

Understanding the interplay of factors informing vaccination behavior in three Canadian provinces

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Arguably, the two most critical components in any response to a pandemic are effective risk communication and the rapid development of a vaccine. Despite the roll-out of a publicly-funded H1N1 vaccine program across the country, less than half of all Canadians were vaccinated during the 2009–10 pandemic. Using focus group data, this study examined vaccinating behaviors, the impact of public health messaging, and the public's attitudes toward H1N1 and the H1N1 vaccine in three Canadian provinces. Drawing on vaccine risk communication literature, a framework was devised to identify and analyze the factors related to vaccine uptake and vaccine refusal. The most predictive factor for H1N1 vaccine uptake was a prior history of vaccinating against seasonal influenza. Other important factors included barriers to immunizing (access issues) and an individual's perception of serious risk from contracting H1N1. Although critical gaps in the public's understanding of influenza infections were identified, together with misinformation about vaccination effectiveness and safety, these factors were less frequently reported to be the core factors influencing an individual's decision to vaccinate.

Introduction

Canada had among the first confirmed cases of a new strain of H1N1 influenza which spread through Mexico, the United States, and Canada in the spring of 2009. Recognizing that the best protection against a novel, virulent strain of H1N1 would come from a universal vaccination program, there was a rush to develop, test, and produce an effective vaccine during the first wave of H1N1 (May–June 2009). When the second wave hit in October to November 2009, a vaccine was available, but unanticipated supply issues caused shortages and public officials were forced to first target those thought to be most at risk, temporarily suspending universal access to the vaccination.¹ Long lines-ups to be vaccinated, confusion over who was eligible to be vaccinated and which vaccine was most appropriate (i.e., two doses vs. a single dose for infants and children, and unadjuvanted vaccines to pregnant women) all impeded the smooth roll out of the vaccination program.^{1,2} Despite extensive efforts and resources invested into providing free universal access to vaccination for Canadians during the pandemic, vaccination rates for H1N1 were suboptimal.³ Rates of vaccination were between 32% and 45% across Canada, approximately the same range as seasonal influenza vaccine uptake in most provinces.⁴

A large body of literature has examined factors influencing the uptake of vaccines,^{5–9} but only a small number of articles have comprehensively examined public attitudes and behaviors toward vaccines administered against novel infectious diseases during

pandemic outbreaks. Much of what we know about the public's response to the release of a novel vaccine during a pandemic comes from survey-based studies.^{10–16} Two systematic reviews^{17,18} (involving a total of 36 papers) evaluated the relevant literature on pandemic vaccination. Both reviews cataloged the following factors which were identified as influencing pandemic vaccine uptake: perceived personal risks, overall attitudes toward vaccines, habitual vaccinating behavior, and a range of relevant social, informational and institutional factors, e.g., societal responsibility, recommendations from health professionals or trust in government.

Using the socio-ecological model (SEM), Kumar et al. included an analysis of the potential interplay of intrapersonal, interpersonal, institutional, community and policy level factors, and how they may be weighed by individuals confronted with a vaccination decision.¹⁹ While most vaccine-uptake studies focus predominantly on the intrapersonal level (risk perception, etc.), the SEM takes as a first principle that vaccine-uptake behavior is likely shaped by a complex interplay between systems and environment, social context, and individual attitudes, beliefs and knowledge. Hence it provides a useful schematic to assess holistically how systems facilitate or create barriers to vaccinate, how community discourse, beliefs, and practices act in addition to individual-level factors (intra and inter-personal) to ultimately shape a person's perception of vaccination and decision to vaccinate.

Building on this SEM-informed study by Kumar et al., our study further develops a conceptual model to identify and

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Table 1. Components of the risk communication and vaccination framework

