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Nadia A. Charania & Leonard J.S. Tsuji

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ORIGINAL ARTICLE

The 2009 H1N1 pandemic response in remote First Nation communities of Subarctic Ontario: barriers and improvements from a health care services perspective

Nadia A. Charania, Leonard J.S. Tsuji

Department of Environment and Resource Studies, University of Waterloo, Waterloo, Canada

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ABSTRACT

Objectives. To retrospectively examine the barriers faced and opportunities for improvement during the 2009 H1N1 pandemic response experienced by participants responsible for the delivery of health care services in 3 remote and isolated Subarctic First Nation communities of northern Ontario, Canada.

Study design. A qualitative community-based participatory approach.

Methods. Semi-directed interviews were conducted with adult key informants (n=13) using purposive sampling of participants representing the 3 main sectors responsible for health care services (i.e., federal health centres, provincial hospitals and Band Councils). Data were manually transcribed and coded using deductive and inductive thematic analysis.

Results. Primary barriers reported were issues with overcrowding in houses, insufficient human resources and inadequate community awareness. Main areas for improvement included increasing human resources (i.e., nurses and trained health care professionals), funding for supplies and general community awareness regarding disease processes and prevention.

Conclusions. Government bodies should consider focusing efforts to provide more support in terms of human resources, monies and education. In addition, various government organizations should collaborate to improve housing conditions and timely access to resources. These recommendations should be addressed in future pandemic plans, so that remote western James Bay First Nation communities of Subarctic Ontario and other similar communities can be better prepared for the next public health emergency.

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Keywords: H1N1 pandemic, remote First Nation communities, barriers, improvements, Subarctic, qualitative analyses

INTRODUCTION

The 2009 H1N1 influenza, caused by a novel influenza A virus subtype, quickly spread worldwide causing the first global pandemic declaration in over 4 decades (1). Reports have shown that Canada's First Nations population were disproportionately impacted by the 2009 H1N1 influenza virus, especially remote communities (2,3). A "remote" community is defined as one located over 350 kilometers from the nearest service centre having year-round road access; while, an "isolated" community is only accessible by planes year-round (4).

People living in remote and isolated First Nation communities may face unique challenges during a pandemic which must be addressed by pandemic planners (5). In remote First Nation communities, federal, provincial and First Nation governments share responsibility for the delivery of health care services (4). Inadequate social policies and insufficient federal funding have negatively impacted primary health care services, community level surveillance and housing in First Nation communities (6). Although living in an isolated community may initially act as a buffer with respect to exposure to an infectious disease, if a pathogen is introduced into an isolated community, the living conditions (e.g., overcrowded housing, impoverished lifestyle) appears to promote virus transmission (5). Additionally, transportation of supplies and resources may be limited, and can be especially challenging in harsh weather conditions (7). Moreover, there are vulnerable populations within First Nation communities who suffer from various co-morbidities (e.g., diabetes, obesity), placing them at greater risk of becoming infected by a novel pathogen (2,3).

It is critical that governments address the concerns of economically and socially disadvantaged groups in order to mitigate the injustice that may occur during a public health emergency (8). In Canada, the Assembly of First Nations has noted that there has been very little inclusion of First Nations' input into current federal and provincial pandemic plans (9).

The purpose of this paper is to retrospectively examine the barriers encountered by 3 geographically remote and isolated First Nation communities during the 2009 H1N1 pandemic response from a health care perspective, and to identify culturally appropriate opportunities for improvement as informed by participants, which should be incorporated into future pandemic plans.

MATERIALS AND METHODS

Study community profiles

The 3 study communities are located in the western James Bay region of northern Ontario with on-reserve population sizes estimated at 850, 1,700 and 1,800, respectively (Ruby Edwards-Wheesk, pers. comm., 2010). These 3 First Nations were chosen for this study because all are remote and isolated, being located in one geographical region (Fig. 1) and share similar living conditions (10,11). In addition, community-based health care providers felt that existing pandemic plans did not properly address their communities' unique conditions.

Each First Nation (or Band) is governed by an elected Chief and Council. All 3 communities have a federally funded health centre for community public health and a primary health care facility covered by 24-hour nursing care.

Two communities have a wing of a provincial hospital; while, the third community has a federal nursing station. Although these primary care facilities have a selection of medical equipment, any patients requiring surgery or care beyond the capabilities of the nursing staff must be transported to the nearest accommodating facility (12).

