

# Hot Topic: A Systematic Review and Content Analysis of Heat-Related Messages During the 2021 Heat Dome in Canada

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## ABSTRACT

**Context:** During the summer of 2021, western Canada experienced a deadly heat event. From the first heat alert to postevent reporting, thousands of media articles were published that reference the heat event. However, a gap remains in understanding how this communication chain—from the release of a public heat alert to information shared through media outlets to the public—currently operates to disseminate heat-related messaging across Canada.

**Objective:** To understand the role of digital media in delivering heat-health messaging during an extreme heat event in Canada.

**Design:** A qualitative content analysis was conducted using Canadian news articles published on the 2021 Heat Dome between June 2021 and February 2022 (n = 2909). The coding frame was designed to align with the basic framework for information gathering used in journalism (who, what, where, when, and how) and included both concept-driven and data-driven codes.

**Results:** Overall, 2909 unique media articles discussing the 2021 Heat Dome were identified, with the majority (74%) published by online news agencies (how). The highest article count was on June 29, 2021 (n = 159), representing 5% of the total data set (n = 2909) spanning 260 days (when); 57% of the identified locations were in British Columbia (where). Although we found that the top voices providing media-based heat-health messages are government officials (who), only 23% of articles included heat-health messaging that aligns with the government health alert bulletins released during extreme heat. In addition, heat-health messaging frequently included contradictory content, inconsistent language, or incorrect advice (what).

**Conclusion:** The findings demonstrate clear opportunities to improve health communication related to extreme heat, perhaps most importantly, including updates to mass media messaging educating the public on heat-protective behaviors.

**KEY WORDS:** extreme heat event, heat alert response system, heat warning, heat wave, public health

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Extreme heat events (EHEs) are a growing threat to public health. In Canada, these protracted periods of elevated ambient temperature are defined on the basis of a series of region-specific criteria that consider temperature and humidity readings as compared with the typical regional

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average for that season.<sup>1</sup> These EHEs are associated with excess mortality and morbidity from numerous causes, including heat-related illnesses (HRIs), adverse cardiovascular events, mental illness, respiratory illness, dehydration, and renal stress,<sup>2</sup> especially in vulnerable populations, such as children, older adults, the chronically ill, and people who work outdoors or in unairconditioned environments.<sup>3</sup> However, these heat-health impacts are preventable when individual, community, and policy-based interventions are implemented.<sup>4</sup> In Canada, the most common strategy for reducing heat-health impacts is the activation of heat alert and response systems (HARS; see Supplemental Digital Content Panel A).<sup>3</sup> HARS are typically activated when 2 or more consecutive days of daytime maximum temperatures and night-time minimum temperatures exceed, region-specific thresholds.<sup>5</sup> An effective HARS includes several components, including a communication plan for increasing awareness, an alert to warn the public and notify decision makers to take action, and the activation of heat mitigation strategies (eg, cooling centers).<sup>6</sup> HARS communication strategies typically use multiple mediums for dissemination including engaging with the media (eg, radio, newspapers) that reach large audiences.<sup>6</sup>

The news media is a major information source for the public when preparing for EHEs.<sup>7</sup> However, how the media frames this information can either increase public understanding and enable appropriate health-protective responses or conversely underplay the risk and fail to inform the public of the need to consider appropriate responses.<sup>8</sup> Existing research on media coverage of natural disasters shows significant gaps between what journalists, audiences, and health authorities think the media should report (eg, health-protective information) and what is presented (eg, infrastructure impacts).<sup>9</sup> This misalignment often leads to government officials, emergency managers, health authorities, and the public criticizing news coverage.<sup>10</sup> By contrast, some argue that deficient news coverage stems primarily from journalists' lack of access to information held by public emergency officials.<sup>11</sup> Although studies have broadly looked at media coverage related to the communication of climate science,<sup>12–14</sup> none have specifically explored how media coverage in Canada disseminates heat-health messaging. Given the forecasted increase in the intensity and frequency of deadly heat in Canada, communicating heat-health protective actions to the public is increasingly important.

To address these knowledge gaps, we undertook a review and analysis of digital media articles published on one of the deadliest EHEs in Canadian history—the 2021 Heat Dome (see Supplemental Digital Content Panel B). The 2021 Heat Dome spanned

10 days in late June, and early July 2021, breaking 103 all-time heat records across the western provinces, including Canada's highest ever recorded temperature (49.6°C [121.3°F] on June 29, 2021) and contributed to more than 619 excess deaths in British Columbia<sup>15</sup> and Alberta.<sup>16</sup> We evaluated what content was prioritized in the media coverage, how it aligned with the Government of Canada heat alert bulletins, and traced how the messages were disseminated across time and geography.

## Methods

### Search strategy

A systematized review of digitized media content (eg, eNews articles) was conducted using 8 academic (MEDLINE, EMBASE, CAB Abstracts/Global Health, AGRICOLA, FSTA, EconLit, PsycINFO, and Scopus) and 5 subscription news databases (ProQuest Canadian Major Dailies, Business Source Elite, NewsDesk, Factiva, and Eureka). The search strategy was developed in consultation with a research librarian team (see Supplemental Digital Content) to obtain the most representative overview of news coverage and minimize reliance on *prestige press* (ie, The Globe and Mail) and outlet bias.<sup>17</sup> Articles published between June 1, 2021, and February 26, 2022 (date of search), were eligible for inclusion. The search strategy therefore aimed to capture all press published after the forecasted heat alert, during the EHE, and postevent.

