



# ADDRESSING MISINFORMATION REGARDING HPV VACCINES IN CANADA

RESULTS OF A PRE-CAMPAIGN SURVEY OF CANADIAN PARENTS OF  
SCHOOL-AGED CHILDREN

REPORT

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## Summary

### *Introduction*

Vaccination is one of the most important tools available to public health to control and eradicate diseases that contribute to significant mortality and morbidity in populations globally. In Canada, up to 40% of Canadian parents are hesitant about vaccination. Concerns are commonly about vaccine safety, which to date has been addressed by healthcare providers who are trusted sources of information on vaccines. However, social media and online networks are increasingly being used to fill the information void.

### *Objective*

In this study, our objective was to identify the preferred promotional formats and type of information parents of school-aged children eligible for HPV vaccination would consider in their decision-making process.

### *Methods*

We implemented a bilingual pre-campaign survey using Facebook ads to recruit parents of school-aged children aged between 9 and 15 years. The survey consisted of twenty (20) multiple-choice and two (2) open-ended questions. Recruitment on Facebook occurred between March 2021 and February 2022. Participants meeting the following requirements were eligible to participate in the study: aged of 18 years old or older; have at least one child between 9 and 15 years of age in care as this is the target aged group of the school-based vaccination programs; live in Canada; and must be able to respond to questions in English or French. For the post-campaign survey, the additional requirement was that they must have viewed the Facebook HPV awareness campaign published on Facebook by the CPHA and Immunize Canada.

### *Results and analysis*

764 parents participated in the study, and 554 met the eligibility criteria. 57,2% (n=317) reported as 35-44 years of age and 1.8% (n=10) identified as 55-64 years of age. The majority of respondents were female caregivers or mothers. 53.8% (n=298) has a child between 9 and 15 years old. Representation was obtained from 9 provinces and 2 territories.

Vaccination information presented in the form of infographics is recommended for public health to promote the HPV vaccine and vaccination against HPV. Respondents reported this format as the most likely to influence their decision-making (n=115) over other types of resources. An infographic is a visual representation of educational content commonly used to deliver complex information, communicate scientific facts and drive behavioural change. Research shows that infographics that are visually simple – the visual message presents orderliness, balance, and clarity – are more effective in driving behavioural change compared to ones that are more complex. These findings

suggest the importance of making the visual message simple when designing the infographics on HPV and counter the dissemination of manipulative and false messages.

Potential side effects associated with HPV vaccines are the top information respondents identified as relevant to their decision-making process. They subsequently identified HPV infection outcomes (i.e., cancer) and the risk of HPV infection as relevant to their decision-making process. Additionally, respondents highlighted the recommendations of healthcare providers as another source, which might influence their decision-making about HPV vaccines and vaccinations; confirming that healthcare providers continue to play a crucial role in increasing HPV vaccination uptake.

### *Conclusions*

Infographics are the preferred method reported by respondents to communicate information regarding HPV vaccination. These visual representations should focus on potential vaccine side effects and their safety to respond to the information needs of parents. This intervention should be combined with healthcare provider recommendations.

## 1. Introduction

Human Papillomavirus (HPV), a sexually transmitted infection, is the cause of several cancers, including cervical cancer.<sup>1-3</sup> It is estimated that 550,000 Canadians are infected with HPV each year, and almost 80% of females of reproductive age will be infected at some point in their life.<sup>4</sup> Usually, HPV infections are transient and resolve spontaneously without any intervention.<sup>2</sup> However, in a small proportion of females, the infection can persist and progress into cervical cancer.<sup>2,5</sup> Cervical cancer causes over 400 deaths, and more than 1,300 Canadians are diagnosed each year.<sup>6</sup> Preventive interventions such as vaccination and screening are known to reduce the risk of cervical cancer. Canada has committed to achieving 90% HPV vaccination coverage for youth by 2025, thereby contributing to Canada's commitment to eliminate cervical cancer.<sup>7,8</sup>

HPV vaccination is part of the routine, school-based immunization programs in Canada. The efficacy of the vaccine is optimal (close to 100%) when administered before exposure to the targeted HPV types.<sup>9,10</sup> The program is available in all Canadian provinces and territories with a two dose schedule for children in grades 4 through 10.<sup>11</sup> This is a publicly funded program that each province and territory implements following its own policy and without a national database that compiles this information.<sup>12</sup>

The SARS-CoV2 pandemic led to the halt of all routine vaccinations for children and youth. The impact of the pandemic on vaccination coverage rates against HPV for school-aged children is under investigation by public health experts. Prior to the pandemic, a pooled analysis showed that national coverage for HPV was approximately 55.91%.<sup>4</sup> A recent report from Public Health Ontario points out rates as low as 5.2% and 0.8% for the 2019-20 and 2020-21 school years.<sup>13</sup>

This decrease, although accelerated during the pandemic could be observed before it started. Indeed, at that time there were already a proportion of Canadian parents (up to 40%) who were hesitant about vaccination reflecting<sup>14-16</sup> similar trends occurring elsewhere globally. The World health organization (WHO) reported a 30% rise in measles cases worldwide, prompting a declaration that vaccine hesitancy is one of the ten biggest threats to global health.<sup>17</sup> A recent systematic review of factors influencing vaccine hesitancy of parents of preschoolers in Canada revealed that only 50 - 70% of children are up to date with recommended vaccines by age 2.<sup>18</sup>

