe.

Table 3a. Effective

Do you think the mobile clinic was: Effective?

Factor	Staff						P-Value*
	City		Healthcare		Volunteers		0.35
	N	%	N	%	N	%	
Yes	41	97.6	51	100.0	37	100.0	
No	0	0.0	0	0.0	0	0.0	
Unsure	1	2.4	0	0.0	0	0.0	
Total	42	100.0	51	100.0	37	100.0	

	Themes	Quotes
Facilitators	• Diverse multidisciplinary team • Clearly defined roles • Collaboration	*"Great collaboration between partners in the planning and implementation phase with short lead time…."* - City & Community
Barriers	• Short notice and limited publicity • Short duration (two days) • No second dose	*"Very frustrating to have excess capacity and turn away people from the same communities for 2nd doses. This was a missed opportunity that is very hard to understand in the context of how severely affected E/NE Calgary has been by COVID."* - Healthcare
Improvements	• More time to prepare for clinic • Increased promotion of clinic • Book both doses	*"Both doses can be offered, as many people came for their second dose"* - Volunteer

*P-values were attained by Chi Square analysis between City, Healthcare, Volunteers.

Table 3b. Efficient

Do you think the mobile clinic was: Efficient?

Factor	Staff						P-Value*
	City		Healthcare		Volunteers		0.64
	N	%	N	%	N	%	
Yes	40	97.6	49	98.0	35	94.6	
No	0	0.0	0	0.0	0	0.0	
Unsure	1	2.4	1	2.0	2	5.4	
Total	41	100.0	50	100.0	37	100.0	

	Themes	Quotes
Facilitators	• Low wait times • Organized protocols • Adequate staffing	*"… the wait time was very good, not too long of line up compared to [the provincial clinic], which was way too long…"* - City & Community
Barriers	• Staff felt rushed • Bottlenecks and logistical challenges • Frequent process changes	*"People were being hurried while they were filling the forms as the line had to be moving"* - Volunteer
Improvements	• Increased organization • Logistical and physical layout • Phone call line for questions	*"Create like a phone call line [so that] questions and concerns can be addressed before clients come to vaccination site"* - Healthcare

*P-values were attained by Chi Square analysis between City, Healthcare, Volunteers.

Table 3c. Patient-Centered

Do you think the mobile clinic was: Patient centred?

Factor	Staff						P-Value*
	City		Healthcare		Volunteers		0.21
	N	%	N	%	N	%	
Yes	38	90.5	50	98.0	32	86.5	
No	0	0.0	0	0.0	1	2.7	
Unsure	4	9.5	1	2.0	4	10.8	
Total	42	100.0	51		37	100.0	

	Themes	Quotes
Facilitators	• Access barriers addressed • Cultural/linguistic support • Community engagement	*"… I had several family members attend who were vaccine hesitant for many reasons. However, by removing the barriers of transport, accessibility and appointments, this clinic truly brought the vaccine to the community."* - City & Community
Barriers	• Patient evaluation surveys • Cultural/linguistic challenges • Short notice about clinic	*"Saw several clients struggling to answer the survey questions. I think four pages was too much."* - Volunteer
Improvements	• More multilingual staff • Increased community engagement • Overcome access barriers (mobile buses) • Accommodations for physical disabilities/different needs	*"Employ clinicians in more languages, and…religious affiliations, such as temples and mosques."* - Healthcare

*P-values were attained by Chi Square analysis between City, Healthcare, Volunteers.

Table 3d Safe

Do you think the mobile clinic was: Safe?

Factor	Staff						P-Value*
	City		Healthcare		Volunteers		0.12
	N	%	N	%	N	%	
Yes	37	88.1	50	98.0	31	83.8	
No	0	0.0	0	0.0	1	2.7	
Unsure	5	11.9	1	2.0	5	13.5	
Total	42	100.0	51	100.0	37	100.0	

	Themes	Quotes
Facilitators	• COVID-19 measures	*"Moving the registration personnel indoors [worked well]."* – City & Community

Table 3 (*continued*)

Table 3d Safe
Do you think the mobile clinic was: Safe?

Factor	Staff			
	City	Healthcare	Volunteers	P-Value*
Barriers	• Language support • Weather accommodations • Lack of resources for weather • Not enough COVID-19 safety		*"Did not sanitize each seat after client was finished with their vaccinations."* – City & Community	
Improvements	• Increased resources to respond to weather changes • Increased COVID-19 precautions		*"…face shields in addition to the self-provded masks would have been appropriate for the greeters who had to get in close proximity of the patrons."* - Volunteer	

*P-values were attained by Chi Square analysis between City, Healthcare, Volunteers.