A list of targeted public and nonprofit organization web sites was also created for each Canadian province/territory to ensure a comprehensive gray literature search of traditional (eg, eNewspapers) and nontraditional media sources (eg, health agency-authored articles). For each targeted web site ( $n = 997$ ), the terms “heat” and “2021” were entered into the search function. When no search function was available, the researchers (E.J.T. and N.G.) performed a manual site search targeting the home page, news, and publication/resource tabs. Finally, an Advanced Google search using location identifiers, date restrictions, and key words (“location” AND “heat wave” OR “heat dome” OR “extreme heat” AND “2021”) was performed to ensure that all open-access news sources were covered (see Supplemental Digital Content). Articles ( $n = 5396$ ) were uploaded to a reference manager software (Zotero, Release 6.0, Corporation for Digital Scholarship, Vienna, Virginia). As some articles were released to multiple sources (media corporations frequently share and modify content), articles with comparable content were identified, and duplicates were removed after review and agreement by 2 authors (E.J.T. and N.G.).

**TABLE****Number of Government of Canada Impact Statements and Heat Warning Messages Identified in Digital News Articles (n, %) and the Number of Related References Within the Articles (n) (WHAT)<sup>a</sup>**

|                              |  | Number of Articles, n (%) | Number of References, n |
|------------------------------|--|---------------------------|-------------------------|
| <b>Impact Statements</b>     |  |                           |                         |
| Statement 1                  | Extreme heat affects everyone.   | 76 (3%)                   | 78                      |
| Statement 2                  | The risks are greater for young children, pregnant women, older adults, people with chronic illnesses, and people working or exercising outdoors.  | 373 (13%)                 | 549                     |
| Statement 3                  | Watch for the effects of heat illness: swelling, rash, cramps, fainting, heat exhaustion, heat stroke, and the worsening of some preexisting health conditions.  | 111 (4%)                  | 247                     |
| <b>Heat-warning messages</b> |  |                           |                         |
| Message 1                    | Outdoor workers should take regularly scheduled breaks in a cool place.  | 78 (3%)                   | 126                     |
| Message 2                    | Avoid sun exposure. Shade yourself by wearing a wide-brimmed, breathable hat or using an umbrella.   | 118 (4%)                  | 143                     |
| Message 3                    | Drink plenty of cool liquids, especially water, before you feel thirsty to decrease your risk of dehydration. Thirst is not a good indicator of dehydration.   | 348 (12%)                 | 682                     |
| Message 4                    | Ask a health professional how medications or health conditions can affect your risk in the heat.   | 28 (1%)                   | 30                      |
| Message 5                    | Check on older family, friends, and neighbors. Make sure that they are cool and drinking water.  | 287 (10%)                 | 402                     |
| Message 6                    | Never leave people or pets inside a parked vehicle.  | 157 (5%)                  | 188                     |
| Message 7                    | Seek a cool place such as a tree-shaded area, swimming pool, shower, or bath, or air-conditioned spot such as a public building.   | 394 (14%)                 | 499                     |
| Message 8                    | When it is hot, eat cool, light meals.   | 26 (1%)                   | 38                      |
| Message 9                    | Keep your house cool. Block the sun by closing curtains or blinds.   | 73 (3%)                   | 75                      |
| Message 10                   | Watch for the symptoms of heat illness: dizziness/fainting; nausea/vomiting; rapid breathing and heartbeat; extreme thirst; and decreased urination with unusually dark urine.   | 140 (5%)                  | 247                     |
| Message 11                   | Heat stroke is a medical emergency! Call 911 or your local emergency number immediately if you are caring for someone, such as a neighbor, who has a high body temperature and is unconscious, confused, or has stopped sweating. While waiting for help—cool the person immediately by moving him or her to a cool place, if you can; applying cold water to large areas of the skin or clothing; and fanning the person as much as possible. | 110 (4%)                  | 141                     |

<sup>a</sup>These heat-health messages and impact statements were developed in partnership between Environment and Climate Change Canada (ECCC), Health Canada and local health agencies in 2011. During a heat event, a selection of these standard heat-health messages are chosen by ECCC meteorologists to include with the warnings and alerts.

**Coding frame**

The coding frame was designed to align with elements of the basic framework for information gathering used in journalism (who, what, where, when, and how)<sup>18</sup> and included both *deductive* (concept-driven) and *inductive* (data-driven) codes. “Who” refers to the sources quoted/cited within the media data set,<sup>19</sup> and thus the codes were developed inductively. To better understand “what” heat-health messages were being communicated in the media articles, a series

of deductive codes were developed on the basis of the Government of Canada call-to-action and impact statements<sup>20</sup> (Table), along with references to specific alerts, warnings, and responses. Additional information related to heat-adaptive behaviors was captured inductively. Inductive codes were also created to mark the locations “where” media coverage was reported. As early heat warnings were released in advance of the EHE, and cascading events occurred following the EHE, each article was also coded for “when” it was published using deductive codes. Finally, to better

understand “**how**” messaging was disseminated to the public, the articles were deductively coded on the basis of the type of media (eg, newspaper/eNews, blog, eBulletin).