Categories	Factors	Definitions
System and Institutional Level Factors	Vaccine Roll-out and Availability	Vaccine services and availability of H1N1 vaccine (e.g., how vaccine was delivered).
	Government Communication	How and when H1N1 information from authorities was received and who delivered that information.
	Institutional Prevention Activities	H1N1 prevention programs (e.g., vaccine clinics), provision of prevention information (e.g., information materials) instituted by an organization (e.g., school, workplace, etc.).
	Organization of the Public into Priority Groups	Who was able to receive vaccinations and who was considered at-risk for contracting H1N1.
Social Context Factors	Public Discourse	How media covered H1N1, and how reliable or important media coverage was in relation to vaccination decisions.
	“Bandwagoning”	Deciding to be vaccinated or not to be vaccinated because “everyone is doing it.”
Interpersonal Level	Interpersonal Influences	Broad social pressure about what is expected of individuals by their social environment. Interaction with friends, family, coworkers, and others more generally in relation to vaccination and/or H1N1.
	Interface with Health Professionals	Any mention of interaction and/or communication (or lack thereof) with a health professional.
Intrapersonal Factors	Habitual Behavior	What individuals usually do or perceive in relation to the seasonal influenza or other vaccinations.
	Altruism	An individual’s decision to vaccinate or not to vaccinate is made in order to protect or benefit someone else or to forego vaccination when vaccine supply is low in order to allow those more at risk to vaccinate.
	“Free-loading”	Relying on herd immunity to protect against H1N1 and therefore deciding not to be vaccinated.
	Vaccine Risk Perception	How safe or unsafe individuals felt the H1N1 vaccine to be.
	Personal Risk Perception	How at-risk individuals perceived themselves to be in contracting and becoming seriously ill from H1N1.
	Knowledge State	Knowledge or lack of knowledge regarding H1N1, vaccination, vaccination roll-out process, priority groups.
	Trust	Who is trusted and not trusted has an influence on what information one accepts and subsequent actions.
	Protected Values	Ideals held so strongly that individuals would be unwilling to act counter to these values no matter what the benefits might be.
	Past Experiences	Past experience with vaccines and/or influenza.
	Perceived alternatives	Tendency to prefer natural products and substances or other non-medical alternatives to vaccination (such as eating properly and exercising).

categorize the key determinants of vaccine uptake during the H1N1 pandemic, and through focus groups explore how these various factors were weighed in the individual’s vaccination decision. Focus groups enable discussion to expand beyond the preconceptions of the researchers and to provide data about key issues important to group participants.²⁰ Our conceptual model, described in Table 1 with operational definitions, is a compilation of factors identified by focus group participants, some of which matched against theory-driven factors, and grouped into the four macro-level categories identified by the SEM model. The results of our study should help inform future survey-based interrogations of vaccine decision-making processes during pandemics (Table 1).

Results

Participant characteristics. Participant characteristics as reported in the surveys are represented in Table 2.

Factors influencing vaccination uptake. Table 3 shows how the factors identified in the focus group discussions were grouped

into four distinct macro domains, defined in detail in Table 1. While not common in presenting focus group data, we quantify the number of participants who identified particular factors to assess how much weight certain factors were given across focus groups to help illustrate which aspects may over-ride decisions to vaccinate or not.

System/environmental or institutional factors. There were 4 distinct or environmental factors (see Table 3) that were generally shaped by the actions of multiple levels of government and formal institutions; individuals had little control over these factors. Several participants (n = 23) reported that the roll-out and availability of the H1N1 vaccine had some influence on their final vaccination decision. This factor was cited more often by participants who did not receive the H1N1 vaccine (n = 16) than those who were vaccinated (n = 7). All participants who did not receive the vaccine mentioned long line-ups and waiting time as negative influences. For example, one participant commented, “*Just hearing [about] people waiting in line for 5 to 10 hours for inoculation—although it would be good, I can think of other things I’d like to do with my time.*” Those who received the vaccine

Table 2. Characteristics of H1N1 focus group participants

	Overall % (n = 130)*	Edmonton, Alberta % (n = 28) ^a	Winnipeg, Manitoba % (n = 54)	Toronto, Ontario % (n = 48) ^b
Gender				
Men	48.5	50.0	46.3	50.0
Women	51.5	50.0	53.7	50.0
Age (years)				
18–34	26.9	32.1	31.5	18.8
35–54	36.9	32.1	35.2	41.7
55+	36.2	35.7	33.3	39.6
Education				
Less than High School	3.8	3.6	3.7	4.2
High School Degree	21.5	14.3	27.8	18.8
Some College/University	23.1	21.4	24.1	22.9
College/University Degree	51.5	60.7	44.4	54.2
Income (Can \$)				
Less than 50,000	33.6	29.6	41.5	27.1
50,000–75,000	29.7	40.7	26.4	27.1
75,000–100,000	18.8	22.2	11.3	25.0
100,000+	18.0	7.4	20.8	20.8
H1N1 Vaccine (yes)	37.0	33.3	40.7	34.8
Seasonal Influenza Vaccine (yes)	36.7	32.1	37.0	39.1

^aOnly 3 focus groups (18–34, 35–55, 55+) were conducted in Edmonton. ^bOnly demographic data from 5 focus groups is available. No data were collected for one focus group held in Toronto, age category: 55+.

mentioned that having the vaccine offered conveniently by their General Practitioner (n = 3) and shorter line-ups at the end of the vaccination cycle (n = 2) positively influenced their decision. Two people who were vaccinated noted they were discouraged by line-ups, but personal risk perception and altruism outweighed the inconveniences.