3.4. Open-ended responses: facilitators & barriers

Respondents provided feedback on clinic barriers, facilitatiors, and improvement suggestions. The following joint displays (Table 3a-d) summarize the key themes that emerged, in conjunction with the quantitative data.

3.4.1. Effective

Facilitators. Respondents felt that the wide range of staff expertise, the diversity of the multidisciplinary team, and collaboration across stakeholders contributed to the effectiveness of the clinic. Respondents noted a *"super collaborative"* (City & Community) atmosphere between the people and organizations represented, and that clinic roles and expectations were well defined (Table 3a). The quotes below highlights the diversity of staff present and the benefit of including all stakeholders in the planning process:

"It was great to see social services were on site. In terms of planning, all the key players were at the table, so it made things move." - City & Community

"Collaborative governance model, collaborations of multiple social services agencies, community groups, and healthcare professionals." – City & Community

Barriers. Respondents noted that the short notice to plan the clinic, as well as the short timeline between approval and clinic launch, made it difficult to adequately publicize the event:

"Approval for the clinic came late which subsequently delayed notification to the public" - Healthcare

Respondents also felt the clinic's duration was too short: *"only 2 days [long], it was not enough"(Healthcare),* and expressed frustration that the clinic was unable to offer second vaccine doses (Table 3a).

3.4.2. Efficient

Facilitators. Respondents noted the low wait times, strong organization protocols, and adequate staffing, as facilitators for clinic efficiency (Table 3b). Low wait times stood out as a key contributor to efficiency:

"Efficient flow for us administering vaccines. Was able to vaccinate someone every 3 min" - Healthcare

Participants also highlighted strong organization protocols, such as line management for registration and vaccinations as a strength of the clinic, citing that *"having the registration and pre-screening questions done before seating for vaccines" (Healthcare),* contributed to efficient vaccine delivery.

Finally, stakeholders felt that adequate staffing and supports for staff contributed to efficiency. They felt that the *"number of volunteers/staff/ doctors/nurses available for each role" (Healthcare)* was sufficient, and that having clearly defined roles, checking in with staff, and ensuring

volunteers took breaks, facilitated clinic efficiency.

"Volunteers knew what they were doing from start to finish. We also had a volunteer coordinator who checked up on us and the volunteers, often reassuring people that they were doing a good job and ensuring people were taking breaks. – Volunteer"

Barriers. Respondents described feeling rushed to move people through registration as a barrier, leaving patients with unanswered questions and confusion about the vaccination process:

"People were rushing us to rush [the patients] into registration, meaning that some people were unable to receive a survey, […] at this time, it felt like efficiency trumped quality of experience for the client and that is wrong" – Volunteer

They also described bottlenecks at registration as a barrier, and identified logistical challenges, such as a lack of *"seating for people who were accompanying clients" (Volunteer).* Finally, frequent process changes were identified due to severe weather, including rain, which caused the registration to move indoors. Staff highlighted the *"changing of plans multiple times" (City & Community)* as a barrier to efficiency.

3.4.3. Patient-centered

Facilitators. Stakeholders felt that the reducing access barriers, low wait times, providing cultural and linguistic support, and community engagement contributed to the clinic being patient-centered.

The efforts to reduce access barriers which supported its patient-centered goal included the clinic's walk-in style, the central community hub location, ease of access via public transportation, and the provision of transit tickets, taxi coupons, and ride-share vouchers. Survey respondents expressed that these efforts created an easy vaccine experience for community members (Table 3c).

Respondents also described the cultural and linguistic support available as enhancing the patient-centered aspect of the clinic. Staff noted that multiple languages were supported which helped reduce fear and increase patient comfort among migrant community members:

"I noticed that people without papers (health card, visa) were so afraid to give information, but after being reassured in their own language they provided all the information that we asked for." - City & Community

Respondents felt the *"outstanding community engagement by social service agencies" (City & Community),* contributed to its patient-centered goal. Community-based organizations, newcomer-serving agencies, and social services were present throughout, and participated in the clinic's planning and implementation.

Barriers. The factors identified as barriers to achieving the patient-centered goal include the patient evaluation surveys, cultural and linguistic challenges, persistent access barriers and lack of accomodations for those with physical disabilites, and the short notice prior to the clinic.

Staff noted that the patients struggled to understand the wording of

the patient evaluation surveys, had difficulty completing the paper surveys while in line, and that the survey was too long. Many did not finish the surveys at all (Table 3c).

While efforts were made to accommodate the community members' various first languages, cultural and linguistic barriers remained as interpreters for some languages were missing. Further, even if a patient's language was correctly identified at check-in and received support in their language, oral interpreters were at times unavailable when physicians administered vaccinations. As one respondent noted, "*On occasion, language at the time of actually administering the vaccine*" *(Healthcare)* was a barrier.

