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Understanding Canadian Health Professionals' Knowledge, Attitudes, Opinions, and Perceptions Towards Zoonotic Infectious Diseases Survey and Interviews 2023-2024

Executive Summary

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Understanding Canadian Health Professionals' Knowledge, Attitudes, Opinions, and Perceptions Towards Zoonotic Infectious Diseases: Survey and Interviews 2023-2024 – Final report

Prepared for Public Health Agency of Canada by Environics Research

March 2024

This public opinion research report presents the results of a quantitative and qualitative research study conducted by Environics Research on behalf of the Public Health Agency of Canada (PHAC). This study was reviewed and approved by the PHAC Research Ethics Board (Project File 2023-031P). The quantitative research consisted of an online survey of 1,023 Canadian health professionals in two groups: 526 physicians and 497 registered nurses/nurse practitioners. Participants were recruited through MDBriefCase, an organization providing accredited professional development education to medical professionals in Canada. This organization is in regular contact with more than 103,000 active health professionals. The survey was in field from December 5, 2023, to February 7, 2024. The qualitative research consisted of 38 interviews of 41 health professionals, conducted with 22 physicians and 19 nurses recruited from the same target population as the quantitative survey. 35 interviews were conducted individually while 3 interviews were conducted as diads with colleagues. 38 participants for interviews were recruited from the quantitative survey while 3 were referred by colleagues. The interviews were conducted from January 18 to February 6, 2024.

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Executive summary

A. Background and objectives

Zoonotic infectious diseases (ZIDs) include a wide range of illnesses that pose a significant threat to human health. Currently, about 60 percent of known infectious diseases in humans and 75 percent of all emerging infectious diseases are zoonotic.¹ Furthermore, climate change has increasingly been found to act as a driving force behind the emergence and re-emergence of ZIDs.² Zoonotic events such as the 2002-2004 SARS outbreak, 2009 H1N1 pandemic, and the 2022 mpox outbreak have shown how ZIDs can impact the health of Canadians, the healthcare system, and the economy.³ It is therefore critical for health professionals to have the capacity to identify, prevent, manage, and respond to ZIDs, to ensure preparedness and a coordinated response to address the latest zoonotic threats to the health and safety of the Canadian population.

PHAC has recognized this need for capacity building related to ZIDs among health professionals. Results from an extensive literature review conducted by PHAC showed the existence of literature on the general knowledge needs of health professionals, including knowledge needs related to infectious diseases. However, the available literature did not address the capacity-building needs of health professionals related to ZIDs specifically, despite the growing and evolving threat of these diseases to the health and safety of the Canadian population. Without an understanding of the capacity-building requirements of health professionals, it is challenging to address these needs. Therefore, it is important to identify the gaps in ZID knowledge, attitudes, opinions, and perceptions among health professionals in Canada through public opinion research (POR). This public opinion research project being led by the Zoonoses Health Professionals Guidance Team is part of a broader zoonoses program being advanced by the Zoonoses Division at PHAC.

The purpose of this research was to identify the knowledge, attitudes, opinions, and perceptions of Canadian human health professionals in relation to ZIDs to better understand their current public health and clinical practices as well as their knowledge and resource needs relating to ZIDs. The objectives of this research were to understand the current landscape in terms of knowledge and experience with ZIDs, identify barriers in providing ZID care, and ascertain information needs and learning preferences among health professionals where ZIDs are concerned.

The results of this research will inform guidance development and dissemination priorities related to ZIDs, in order to inform public health and primary care practice of health professionals in Canada, with consideration for the specific needs of key groups of healthcare professionals. By addressing the guidance needs identified

¹ Woodhouse and Gowtage-Sequeria, “Host Range and Emerging and Reemerging Pathogens,” *Emerging Infectious Diseases*, no. 11(12)(2005): 1842–1847, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3367654/>; Jones et al., “Global trends in emerging infectious diseases,” *Nature*, no. 451 (2008): 990-993, <https://www.nature.com/articles/nature06536>.

² Bartlow et al., “Forecasting Zoonotic Infectious Disease Response to Climate Change: Mosquito Vectors and a Changing Environment,” *Veterinary Sciences*, no. 6(2)(2019): 40, <https://doi.org/10.3390/vetsci6020040>.