Social context. Participants identified two key social contextual factors that shaped their decision either to vaccinate or not to vaccinate (Table 3): public discourse about the safety and effectiveness of vaccination, as well as alternatives to vaccinating; and a “bandwagoning” effect (impulse to vaccinate driven by the perception that everyone was rushing to vaccinate). Among those who did not receive the vaccine (n = 12), media reporting was considered overhyped and sensationalistic (n = 4) with one participant reflecting, “I’m wondering if the people who didn’t have the vaccine might have had it if there was less hype about it on the, all the media.” Others who did not vaccinate felt that the media coverage of the debate over the vaccine safety (n = 4) and the perceived mixed messages from different media outlets (n = 4) negatively influenced their decision to vaccinate.

Inter-personal factors. Participants noted two key inter-personal factors that influenced their decision-making process: (1) discourse and social norms within community-level, personal, and professional social networks; and (2) contact with health care professionals, typically the family doctor, who provided information, advice and, in some cases, a role model for vaccinating behavior (Table 3). Many participants (n = 41) mentioned

interaction with a family member, friend or colleague as influencing individual vaccination decisions. Participants who received the vaccine were encouraged by family members or friends to vaccinate (n = 16). Two were discouraged by family members and friends, but were vaccinated nonetheless. Participants who did not receive the vaccine had friends or family members who discouraged vaccination by providing negative information on vaccines, sharing negative experiences with vaccines, or promoting natural or other health alternatives to vaccination (n = 18). Participants who did not receive the vaccine had friends or family members who encouraged vaccination, but other factors such as protected values, vaccine risk perception and personal risk perception led them to the decision not to vaccinate (n = 5). “I put a lot of weight on my friends, the experiences that were being communicated through social networking sites or people that were known to me.”

Many participants (n = 16) mentioned interaction with a health professional as a factor and family physicians were mentioned in all but 3 cases. Some participants (n = 5) who did not receive the vaccine stated that their physician recommended against vaccination or revealed that s/he was not planning to be vaccinated. A few individuals (n = 8) were encouraged to receive the vaccine by a health professional, but did not follow the advice. Of the participants who did receive the vaccine, most (n = 19) mentioned a physician recommendation along with trust for their physicians as a significant factor in the vaccination decision. “I talked to my family doctor and he told me to get the shot.”

Table 3. Factors reported as influencing focus group participants' decision-making

Factors	Participants who reported vaccinating against H1N1 (n = 47) ^a			Participants who reported NOT vaccinating against H1N1 (n = 80) ^a		
	Edmonton (n = 9)	Winnipeg (n = 22)	Toronto (n = 16)	Edmonton (n = 18)	Winnipeg (n = 32)	Toronto (n = 30)
System/Institutional Level						
Definition of Priority Groups	1+	0	0	1+	1-	1-
Government Communication	2(1+/1-)	2+	3(2+/1-)	5-	2-	2-
Vaccine Roll-out and Availability	2+	1-	4(3+/1-)	6-	7-	3-
Institutional Interventions	1+	2+	1+	0	1+	0
Social Context Level						
Media Coverage	5(4+/1-)	4(2+/2-)	3(2+/1-)	7-	2-	3-
"Bandwagoning"	0	1-	2+	2-	1-	0
Interpersonal Level						
Interpersonal Influence	5(4+/1-)	6(5+/1-)	7+	7(1+/6-)	8(4+/4-)	8-
Interaction with Health Professionals	1+	7(4+/3-)	12+	2(1+/1-)	8(5+/3-)	6(2+/4-)
Intrapersonal Level						
Habitual Behavior	4+	7(6+/1-)	5+	10-	9-	12(1+/11-)
Altruism	7+	1+	7+	3(2+/1-)	2(1+/1-)	1-
"Free-loading"	0	0	0	1-	0	1-
Vaccine Risk Perception	8(7+/1-)	4(1+/3-)	4(1+/3-)	9-	15-	15-
Personal Risk Perception	8+	10(8+/2-)	10+	7(1+/6-)	12(1+/11-)	12(1+/11-)
Knowledge State	4(2+/2-)	5+	3(2+/1-)	6-	6(1+/5-)	12-
Trust	3+	4+	0	1-	1-	5-
Protected Values	1+	0	0	3-	4-	9-
Past Experience	1+	1+	1-	1-	4-	10(1+/9-)
Perceived Alternatives	0	2-	0	1-	7-	11-