Despite efforts to reduce physical access barriers, stakeholders still noted a lack of accommodations for patients with physical disabilities and felt that a "*priority check-in line for people with disabilities*" *(Volunteer)* was needed.

3.4.4. Safe

Facilitators. Respondents felt that the clinic's adherence to COVID-19 protocols helped improve its safety (e.g., sanitizing, mask wearing). Respondents also felt that patients' access to their preferred language for communication promoted their safety. Lastly, moving the clinic's registration indoors in response to a severe thunderstorm was identified as a positive safety response (Table 3d).

Barriers. Barriers to safety include lack of resources for the inclement weather, such as, "*not enough ponchos for the volunteers*" *(City & Community),* and safety concerns around COVID-19, such as, insufficient sanitization of chairs and not enough PPE.

> "*Not enough PPE offered to volunteers - face shields in addition to self-provided masks would have been appropriate for the greeters who had to get in close proximity of the patrons.*" – Volunteer

3.5. Suggestions for improvements

3.5.1. Effective

For future outreach vaccine clinics, survey respondents identified three key areas that would improve effectiveness: more time for planning and preparation, increased marketing, advertisement, and promotion to community, and the ability to deliver additional vaccine doses (Table 3a).

Respondents highlighted the need for more planning time, "*...perhaps should have been organized a few weeks earlier*" *(Healthcare),* and the need for increased communication through physical and digital channels preferred by newcomer communities:

> "*Having posters out in different languages at temples, mosques, Gurdwara, radio announcements, [and] TV channels could have brought in larger numbers.*" - Healthcare.

Another improvement suggestion for future clinics was to provide second vaccine doses, as this clinic was restricted to providing only the first dose of the COVID-19 vaccine. Community members hoping to receive their second dose were turned away (Alberta Health Services, 2021; Alberta Health Services, 2021).

3.5.2. Efficient

Survey respondents provided suggestions to improve efficiency for future vaccine clinics, including improved organization at the clinic to reduce bottlenecks, particularly with drawing up vaccine doses. Health system protocols dictated that physician vaccinators had to draw up each of their own vaccine doses, which required significant time. The 'hockey hub' model utilized "immunization coaches" to support physicians with proper vaccine administration. To improve efficiency, respondents suggested increased support from immunization coaches,

including drawing up the vaccine and labeling the syringes, to reduce wait times:

> "*...coaches able to draw vaccine up, label each syringe, and have the immunizer double check – this will speed up the wait significantly*" *(Healthcare).*

In addition, logistical changes and changes to the physical layout, such as extended duration for more than two days, having a larger venue, and, "*identifying alternative parking spots for volunteers*" *(City & Community),* were suggested.

Finally, respondents suggested setting up a phone line for interested patients to ask questions and have their concerns addressed, prior to coming to the clinic (Table 3b).

3.5.3. Patient-centered

While many aspects of this clinic addressed the social vulnerabilities specific to newcomers, barriers still remained. Staff suggested several improvements to enhance the clinic's "patient-centered" goal, such as increased language supports, increased community engagement and clinic promotion, further efforts to overcome accessibility barriers through use of mobile buses, priority check-in lines for people with disabilities, separate vaccination lines for those under 18 which include child-friendly activities, and choosing future locations with increased access to public transportation such as light rail train (LRT) stations:

> "*Health care in the NE has to change, cannot be always a clinic model. Health care practitioners...need to go to the people, be a part of their communities. [Mobile buses] would be a great concept...not just for covid vaccines, but flu shots and other vaccines.*" – Healthcare

> "*...perhaps we need a [designated] <18 [years] row with a pediatrician in Disney outfits to help those kids feel more comfortable.*" - Healthcare

3.5.4. Safety for vulnerable patients

Respondents felt that the clinic's largest safety improvements would come from increased COVID-19 safety measures, and planning for unexpected weather changes. Suggestions included more PPE for volunteers, such as "*face shields in addition to self-provided masks*" *(Volunteer),* "*a bit more sanitization for staff/people who were vaccinating others*" *(Volunteer),* and "*something to protect clients from the weather*" *(Volunteer).*

4. Discussion

We present a formative evaluation of a community-engaged COVID-19 vaccine clinic that summarizes the perspectives of diverse stakeholders representing healthcare workers, city and community workers, and volunteers. Respondents almost uniformly felt the vaccine clinic met its collaboratively defined goals of being effective, efficient, patient-centered, and safe, and was scalable to other locations. Our findings suggest that the collaboration among diverse stakeholders across various sectors contributed to the clinic's perceived success.