Study population

Using purposive sampling, participants (n=13) were chosen by the researchers who had the authority to represent the 3 government sectors (i.e., federal, provincial and First Nations) responsible for making decisions and implementing each study community's pandemic response from a health services perspective (13). The health director manages the federal



Figure 1. Location of remote and isolated communities of western James Bay, northern Ontario, Canada.

health centre, while the nurses-in-charge and community health nurses are responsible for a wide variety of health care activities, including immunizations. The director of patient care is in charge of the provincial hospital wing and the clinical coordinator is responsible for managing primary care activities of front-line health care workers, such as dispensing of antiviral treatment. The community with a nursing station has a nurse-in-charge who has a similar role as the clinical coordinator. Lastly, the Band Council has the ultimate decision-making power when responding to a pandemic; chosen participants included the elected Chief and/or deputy Chief.

Community-based participatory approach

This research can be described as a community-based participatory approach, as it directly involved First Nation community members and allowed for the finding and implementation of culturally appropriate and relevant solutions (14,15). A community-based advisory group was formed of 5 participants representing the communities' health centers and Band Councils to ensure that the study met the needs of the communities and was conducted in a culturally appropriate manner. The community-based advisory group actively collaborated with the authors to develop the study's objectives, design, interview questions and protocols. In addition, they validated the results and aided in disseminating the study's findings. Ethics clearance was granted through the Office of Research Ethics at the University of Waterloo.

Data collection

Qualitative data were collected by semi-directive interviews with 13 adult key informants during the period February 9 to 23, 2010, after community illness rates returned to baseline levels, thus

participants had a period of time to reflect on their community's pandemic response. Being culturally appropriate for the western James Bay region, verbal informed consent was obtained and interview questions were vetted through the community-based advisory group (16,17). Semi-directive interviews were used to gain an in-depth understanding of interviewees' perspectives (13). To encourage elaboration, questions were open-ended and frequent probes were used (18). The interview questions were developed based on academic literatures of health care service aspects of a pandemic response, including questions about identifying positive aspects, barriers faced and opportunities for improvements. For the participants' convenience, interviews were done at their chosen place and time, and individual interviews lasted from approximately 15 minutes to 1.5 hours. The interviews were in English and audio recorded with the permission of the participants, and notes were also taken.

Data analyses

The transcribing, coding, categorizing and analysing of the data were done by the author (NAC) and confirmed by the co-author (LJST). Data from the interviews were manually transcribed verbatim into electronic format. Codes were created using deductive and inductive thematic analysis. This combination approach allowed for the use of "theory-driven" codes derived from previous research and "data-driven" codes which emerged from the raw data itself (19). During deductive coding, a template organizing approach was employed which utilized the pandemic response framework outlined in the existing regional First Nations and Inuit Health Branch (FNIHB) pandemic influenza plan as a coding template (20,21). Seven broad codes were used as a template to

organize similar segments of data and provide a flexible guide for subsequent analysis and interpretation (19,20). Inductive coding was used for data that described a new code which emerged from the data (22). For instance, segments of data regarding supplies and equipment were previously coded as health services; however, after reviewing the participants' interview transcripts, supplies emerged as a separate code. The data within each of the resulting 8 codes was further categorized according to interview trigger questions (i.e., positive aspects, barriers faced and suggested improvements), always noting which community and health sector the commenting participant represented (19). This approach allowed for the data to be analysed revealing connections and overarching themes regarding the similarities and differences experienced during the pandemic response within and between each community. The data analysis was an iterative process and was completed several times to ensure accuracy.

The resulting 8 codes were presented in paper format and verbally validated (no subsequent changes were proposed) by each community's pandemic committee, which comprised of representatives (8 to 10 people attended) from various sectors involved in the community's pandemic response: Band Council, nursing station, health centre, James Bay General Hospital (JBGH), education, clergy, Northern (a store), water treatment plant and emergency medical services. This method of validating the resulting codes beyond the interviewed participants (although their respective sectors maintained representation during the community pandemic committee meeting) was used because the theory and data-informed codes would subsequently comprise the framework for each community's modified community-level pandemic plan thereby directly applying the study's findings (23).

RESULTS

The details of 6 codes (e.g., vaccine, antivirals, health services, supplies, public health measures and communications) are presented, as 2 codes (e.g., surveillance and emergency response) were selectively omitted to allow for the presentation of the most relevant results in this paper. Representative quotes were used to accurately reflect participants' tone and views; however, for confidentiality purposes, which community and health sector a participant represented was not identified (18,24).