The value in each cell represents the number of participants who reported the factor. (+) indicates instances where a factor was reported as supporting a decision to vaccinate while (-) indicates instances where a factor was reported as dissuading participants from vaccinating. In both groups, participants reported acting in a manner contrary to the influence of some factors. a: The totals reported include participants from all three jurisdictions who completed the survey question related to vaccinating (n = 137). Three who participated in the survey did not complete the question related to their vaccination status; of the 10 participants in the Toronto focus groups who did not complete the survey at all, 5 stated during the focus group that they had been vaccinated while 5 stated that they did not receive the vaccine.

Intra-personal factors. We identified 10 distinct intrapersonal factors that participants reported influenced their vaccine decision-making (Table 3). A person's perception of danger from H1N1 was the most reported factor influencing individual's H1N1 vaccination decisions (n = 59). The number of participants who mentioned personal risk perception was almost evenly distributed between those that were vaccinated (n = 28) and those who were not vaccinated (n = 31). Of the participants who received the vaccine, 26 felt at risk of contracting H1N1 for the following reasons: they usually felt at risk for the seasonal influenza, they knew people who had been sick with H1N1, media coverage convinced them that H1N1 was serious and they were in danger, or they thought they were at increased risk because of a pre-existing health condition or age. Two participants did not feel at personal risk from H1N1, but received the influenza shot because of the recommendation of a family doctor and social pressure. Of the 31 participants who did not receive the vaccine, 28 did not feel at risk for H1N1 for the following reasons: they

did not habitually feel at risk for the seasonal influenza, H1N1 was perceived to be a similar risk to seasonal influenza, they considered their overall good health to be protective. One participant commented, "I don't get the flu so why would I? I didn't think I was at risk to get H1N1." 3 participants did feel at risk, but chose not to be vaccinated because they were not in a priority group and felt they would face long line-ups to receive the vaccine.

Many participants (n = 55) cited perceived risks associated with the vaccine as a factor influencing their decision either to, or not to, vaccinate. Participants who were not vaccinated cited both concerns over the safety of the vaccine and the belief that it was inadequately tested for side-effects (n = 39). "We heard the vaccines were not really tested. They kind of rushed it." Of those participants (n = 16) who did receive the vaccine, they also discussed the safety of the vaccine. Some participants (n = 7) were uncertain about safety and testing, but their concerns over vaccine safety were over-riden by other factors including a sense of obligation to at-risk family members, a physician's recommendation

to proceed with vaccinating, social pressure to vaccinate, and/or a general sense of social responsibility to contribute to the effort to protect the community at large.

Participants who chose not to receive the vaccine cited informational factors more often than participants who did receive the vaccine (n = 24 vs. n = 12). The majority of those participants who received the vaccine felt they had sufficient knowledge to make an informed decision (n = 9), while 3 were concerned that they lacked information and/or that contradictory information made them hesitant to vaccinate. The majority of participants who did not receive the vaccine felt they did not have sufficient information to make an informed decision and/or that the lack of consistency across information from different sources made them wary about the credibility of information promoting the vaccine (n = 23). One participant was positively influenced by information provided by his doctor, but ultimately did not receive the vaccine.

Most participants (n = 47) framed their final vaccination decisions in relation to their experience with seasonal influenza. Those participants (n = 30) who decided against vaccination reported that they did not usually feel at risk for the flu and/or did not normally receive an influenza shot as a reason for their vaccination decision. *"I haven't gotten the flu, I don't get the flu shots and I just felt like it was a waste of time for me."* Those participants (n = 15) who did receive the vaccination mentioned that they normally did receive the seasonal influenza shot and/or normally did feel at risk for the season influenza. In both groups, only one participant stated that they made a final H1N1 vaccination decision contrary to their habitual decisions in relation to seasonal influenza vaccination.