Respondents felt the clinic's success depended upon its use of multilingual staff, reducing vaccine access barriers, and prioritizing community engagement. Interestingly, staff members' diversity mirrored the ethnocultural diversity of its target communities and thus helped broker language and cultural barriers. Ensuring that undocumented migrants were welcomed and made to feel safe was also perceived as critical to the clinic's success. Despite its overall perceived success, respondents felt that inadequate planning time, limited time for outreach and awareness, and having to turn away those eligible for their second vaccine doses, presented barriers to achieving the clinic's goals. Improvement suggestions for future community vaccine clinics include providing additional language support, increased pre-clinic promotion and engagement, increasing clinic duration, and providing additional vaccine doses to those eligible.

Like many other low-income and racialized communities across North America, Europe, and the Middle East, the communities this vaccine outreach clinic targeted were disproportionately impacted by COVID-19 infections, experienced multiple access barriers, and reported lower vaccination rates compared to high-income areas. Residents of the clinic's targeted geographic areas were discriminated against for experiencing among the highest per capita rates of COVID-19 and the lowest vaccination rates in the province (Hudes, 2020), and were labelled as "vaccine hesitant" (Statistics Canada, 2021). This resulted in scapegoating of the community as being responsible for the ongoing waves of COVID-19 in the province (Hudes, 2020), reinforcing the stereotype of migrants being vectors of disease.

Discourses that label marginalized communities as "vaccine hesitant", and blame them for spreading COVID-19, are directly challenged by this community-engaged clinic. These same communities achieved nearly 100% first dose COVID-19 vaccination rates among eligible residents >12 years five months after this community-engaged clinic took place (Markus, 2021). This suggests that disparities in vaccine uptake among migrant and non-migrant populations may not be an issue of willingness to vaccinate, but rather an issue of vaccine accessibility (Bibbins-Domingo et al., 2021). Additonally, vaccine disparities among migrant and non-migrant communities may be mediated by multi-stakeholder coalitions. Further, this community-based achievement highlights the potential of CBPR to repair broken trust between community members and institutions (McElfish et al., 2021), as well as transform communities through investing in capacity-building and genuine partnerships with community members, despite the structural inequities and limitations of traditional public health initiatives (Demeke et al., 2022).

While public health initiatives are often siloed, this COVID-19 vaccine outreach clinic demonstrates the potential benefits of combining multistakeholder parnterhips and CBPR principles to reduce health inequities. Community-engaged public health interventions such as vaccine outreach clinics, are resource-intensive and can include high upfront costs, time investments, and disruptions to regular operations to provide outreach services (Government of Canada, 2021). Our findings, however, demonstrate that stakeholders across healthcare, government, and community sectors, were willing to add the resources required for community-based care models and almost universally agreed it was an acceptable alternative to traditional vaccine clinics. This acceptance of CBPR vaccine delivery methods provides evidence for the need to invest in community-based post-colonial responses to persistent health inequities and disparities.

CBPR methods have been used to establish community-based vaccine clinics in other North American settings. For example, Marquez et al. utilized "community-academic-public health partnerships" to deliver a "community-centered" vaccine strategy, including a series of neighbourhood vaccine clinics, which successfully reduced barriers to COVID-19 vaccination for the Latinx community in San Francisco (Marquez et al., 2021). Similarly, in Philadelphia, multistakeholder community-based COVID-19 vaccine clinics were implemented in medically underserved areas to reduce access barriers and improve health equity for Black community members (Klusaritz et al., 2022).

While this intervention was the first low-barrier community-based vaccine clinic in Alberta, our findings, demonstrate that CBPR-based vaccine initiatives are transferrable to the Canadian context and offer an equity-based approach to addressing vaccine barriers for migrants.

Further study is needed to examine the perspectives of migrants who participated in this community-based vaccine clinic. Patient perspectives will help to better understand the factors associated with vaccine access and hesitancy among migrants. Finally, more research is needed to explore best practices in maintaining community-based interventions over the long-term, and how to effectively integrate them into standard health system operations.

While respondents perceived that this community-engaged vaccine clinic met its objectives, there are limitations to consider. First, stakeholders participated voluntarily, therefore they may have already had favourable opinions of community-engaged vaccine delivery models. Second, because the survey instrument was developed with collaboration from community members, it has not been validated, and therefore presents an unknown risk for bias. Finally, this evaluation was completed for an intervention specific to a particular local geographic area and population, therefore these conclusions may not be relevant to all settings. When considering replicating this model in other areas, future clinics could benefit from increased community engagement, including expanding language supports and further engagement with trusted religious and community leaders.

5. Conclusions

Multistakeholder perspectives of a community-engaged vaccine clinic concluded that it achieved its goals of being effective, efficient, patient-centered, and safe, and may provide a framework for replication in similar contexts. Our findings provide evidence to support expanding community-engaged vaccine delivery models among marginalized urban areas to promote vaccine equity among migrants and other underserved communities. Improving vaccine equity among migrants is critical to challenge discourses that construct minoritized communities as disease vectors, or as unwilling to help mitigate COVID-19 transmission, and is vital to protecting already marginalized communities.