The WHO defines vaccine hesitancy as a “delay in acceptance or refusal of vaccines despite availability of vaccine services”<sup>19</sup>. Different factors may be associated with vaccine hesitancy or refusal. At the individual level, these factors include being skeptical about vaccine safety, being uncertain about medical and scientific research, and opposing vaccination for religious reasons<sup>20-22</sup>. At the societal level, these factors include gender, race, and ethnicity; inequities in education, income, and socioeconomic status; systemic barriers in the healthcare delivery system; and beliefs, preferences, and

practice patterns of the recipients and providers of care<sup>23-25</sup>. These factors varied across time, place and vaccines. Therefore context-specific research is crucial to understand the array of factors associated with vaccine hesitancy<sup>26,27</sup>.

Among the factors associated with vaccine hesitancy, safety and efficacy of vaccines are the primary concerns of vaccine hesitant parents. Some perceive their health care providers to be a key source of information.<sup>28</sup> However, in instances wherein professional advice is unavailable, parents can share their doubts or observations and search for information on forums and social networks<sup>29</sup>. The challenge posed by social networks is the inability of information seekers to identify credible sources. In fact, the downside of social media and online social networks is the propagation of misinformation. We define misinformation as any false or inaccurate information that is spread either intentionally or unintentionally<sup>30</sup>. Such misinformation when spread on social media incites negative emotions towards vaccines and leads to an increase in hesitancy to vaccinate<sup>30-32</sup>.

With the potential harm to health by the sharing of inaccurate and out of date information, technology companies themselves have taken a position and changed their policies. For example, since February 2019, Pinterest, Facebook, Instagram and Google have addressed anti-vaccine content on their sites and have acknowledged the detrimental role they have played in spreading misinformation about vaccines<sup>33</sup>. These companies have attempted to reduce access to misleading information including removing ads that promote vaccine misinformation, and not displaying or recommending content with anti-vaccine information<sup>34-36</sup>. Given the current context of misinformation and fear surrounding vaccines, accurate representation seems paramount<sup>37</sup>. Social marketing, which can be broadly defined as the use of marketing principles in order to foster positive social change, may offer a method to address vaccine hesitancy<sup>37</sup>.

It is in this vein that the Canadian Public Health Association (CPHA) obtained support, in the form of marketing credits, from Facebook Canada to increase awareness of credible vaccine information on social media. CPHA and Immunize Canada had a discussion with researchers from the project team, including an expert in social marketing campaigns, around the design and implementation of the research project that reinforced the need to identify a target behaviour and audience. Based on numerous discussions and a review of the literature, CPHA and Immunize Canada determined it would launch two distinct campaigns to respond to their needs of information regarding vaccination: 1) providing credible information to parents of at least one child between 8 and 15 years of age concerning their need to be immunized with the Human Papillomavirus (HPV) vaccine and 2) providing credible information to health professionals concerning their need to be immunized with the annual seasonal influenza vaccine.

This is a project that will be implemented in three phases: 1) a pre-campaign survey to assess parents' knowledge, attitudes and perceptions of the HPV vaccine and

vaccination, and health professionals' knowledge, attitudes and perceptions of influenza vaccine and vaccination before the social media marketing campaigns (phase 1); 2) a marketing campaign to increase availability and visibility of credible HPV and influenza vaccines information on Facebook (phase 2); 3) a post marketing campaign to assess parents' knowledge, attitudes and perceptions of the HPV vaccine and vaccination, and health professionals' knowledge, attitudes and perceptions of influenza vaccine and vaccination after social media marketing campaigns (phase 3).

In this report, we present the results of the first phase, focusing on informational needs of parents/caregivers.

## **2. Objective**

In this study, our objective was to identify the preferred promotional formats and type of information parents of children eligible for HPV vaccination would consider in their decision-making process.

## **3. Methods**

### **3.1. Data collection**

The University of Guelph Research Ethics Board approved the study. We displayed advertisements to recruit parents on Facebook, over an eleven-month period: from March 2021 to February 2022. The advertisements led participants to a Facebook landing page where they provided their consent to participate in the study. Participants meeting all the following criteria were eligible to participate: be 18 years of age or older; have at least a child between 9 and 15 years of age in their care; live in Canada; be able to respond to questions in English or French. Email addresses were collected to participate in an incentive draw for a smartwatch valued at \$250 for the pre-survey and another for an electronic tablet valued at \$450 to participate in the second phase of the study. All participants provided informed consent prior to completing the survey and their responses were anonymized.

### **3.2. Measures**

The survey consisted of 20 multiple-choice and two (2) open-ended questions and took approximately 15 minutes to complete. The following topics were covered: 1) socio-demographic information (e.g., age, residence, sex, gender, level of education); 2) HPV vaccine hesitancy; 3) HPV vaccination acceptance and barriers (e.g., How would you rate your knowledge about the HPV vaccine?); 4) HPV information sources (e.g., Please rank the following social media sources you consult for the purpose of obtaining credible (trust-worthy) information about HPV vaccination in order of importance with 1 being the most important and 5 being the least important to you); 5) Trust in public health



messages (e.g., How much do you trust public health campaigns messages); 6) HPV campaign (e.g., Please rank the following advertising formats that are used to provide HPV vaccination information in order from most likely (1) to least likely (5) influence your decision-making.); 7) Impact of COVID-19 on the importance of having child vaccinated (In a few sentences, please tell us whether the COVID-19 pandemic had an impact on your perception of the importance of having your child vaccinated against HPV?); and 8) the importance of vaccination programs (In a few sentences, please tell us your perception of the importance of vaccination programs?).