Vaccine

Participants from all of the communities reported that enough doses of the vaccine were received and good uptake rates were noted in their respective community. One community reported an estimated pandemic vaccine uptake rate of 80%, significantly higher than Canada's estimated rate of between 40 and 45% (25). However, 1 community had experienced an influenza outbreak prior to receiving the pandemic H1N1 vaccine.

Participants from 2 communities expressed that their communities' mass immunization clinics (MIC) went smoothly. For instance, 1 of these communities was sent 3 support workers from Health Canada and implemented a modified immunization certification course to train additional health care personnel to vaccinate. In addition, all workers donned personal protective equipment (PPE) and patients with influenza-like illness (ILI) symptoms were separated and given surgical masks to wear.

However, 1 community's participants revealed that they experienced issues with their MIC. For instance, there was a lack of human resources (i.e., trained nurses and auxiliary staff); thus, the nurses who were vaccinating fell ill due to

exhaustion and not having adequate time to don PPE. It was suggested that additional human resources should be secured by providing training for community members to act as auxiliary staff (i.e., crowd control, security, etc.), which would free the nurses from other tasks and allow them to concentrate solely on vaccinating. Participants also requested that nurses be trained to perform immunizations and more nurses capable of vaccinating be deployed to their community to help at the next MIC. In addition, since the nurses were not provided with information on how to properly run a MIC, it became a harsh learning experience; a simulation would be helpful prior to the next MIC.

Antivirals

Participants from all 3 communities believed that they received enough doses of antivirals. However, the more timely distribution of antivirals was an issue. Also, some participants reported that they received antivirals which had short expiry dates. Indeed, a participant mentioned,

...the first bunch we received, I was surprised the expiry date was a month and a half after we receive[d] it... (Participant #8)

Health services

Participants from all 3 communities felt there was a lack of human resources during their pandemic response; their health care facilities were short-staffed and staff felt overworked. A participant mentioned that

...we were left to do everything on our own... (Participant #1)

Also, a participant believed that they would not have been able to cope and provide adequate patient care if their community had been more severely impacted by the pandemic. In addition, a participant noted that there was a lack of trained

health care personnel and a shortage of equipment in the communities, especially for severely ill patients requiring mechanical ventilation.

With regards to an alternative care site (ACS), all 3 communities discussed the possibility and feasibility of opening one which would function as a satellite centre providing necessary health services. In all communities, various possible locations for an ACS were suggested. However, some participants stated that the funding and human resources required to open an ACS must be secured prior to the next pandemic alert.

Supplies

Participants from all communities felt that their communities' health facilities (i.e., health centres and JBGH) had an adequate amount of supplies for their pandemic response. Nevertheless, 1 community's health centre chartered a plane to bring in supplies (i.e., masks, gowns, gloves and hand sanitizers) that were paid for out of their own capital, since their allotted resources from FNIHB did not arrive in a timely manner. Several participants experienced further challenges with receiving supplies in a timely fashion, which brought up issues of how supplies, especially food, can be adequately stockpiled ahead of time, especially if transportation is compromised.

Also, most participants believed that there was a lack of funding for supplies and provision of supplies, especially surgical masks and hand sanitizers, for the community itself. One participant reported that instead of receiving needed hand sanitizers, the community received body bags. The participant felt that

...the government of Canada doesn't want to help the Native people...because it was cheaper...to send 500 body bags. (Participant #11)

Some participants felt that it was unfair that community members were obligated to purchase individual infection control supplies, since this proved to be especially difficult for low-income families. Participants from each community expressed that they would like infection control supplies to be provided for the community and that there should be funding in place to purchase supplies for the next emergency; as one participant mentioned,

...a fund or some kind of formal arrangement in a pandemic, First Nation communities are always vulnerable to begin with because you're isolated... (Participant #5)

Public health measures

Each community agreed that overcrowding in houses was an issue since it may promote virus transmission and it was not feasible to segregate ill family members. Therefore, in some ways, overcrowding in houses made it difficult for community members to follow recommended public health guidelines.

Some additional issues were reported with respect to following isolation recommendations in that health care workers who were ill and had been sent home to isolate themselves were subsequently seen out in the community even though community gatherings had been cancelled. However, in general, most participants reported that community infection control measures were followed within the community despite the fact that some complained the measures were unnecessary. For instance, people wore surgical masks, avoided handshakes and stockpiled supplies (if available) when directed. Additionally, participants reported that modifying cultural practices at funeral services, such as limiting attendance and avoiding physical contact (i.e., hugging and kissing), was generally well received.