Author contributions statement

GEF, KP, and DLS conceptualized and designed the study. MY, AS, MA, MRY, ERC, EN, LEH, GEF, AC, and DL were involved in data collection. LEH, NH, and SKC completed the data analysis. STE provided in-depth guidance in survey data integration. All authors were involved in the interpretation of findings, writing the manuscript, and approving the final draft.

Funding

Declaration of Competing Interest

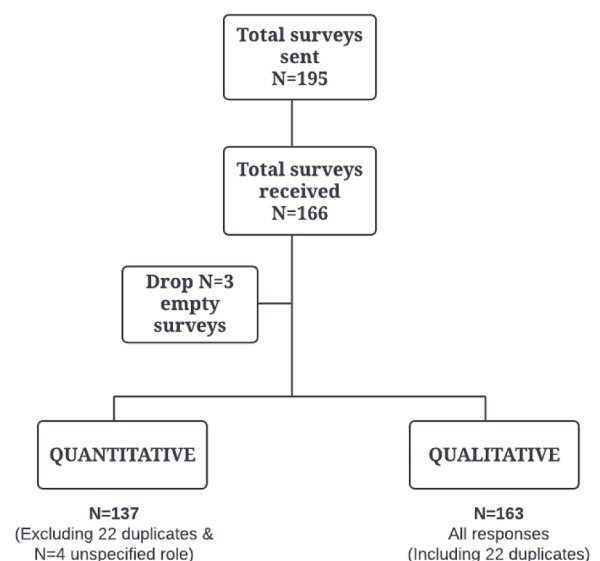The authors declare that they have no known competing financial

Fig. 1. Flow diagram of inclusion and exclusion of survey data.

Table 4

Quantitative survey results: scalable.

Do you think this mobile vaccination clinic model could be effectively scaled to other worksites, neighbourhoods, or locations?							
Factor	Staff City		Healthcare		Volunteers		P-Value*
	N	%	N	%	N	%	0.56
Yes	39	92.9	49	96.1	35	94.6	
No	0	0.0	1	2.0	0	0.0	
Unsure	3	7.1	1	2.0	2	5.4	
Total	42	100.0	51	100.0	37	100.0	
If we organize future pop-up mobile vaccination clinics, would you be interested in participating again?							
Yes	39	92.9	48	96.0	37	100.0	0.26
No	0	0	0	0	0	0	
Unsure	3	7.1	2	4.0	0	0.0	
Total	42	100.0	50	100.0	37	100.0	

*P-values were attained by Chi Square analysis between City, Healthcare, Volunteers.

interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jmh.2023.100188.

References

Abba-Aji, M., Stuckler, D., Galea, S., McKee, M., 2022. Ethnic/racial minorities' and migrants' access to COVID-19 vaccines: a systematic review of barriers and facilitators. J. Migr. Health 5, 100086. https://doi.org/10.1016/J.JMH.2022.100086.

Akwataghibe, N.N., Ogunsola, E.A., Broerse, J.E.W., Agbo, A.I., Dieleman, M.A., 2022. Inclusion strategies in multi-stakeholder dialogues: the case of a community-based participatory research on immunization in Nigeria. PLoS One 17, e0264304. https://doi.org/10.1371/journal.pone.0264304.

Alberta Health Services, COVID-19 scientific advisory group rapid evidence report population vaccination strategies for COVID-19: evidence around the role of exposure risk, (2021) 58.

Alberta Health Services, COVID-19 vaccine frequently asked questions, (2021). https://www.albertahealthservices.ca/topics/Page17389.aspx (accessed April 6, 2022).

Alberta Health Services, 2022. COVID-19 immunization for children under 12 - frequently asked questions. https://www.albertahealthservices.ca/topics/Page17745.aspx (accessed February 28, 2022).

Alberta Primary Care Networks, 2019. Alberta PCNs - primary care networks program management office. https://pcnpmo.ca/alberta-pcns/Pages/default.aspx (accessed June 30, 2022).

Arya, N., Redditt, V.J., Talavlikar, R., Holland, T., Brindamour, M., Wright, V., Saad, A., Beukeboom, C., Coakley, A., Rashid, M., Pottie, K., 2021. Caring for refugees and newcomers in the post-COVID-19 era: evidence review and guidance for FPs and health providers. Can. Fam. Phys. 67, 575–581. https://doi.org/10.46747/cfp.6708575.

Büyüm, A.M., Kenney, C., Koris, A., Mkumba, L., Raveendran, Y., 2020. Decolonising global health: if not now, when? BMJ Glob. Health 5, 3394. https://doi.org/10.1136/bmjgh-2020-003394.