All authors reviewed the codes to determine whether any categories should be added or revised and to seek agreement on definitions and decision rules. The articles were then uploaded to NVivo (Release 1.6.2, QSR International, Burlington, Massachusetts). Trial coding was completed independently by E.J.T. and N.G. ( $n = 500$  articles;  $\sim 10\%$ ) and a coding comparison query was used to ensure reliability and validity of the category definitions. The coders achieved a  $\kappa$  coefficient of 0.80, indicating a “very good/excellent” agreement.<sup>21</sup>

### Content analysis

The remaining articles ( $n = 4857$ ) were divided evenly and reviewed by either E.J.T or N.G. Because of the size of the data set, full-text review co-occurred with coding. Only those articles published in English or in French were retained; the latter were translated to English via accredited professional translators. A bilingual research team member checked the translated English versions for accuracy (N.G.). We also excluded all social media (eg, Twitter posts) content without transcription (eg, video-only content), articles with restricted access (ie, paywall), articles in other

languages, and articles published outside of Canada. Once coded, a qualitative content analysis of the data was then completed. Data visualizations were created using R (R Software, Release 4.2.2, R Core Team).

## Results

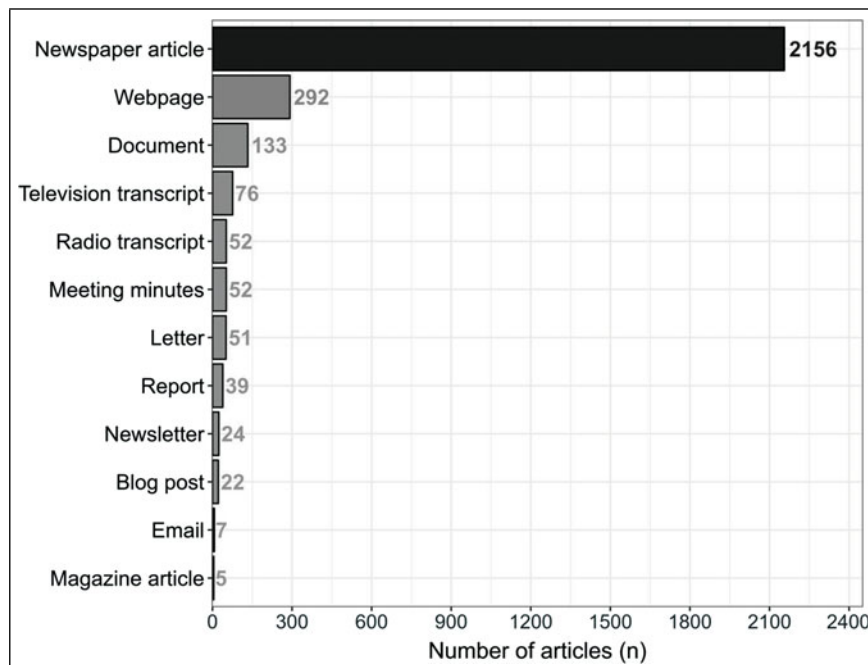
The following sections present the coded findings from 2909 articles based on the basic framework for information gathering used in journalism, including **how**, **when**, **where**, **who**, and **what**. Quotations from the news articles analyzed are used throughout [as indicated using numeric formatting in square brackets] to provide evidence and supplement the concepts identified (see Supplemental Digital Content Panel C, for a list of news article references directly cited).

### How

The majority of news articles ( $n = 2156$ , 74%) were published in online newspapers (eg, Vancouver Sun, Toronto Star), followed by web pages (eg, provincial health web sites) ( $n = 292$ , 10%), and documents (eg, reports, municipal council minutes) ( $n = 133$ , 5%) (Figure 1).

### When

Only 176 (6%) articles were published in the days preceding the EHE (June 1, 2021 to June 23, 2021).



**FIGURE 1** Sources of News Articles on the 2021 Heat Dome (HOW)<sup>a</sup>

<sup>a</sup>The number of novel digital news articles related to the 2021 Heat Dome is categorized by type of source. The shading corresponds to the number of articles from each source, with dark shades (black/dark gray) indicating categories with a greater number of articles and light shades (light gray) indicating fewer articles.

A few of these early articles referenced the warnings from the Government of Canada ( $n = 28$ , 1%) and coverage of the Pacific Northwest heat wave in the United States ( $n = 11$ , <1%) in anticipation of the EHE (Figure 2A). More than a third ( $n = 1045$ , 36%) of the captured articles were published during the EHE, which spanned a roughly 2-week period (June 24, 2021, to July 7, 2021) (Figure 2A), with the publication peak observed during the week of June 28, 2021 ( $n = 748$ , 26%). The highest daily article count was found on June 29, 2021 ( $n = 159$ ), representing 5% of the total data set (Figure 2B).