## 4. Data Analysis

We compiled and analyzed the data collected with SPSS software. We summarised survey responses using descriptive statistics. The data cleaning consisted of checking the data and identifying and removing problematic cases. We deleted cases with a 20% or more non-completion rate. Variables were checked for univariate outliers. For the questions related to the credible social media source, we combined the different data under a single variable. We also analyze the comments related to “other” – sources to receive credible information -. To do so, MTD read and re-read the comments. She then discussed with BG the categories describing the content. For comment highlighting diverse sources related to various categories, she considered the first source. Together, they reviewed the categories and searched for patterns of themes. Finally, they named/renamed the themes and produced a report.

## 5. Results

### 5.1. Participant demographics

A total of 764 parents participated in the study, and 554 met the eligibility criteria; 210 were excluded either because they didn't meet at least one of the eligibility criteria or had a 20% or more non-completion rate. Among the 554 parents who met the eligibility criteria and were included in the study, 57,2% (n=317) reported as 35-44 years of age and 1.8% (n=10) identified as 55-64 years of age; 35.5% (n=198) reported as 45-54 years of age and only 5.1% (n=28) identified as 25-34 years of age. Most respondents (92.6%; n=513) were female caregivers or mothers and only 6.3% (n=35) identified as male. A total of 53.8% of participants (n=298) have a child between 9 and 15 years old. Representation was obtained from 9 provinces and 2 territories. We summarized these results in Table 1.

## **5.2. Reasons to have or not to have their child or children receive HPV vaccination and Decision-making Process.**

Three main reasons were reported to drive the process for having their child or children receive HPV vaccines: childhood vaccines are effective (n=314; 56.7%); Childhood vaccines are important for the child or children's health (n=302; 54.2%); 54.2% of the participants (n=300) found it important to have their child or children receive HPV vaccine to protect the health of others in the community (see Table 2). The main reasons not to have their child or children receive HPV vaccine were: don't want to get a vaccine (unwillingness to get a vaccine) (n=75; 13.5%); lack of a vaccination clinic (n=47; 8.5%) and uncertainty about the effectiveness of the vaccine (n= 46; 8.3%); (see Table 3).

Notably, 44.6 % of respondents reported average knowledge about the HPV vaccine (n=247) and 21.3% reported their knowledge was above average (n=118). Excellent knowledge about the HPV vaccine was reported by only 13.9% of the respondents (n=77) (see Table 4).

Finally, 43.1% of participants (n=214) found their decision-making process to have their child or children vaccinated for HPV very easy, during the COVID-19 pandemic and 26.4% of the respondents found it easy (n=131). However, 48.4% (n=241) found their decision-making process very easy before the COVID-19 pandemic while 31.7% found it easy (n=158). This result is summarized in Table 5.

## **5.3. Social media sources the participants rely on to obtain credible information about HPV vaccines and vaccination**

We asked participants to rank social media sources they consult for the purpose of obtaining credible (trustworthy) information about HPV vaccination in order of importance with 1 being the most important and 5 being the least important. Respondents reported relying on other sources of information to obtain credible information about HPV vaccines and vaccination (24.9%; n=138) (see Table 6). They also choose Facebook as the second most relevant source (23.3%; n=129). Reddit was the third social media source caregivers rely on (7.8%; n=43).

We grouped in two main categories other sources that participants specified, which might influence participants' decision-making about HPV vaccines and vaccinations: Scholarly sources and non-scholarly sources. Scholarly sources included peer-reviewed journals, books. Non-scholarly sources included news and videos, personal experiences, information from healthcare providers, public health organizations, search engines and websites, phone applications, blogs and drug's labels. Most respondents (48.4%, n=105) relied on non-scholarly sources while 17.1% (n=37) relied on scholarly sources (see Table 7). Among non-scholarly sources, parents relied mainly on Information from healthcare providers (17.5%; n=38). They also rely on information from search engines and websites (11.1%; n=24) and only 0.7% (n=4) relies on their personal experience to

obtain credible information about HPV vaccines and vaccination. Finally, most parents, 7.9% (n=44) do not consult social media for vaccine information. We summarized this result in Table 8.

#### **5.4. Trust in public health campaign messages**

We asked the survey respondents to rank their trust of the public health campaign messages on a ten-point scale with 0 corresponding to “Do not trust at all” and 10 corresponding to “Completely trust”. A total of 22.5% (n=105) selected completely trust public health campaign messages, while 11.4% (n=63) selected not trust at all. 30.4% of the respondents were on top of the scale with responses choices of 8 (n=81; 17.3%) and 9 (n=61; 11.0%), while only a small number didn’t trust (4 and below) (n=56, 12.1%). We also report here the mean (6.44), the Median (8.00) and Standard deviation (3.434) to complete this descriptive statistics analysis. We summarized this result in [Table 9](#).