Balakrishnan, V.S., 2021. Impact of COVID-19 on migrants and refugees. Lancet Infect. Dis. 21, 1076–1077. https://doi.org/10.1016/S1473-3099(21)00410-2.

Berardi, C., Lee, E.S., Wechtler, H., Paolucci, F., 2022. A vicious cycle of health (IN) equity: migrant inclusion in light of COVID-19. Health Policy Technol., 100606 https://doi.org/10.1016/J.HLPT.2022.100606.

Betsch, C., Schmid, P., Heinemeier, D., Korn, L., Holtmann, C., Böhm, R., 2018. Beyond confidence: development of a measure assessing the 5C psychological antecedents of vaccination. PLoS One 13, e0208601. https://doi.org/10.1371/JOURNAL.PONE.0208601.

Bibbins-Domingo, K., Petersen, M., Havlir, D., 2021. Taking vaccine to where the virus is—equity and effectiveness in coronavirus vaccinations. JAMA Health Forum 2, e210213. https://doi.org/10.1001/jamahealthforum.2021.0213.

Burgess, R.A., Osborne, R.H., Yongabi, K.A., Greenhalgh, T., Gurdasani, D., Kang, G., Falade, A.G., Odone, A., Busse, R., Martin-Moreno, J.M., Reicher, S., McKee, M., 2021. The COVID-19 vaccines rush: participatory community engagement matters more than ever. Lancet 397, 8–10. https://doi.org/10.1016/S0140-6736(20)32642-8.

Cacari-Stone, L., Wallerstein, N., Garcia, A.P., Minkler, M., 2014. The promise of community-based participatory research for health equity: a conceptual model for bridging evidence with policy. Am. J. Public Health 104, 1615–1623. https://doi.org/10.2105/AJPH.2014.301961.

Canadian Institutes of Health Research, 2018. Natural Sciences and Engineering Research Council of Canada, and Social Sciences and Humanitarian Research Council, 2018. Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans – TCPS 2. https://ethics.gc.ca/eng/policy-politique_tcps2-eptc2_2018.html.

Centre for Newcomers, 2023. Calgary Newcomer Collaborative. https://www.centrefornewcomers.ca/calgarynewcomerscollaborative (accessed February 12, 2023).

Cook, T., Brandon, T., Zonouzi, M., Thomson, L., 2019. Destabilising equilibriums: harnessing the power of disruption in participatory action research. Educ. Action Res. 27, 379–395. https://doi.org/10.1080/09650792.2019.1618721.

Demeke, J., McFadden, S.M., Dada, D., Djiometio, J.N., Vlahov, D., Wilton, L., Wang, M., Nelson, L.E., 2022. Strategies that promote equity in COVID-19 vaccine uptake for undocumented immigrants: a review. J. Community Health, 47(3), 554–562. https://doi.org/10.1007/s10900-022-01063-x.

Edmonds, J., Flahault, A., 2021. Refugees in Canada during the first wave of the COVID-19 pandemic. Int. J. Environ. Res. Public Health 18, 1–16. https://doi.org/10.3390/ijerph18030947.

European Centre for Disease Prevention. Reducing COVID-19 transmission and strengthening vaccine uptake among migrant populations in the EU/EEA. https://www.ecdc.europa.eu/en/publications-data/covid-19-migrants-reducing-transmission-and-strengthening-vaccine-uptake.

Fabreau, G.E., Holdbrook, L., Peters, C.E., Ronksley, P.E., Attaran, A., McBrien, K., Pottie, K., 2022. Vaccines alone will not prevent COVID-19 outbreaks among migrant workers-the example of meat processing plants. Clin. Microbiol. Infect. https://doi.org/10.1016/J.CMI.2022.02.004.

Fedor, T., 2021. Calgary's northeast has slowest vaccine demand in the city despite being COVID-19 hotspot. https://calgary.ctvnews.ca/calgary-s-northeast-has-slowest-vaccine-demand-in-the-city-despite-being-covid-19-hotspot-1.5433795. (accessed June 29, 2022).

Fernández, L., Shorett, P., 2021. Lessons in equity from the front lines of COVID-19 vaccination. JAMA Health Forum 2, e210612. https://doi.org/10.1001/JAMAHEALTHFORUM.2021.0612. –e210612.

Gibson, C., 2021. Interactive map breaks down COVID-19 vaccination rate by Alberta community. https://globalnews.ca/news/7872277/alberta-covid-19-interactive-vaccine-map/ (accessed June 29, 2022).

Government of Alberta, Alberta provincial electoral divisions summary tables: compiled from the 2016 census of Canada, (2018).