## Where

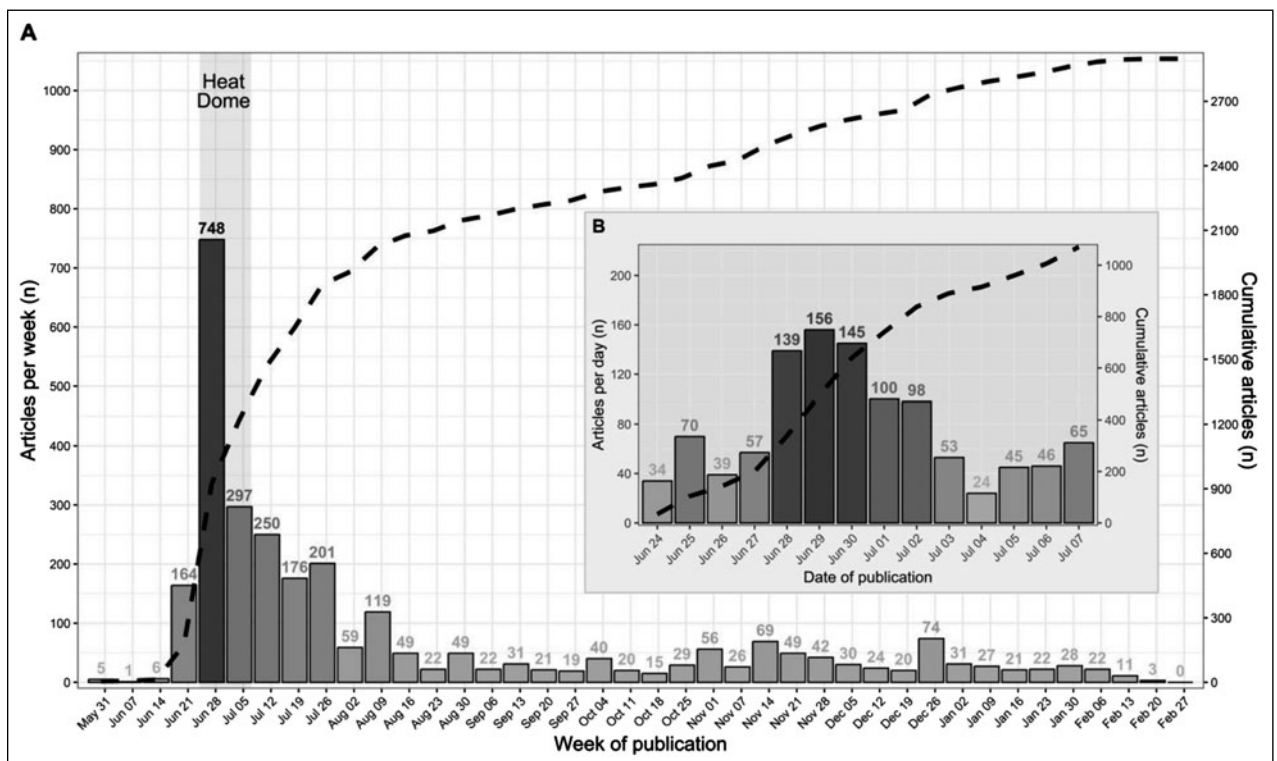
Various locations across Canada were referenced in the media articles covering the EHE (Figure 3). Of the 2589 locations identified in the media articles, the majority were provincial and territorial references, including British Columbia ( $n = 1470$ , 57%), Alberta ( $n = 385$ , 15%), Saskatchewan ( $n = 228$ , 9%), and Manitoba ( $n = 141$ , 5%) (Figure 3A). The top 3 cited communities were all within British Columbia: Lytton ( $n = 651$ , 25%), Vancouver ( $n = 348$ , 13%), and Kamloops ( $n = 157$ , 6%) (Figure 3B).

## Who

The identified media articles referred to various sources (Figure 4A). The top 3 *expert* source categories were government officials (eg, mayors, members of parliament), agricultural sector representatives (eg, farmers, presidents of agricultural associations), and emergency services (eg, BC Wildfire Service, BC Emergency Health Services Board), primarily located in British Columbia and Alberta (Figure 4B). The public also represented a top-cited source within the data set, providing stories of their lived experience of the EHE.