Discussion

This is not the first study examining the attitudes toward H1N1 vaccination among the general public.¹¹⁻¹⁹ However, to our knowledge this is the first comprehensive study of self-reported factors derived from focus groups. Following Kumar et al.'s call for a more integrated and holistic approach to vaccine decision making research, we not only identified a range of individual factors but also studied the interactions between the different factors and their relative weight in a particular decision. This approach allowed us to probe in-depth how individuals made decisions about vaccinating during the 2009–2010 H1N1 pandemic.

While not generalizable, our results indicate that analysis of focus group discussions of vaccine-decision making processes can provide additional insight into how people weigh not only individual decision-making factors but how these factors acted together, and in certain contexts, how one factor was observed to override others. Social contextual factors including media coverage and communication from authorities served as the core circumstantial factors that framed the H1N1 pandemic for participants. These circumstantial factors were important features in how individuals' perceptions, beliefs and attitudes developed during the pandemic. While intrapersonal factors were the most cited in relation to individuals' intent to vaccinate, in the end, other more immediate factors, including interpersonal communication, interaction with health care providers, and convenience

often overrode initial intent. For example, one participant commented that since they had asthma, they recognized they should vaccinate but could not *"afford to spend eight hours in a line"*. While some of these intrapersonal factors (personal risk perception, vaccine risk perception, individual's state of knowledge, trust, and altruism) were more fluid and more likely to be overruled, other intrapersonal factors (habitual behavior and protected values) were less amenable to change and therefore more likely to prevail. One participant commented that while he should have taken the vaccine because his wife was a diabetic, he chose not to because he had never been sick with influenza, nor had previously been vaccinated, and *"just didn't see the point in it."*

Our research also points to 4 broad areas that should be further explored to better understand vaccination decisions and the design and impact of vaccine-related communication campaigns. These areas are: (1) habitual behaviors related to seasonal influenza vaccination; (2) ongoing issues with the interface between strategic public health communications and the media; (3) managing knowledge deficits and (4) dual role of factors and further theoretical development.

Habitual behaviors. Literature on uncertainty and decision-making argues that, in times of crisis, many people fall back on practiced and familiar behavior patterns as they represent a stable point of reference.^{21,22} Based on our data and this body of literature, we hypothesize that habitual behavior is an important feature of influenza-related pandemics. Are some demographics more prone to vaccinate because they have regular experiences with vaccinating, e.g., parents of young children, or at-risk groups targeted for seasonal influenza vaccination campaigns? Given that seasonal influenza vaccination is the only annual vaccine campaign targeting adults, it may serve as an annual testing ground for public health initiatives designed to foster habitual vaccination and an ideal venue for researching habitual behavior more closely. At the very least, public health officials in charge of pandemic planning might be interested in tracking seasonal influenza uptake more closely. This may ultimately lead to a more integrated approach between seasonal influenza campaigns and pandemic planning whereby strategies to promote seasonal influenza vaccine are viewed as a component of pandemic planning.

Interface between strategic public health communications and the media. Both media reporting and government communications provided the context in which participants made risk assessments and ultimately vaccination decisions. However, our participants mentioned mainstream media reporting (strategic public health messaging vetted through an editorial lens) far more often than direct government communication (paid advertising and public announcements, website content etc.). Focus group discussions suggest that messages direct from public health agencies were largely "drowned out" by news stories. Participants described being rapidly fatigued by the amount of coverage and the high level of emotion in the news reporting, though only a small minority actively sought out official government communications. Addressing these issues may require a greater focus on information triage at the government level that allows public health agencies to better manage the quantity and quality of health information released to the public through the

media. More research is needed to investigate how pandemic risk communication can effectively balance the need for effective motivation with the risks of issue fatigue due to overly emotional reporting. In addition, because most participants did not have experiences that matched the high level of urgency in both media and official government reporting, many did not view the urgent messages seriously. This suggests that both media and effective public health messaging needs to reflect the audience's experiences in their daily environment or risk losing credibility.