Government of Alberta, Alberta provincial electoral divisions: Calgary-North East, office of statistics and information: provincial electoral division. (2018). https://open.alberta.ca/dataset/8260071f-b931-464f-8c73-97b872e32a31/resource/f5d5d77a-35be-4490-a367-e50d97e74dfa/download/calgary-north-east_profile.pdf (accessed February 28, 2022).

Government of Canada, 2021. Planning guidance for immunization clinics for COVID-19 vaccines. https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/planning-immunization-clinics-covid-19-vaccines.html#a2.3 (accessed November 5, 2021).

Grey Bruce Health Unit, Grey bruce health unit takes hockey hub - COVID-19 mass immunization model on the road - news releases, (2021). https://www.publichealthgreybruce.on.ca/About-Us/News-Releases/ArticleID/844/Grey-Bruce-Health-Unit-Takes-Hockey-Hub-COVID-19-Mass-Immunization-Model-on-the-Road (accessed April 6, 2022).

Grey Bruce Health Unit, Hockey hub - COVID-19 mass immunization hub in grey bruce - news releases, (2021). https://www.publichealthgreybruce.on.ca/About-Us/News-Releases/ArticleID/738/Hockey-Hub-COVID-19-Mass-Immunization-Hub-in-Grey-Bruce (accessed April 6, 2022).

Hassan, N., Holdbrook, L., Clarke, S., Grewal, R., Norrie, E., Ip, A., Coakley, A., Pottie, K., Spitzer, D., Fabreau, G., 2022. Equitable vaccine access: characterization and evaluation of a community-engaged COVID-19 vaccination outreach clinic for underserved urban communities [Abstract], North American Refugee Health Conference, Cleveland, USA, 2022.

Hudes, S., 2020. Kenney's "wake-up call" to northeast Calgary condemned as scapegoating. Calgary Herald. https://calgaryherald.com/news/politics/kenneys-wake-up-call-to-northeast-calgary-condemned-as-scapegoating (accessed February 27, 2022).

Israel, B.A., Schulz, A.J., Parker, E.A., Becker, A.B., 1998. Review of community-based research: assessing partnership approaches to improve public health. Annu. Rev. Public Health 19, 173–202. https://doi.org/10.1146/annurev.publhealth.19.1.173.

Klusaritz, H., Paterson, E., Summers, C., Al-Ramahi, N., Naseer, N., Jeudin, H., Sydnor, Y., Enoch, M., Dollard, N., Young, K.D., Khan, N., Henne, J., Doubeni, A., Kasbekar, N., Gitelman, Y., Brennan, P.J., Bream, K., Cannuscio, C.C., Wender, R.C., Feuerstein-Simon, R., 2022. Community-based COVID-19 vaccine clinics in medically underserved neighborhoods to improve access and equity, Philadelphia, 2021–2022. Am. J. Public Health 112, 1721–1725. https://doi.org/10.2105/AJPH.2022.307030.

MacDonald, N.E., Eskola, J., Liang, X., Chaudhuri, M., Dube, E., Gellin, B., Goldstein, S., Larson, H., Manzo, M.L., Reingold, A., Tshering, K., Zhou, Y., Duclos, P., Guirguis, S., Hickler, B., Schuster, M., 2015. Vaccine hesitancy: definition, scope and determinants. Vaccine 33, 4161–4164. https://doi.org/10.1016/j.vaccine.2015.04.036.

MacDonald, N.E., Comeau, J., Dubé, È., Graham, J., Greenwood, M., Harmon, S., McElhaney, J., McMurty, C.M., Middleton, A., Steenbeek, A., Taddio, A., 2021. Enhancing COVID-19 vaccine acceptance in Canada: an RSC policy briefing. Royal Society of Canada. https://rsc-src.ca/sites/default/files/VA%20PB_EN_0.pdf.

Markus, J., 2021. This calgary area hit 99% vaccination among those eligible | CBC News, CBC News. https://www.cbc.ca/news/canada/calgary/vaccine-calgary-nort heast-edmonton-alberta-1.6248708 (accessed February 26, 2022).

Marquez, C., Kerkhoff, A.D., Naso, J., Contreras, M.G., Diaz, E.Castellanos, Rojas, S., Peng, J., Rubio, L., Jones, D., Jacobo, J., Rojas, S., Gonzalez, R., Fuchs, J.D., Black, D., Ribeiro, S., Nossokoff, J., Tulier-Laiwa, V., Martinez, J., Chamie, G., Pilarowski, G., DeRisi, J., Petersen, M., Havlir, D.v., 2021. A multi-component, community-based strategy to facilitate COVID-19 vaccine uptake among Latinx populations: from theory to practice. PLoS One 16, e0257111. https://doi.org/10.1371/journal.pone.0257111.

McCutcheon, J., Van Dijk, M., 2021. Layout and Map: Village Square Leisure. Centre Vaccine Clinic, AHS Design Lab, Calgary.