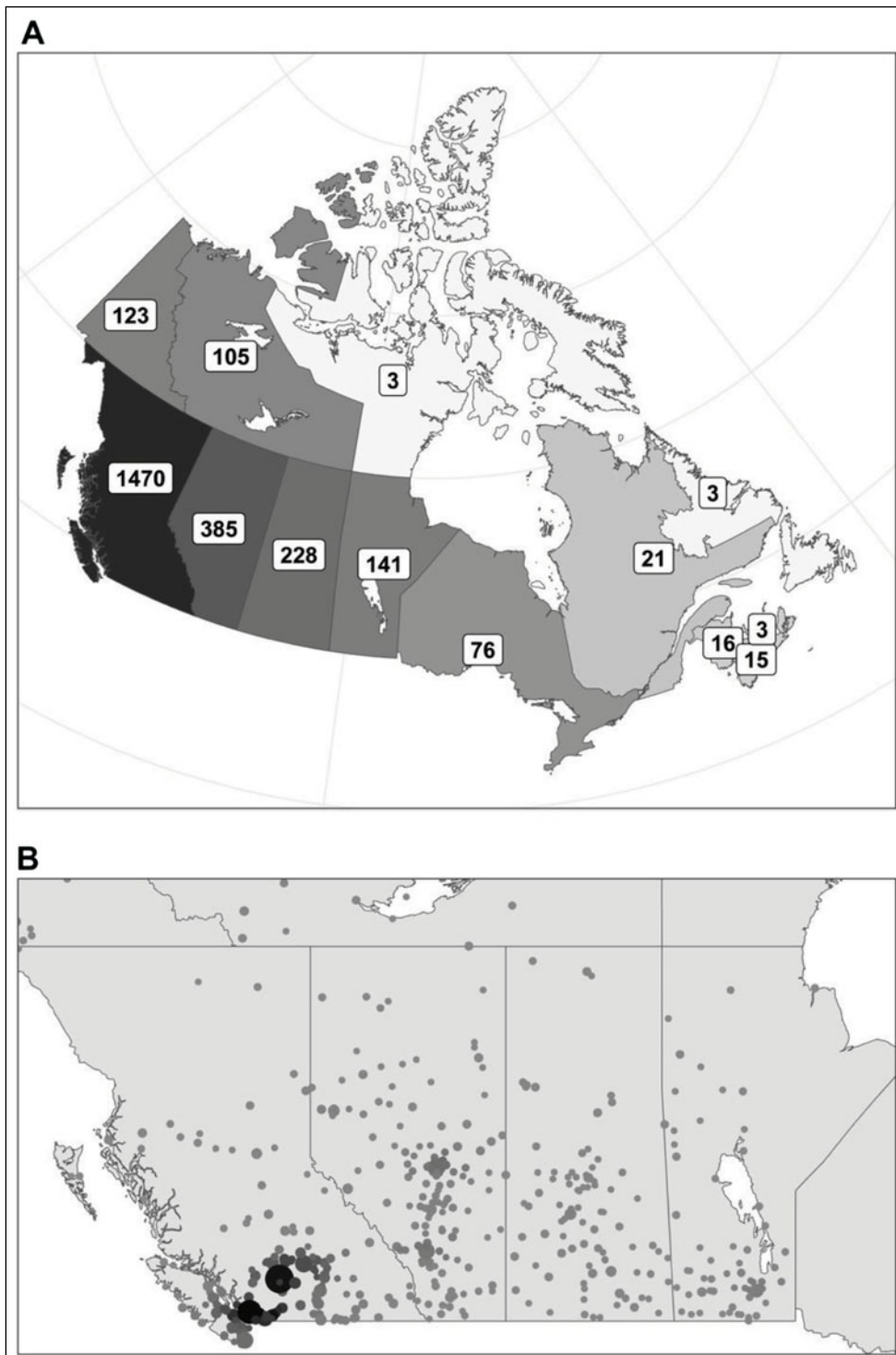
## What

Heat alerts or warnings were mentioned in 429 articles (15%), with some explicitly citing Government of Canada heat alerts (eg, “Environment Canada warns the torrid heat wave that has settled over much of Western Canada won’t lift for days” [1]) ( $n = 69$ , 16%) or mentioning regional responses ( $n = 21$ , 5%) (eg, “Edmonton activated its extreme weather response” [2]). Only 3% ( $n = 76$ ) of the articles included the Health Canada impact statement that “everyone is



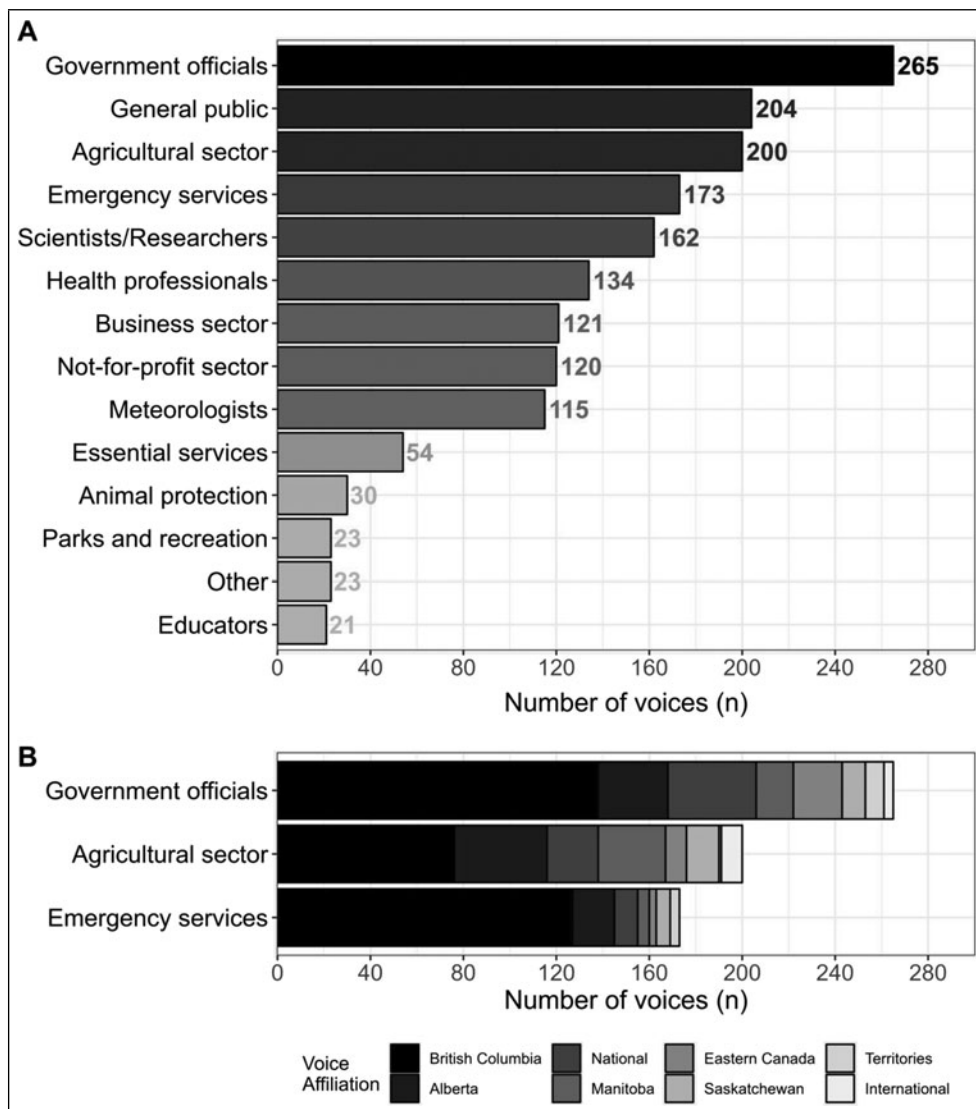
**FIGURE 2** Timeline of News Publications on the 2021 Heat Dome (WHEN)<sup>a</sup>