#### **5.5. Promotional formats that are used to provide HPV vaccination information that could influence parents’ decision-making**

We asked participants to rank a series of advertising formats used to provide information about HPV vaccination in order of most likely (1) to least likely (5) to influence their decision-making without duplicate responses. We recoded the preferred format to only look at what each participant ranked first. Infographics were reported as the format most likely to influence participants’ decision-making (n=115); other sources (e.g., information from healthcare professionals and public health organizations, Personal experience) follow (n=86), narratives/stories (67) are ranked 3<sup>rd</sup> and videos are ranked 4<sup>th</sup> (50) (see Table 10).

#### **5.6. Information parents look for to make their decision about HPV vaccination**

We asked participants what information they were looking for to make their decision about HPV vaccination for their children. They could select all the predefined responses applicable including effectiveness of vaccines, HPV vaccine ingredients, safety regarding getting more than one vaccine, how HPV vaccines are tested, who monitors HPV vaccine safety, additives in HPV vaccines, how to minimize vaccine injection pain and fear, how HPV vaccination schedule is tested, homeopathic remedies, chances of getting HPV infection, HPV infection outcomes and providers of the HPV vaccine. Side effects of HPV vaccines are the top information parents seek when making their decision about HPV vaccination (359 selected this option); HPV infection outcomes (i.e., cancer) follow (263 selected this option). Information on the chances of getting HPV infection (233 checked the box) and how HPV vaccines are tested (203 selected this option) are also important. Homeopathic remedies (29 checked the box) and alternative HPV vaccination schedules (61 selected this option) are among the least valuable information. We summarized these results in Table 11.

## 6. Discussion

Our objective was to explore the advertising formats and the information parents look for to make their decision about HPV vaccination.

Our results showed that infographics are the format reported by parents most likely to influence their decision-making regarding HPV vaccines and vaccination. An Infographic is defined as a visual representation of educational content<sup>38</sup>. They are commonly used to deliver complex information, communicate scientific facts and drive behavioural change<sup>38</sup>. When designed properly, they can engage both specialists and lay persons<sup>39</sup>. Li and al.<sup>39</sup> also suggest that an infographic that is properly designed can illustrate concepts, clarify data patterns, and provide aesthetic pleasure. Research shows that infographics that are visually simple – the visual message presents orderliness, balance, and clarity – are more effective in driving behavioural change compared to the messages that are complex<sup>39</sup>. For example, in a large longitudinal study involving young adults, Garcia-Retamero et al.<sup>40</sup> conducted an eight-hour educational intervention and examined the impact of the intervention on the efficacy of a message for promoting condom use. The authors noted that simple brochures featuring visual aids were effective in changing attitudes and behavioural intentions as the extensive intervention. These findings suggest the importance of making the visual message simple when designing the infographics on HPV and counter the dissemination of manipulative and false message.

Side effects of HPV vaccines are the top information parents seek when making their decision about HPV vaccination. Safety concerns are not a new topic in the field of HPV vaccination. A study from the National Cancer Institutes (United States) showed an increase in the percentage of parents who declined the HPV vaccine for their children due to safety concerns from 13% in 2015 to 23% in 2018, although reports of serious health issues after HPV vaccination were consistently rare during the same period<sup>41</sup>. The authors hypothesize that rising safety concerns are driven using social media and the reliance on online source to find vaccine information. The findings suggest the relevance of addressing the concerns of parents regarding vaccine safety on online sources.

Our study suggests that parents rely on other sources of information than social media to obtain credible information about HPV vaccines and vaccination. They consider their healthcare providers the most important source of information in deciding regarding HPV vaccines and vaccination for their children. These results confirm that parents value the information and recommendations provided by their children's healthcare providers<sup>42</sup> more than what is posted on social media. Therefore, healthcare professionals may play a crucial role in improving HPV vaccination uptake among school-aged children<sup>43</sup>. The impact of this result can be twofold: 1) when the providers are concerned about potential negative reactions of parents to a recommendation of HPV vaccination, these findings should provide reassurance<sup>42</sup>. At the same time, healthcare

providers will need to be prepared to provide accurate information to HPV pro-vaccine and hesitant parents<sup>42</sup>; 2) Healthcare professional's own vaccine concerns, hesitancy and inadequate knowledge could hinder them from encouraging parents to get their children vaccinated<sup>43</sup>. Public Health organizations should ensure that healthcare professionals have the support and education they need to be informed and educated on HPV to reduce their own vaccine hesitancy<sup>43</sup>.

### **6.1. Study limitations**

Vaccine hesitancy questions were included in the survey, but results were inconsistent due to missing data and not included in this report. The recruitment process was extended to 11 months due to the misidentification of participants and the heightened risk of fraud. We mitigated this limitation by excluding participants who did not complete socio-demographic questions and responded to the survey within a reasonable period. The study was underway at the start of COVID-19 and attitudes of participants may have been influenced. Results are derived from a small sample of Facebook users, and therefore generalizability should be contextualized accordingly.

## **7. Conclusions**

The results of our study suggest that infographics should be the primary method for educating parents about HPV vaccination of adolescents on Facebook. These visual representations should focus on vaccine safety to respond to the information needs of parents. However, focusing intervention on parents alone, may not increase vaccine uptake<sup>44</sup>. They are more effective in increasing vaccine uptake, in combination with other strategies, such as clear and accurate healthcare provider recommendations<sup>44-46</sup>. Healthcare provider should also be knowledgeable of common misinformation being circulated in social media and be prepared to address them through appropriate educational techniques, such as attitudinal inoculation<sup>47</sup>. Further research into addressing such misinformation may provide valuable insights on how to improve vaccination rate among school-aged children.