Communications

All 3 communities formed a community pandemic committee. All participants from 1 community believed that their pandemic committee encompassed a team approach by collaborating and cooperating, which led to effective communication. However, 2 communities' participants suggested that more support and participation from all key players would have been beneficial in order to develop and implement community-wide recommendations, especially during the early stages of pandemic preparation. Additionally, a participant suggested that receiving feedback from the pandemic committee would be valuable to ensure that all members comprehended the subsequent actions to be taken. One participant stated,

...we needed cooperation from the leadership, and also from the people to start taking things seriously... (Participant #13)

Nevertheless, some participants reported good communication within their respective organizations. For instance, a participant commented that weekly teleconferences were helpful, as additional information was provided and questions answered. Participants also reported that they were in constant communication with their neighbouring coastal communities to share information and provide support in a mutually beneficial manner.

A majority of participants stated that they received information from multiple media sources (i.e., Internet, television, radio) which were misleading at times. Specifically, participants felt that the media attention sensationalized the pandemic resulting in unnecessary hype and panic in their communities. Additionally, a participant stated that the information received was too generalized to be helpful in the context of living in a remote community. The participant questioned,

...that's a lot of information, but at the same time, is it geared here to the community or is it geared to somewhere else? (Participant #1)

Participants from all communities felt there was a general lack of community awareness during the pandemic even though various dissemination strategies were used, such as distributing posters and pamphlets and making announcements on the radio. For instance, some community members did not understand the disease process of influenza, the effects of the pandemic vaccine and the importance of community infection control measures. All participants agreed that more education and awareness are required to be better prepared.

In summary, although each community's

participants emphasized various concerns, they also identified common positive aspects, barriers faced and opportunities for improvement regarding their community's pandemic response (Table I).

DISCUSSION

In general, remote and isolated First Nation communities possess several distinct characteristics which affected their pandemic response, such as geospatial isolation, living conditions, culture and governance. The results of this qualitative study helped to inform the following recommendations for government officials to address in order to improve future pandemic community responses (Table II).

Table I. Common positive aspects, barriers faced and opportunities for improvement regarding the pandemic response in 3 remote and isolated First Nations communities.

Positive aspects	Barriers faced	Opportunities for improvement
Vaccine -Good uptake -Received enough doses	Public health measures -Overcrowding in houses	Supplies -More funding
Antivirals -Received enough doses	Health services -Lack of human resources	Health services -More human resources
Supplies -Health facilities had enough	Communication -Poor community awareness	Communication -More community awareness

Table II. Participants' suggested recommendations and additional considerations for government officials for developing future pandemic plans.

Participants' recommendations
<ul style="list-style-type: none"> - Distribute resources (i.e., vaccines, antivirals, supplies) in a timely fashion - Provide additional supplies for community use - Establish an emergency fund - Recruit nursing staff - Deploy interdisciplinary team of health care professionals - Secure funding and human resources for alternate care site - Implement disease awareness education sessions - Deliver more regional and community specific information
Additional considerations
<ul style="list-style-type: none"> - First Nations and Inuit Health Branch (federal organization) and Ministry of Health and Long-Term Care (provincial organization) should re-evaluate resource distribution plans - First Nations and Inuit Health Branch should collaborate with the communities to develop a food supply plan - Improve housing conditions - Declare pandemic committee meetings mandatory

Distribute resources in a timely fashion

In general, participants believed that distributing resources (i.e., vaccines, antivirals, and pandemic supplies) in a timely fashion needs to be improved.

Some participants believed that vaccines were not distributed to their communities in a timely fashion, although they received an adequate amount. Vaccination is the best way to prevent influenza-related complications; however, the development of a pandemic vaccine could take up to 5 months after the strain has been identified (7,26). Therefore, research focusing on increasing the pace and capacity of pandemic vaccine development and production should be a priority (27). Once the pandemic vaccine is available, it is the responsibility of all government levels to ensure First Nation communities receive a timely and equitable distribution (4).

Additionally, a timely distribution of antivirals continues to be an ongoing global challenge (28). Considering that geographically remote and isolated areas are difficult to access and transport supplies to, special care should be taken to ensure these communities do not receive shipments of antivirals with relatively short expiry dates (7).

While all communities stated their health facilities had enough supplies, these supplies (i.e., masks, gowns, gloves and eye protection) were sometimes not distributed in a timely fashion to the region. FNIHB and the Ministry of Health and Long-Term Care (MOHLTC) are responsible for ensuring that health facilities in First Nation communities have a continuous stockpile of pandemic supplies (7). In addition, FNIHB should work in collaboration with remote First Nation communities to develop a plan of how food supplies can be adequately transported and stockpiled during a pandemic.