<sup>a</sup>Panel A: number of digital news articles on the 2021 Heat Dome published each week during the entire study period (June 1, 2021 to February 26, 2022). Panel B (inset): number of digital news articles published during the Heat Dome (June 24 to July 7). For both panels, the shading of the bars corresponds to the weekly (panel A) or daily (panel B) number of articles published, with dark shades (black/dark gray) indicating a greater number of articles published and light shades (light gray) indicating fewer published articles. The gray dotted line on each panel indicates the cumulative number of articles published over each period.



**FIGURE 3** Map of the Digital News Articles Published on the 2021 Heat Dome (WHERE)<sup>a</sup>

<sup>a</sup>Panel A: References to Canadian provinces/territories in digital news articles. The shading corresponds to the number of times each province/territory was referenced in each category, with dark shades (black/dark gray) indicating a greater number of references and light shades (light gray) indicating a smaller number of references. Panel B: References to specific locations in western Canada, including cities, counties, districts, First Nations, hamlets, islands, lakes, municipalities, rivers, towns, townships, unincorporated communities, and villages. The size of each bubble indicates the number of times each location was referenced, ranging from less than 10 (eg,  $n = 1$ , Tadoule Lake, Manitoba; small light gray dots in upper right portion of map) to more than 640 ( $n = 651$ , Lytton, British Columbia; large black point in lower left corner). The shading of the points indicates the density of location references, considering both the number of times each location was referenced and its geographical relation to other referenced locations. Dark shades (black/dark gray) indicate a greater density and light shades (light gray) indicate a lower density.



**FIGURE 4** Voices Cited in News Coverage Related to the 2021 Heat Dome (WHO)<sup>a</sup>

<sup>a</sup>Panel A: Number of cited voices in each category among digitized news coverage related to the 2021 Heat Dome by category. The shadings in Panel A correspond to the number of voices in each category, with dark shades (black/dark gray) indicating categories with a greater number of voices and light shades (light gray) indicating categories with fewer voices. Panel B: Regional affiliation of each voice. The shadings in panel B indicate affiliation groupings (see legend).

vulnerable to the heat” [20] and 13% ( $n = 373$ ) listed at least 1 of 6 groups identified to be at greater risk for HRIs. The most cited groups were children ( $n = 318$ , 11%), older adults ( $n = 282$ , 10%), and people with chronic illnesses ( $n = 269$ , 9%). Common symptoms of HRIs were cited in only 4% ( $n = 111$ ) of the articles (Statement 1, Table). Furthermore, the media articles listed 57 additional indicators for HRI (Table S2). Finally, a quarter ( $n = 402$ , 23%) of the articles included at least one heat-health message that aligned with the Government of Canada’s warning messages (Table). The most common messages were statements to seek cool spaces (message 7;  $n = 394$ , 14%) and drink

cool, hydrating liquids (eg, water) (message 3, Table;  $n = 348$ , 12%). All messages were cited at least once (Table).

Across the articles, additional heat-health warnings were identified. For example, in addition to the Government of Canada’s impact statements for heat-vulnerable populations (statement 2, Table), 7 other groups were identified, including those living alone/isolated ( $n = 149$ , 5%), people experiencing housing insecurity ( $n = 146$ , 5%), people with mental illness ( $n = 61$ , 2%), other socially marginalized groups (eg, non-English speakers, immigrants, racialized groups) ( $n = 57$ , 2%), people with impaired

mobility (n = 48, 2%), tourists (n = 41, 1%), and individuals with cognitive impairment (n = 24, 1%). Similarly, additional heat mitigation statements were identified, including recommendations to visit municipal cooling centers (n = 233, 8%), stay informed about the EHE via local news and alerts (n = 175, 6%), and to reschedule outdoor activities to cooler hours of the day (n = 145, 5%).