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## 9. Appendix

**Table 1:** Frequency table of the demographic characteristics of the participants

Demographics Characteristics	Sample Size (N)	Percent
Ages (years)	553	99.8
<b>25-34</b>	28	5.1
<b>35-44</b>	317	57.2
<b>45-54</b>	198	35.7
<b>55-64</b>	10	1.8
<b>Missing</b>	1	0.2
Sex	<b>553</b>	99.8
<b>Female</b>	513	92.6
<b>Male</b>	35	6.3
<b>Choose not to respond</b>	5	0.9
<b>Missing</b>	1	0.2
Gender	554	100.0
<b>Woman</b>	508	91.7
<b>Man</b>	36	6.5
<b>Other</b>	3	0.5
<b>Choose not to respond</b>	7	1.3
Level of Education	554	100.0
<b>Some high school</b>	6	1.1
<b>High school</b>	32	5.8
<b>Some college or university</b>	64	11.6
<b>College diploma</b>	127	22.9
<b>Apprenticeship training and trades</b>	17	3.1
<b>Professional certification</b>	37	
<b>Undergraduate degree</b>	162	29.2
<b>Graduate degree</b>	109	19.7
Province of Residence	552	99.6
<b>Alberta</b>	90	16.2
<b>British Columbia</b>	75	13.5
<b>Manitoba</b>	36	6.5
<b>New Brunswick</b>	21	3.8
<b>Newfoundland and Labrador</b>	6	1.1
<b>Northwest Territories</b>	2	0.4
<b>Nova Scotia</b>	27	4.9
<b>Ontario</b>	194	35.0
<b>Quebec</b>	49	8.8
<b>Saskatchewan</b>	48	8.7
<b>Yukon</b>	4	0.7
<b>Total</b>	552	99.6
<b>Missing</b>	2	0.4
<b>Number of children between 9 and 15</b>	551	99.5

1	298	53.8
2	197	35.6
3	43	7.8
4	13	2.3
Missing	3	0.5
<b>Number of children between 9 and 15 female</b>		
0	211	38.1
1	259	46.8
2	70	12.6
3	6	1.1
4	2	0.4
Missing	6	1.1
<b>Number of children between 9 and 15 male</b>		
0	204	36.8
1	260	46.9
2	71	12.8
3	12	2.2
4	1	0.2
Missing	6	1.1
<b>Number of children between 9 and 15 intersex</b>		
0	537	96.9
1	4	0.7
2	1	0.2
Missing	12	2.2

**Table 2:** Frequency table of reasons to have their child or children receive HPV vaccination

Statements	N	Percent	Valid Percent
<b>Generally, I do what my doctor or health care provider recommends about vaccines for my child/children</b>			
Strongly agree	260	46.9	51.4
Agree	141	25.5	27.9
Neither agree or disagree	44	7.9	8.7
Disagree	22	4.0	4.3
Strongly disagree	37	6.7	7.3
N/A	2	0.4	0.4
Total	506	91.3	100.0
Missing	48	8.7	
Total	554	100.0	
<b>The information I receive about vaccines from the vaccine program is reliable and trustworthy.</b>			
Strongly agree	233	42.1	46.0
Agree	149	26.9	29.4
Neither agree or disagree	56	10.1	11.1

<b>Disagree</b>	27	4.9	5.3
<b>Strongly disagree</b>	40	7.2	7.9
<b>N/A</b>	1	0.2	0.2
<b>Total</b>	506	91.3	100.0
<b>Missing</b>	48	8.7	
<b>Total</b>	554	100.0	
<b>I know that childhood vaccines are effective.</b>			
<b>Strongly agree</b>	314	56.7	62.1
<b>Agree</b>	128	23.1	25.3
<b>Neither agree or disagree</b>	27	4.9	5.3
<b>Disagree</b>	15	2.7	3.0
<b>Strongly disagree</b>	22	4.0	4.3
<b>Total</b>	506	91.3	100.0
<b>Missing</b>	48	8.7	
<b>Total</b>	554	100.0	
<b>All childhood vaccines offered by the government program in my community are beneficial</b>			
<b>Strongly agree</b>	261	47.1	51.7
<b>Agree</b>	123	22.2	24.4
<b>Neither agree or disagree</b>	42	7.6	8.3
<b>Disagree</b>	37	6.7	7.3
<b>Strongly disagree</b>	41	7.4	8.1
<b>N/A</b>	1	0.2	0.2
<b>Total</b>	505	91.2	100.0
<b>Missing</b>	49	8.8	
<b>Total</b>	554	100.0	
<b>Childhood vaccines are important for my child's health.</b>			
<b>Strongly agree</b>	302	54.2	59.8
<b>Agree</b>	128	23.1	25.3
<b>Neither agree or disagree</b>	29	5.2	5.7
<b>Disagree</b>	14	2.5	2.8
<b>Strongly disagree</b>	32	5.8	6.3
<b>Total</b>	505	91.2	100.0
<b>Missing</b>	49	8.8	
<b>Total</b>	554	100.0	
<b>Having my child vaccinated is important for the health of others in my community.</b>			
<b>Strongly agree</b>	300	54.2	59.3
<b>Agree</b>	105	19.0	20.8
<b>Neither agree or disagree</b>	41	7.4	8.1
<b>Disagree</b>	21	3.8	4.2
<b>Strongly disagree</b>	38	6.9	7.5
<b>N/A</b>	1	0.2	0.2
<b>Total</b>	506	91.3	100.0
<b>Missing</b>	48	8.7	
<b>Total</b>	554	100.0	
<b>New vaccines carry more risks than older vaccines.</b>			
<b>Strongly agree</b>	53	9.6	10.5
<b>Agree</b>	65	11.7	12.8
<b>Neither agree or disagree</b>	171	30.9	33.8
<b>Disagree</b>	129	23.3	25.5
<b>Strongly disagree</b>	85	15.3	16.8
<b>N/A</b>	3	0.5	0.6
<b>Total</b>	506	91.3	100.0