³ Canadian Medical Association and Deloitte, “A struggling system: understanding the health care impacts of the pandemic,” CMA Digital Library, November 2021, <https://digitallibrary.cma.ca/link/digitallibrary7>; Balint et al., “Chapter 3: The 2003 SARS Outbreak in Canada: Legal and Ethical Lessons About the Use of Quarantine,” *Ethics and Epidemics*, no. 9 (2006): 43-67, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7162264/>; Hodge, “Canadian Healthcare Workers’ experiences during pandemic H1N1 influenza: Lessons from Canada’s response,” National Collaborating Centre for Infectious Diseases, 2014, <https://nccid.ca/publications/canadian-healthcare-workers-experiences-during-pandemic-h1n1-influenza/>.

through this research, this work will aim to ensure that health professionals are equipped to address ZID threats, and protect the health and safety of Canadians.

B. Methodology

This research study consisted of two parts:

1. **Quantitative survey:** A 15-minute online survey with a representative sample of 1,023 Canadian health professionals who may encounter ZIDs in their practice in two groups: 526 physicians and 497 registered nurses and nurse practitioners. The survey was in field from December 5, 2023 to February 7, 2024.
2. **Qualitative interviews:** 35 IDIs (Individual interviews) and 3 diads were conducted with 38 survey participants and 3 participants who were referred by colleagues. A total of 38 interviews were conducted with 22 doctors and 19 nurses.

Quantitative survey

The survey sample came from MDBriefCase, an organization providing accredited professional development education to medical professionals in Canada. MDBriefCase’s database provides access to more than 103,000 active health professionals. MDBriefCase was responsible for inviting and directing qualified respondents to the survey hosted by Environics. As this online survey used an opt-in list of health professionals, it is a non-probability survey. Thus, it cannot be assumed to be fully representative of the target population and no margin of sampling error is calculated. Results in this report are described as based on those responding and not representative of the population of doctors and nurses.

Environics achieved the following regional distribution among survey participants; final data were weighted to reflect regional distribution within each group based on Canadian Health Institute for Health Information (CIHI) data from 2020.⁴

Table 1 – Regional Distribution of Completed Surveys

Occupation	Canada	Atlantic	Quebec	Ontario	MB/SK	Alberta	BC + Terr
Physicians/GPs	526	29	57	270	32	61	77
Nurses/nurse practitioners	497	58	44	171	77	85	62

Respondents were offered an incentive of \$35 for their participation. MDBriefCase was responsible for providing incentives to their panellists through gift cards. Respondents had the choice to complete the survey in English or French; 953 surveys were completed in English and 70 in French.

⁴ Canadian Institute for Health Information, “Health workforce in Canada: In focus (including nurses and physicians),” 2020, <https://www.cihi.ca/en/health-workforce-in-canada-in-focus-including-nurses-and-physicians>.

Qualitative interviews

The qualitative research is based on 38 semi-structured interviews with doctors, registered nurses, and nurse practitioners. Interviews were mainly conducted through a Canadian, privacy-authorized online web-based platform called Recollective, but some were conducted via Zoom or by telephone to accommodate participants who were not able to use Recollective.

Participants were recruited from the survey, which contained a short qualitative screener that asked respondents if they wished to opt-in for the qualitative research. Invitations were deployed to survey respondents from the opt-in list; to ensure a diverse mix of interview participants, some respondents in the list were prioritized for invitations based on location and specific practice experience. Participants were also given the option to invite colleagues with relevant expertise or delegated responsibilities; only 3 participants pursued this option, resulting in a total of 41 interview participants in 38 interviews.

Qualitative interview participants could choose to do their interview in English or French; 33 interviews were conducted in English and 5 in French. Participants comprised a mix of ages, gender, years of experience, clinical specialization, prior knowledge of zoonotic diseases, region, and experience with Indigenous populations. Interviews lasted 30 to 45 minutes. Participants were offered an incentive of \$320 for their participation, paid by e-transfer from Environics Research.

Qualitative research provides insight into the range of opinions held within a population, rather than the weights of the opinions held, as measured in a quantitative survey. The results of the qualitative research should be viewed as indicative rather than projectable to the population.

C. Contract value

The contract value was \$249,871.25 (including HST).

D. About the report

The report begins with an executive summary outlining key findings and conclusions, followed by a detailed analysis of the quantitative survey data and qualitative interviews.