Therefore, we suggest that all government levels collaborate to re-evaluate resource distribution plans, so remote First Nation communities receive needed resources in a timely fashion (7).

Increase funding for disease outbreaks

It is the responsibility of provincial ministries and federal departments to provide supplies for workers who provide critical infrastructure services (7). However, most participants felt there was an inadequate amount of supplies for their community. As confirmed in previous studies (29), some participants stated that certain households could not afford supplies. Participants suggest that government officials focus efforts on providing additional supplies to First Nation communities and establish an emergency fund that can be accessed to purchase supplies for disease outbreaks.

Increase human resources

Health Canada's FNIHB is responsible for delivering public and primary health care services (if provincial services are not available) to remote and isolated First Nation communities (4). However, studies have shown that geographically isolated First Nation communities have less access to health care services and experience shortages of trained health care professionals (30). Being geographically remote and isolated presents a barrier to recruiting and retaining nurses in these communities; additionally, studies have shown that high turnaround rates of nursing staff can pose negative effects on the provision of health services (18,31). Nurses are the main providers of primary care in these communities; therefore, FNIHB and JBGH should continue to focus efforts on recruiting a full-time, permanent complement of nurses in these communi-

ties who have undergone proper orientation in order to prepare them for the demanding nature of the job and to introduce them to the importance of First Nations' traditional values (18,32). Further, as suggested by participants, FNIHB and JBGH should include plans to deploy an interdisciplinary team of health care professionals specializing in respiratory therapy, mental health, disease education and post-pandemic psychological debriefing to provide additional services, if required.

Improve plans for an Alternative Care Site (ACS)

The Canadian Pandemic Influenza Plan for the Health Sector (CPIPHS) (4) recommends that communities have guidelines in place to address the likely situation that health care facilities will become overwhelmed during an influenza pandemic. However, the Ontario Health Plan for an Influenza Pandemic (OHP/IP) (7) states that sources of funding for equipment and infrastructure for ACSs have not yet been identified. Therefore, participants suggested that government officials secure funding and human resources for an ACS and include details in community pandemic plans.

Improve living conditions

In 1876, the Indian Act entitled registered Indians on reserves to housing, education and health care (30), either as a treaty right or fiduciary responsibility. Although, improvements have been made, impoverished crowded housing remains a problem in numerous First Nations communities (33,34). Overcrowding in houses has been associated with the increased probability of infectious respiratory disease transmission (35). Indeed, it has been reported that houses with many inhabitants posed issues to preventing the spread of disease (29). Therefore, government officials

need to continue to focus efforts on improving the housing conditions in remote First Nation communities.

Increase education and participation

Some participants mentioned that community members did not always follow infection control recommendations and there was a lack of support from key players of the pandemic committee. This can be attributed to the reported lack of community awareness regarding the pandemic, disease processes and the effectiveness of proposed public health measures. Public communication is essential for community members to understand the situation and how to respond (4). In First Nation communities, it is vital that educational programs are modified to respect their culture; for instance, how they interpret illness and their holistic approach to health issues (32,36). Participants suggested community educational sessions to stress the importance of immunization, infection control and general disease prevention. Furthermore, participants commented that it would be advantageous if government officials provided regional and community specific information geared towards influenza mitigation in a remote community. Also, to make pandemic preparedness a political priority and ensure participation by key players, local Band Councils can declare pandemic committee meetings as mandatory (32).

Conclusion

This qualitative study presents information to raise awareness about the unique needs of geographically remote and isolated First Nation communities during a public health emergency, which aims to improve current policies and plans. Government bodies should focus efforts on providing more support to these communi-

ties in terms of human resources, monies and education. Additionally, resource distribution plans and housing conditions must be improved to lessen the impact that social factors have on these communities.

The identification of elements common to all of the communities' pandemic response could help other remote and isolated communities improve their pandemic response. Furthermore, lessons learned from the 2009 H1N1 pandemic response could be used to improve the management of seasonal influenza epidemics and perhaps other communicable diseases. Future studies should focus on how to feasibly improve the pandemic response capacity by remote and isolated First Nation communities.

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Nadia A. Charania
 Department of Environment and Resource Studies
 University of Waterloo
 200 University Avenue West
 Waterloo, ON N2L 3G1
 CANADA
 Email: ncharani@uwaterloo.ca