<b>Missing</b>	48	8.7	
<b>Total</b>	554	100.0	
<b>Getting the HPV vaccine offers protection from infection by the human papilloma virus.</b>			
<b>Strongly agree</b>	245	44.2	48.4
<b>Agree</b>	159	28.7	31.4
<b>Neither agree or disagree</b>	59	10.6	11.7
<b>Disagree</b>	16	2.9	3.2
<b>Strongly disagree</b>	10	3.8	5.1
<b>N/A</b>	1	0.2	0.2
<b>Total</b>	506	100.0	100.0
<b>Missing</b>	48	8.7	
<b>Total</b>	554	100.0	
<b>I'm concerned about serious adverse effects of vaccines.</b>			
<b>Strongly agree</b>	84	15.2	16.8
<b>Agree</b>	120	21.7	24.0
<b>Neither agree or disagree</b>	87	15.7	17.4
<b>Disagree</b>	147	26.5	29.4
<b>Strongly disagree</b>	62	11.2	12.4
<b>Total</b>	500	90.3	100.0
<b>Missing</b>	54	9.7	
<b>Total</b>	554	100.0	
<b>My child does not need vaccines for diseases that are not common anymore</b>			
<b>Strongly agree</b>	27	4.9	5.3
<b>Agree</b>	18	3.2	3.6
<b>Neither agree or disagree</b>	58	10.5	11.4
<b>Disagree</b>	164	29.6	32.3
<b>Strongly disagree</b>	239	43.1	47.1
<b>N/A</b>	1	0.2	0.2
<b>Total</b>	507	91.5	100.0
<b>Missing</b>	47	8.5	
<b>Total</b>	554	100.0	

**Table 3: Reasons not to have their child or children receive HPV vaccine**

Statement: The following ever prevented from vaccinating your child	Sample Size (N)/554	Percent
Don't have a doctor	20	3.6
Cost of vaccine	16	2.9
Place to receive vaccine is too far	10	1.8
Clinic availability	47	8.5
Wait times	19	3.4
Not sure of the effectiveness of the vaccine	46	8.3
Afraid of injection or pain associated with getting a vaccine	20	3.6
Previous reaction to a vaccine	20	3.6
Don't want to get a vaccine	75	13.5
Other	171	30.9

**Table 4:** Frequency table of knowledge about HPV vaccine

Rate	N	Percent	Valid Percent
<b>How would you rate your knowledge about the HPV vaccine?</b>			
<b>Below average</b>	53	9.6	10.6
<b>Average</b>	247	44.6	49.6
<b>Above average</b>	118	21.3	23.7
<b>Excellent</b>	77	13.9	15.5
<b>Unknown</b>	3	0.5	0.6
<b>Total</b>	498	89.9	100.0
<b>Missing</b>	56	10.1	
<b>Total</b>	554	100.0	

**Table 5:** Frequency table of the decision-making process to vaccinate their child or children for HPV before the coronavirus pandemic

Rate	N	Percent	Valid Percent
<b>How would you rate your decision-making process to vaccinate your child for HPV <u>before</u> the coronavirus pandemic?</b>			
<b>Very easy</b>	241	43.5	48.4
<b>Easy</b>	158	28.5	31.7
<b>Difficult</b>	61	11.0	12.2
<b>Very difficult</b>	7	1.3	1.4
<b>Unknown</b>	22	4.0	4.4
<b>None of the above</b>	9	1.6	1.8
<b>Total</b>	498	89.9	100.0
<b>Missing</b>	56	10.1	
<b>Total</b>	554	100.0	
<b>How would you rate your decision-making process to vaccinate your child for HPV <u>during</u> the coronavirus pandemic?</b>			
<b>Very easy</b>	214	38.6	43.1
<b>Easy</b>	131	23.6	26.4
<b>Difficult</b>	69	12.5	13.9
<b>Very difficult</b>	26	4.7	5.2
<b>Unknown</b>	22	4.0	4.4
<b>None of the above</b>	34	6.1	6.9
<b>Total</b>	496	89.5	100.0
<b>Missing</b>	58	10.5	
<b>Total</b>	554	100.0	

**Table 6:** Frequency table of social media sources the participants rely on to obtain credible information about HPV vaccines and vaccination.