Managing knowledge deficits. Literature on risk perception and public understanding of science emphasizes the limitations of a knowledge deficit model for understanding individual's perception of medical technologies like vaccination.²³ However, during the study it became apparent that participants lacked a basic knowledge of biology (e.g., viral mutation, the difference between treatments for viral and bacterial infections) and a precise understanding of vaccine production and procedures. Participants found it challenging to understand why scientists remained uncertain about the trajectory of the pandemic and seemed to have an unrealistic expectation of scientists' ability to rapidly type the genomics and develop treatments against H1N1. While some participants reported a desire for simple, clear and directive communications from public health officials, there was often the perception that there was not enough background information justifying the recommendations given. Consequently, these recommendations were interpreted as not based on science but rather as advertising and marketing. In the information void, participants tried not only to use information from various sources (internet or personal conversations which were often described as reflecting high levels of emotion and human interest) to form an opinion about the H1N1 vaccine and H1N1 itself, but also to piece together an understanding of the technical and scientific processes related to measuring vaccine safety and effectiveness. These knowledge-seeking activities reflect a fundamental understanding by participants that, in the absence of mandates, it was ultimately up to them to decide to vaccinate. This decision-making process was complicated by the fact that participants' descriptions of their understanding of vaccine manufacturing and the oversight mechanisms that ensure safety and effectiveness contained significant inaccuracies. This suggests that there is a need to develop a more robust knowledge base and communication strategy to enable citizens to make informed choices about vaccination between pandemics and to ensure that a range of technical and scientific briefs are available in plain language and are easily (and prominently) accessible online.

Dual role of factors and further theoretical development. A further novelty of our study analysis was its ability to highlight the dual role specific decision-making factors play in the decision to vaccinate. Factors hypothesized to support vaccination decisions were sometimes found to dissuade vaccination and vice versa. We found, for example, altruistic motives ascribed to not vaccinating as well as vaccinating. Similarly, protected values (vaccination or vaccination refusal as a core value), typically associated with staunch anti-vaccinationists were also observed in the vaccinated group.^{24,25} The domains also provide a useful schematic to articulate how systems can facilitate or create barriers to

vaccinate, how community discourse, beliefs, and practices act in addition to individual-level factors (intra and inter-personal) to ultimately shape a person's perception of vaccination and decision to vaccinate.

Methods

Design. This mixed-methods case study is part of a larger project examining the overall effectiveness of Canadian risk communication strategies during the H1N1 pandemic that includes a web-survey with front line health professionals, key informant individual interviews with health agency representatives at the federal, provincial and local levels, and public focus groups. In this arm of the study, we recruited members of the general public to participate in focus groups in three Canadian provinces (Ontario, Alberta, Manitoba). The Health Research Ethics Boards of the University of Manitoba and the University of Alberta approved the protocol of this study.

Focus groups. Fifteen focus groups with a total of 143 participants were conducted in Toronto, Ontario; Winnipeg, Manitoba; and Edmonton, Alberta between November 2010 and February 2011. Participants were recruited by a professional recruitment firm in each city and provided with a \$60 honorarium. Participants were segmented into three sessions of equal size according to the following age groups: 18–34 y; 35–55 y; and 55+. These age groups were selected based on the risk categories used in communications strategies adopted by provincial and federal health agencies i.e., 18–34 were designated higher risk while those in the age category 55+ were thought to have partial immunity due to exposures to previous H1N1 epidemics. To obtain as diverse a representation of participants as possible, demographic factors such as income levels, educational background, relationship status, and number of children were used to select participants at the time of recruitment.

The focus group guide was informed by both academic literatures examining risk communication, psycho-social literature on trust and attitudes toward vaccination,²⁶⁻²⁹ and government reports examining the Canadian response to the SARS outbreak.^{30,31} Additionally, at the end of each focus group, participants were asked to fill out a questionnaire, which asked about their vaccination behavior and basic demographic information.

Development of analytic coding framework and data analysis. An analytic coding framework designed to identify factors affecting vaccination decisions was created based on emergent themes in focus group transcripts, the Social Ecological Model (SEM) for understanding health-related decision-making,^{19,32} the framework for risk communication developed by Bostrom,⁵ and factors affecting vaccination decisions established in previous studies.^{17,24-26,28,29,33-35} While one previous study has examined vaccine decision-making using the SEM, and various studies have established specific factors associated with vaccination decisions, this is the first study to combine parts of the SEM model with individual factors. In so doing we have developed a comprehensive framework for understanding pandemic vaccine decision making. The Social Ecological Model was used to organize the factors identified in our data by coding statements participants