Quantitative results were analyzed by sub-groups including practitioner type, practice area or specialty, practice setting, region, and other key demographic and experience metrics to illuminate the findings where relevant. Statistical differences between sub-groups are noted in the report where they are interpreted to be important and relevant to the analysis. Differences between gender groups were omitted, due to the distinct differences in gender composition between doctors (52% women, 44% men) and nurses (89% women, 9% men). Put another way, 84% of all men who completed the study are doctors, and 62% of all women who completed the study are nurses. This difference means that statistically significant relationships between men and women in the study are likely to be spurious, and better explained by looking at their professional characteristics. Provided under a separate cover is a detailed set of “banner tables” presenting the results for all questions in the quantitative survey by population segments as defined by region, demographics, and practice details.

The qualitative findings in the main report were written based on the structure of the interview guide, with additional sections for themes and findings that emerged from the research. These results were used to further complement the findings from the quantitative survey on the barriers to accessing information and the

information needs of physician and nurses in primary care and public health with respect to ZIDs. Quotations from the participants were included throughout the qualitative section to support the themes and findings.

Use of findings of the research. Data from this research will be used to identify and address the gaps in ZID knowledge, attitudes, opinions, and perceptions among health professionals in Canada for high priority diseases. This will aim to ensure health professionals have greater capacity to address zoonotic threats to the health and safety of the Canadian population.

E. Key findings

Key findings – Quantitative survey

Only 32% of health professionals report encountering zoonoses at least once a month among their patients, indicating that most do not encounter zoonoses frequently. When looking at specific diseases, Lyme disease is the disease encountered most by physicians and nurses in Canada; it is the only disease that was encountered by a majority of respondents. Other diseases among the list of [52 ZIDs included in the survey](#) range from just 1% to 38% of health professionals saying they have encountered them in their practice. Diseases that are encountered more often tend to be those associated with well-known past outbreaks or epidemics (e.g., West Nile virus infection, rabies, Zika virus infection, mpox), common travel-related illnesses (e.g. chikungunya, cryptosporidiosis), and diseases that can be occupational hazards or risks for vulnerable patients (e.g., toxoplasmosis, bartonellosis, brucellosis). Most nurses and physicians did not mention other zoonoses of relevance to the scope of the zoonoses program work being led by the Zoonoses Health Professionals Guidance Team in the Zoonoses Division at PHAC.

The majority of doctors and nurses (89%) report having general, limited, or no knowledge on ZIDs. Very few rate their knowledge as expert or advanced (nurses 7%, physicians 15%). None of the nurses in the study rated their knowledge level as “expert.”

A bivariate analysis shows there is a clear and positive correlation between encountering a disease, and self-reported confidence in managing it. Lyme disease stands out from others for being encountered most often, and with the highest ratings for confidence. A multivariate regression analysis shows that even in combination with other variables, like self-rated knowledge and various disease characteristics, encountering a disease is the strongest driver of confidence in managing diseases. This finding was echoed in the qualitative research, where participants often noted that their lack of confidence about managing ZIDs was specifically due to the rarity of these diseases in everyday practice.

For diseases that are more well-known, self-rated knowledge is also a key driver of self-reported confidence. Based on the quantitative and qualitative research, education about ZIDs is quite limited for most health professionals. From qualitative interviews, it appears that self-rated knowledge of specific ZIDs is largely built on information from sources such as public health bulletins, experience with patient cases, and articles in journals or magazines. This could explain why knowledge is often a more important driver of confidence for the more frequently encountered diseases than it is for others.

Physicians are more satisfied (52%) with the formal ZID education provided in the context of their academic program (e.g., medical school, residency, nursing school) than nurses (31%). Nearly one-quarter of nurses (23%) say they did not receive any education on ZIDs during their formal healthcare training on ZIDs, which was substantially more than the amount of doctors (7%) who say they did not receive such training.

Satisfaction with formal education on ZIDs is higher for those practicing family medicine, those who see ZIDs more frequently (i.e. daily, weekly, or monthly), and those with experience practicing outside of Canada. In the multivariate regression analysis, satisfaction with formal education on ZIDs was a significant, albeit smaller, driver of self-reported confidence in managing ZIDs.

Physicians and nurses are equally satisfied with continuing education on ZIDs, when they have received it.

Nearly half (46%) of physicians who received continuing education on ZIDs are satisfied with this education, just slightly lower than the proportion of physicians satisfied with their formal education (52%). In contrast to formal education satisfaction, nurses show an equal level of satisfaction with continuing education (47%) when compared to physicians.

A minority of health professionals indicate they are confident in providing specific ZID information or services; overall self-reported confidence is highest for public health reporting and lowest for patient management.