<sup>1</sup> Number of respondents who checked the box

Social media source	N <sup>1</sup>	Percent
<b>Facebook</b>	129	23.3
<b>Twitter</b>	32	5.8
<b>Instagram</b>	5	0.9
<b>Pinterest</b>	15	2.7
<b>Reddit</b>	43	7.8
<b>Other</b>	138	24.9
<b>Total</b>	362	65.3
<b>Missing</b>	192	34.7
<b>Total</b>	554	100.0

**Table 7:** Frequency table of “other” sources the participants rely on to obtain credible information about HPV vaccines and vaccination.

Source	N	Percent	Valid percent
<b>Non scholarly sources</b>	105	19.0	48.4
<b>Scholarly sources</b>	37	6.7	17.1
<b>Non Classifiable</b>	75	13.5	34.6
<b>Total</b>	217	39.2	100.0
<b>Missing</b>	337	60.8	
<b>Total</b>	554	100.0	

**Table 8:** Frequency table of non-scholarly sources parents rely on to obtain credible information about HPV vaccines and vaccination.

Sources	N	Percent	Valid percent
<b>Scholarly sources</b>	37	6.7	17.1
<b>News and videos</b>	16	2.9	7.4
<b>Personal experience</b>	4	0.7	1.8
<b>Healthcare providers</b>	38	6.9	17.5
<b>Public health organizations</b>	14	2.5	6.5
<b>Blogs</b>	1	0.2	0.5
<b>Search engines and websites</b>	24	4.3	11.1
<b>Applications</b>	7	1.3	3.2

<b>Drug's Label</b>	1	0.2	0.5
<b>Don't consult social media for vaccine information</b>	44	7.9	20.3
<b>Other</b>	31	5.6	14.3
<b>Total</b>	217	39.2	100.0
<b>Missing</b>	337	60.8	
<b>Total</b>	554	100.0	

**Table 9:** Descriptive statistics of trust in public health campaign messages

Scale	N	Percent	Valid Percent
<b>0 (do not trust at all)</b>	63	11.4	13.5
<b>1</b>	12	2.2	2.6
<b>2</b>	11	2.0	2.4
<b>3</b>	14	2.5	3.0
<b>4</b>	19	3.4	4.1
<b>5</b>	42	7.6	9.0
<b>6</b>	16	2.9	3.4
<b>7</b>	43	7.8	9.2
<b>8</b>	81	14.6	17.3
<b>9</b>	61	11.0	13.1
<b>10 (completely trust)</b>	105	19.0	22.5
<b>Total</b>	467	84.3	100.0
<b>Missing</b>	87	15.7	
<b>Total</b>	554	100.0	

**Table 10:** Descriptive statistics of the advertising formats that are used to provide HPV vaccination information in order from most likely (1) to least likely (5) influence decision-making

<sup>1</sup> Number of participants ranking the format first

<sup>2</sup> Number of participants who checked the box

Advertising Formats	N <sup>1</sup>	Percent	Valid Percent
<b>Videos</b>	50	9.0	14.8
<b>Images</b>	19	3.4	5.6
<b>Infographics</b>	115	20.8	34.1
<b>Narratives/Stories</b>	67	12.1	19.9
<b>Others</b>	86	15.5	25.5
<b>Total</b>	337	60.8	100.0
<b>Missing</b>	217	39.2	
<b>Total</b>	554	100.0	



**Table 11:** Information that parents look for to make their decision about HPV vaccination

Information parents look for to make their decision about HPV vaccination	N <sup>2</sup>
<b>What are the side effects of HPV vaccines</b>	359
<b>What are HPV vaccine ingredients</b>	169
<b>Is it safe to get more than one vaccine at the same time</b>	170
<b>How are HPV vaccines tested</b>	203
<b>Who monitors HPV vaccine safety</b>	185
<b>Who regulates HPV vaccine safety</b>	190
<b>Are additives in HPV vaccines safe</b>	135
<b>How to minimize HPV vaccine injection pain and fear</b>	82
<b>Can someone get sick from an HPV vaccine</b>	139
<b>How is the HPV vaccination schedule tested</b>	104
<b>Alternative HPV vaccination schedules</b>	61
<b>Homeopathic remedies</b>	29
<b>Chances of getting HPV infection</b>	233
<b>HPV infection outcomes (i.e., cancer)</b>	263
<b>Who is providing the vaccine (e.g., doctor, nurse, etc.)</b>	136
<b>Don't know/Not sure</b>	21
<b>Other</b>	33

**Table 12:** Other social media sources used to provide HPV vaccination information that may influence parents' decision-making to have their children vaccinated for HPV