made about the issues influencing their attitudes toward the H1N1 immunization and the decision to (or not to) immunize. Transcripts were initially coded to identify individuals' comments related to H1N1 symptoms, information sources, protection behaviors and vaccine decision-making. After the factors were identified in the first round of coding, a subset containing all comments related to vaccine decision-making was further coded into domains derived from the theoretical literature and themes emerging from the first round of coding. We then further organized this subset and the factors related to vaccine decision-making into four macro domains derived from the Social Ecological Model (SEM): system and institutional level, social context level, interpersonal level and intra-personal level (see Fig. 1 and Table 1). The transcripts were coded and validated by a second member of the research team. NVivo 9™ was utilized for all coding processes to aid in classifying, sorting, and categorizing data. Frequencies and demographic comparisons were determined using SPSS (Version 18).

Limitations. Focus groups by design have certain limitations.³⁶ The findings from this study cannot be generalized on a population level, although they may be transferable to other similar groups of people in similar circumstances. Participants may have had difficulties remembering all factors influencing their final H1N1 vaccination decision-making process due to the time passed between their decision and the focus group interviews. Furthermore, participant's recall and statements may have been influenced by focus group members and discussion.

Conclusions

Similar to experiences with annual influenza vaccination uptake, the public's utilization of H1N1 vaccination as a core protective measure during the 2009–10 pandemic was suboptimal. The standard response from policy makers and officials would be to assume a colossal failure in translating the science, and communicating the utility and effectiveness of vaccination to limit the spread of influenza (especially in vulnerable populations and health care institutions) and ultimately to protect individuals from serious sequelae following influenza infections. While our research certainly demonstrates that focus group participants did not always understand how vaccines work, and how vaccines are developed and tested before implementation at a population level, their concern over vaccine safety or vaccine efficacy was relatively low compared with other more salient factors used in their decision-making processes. Perceptions about the risks of getting sick themselves combined with core protected values (either for or against vaccines) and habitual behaviors toward seasonal influenza vaccinations did not coincide, in their mind, with the level of urgency to vaccinate that typically underscored provincial and federal agency messages. In addition, when weighing the risks

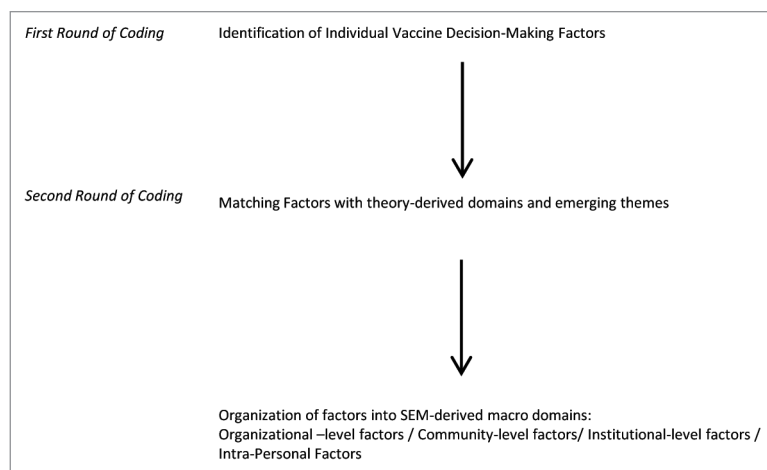


Figure 1. Process of identification, coding and organization of factors related to vaccine decision-making.

from a novel vaccine, participants reported being influenced by pre-vaccination communications about protective measures and chose to continue to adopt these measures rather than vaccinating. Some participants had a general sense that federal and provincial health agencies were *only* promoting vaccine uptake when other communicators (i.e., anti-vaccine proponents and other alternative health websites) were seen to be providing a more comprehensive picture about the risks of H1N1 and a more holistic set of protective measures. While these individual perceptions are not completely reflective of what health agencies communicated through their websites and the media, it does not change the pervasiveness of these perceptions. As we continue to witness declines in childhood vaccination rates and resurgences of some diseases once-thought long past (e.g., measles, mumps, meningococcal meningitis), we urgently require research that illuminates individual and population level habitual decisions related to seasonal influenza vaccinations, how risk communication messaging from health agencies need to be more strategic in working with the media, and how best to develop effective long-term strategies that help to manage existing knowledge deficits.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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