McElfish, P.A., Rowland, B., Porter, A., Felix, H.C., Selig, J.P., Semingson, J., Willis, D.E., Smith, M., Riklon, S., Alik, E., Padilla-Ramos, A., Jasso, E.Y., Zohoori, N., 2021. Use of community-based participatory research partnerships to reduce COVID-19 disparities among Marshallese pacific Islander and Latino Communities – Benton and Washington Counties, Arkansas, April–December 2020. Prev. Chronic Dis. 18, 1–5. https://doi.org/10.5888/PCD18.210124.

McFadden, S.M., Demeke, J., Dada, D., Wilton, L., Wang, M., Vlahov, D., Nelson, L.R.E., 2022. Confidence and hesitancy during the early roll-out of COVID-19 vaccines among black, hispanic, and undocumented immigrant communities: a review. J. Urban Health 99, 3–14. https://doi.org/10.1007/s11524-021-00588-1.

Patrice, T., Lamboni, D., 2020. COVID-19 and the Beef Supply Chain: An Overview. Statisics Canada (Catalogue no 45280001). https://www150.statcan.gc.ca/n1/en/pub/45-28-0001/2020001/article/00086-eng.pdf?st=GEScJJcB.

QSR International Pty Ltd., NVivo (Version 12, 2018). https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home (accessed February 13, 2023).

Quinn, S.C., Andrasik, M.P., 2021. Addressing vaccine hesitancy in BIPOC communities — toward trustworthiness, partnership, and reciprocity. N. Engl. J. Med. 385, 97–100. https://doi.org/10.1056/NEJMP2103104/SUPPL_FILE/NEJMP2103104_DISCLOSURES.PDF.

Reverby, S.M., 2021. Racism, disease, and vaccine refusal: people of color are dying for access to COVID-19 vaccines. PLoS Biol. 19, e3001167 https://doi.org/10.1371/journal.pbio.3001167.

Sánchez, V., Sanchez-Youngman, S., Dickson, E., Burgess, E., Haozous, E., Trickett, E., Baker, E., Wallerstein, N., 2021. CBPR implementation framework for community-academic partnerships. Am. J. Community Psychol. 67, 284–296. https://doi.org/10.1002/ajcp.12506.

SQUIRE, 2015. SQUIRE 2.0 guidelines. http://www.squire-statement.org/index.cfm?fuseaction=Page.ViewPage&PageID=471 (accessed February 28, 2022).

StataCorp, 2019. Stata Statistical Software: Release 16. LLC, College Station, TX: StataCorp.

Statistics Canada, 2021. COVID-19 vaccine willingness among Canadian population groups. https://www150.statcan.gc.ca/n1/pub/45-28-0001/2021001/article/00011-eng.htm (accessed April 6, 2022).

Tait, C., 2021. Alberta advisory panel calls for pop-up clinics in communities with barriers to vaccines. https://www.theglobeandmail.com/canada/alberta/article-alberta-advisory-panel-calls-for-pop-up-clinics-in-communities-with/ (accessed June 29, 2022).

Tremblay, M.C., Martin, D.H., McComber, A.M., McGregor, A., Macaulay, A.C., 2018. Understanding community-based participatory research through a social movement framework: a case study of the Kahnawake schools diabetes prevention project. BMC Public Health 18, 1–17. https://doi.org/10.1186/S12889-018-5412-Y/TABLES/3.

Tuyisenge, G., Goldenberg, S.M., 2021. COVID-19, structural racism, and migrant health in Canada. Lancet 397, 650–652. https://doi.org/10.1016/S0140-6736(21)00215-4.

Vang, Z.M., Sigouin, J., Flenon, A., Gagnon, A., 2016. Are immigrants healthier than native-born Canadians? A systematic review of the healthy immigrant effect in Canada. Ethnicity & Health 22 (3), 209–241. https://doi.org/10.1080/13557858.2016.1246518.

World Health Organization, 2021. COVID-19 immunization in refugees and migrants: principles and key considerations: interim guidance, 31 August 2021. https://www.who.int/publications/i/item/covid-19-immunization-in-refugees-and-migrants-principles-and-key-considerations-interim-guidance-31-august-2021.

World Health Organization, 2021. Implementing the Immunization Agenda 2030: A Framework for Action through Coordinated Planning, Monitoring & Evaluation, Ownership & Accountability, and Communications & Advocacy. https://www.who.int/publications/m/item/implementing-the-immunization-agenda-2030 (accessed February 14, 2022).

World Health Organization, 2020. Immunization Agenda 2030: a global strategy to leave no one behind. https://www.who.int/publications/m/item/immunization-agenda-2030-a-global-strategy-to-leave-no-one-behind (accessed February 14, 2022).