Contradictory, poorly timed, and overly concise heat-health messages that could be taken out of context were also identified. For example, some articles recommended opening windows, whereas others suggested shutting windows to keep warm air out (Table S3). Some articles recommended following COVID-19 mitigation efforts in contrast to others that prioritized heat mitigation (Table S3). Many articles also supported recommendations that lacked context (eg, “stay indoors” despite interior temperatures exceeding 40°C [104°F] in homes without air conditioning) (Table S4). Similarly, many articles gave vague recommendations such as “be prepared” (Table S5). Finally, articles commonly used complex terminology within the heat-health messaging, such as “heat syncope” instead of saying “fainting” (Table S6).

## Discussion and Conclusion

We analyzed thousands of articles covering the 2021 Heat Dome in Canada and explored how public heat-health messages were framed in the news. The findings demonstrate clear opportunities to improve public health communication related to extreme heat. This section summarizes key patterns that emerged through our study, places these findings in the context of the literature, and discusses policy and research implications (Table S7).

### Prioritizing health protective messages

Only a small portion of the articles (23%) referenced guidance on reliable strategies for reducing the health impacts of heat (Table), and only 15% cited heat alerts or warnings. By contrast, 22% of articles mentioned “record-breaking temperatures” [41]. Unsurprisingly, the town of Lytton, British Columbia, was the most referenced location, as it broke temperature records (49.6°C [121.3°F]) and experienced a devastating fire that destroyed buildings and infrastructure (Figure 3).<sup>22</sup> These findings are in line with previous coverage of the 2019 European heat waves, which found that the news media highlighted record-breaking temperatures, followed by the impact of the heat wave on critical infrastructure (eg, transport, energy).<sup>23</sup> Focusing on record-breaking

temperatures or the infrastructure impacts of an EHE is in line with *news values*, which refers to criteria that influence the selection and presentation of events as published news.<sup>24</sup> However, with the public receiving a significant amount of their health information from the media,<sup>25</sup> a greater balance is needed between reporting reactive content (eg, impacts to critical infrastructure) and proactive content (eg, heat-protective messaging). Scientific experts and health agencies should work to provide journalists with evidence-supported heat mitigation behaviors and actions, such as providing a knowledge translation reference guide tailored explicitly for journalists.

### Evidence-based and accessible heat-health guidance

Our analysis also identified that many articles provided overly simplified guidance on how the public could protect themselves from extreme temperatures (Table S5). For example, when recommending hydration, cited phrases included “keep hydrated,” [19] “drink a cool beverage,” [20] “stay hydrated with cold water and cold drinks,” [21] and “drink more water than you think you need” [22]. These messages make assumptions about the reader’s existing knowledge (eg, what hydration means, or how much water should be consumed), or leave room for misinterpretation (eg, cool beverages may include caffeine or alcohol). This example is particularly relevant as during EHEs hospitalizations due to dehydration increase but so do intakes due to other hydration-related conditions such as mild/severe hyponatremia<sup>26</sup> (a common electrolyte imbalance seen in older adults during heat exposure).<sup>2</sup> Therefore, providing overly simplistic guidance on hydration (or other heat-health messaging) may have unanticipated health implications. Although a balance is needed between informational content conciseness/clarity, these findings highlight that being overly concise may have negative health implications.<sup>27</sup>

Instances of contradictory messaging and advice lacking critical context were also identified (Tables S3 and S4). For example, some articles advised the public to stay inside during the EHE. However, the British Columbia Coroners’ Report<sup>15</sup> confirmed that 98% of deaths occurred indoors and Henderson et al<sup>28</sup> summarized that “people died because it was too hot inside, not because it was too hot outside.” Therefore, messages advising the public to “stay inside” [42] should be prefaced with references to cool indoor spaces or spaces with air-conditioning to avoid harm. Evidence suggests that exposure to conflicting health information can adversely affect public understanding and trust in health recommendations and undermine the success of public health messaging strategies.<sup>29</sup>



When people are exposed to health promotion messaging, they process these messages within a broader information landscape that is increasingly dominated by conflicting and often controversial information.<sup>30</sup> Thus, the presence of inconsistent or opposing recommendations may reduce uptake of health-protective actions by the public.<sup>30,31</sup>

The media articles also used a wide range of terminology that may have caused confusion (Table S6). For example, 57 terms were used to describe the signs of HRI, some of which used language that may not be understood by the public (Table S2). Complex language may confuse and impact awareness of heat-related risks.<sup>24</sup> For example, “hyperthermia” [28], “heat tetany” [29], and “heat syncope” [30] were cited within the articles. Although these terms are accurate descriptors of HRIs, they could be communicated in plain language to ensure that all readers can understand them (ie, replace “heat syncope” with “fainting”). These findings further emphasize that heat-health communication should seek to use simple, direct terminology.