Practice area seems to play a role here; those specializing in public health or working in public health settings are more confident about public health reporting, infection control, and contact tracing, while those in emergency and critical care say they are most confident about patient assessment, diagnosis, and patient management.

Results of the quantitative research indicated that federal, provincial and territorial government health websites and digital clinical support tools are the resources used most; information from the qualitative interviews indicated that digital tools, especially the clinical decision support resource, UpToDate, are the most preferred. Given that health professionals indicated in the survey that the biggest barrier to caring for ZID patients is keeping up with the latest information, it is not surprising that they also expressed a strong preference for a tool that includes this concept in its branding.

Almost all health professionals surveyed are at least somewhat interested in receiving more professional education on ZIDs. They rank treatment, prevention, and diagnosis as the topics they would most like to learn about. In terms of formats, self-directed online learning, interactive online courses, webinars and fact sheets are the top formats preferred by health professionals. Format preferences differ by sub-group in some instances, for example, fact sheets are preferred more often by nurses and those practicing in rural areas, while physicians are more inclined to pursue continuing medical education (CME) and read journal articles.

K-means analysis was used to cluster respondents accordingly to similarities in the diseases they encountered; this analysis partitioned respondents into four discrete clusters. **Cluster 1** is experienced and confident with a wide range of ZIDs including those that are extremely rare; most are physicians in urban hospitals. They encounter patients with ZIDs more often than health professionals in the other clusters. **Cluster 1** health professionals use a range of ZID resources often and are quite amenable to further training on the subject. **Cluster 2** is experienced with some specific diseases, particularly respiratory diseases associated with livestock and wildlife, and hantavirus diseases associated with crowded living conditions, likely because they work in front-line settings where they are more likely to encounter patients at risk of specific ZIDs due to occupational or lifestyle risks. **Cluster 2** health professionals have some interest in learning more about ZIDs, but time is a significant barrier and they are most interested in resources that are easy to use and available when they need them. Respondents in **Cluster 3** are more likely to work in family practices and community care, sometimes in rural settings, where they rarely or never see ZIDs in patients. Their experience, confidence, and knowledge about ZIDs is limited, but the nature of their practices means that learning more about ZIDs is not a priority for them. **Cluster 3** health professionals are most interested in resources that are short, easy to understand, and of demonstrable relevance to their practice. Health professionals in **Cluster 4** have higher levels of experience with some specific diseases, in particular West Nile virus infection, and are the most likely among the four clusters to work in a public health or travel clinic setting (although most work in hospitals or family practice). They tend to have knowledge of ZIDs in a direct patient care context where patients may be diagnosed with ZIDs while seeking care for other reasons. **Cluster 4** health professionals are more frequent users of ZID resources than Cluster 2, but like Cluster 2, time to look up symptoms for each patient is a critical barrier.

A principle components analysis was used to group the 52 diseases from the survey into groups (or factors) of diseases that tend to be seen by the same health professionals. Seven groups were defined by this analysis; additional research was used to identify shared characteristics of the diseases in each group. The seven

groups can be broadly described as: rarely encountered, common endemic and travel diseases, outdoor and agricultural occupational risks, rare emerging and travel-related diseases, diseases related to crowded living conditions, respiratory diseases from livestock and wildlife, and rare encephalitic diseases.

The seven disease groups were analyzed to see which clusters, identified by the K-means analysis, were most associated with each disease group; this analysis can be used to inform strategic resource development to target resources to those health professionals for whom they are most relevant in practice. Cluster 1 is experienced in all seven groups. Cluster 2 is strongly associated with the respiratory diseases from livestock and wildlife group, and is also fairly experienced with common endemic and travel diseases, some diseases associated with outdoor and agricultural occupational risks, and the diseases related to crowding living conditions group (especially the hantaviruses in this group). Cluster 4 has specific experience with Lyme disease, mpox, West Nile virus infection (from the common endemic and travel diseases group) and bartonellosis (outdoor and agricultural occupational risks).

Key findings – Qualitative

Primary care practitioners rarely identified ZID cases in their practices. Some said they provide counselling, vaccinations, or referrals for those with specific risk factors (animal exposure, recent travel, travel plans). In line with findings from the survey, **Lyme disease was the most common ZID encountered in everyday practice**, with health professionals across Canada often seeing patients with concerns about the risk. Participants located in Ontario, Quebec, and some parts of Atlantic Canada sometimes treated patients with Lyme disease, while those in other regions typically fielded questions about the disease but did not see active cases in patients.

