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RESEARCH ARTICLE

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Tourists and epidemics: how news media cover the risks of Zika virus and chikungunya outbreaks in the Americas

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ABSTRACT

Globally, the tourism industry has shown to be vulnerable to emerging infectious diseases outbreaks (i.e. COVID-19, Ebola, H1N1). In general, these diseases are often novel and unknown; therefore, news media becomes a key informative communication channel. We conducted a content analysis of newsprint media published between 2010 and 2019 that focused on two recent emerging epidemics in the Americas, Zika virus and chikungunya, and tourism. The results show that the number of published news suddenly increased when the outbreaks of both diseases took place and decreased in the following years. The majority of articles advised avoiding travel to places with outbreaks, especially those concerning Zika virus. A smaller percentage included informative messages about actions travellers can adopt to protect themselves from these diseases. As emerging disease outbreaks are predicted to continue, communication during future crises should provide travellers with accurate information about the diseases, balanced with suggestions on how to prevent and manage an infection, encouraging responsible travel rather than fear and travel avoidance. Well-coordinated and informed risk communication can serve as a proactive and reactive strategy to mitigate and cope with future risk-related events.

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Risk perception; tourism; mosquito-borne disease; content analysis; risk communication; emerging infectious diseases

Introduction

The travel industry is one of the largest contributors to the global economy. In 2019, the sector contributed 10.3% of the global GDP, generating 330 million jobs worldwide (World Travel and Tourism Council, 2020). However, the industry is highly vulnerable to disasters and crises (Ritchie & Jiang, 2019), as it relies on the interdependence of diverse groups of consumers and a wide variety of travel-related products and services. Often, climatic, political, or health-related crises have had negative impacts on the tourism sector (Ritchie & Jiang, 2019), causing a decrease in visitor influx, followed by loss of employment and lower incomes in the affected destinations (Choe et al., 2021; Kozak et al., 2007). A growing concern has been the emergence and re-emergence of infectious diseases, as their frequency has increased globally in the last 50 years, and that pattern is expected to

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continue (Jones et al., 2008). In many cases, prevention and control measures to manage these emerging diseases rely on people's knowledge and ability to engage in preventive behaviours, as often there are no vaccines or other protective alternatives available. Different forms of public and private communication (e.g. news media, social media, institutional announcements) play an important role in the diffusion of information about emerging diseases to public audiences, often preceding and influencing people's risk perceptions and actions (Dahlstrom et al., 2012; Kasperson et al., 1988). Through this study, we analyse news media content associated with two recent emerging diseases in the Americas, Zika virus and chikungunya, to better understand how risk communication can – or should – play a role in future epidemic-induced tourism crises.

Literature review

Tourism and emerging diseases

Prior research on epidemics has shown that in the absence of official travel restrictions, impacts on the tourism industry derive primarily from tourists' concerns towards travelling to 'risky' places. Safety and security are highly valued characteristics of a destination, influencing visitors' travel decision-making (Reisinger & Mavondo, 2005). In one study, among visitors to Hong Kong, terrorist acts and infectious diseases were identified as major drivers of changes to travel plans (Kozak et al., 2007). Further, the impact of emerging diseases on the tourism industry usually lasts longer than the actual epidemic risk and ripples outward, affecting a wider geographic area. Ebola outbreaks between 2013 and 2015 affected the tourism industry in several African countries, even in locations where no local transmission of the virus was reported (Novelli et al., 2018). An outbreak of the Middle East Respiratory Syndrome (MERS) in South Korea in 2015 translated to a loss of 3.1 billion USD given the decline of inbound tourism during four months (Choe et al., 2021). In 2020, the emergent SARS COVID-19 pandemic promoted travel restrictions, halting tourism activities worldwide, while prompting the loss of almost 62 million jobs and a 49.1% decline of global GDP compared to 2019 (World Travel and Tourism Council, 2021).[1]

From 335 emergent infectious diseases reported between 1940 and 2004 it is estimated that 22.8% were transmitted by vectors (Jones et al., 2008). Among these, mosquitoes play a key role, posing global threats to public health and presenting great economic burdens (Mayer et al., 2017). The relation between travel and mosquito-borne diseases (MBD) is bidirectional. MBD outbreaks can affect visitor flows, as individuals decide to avoid travelling to 'risky' destinations. However, travel also facilitates the movement of both vectors and infected humans across the globe, given that the visitors' mobilization tend to be faster than the incubation period of most infectious diseases (Mier-y-Teran-Romero et al., 2017). With 1.5 billion international tourist arrivals registered by the World Tourism Organization pre-pandemic (UNWTO, 2020), travel activity will likely continue to be a risk factor for the spread of infectious diseases.