Other social media sources used to provide HPV vaccination information that may influence parents' decision-making to get their children vaccinated for HPV										
Scholarly sources (1)	Non scholarly sources								Non Classifiable	
	News and videos (2)	Personal experience (3)	Health care providers (4)	Public health organizations (5)	Blogs (6)	Search engine and websites (7)	Applications (8)	Drug's label (9)	Don't consult SM for vaccine infos (10)	Other (11)
									You don't get vaccine info on SM unless legit link	Tv
Academic literature	Druthers, Rebel News	*Talking with experts. Scientific studies	Advice from doctors only	Public health units and reliable news media	Blogs	Authentic medical website	Snapchat	Package insert	Don't consult social media for vaccine info	Recherche autre que internet
Actual research from scholarly journals	Prefer news sources	Family	A doctor	Bc cdc		Google	Tiktok		Do not consult social media for this purpose	Aucun réseaux sociaux est digne de confiance
Articles	Youtube	Personal research	Doctor	Health Canada or science journals		Google – medical studies and medical journals	Telegram		Do not rely on social media for vaccine info	Credible not main stream unbiased unpaid by the g.
Articles scientifiques	Youtube with a credible/professional source	Word of mouth	Doctor and public health	National Cancer Institute		I would check the internet for information			Don't usually get medical information from social	Facts
Ebsco, Google Scholar, peer reviewed	News	Own research	Doctors or public health	U (Canadian Public Health Association)		Mayo Clinic website			I do not go to social media for important info	I do not trust any of the pharmaceutical companies

Other social media sources used to provide HPV vaccination information that may influence parents' decision-making to get their children vaccinated for HPV										
journals										
Certified studies	News and government sites	Researched it	Doctor or public health nurse	WHO, PHAC, CDC		Medical website			I do not use any of these sources for credible inf	I don't know any others
Journals and books	News articles or doctor advice only		Doctor, science papers published	Health Unit media pages		Real online sites and medical journals			I do not use social media for scientific info	I don't trust social media sources
Journals	News media outlets		Doctor/healthcare professionals	PHUs, PHAC, HC, CIG, Immunize Canada, GSK		Reputable web sites			I don't consult social media for credible info	I would never consider social media as trustworthy
Journals such as Science and Nature	News sources		Doctors/reliable online information	Public health units and reliable news media		Trustworthy internet site, my Family physician			I don't consult social media for health decisions	I wouldn't pick any social media site for this decision
Medical journals	News. Research. Doctor		Doctor	Information given by public health		Webmd			I don't generally use social media for this.	I'm a scientist with a background in medicine I do
Medical journals	newspaper		Doctors and peer reviewed studies	National association on immunization committee		Webpages			I don't rely on social media for credible info.	It's insane to consult social media for info.
Medical journals and pharmacists	Newspapers		Doctors, guidance from Canadian health orgs			Credible webpages bccdc			I don't rely on social media to give me scientific	Literally anything but Facebook
Medical journals from trusted and respectable docs	Reputable news sources		Doctors, nurses			Credible website			I don't use social media sources for vaccine info.	Médias sociaux pour les pires pour de vrais infos

Other social media sources used to provide HPV vaccination information that may influence parents' decision-making to get their children vaccinated for HPV										
Medical journals, and alternative medical sources	The news/articles		Family Doctor, Health Canada			Global health & public health websites			I don't use social media for that kind of information	Medical sources
Medical journals, hospital clinics			Functional Medicine Doctor			Government sites and medical sites			I don't access medical info from social media	J'utilise seulement Facebook
Medical journals, preferably			I consult my GP or paediatrician for questions			Immunizealberta.ca			I don't consult social media for health info	Only have Facebook
Online medical journal searches			I rely on medical information from medical professionals			Official websites			I don't consult social media for info on vaccines	Social media does not influence me at all
Only proper books			I would trust the medical community before SM			Not on social but Google search of reputable sites			I don't get health information on social media.	I may listen to some podcast, but rely on scienti
			Interior health advisor			Real online sites and medical journals			I don't look to social media for medical advice	Social media is not trustworthy
Books			Only listen to doctors and scientist			Other sources on the internet			I don't really consult any of these for info	Social media is not reliable at all
			My doctor						I don't really use social media for research	Not social media
I get info from ncbi			Physician						I don't use social	Other

Other social media sources used to provide HPV vaccination information that may influence parents' decision-making to get their children vaccinated for HPV										
									media for any medical advice.	
I trust research pages & doctors. Not social media			Public health nurses						I don't use social media sources to make decisions	There is no question being asked here
			Rely on local trusted health care team members						I don't get my vaccine info from social media	They all are untrustworthy
			Trusted doctors and reviewed studies						Je n'utilise pas les réseaux sociaux pour l'info	Medical and web
Peer reviewed articles and immunology journals			Try to find doctor based knowledge						Je ne consulte pas les medias sociaux pour ça.	I don't know any others
Peer reviewed articles, I don't use any social media			Unbiased doctors & their science. Not main stream media						No media source is good source for vaccine info	N/a
Peer reviewed journals			Social media is not a good source but a doctor.						No social media for trustworthy information	Na
Peer reviewed lit. Don't use SM to inform myself			Reliable medical source						No social media used	NA
Peer reviewed									None	

Other social media sources used to provide HPV vaccination information that may influence parents' decision-making to get their children vaccinated for HPV										
literature only										
Peer reviewed scientific studies									None of them are credible	
PubMed, JAMA, Nature, The Lancet									None of these are sources of vaccine information	
									None of these are where I would go to get information	
Research									None. I don't consult social media for vax info	
Research journals and articles									None	
Research papers									Not a social media site.	
Scientific journals									Not consulted social media for health questions	
Scientific papers									Not on social media	
Scientific research									Not social media	
Scientific research, but not prostitute science									Social media is not for medical information	

Other social media sources used to provide HPV vaccination information that may influence parents' decision-making to get their children vaccinated for HPV										
University research journal database									Why do I get info on social media about vaccines	

\*Rephrasing made to make some comments understandable.