Lack of experience with ZIDs drove low self-reported confidence in managing them. With most receiving limited training and continuing education on ZIDs, knowledge of specific diseases was very limited among physicians and nurses. Interview participants often pointed to this as a driver of low confidence in managing diseases. Additionally, due to the heavy demands of the job, **ZIDs were simply not seen as a priority for learning unless they were directly relevant to their practice.** Some health professionals had a higher degree of confidence in managing specific diseases like Lyme disease or rabies, but only when these were common in their practices.

UpToDate was the resource mentioned most often in interviews; PHAC and other Government of Canada resources were familiar, but generally not top-of-mind. UpToDate is a favourite resource for many nurses and physicians, who said it is easy to use, trustworthy, and up to date with recent research and recommendations. For infectious disease topics, the United States Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) were both frequently mentioned as good resources. Often, health professionals said they start with a Google search and look for reputable sources in the results, like Mayo Clinic and Johns Hopkins. Government of Canada resources were somewhat well-known, and many participants had used them intermittently, but they were often seen to be difficult to navigate, which limited their usefulness in situations where information was needed quickly.

An ideal resource would be a searchable web and app platform that is easy to use, with Canadian context. The relative rarity of most ZIDs in Canada meant they were not high on the priority list for deeper study or continuing education. Some interview participants pointed out that it was more important for them to know protocols for handling a potential case if it arises, rather than knowing specifics about individual diseases. Health professionals indicated that an ideal resource would be a user-friendly online database that they could access in an app or on a website, with different options for searching (e.g., by geography, symptom, patient risk factors, species involved, etc.). Canadian context was noted to be an important element, because different disease

factors like endemicity, diagnostic tools, and treatment options can differ from country to country, and regionally within a country. **Public health bulletins, infographics and articles were also seen as useful ways to drive familiarity with specific diseases, especially when there is imminent concern.**

Key Findings – Conclusion and Recommendations

Five broad considerations for future resource development and capacity building were drawn from the research findings:

1. Resources should be relevant and realistic:
 - Next steps should be grounded in the understanding that most health professionals do not realistically have the capacity for intensive study about ZIDs.
 - ZIDs are perceived as a low priority for learning among most health professionals because most do not encounter patient cases of ZIDs very often, and ZIDs are also easily conflated with other infectious diseases that are not zoonotic.
 - Education about specific ZIDs will be most effective when it is very strategic and geared for the right audiences.
 - Look for opportunities to ensure that more general information about ZIDs is integrated in resources about infectious diseases.
2. Resources are most useful if they are broad in scope, accessible, and easy to use:
 - The best resource for most health professionals is one that is easy to reach in a time of need, but that otherwise does not command much time or attention.
 - Since health professionals are not generally able to identify specific gaps in the resource landscape, it is therefore necessary to anticipate their needs to some extent by prioritizing what is most important for them to know.
 - It may be effective to enhance existing resources that health professionals already know about and reach for in everyday practice.
3. Health professionals know what resources have worked for them in the past:
 - Health professionals take it seriously when an infectious disease becomes a threat to the community. They will pay attention to information about outbreaks or diseases of concern, and they appreciate materials that help them to identify risk factors in their patients.
 - It may be useful to look at the resources and education approaches used for ZIDs where health professionals had higher levels of experience and self-reported confidence.
 - Physicians specifically will also take note of diseases they read about in journals and magazines.
4. Resources can be designed to be very strategic to increase their relevance and uptake:

- The multivariate analysis can be applied to more effectively target resources that are effective for specific settings or types of health professionals.
 - The multivariate analysis could also inform communication about specific diseases to the audiences who need them most.
5. Collaboration and consultation with colleagues can grow capacity:
- The single biggest influence on self-reported confidence in managing ZIDs is experience with specific diseases, which makes experienced colleagues a valuable resource.
 - Consider ways to encourage more health professionals to build knowledge and confidence with ZIDs at different stages of their career. Having even one colleague with more ZID experience can build capacity for an entire practice.

Political neutrality statement and contact information

I hereby certify as senior officer of Environics that the deliverables fully comply with the Government of Canada political neutrality requirements outlined in the Communications Policy of the Government of Canada, and Procedures for Planning and Contracting Public Opinion Research. Specifically, the deliverables do not include information on electoral voting intentions, political party preferences, standings with the electorate, or ratings of the performance of a political party or its leaders.

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