The emergence of chikungunya and Zika virus in the Americas

Before COVID-19, the largest recent epidemics in the Americas were caused by two MBD, chikungunya virus (CHIKV) in 2013 and 2014, and Zika virus (ZIKV) in 2015 and 2016 (Mayer et al., 2017). Local transmission of CHIKV was first reported in 2013 in Saint Martin, quickly spreading to 45 countries and territories within a year. By 2016, there were more than 2.9 million suspected and confirmed cases (Yactayo et al., 2016). In December 2014, health ministry officials in Brazil reported suspected ZIKV cases to the World Health Organization (WHO). Throughout 2015 the virus spread to 49 countries in the Americas, with the highest incidence of infection reported in 2015 and 2016 (Lowe et al., 2018).

Both diseases became endemic, as most of Latin America and the Caribbean have a widespread presence of the main mosquito vectors, *Aedes aegypti* and *Aedes albopictus*, which are not native to

the Americas, but were introduced centuries ago through trade and tourism (Mayer et al., 2017; Paixão et al., 2018). The life cycle of these mosquito species is intrinsically related to water availability, needed for their breeding and growth. Tropical and subtropical regions in the Americas offer a suitable habitat for both species, including environmental (i.e. temperature, precipitation) and anthropogenic (i.e. socioeconomic factors, urbanization, deforestation) factors that enable their establishment and reproduction (Kraemer et al., 2015).

Both CHIKV and ZIKV infections present similar symptoms, including mild and asymptomatic cases (Paixão et al., 2018). CHIKV is characterized by severe joint pain and has a higher symptomatic rate than ZIKV. Usually, the joint pain lasts from a few days to a week, but some individuals can develop chronic joint aches and there are some reports of death related to CHIKV (Tritsch et al., 2019; Yactayo et al., 2016). ZIKV has been associated with birth malformations and developmental disabilities in neonates, as well as with miscarriages when women are infected during pregnancy. In adults, ZIKV is related to other neurological complications, like Guillain-Barré Syndrome (Chan et al., 2016). With no approved vaccines available for CHIKV or ZIKV, prevention and control largely rely on people's awareness and implementation of preventive measures to avoid the spread of both the mosquitoes and the diseases (i.e. breeding sites, mosquito bites).

Risk perception and risk communication

Mosquito-borne and other emerging diseases represent a threat to both locals and visitors. However, technical risk assessments are not enough, as most people make risk judgments and decisions based on their subjective risk perceptions (Slovic, 1987; Wilson et al., 2019). According to the social amplification of risk framework (SARF), psychological, social, and cultural factors shape individuals' risk perceptions towards a particular risk event, like the emergence of a disease (Kasperson et al., 1988, 2022). Normally, scientific or technical information about diseases is beyond the general knowledge of the public, thus news media represents an important and accessible source to inform about causes of diseases, as well as risk alerts and warnings (Binder et al., 2015; Chen et al., 2020; Ophir & Jamieson, 2020; Wirz et al., 2021). Hence, the media can play a role in heightening or decreasing risk perception and encouraging responses by individuals towards a certain risk, as they serve as (in the words of SARF) 'amplification or attenuation stations' (Figure 1) (Jerit et al., 2019; Kasperson et al., 1988; Squiers et al., 2019). Disease outbreaks often qualify as newsworthy (Ophir & Jamieson, 2020), and the emergence of both CHIKV and ZIKV were highlighted in the news. In particular, warnings and prevention recommendations were issued by national and local governments for potential travellers visiting Zika-affected areas (Squiers et al., 2019).