### **Timing of heat-health messages**

Across the 260 days captured in this study (Figure 2A), the contents of EHE-related articles shifted dramatically. The low article count in circulation in advance of the EHE may indicate a lack of *newsworthiness* upon the initial heat warning having been released. As the EHE evolved, the number of articles increased, with the peak of publications coinciding with the highest temperatures and the highest reported heat-related daily death count ( $n = 234$  deaths) (Figure 2B).<sup>15</sup> This finding suggests that reactionary news coverage built over time with the rising heat and slowly dissipated as other unrelated storylines competed for priority. This is noteworthy because heat can impact health during an EHE (acute effect) but also poses a continued risk beyond the heat event itself (lag effect).<sup>32</sup> This lag was evidenced in the British Columbia Coroners Service investigation report, which indicated that heat-related deaths continued to occur for 19 days after the EHE began.<sup>15</sup> Thus, publishing proactive, heat-protective media coverage early within an EHE, and continuing this coverage in the days following, is critical so that communities may be better positioned to prevent HRI and death.

### **Prioritizing heat-vulnerable populations**

Only 13% of the articles identified groups known to be at greater risk for HRI (Table). This low frequency suggests that heat-vulnerable groups may not have received adequate warning of their susceptibil-

ity to HRI or death. This is a critical finding, as the British Columbia Coroners’ Report<sup>15</sup> (a post-event analysis with policy recommendations for the Province of British Columbia) confirmed that the majority of decedents were older adults living with chronic disease (eg, mental illness, diabetes), living alone and in socially or materially deprived neighborhoods without adequate cooling—all factors of heat vulnerability.<sup>2</sup> Previous studies on the public’s perception of EHEs have revealed that many heat-vulnerable individuals do not consider themselves at risk.<sup>7</sup> Therefore, it is important that future communications prioritize identifying these heat-vulnerable population groups and provide heat-health messages directed to these individuals or their caregivers to enhance protective actions.

### **Reaching rural and remote residents**

Although our cross-Canada scan found references to more than 2500 locations, media coverage was primarily concentrated around urban centers (eg, Vancouver) (Figure 3A and B). Although this finding is expected due to the population density in urban centers, location of health agencies, community resources, and media agencies disseminating the messaging, it indicates that rural/remote residents may not be receiving targeted heat-health communication.<sup>33</sup> Recent studies show that elevated temperatures appear to impact both the most rural and the most urbanized areas, as seen by increases in hospitalization rates.<sup>34</sup> Therefore, by prioritizing messaging primarily to urban centers, individuals residing in rural areas may be less likely to engage in protective behaviors due to a lack of awareness or assumption that they are not directly affected. For example, Abrahamson et al<sup>35</sup> found that individuals may fail to engage in protective behavior change when they do not ascribe themselves to the characteristics or *labels* used within the messaging. To ensure widespread reach, that addresses the complex vulnerabilities of different communities, a concerted effort is needed from local and regional health authorities to address any gaps in media coverage in their communities with targeted heat-health messaging (Figure 1).

### **Credible heat-health information sources**

Although we found that journalists relied on an array of spokespeople when reporting on the 2021 Heat Dome (Figure 4A and B), the articles emphasized messages from government officials, with 265 sources quoted (Figure 4A and B). This finding is consistent with coverage of other complex meteorological events that have found that journalists are strongly reliant on

## Implications for Policy & Practice

- Governments can be credible sources of information for the media—therefore, health officials can assist local agencies and journalists by providing messaging on appropriate health-protective actions to support heat-vulnerable populations before, during and after heat waves.
- Many of the heat-health interventions recommended in media articles do not align with current public health guidance—health authorities could provide guidance and prepackaged messages to media outlets to ensure the availability and accuracy of heat-health information in advance of future heat events.
- To strengthen community preparedness for extreme heat, all stakeholders (eg, public health, public safety, media) should engage as partners in creating and disseminating health-protective messaging in advance of the heat season, as well as in advance of anticipated heat waves.

government officials and politicians as sources.<sup>36</sup> This highlights the role of the government as a source of knowledge for journalists to convey community preparedness and responsiveness during EHEs. However, taken together with the minimal heat-health information included in many articles and the wide variance in messaging provided, these sources may need to be provided with evidence-based information to assist them with getting the most health-protective messages out to the public (eg, packaged press material and speaking points<sup>37</sup>).

This study provides novel insights into the communication landscape in Canada during a historic EHE. By systematically analyzing media coverage about the 2021 Heat Dome, we were able to evaluate what content was prioritized in the media coverage, how it aligned with the Government of Canada heat alert bulletins, and to trace how the messages were disseminated across time and geography. We found that the articles primarily focused on record-breaking temperatures and infrastructure impacts instead of providing guidance on reliable strategies for reducing the health impacts of heat. When available, heat-health messaging often included contradictory content, inconsistent language, overly simplified messaging, and typically did not address heat-vulnerable groups or those residing outside of urban centers. These findings demonstrate clear opportunities to improve public health communication related to extreme heat—perhaps most importantly, providing journalists, government officials, and stakeholders with evidence-supported heat mitigation actions in advance of the heat season and again with the release

of heat alerts to promote proactive coverage. With the global death tolls from extreme heat rising,<sup>38</sup> it is imperative that heat-health communication be strengthened, as it is vital to fostering public resilience.

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