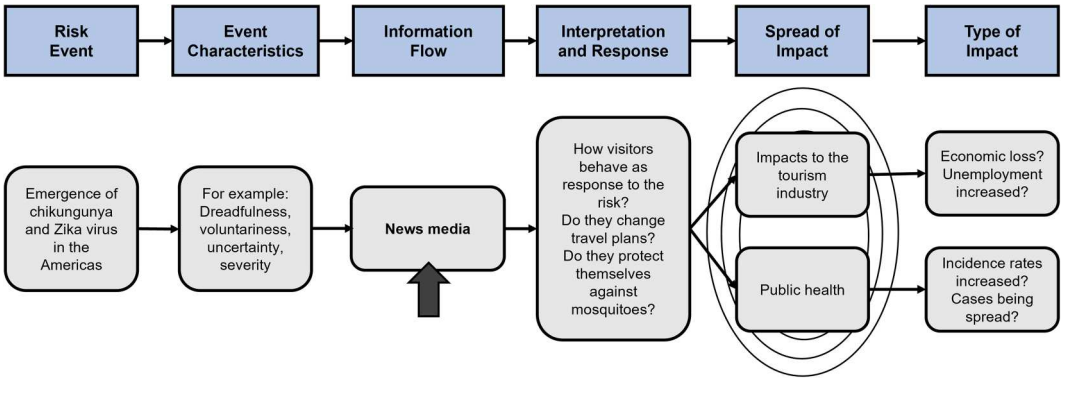

Figure 1. Social amplification of risk framework applied to chikungunya and Zika virus threats/epidemics in the Americas (Adapted from Kasperson et al., 1988). This manuscript focuses solely on information flow through news media (one of several possible 'amplification stations' identified in SARF), analysing how it can influence the interpretation, response, and impact from potential travellers.

Although engagement in preventive behaviours to avoid infectious diseases is widely encouraged, successful adoption of these practices varies depending on various factors, including perception of risk and efficacy. Self-efficacy refers to the confidence an individual has of being capable of engaging in a behaviour, with a higher level of self-efficacy related to higher likelihood of adoption (Bandura, 2004). Further, societal efficacy refers to the perception that response actions being implemented by an institution serve as a coping mechanism at a collective level (Evensen & Clarke, 2012). Response efficacy at the individual and societal levels refers to the perception that a suggested behaviour is effective to overcome or control a given situation or risk (Omodior et al., 2017). As decades of empirical research have shown, effective health risk communication should provide information about protective and efficacy actions to avoid inducing fear and other unproductive coping responses (Bavel et al., 2020; Rimal & Real, 2003; Witte, 1994).

Health-related crises, including epidemics, are prone to negative media coverage, which can affect the image of a destination (Choe et al., 2021; Hugo & Miller, 2017; Novelli et al., 2018; Sell et al., 2018). However, limited research has sought to understand media coverage and epidemics, especially as a potential factor influencing the tourism industry during outbreaks in developing countries (Chen et al., 2020; Yu et al., 2020). The impact of a sudden decrease of visitors to economies highly dependent on tourism can have a significant impact, especially for developing countries (Novelli et al., 2018). A better understanding of how outbreaks are communicated in news media, as potential drivers of risk perceptions and tourists' behaviours, can help inform communication and management strategies during future outbreaks (Ophir & Jamieson, 2020). This study aims to contribute to the growing field of research that focuses on risk and crises communication in tourism, given its complexity and its importance to serve as a complement to managing strategies dealing with future crises (Liu et al., 2023; Pascual-Fraile et al., 2022). Although our theoretical framework, SARF, has been widely applied to general media coverage of risk events, fewer studies have considered coverage that is specific to the travel industry, and to the Americas (Wirz et al., 2018).

The recent unprecedent experience with COVID-19 was an extreme global example of the impact an emerging disease can cause in the tourism sector (Gössling et al., 2020). The situation and its consequences are still evolving, and recent studies have found a shift in travellers' perceptions and preferences (Orden-Mejía et al., 2022; Teeroovengadum et al., 2021), destination management (Clark et al., 2022; Neshat et al., 2021), and even proposing a reflection on the pre-pandemic tourism paradigm (Gerke et al., 2023; Hall et al., 2020). Although each disease has its own characteristics, understanding diverse past epidemics allow for future informed decision-making (Park et al., 2022; Wilder-Smith, 2021). Therefore, in this study we analyse the content and message frequency in newsprint media regarding the recent Zika virus and chikungunya outbreaks in the Americas, focusing specifically on tourism-related articles published in the U.S. Our research questions include: (RQ1) how, if at all, messaging and coverage changed between 2010 and 2019; (RQ2) what health-related messaging may have contributed to amplified (i.e. elevated) or attenuated (i.e. minimised) risk perceptions; and (RQ3) what preventive and travel behaviours targeting visitors were suggested.

Materials and methods

We conducted a quantitative content analysis (Krippendorf, 2018; Riffe et al., 2014) of news media on Zika virus, chikungunya, and tourism. Each news article served as the unit of analysis. We identified articles published between 2010 and 2019 using Nexis Uni and Global Newsstream that included the keywords 'Zika' or 'chikungunya'; and 'touris*' or 'travel*'; and 'USA' / 'United States' or 'Guatemala'. After removing duplicates and documents that did not fit the inclusion criteria, 515 news articles, including 375 news articles about ZIKV and 140 articles about CHIKV were included in the analysis (Figure 2).

The articles were analysed using NVivo 12© by applying a coding protocol (Krippendorf, 2018; Riffe et al., 2014) with four overarching categories: risk-elevating messages, risk-minimising

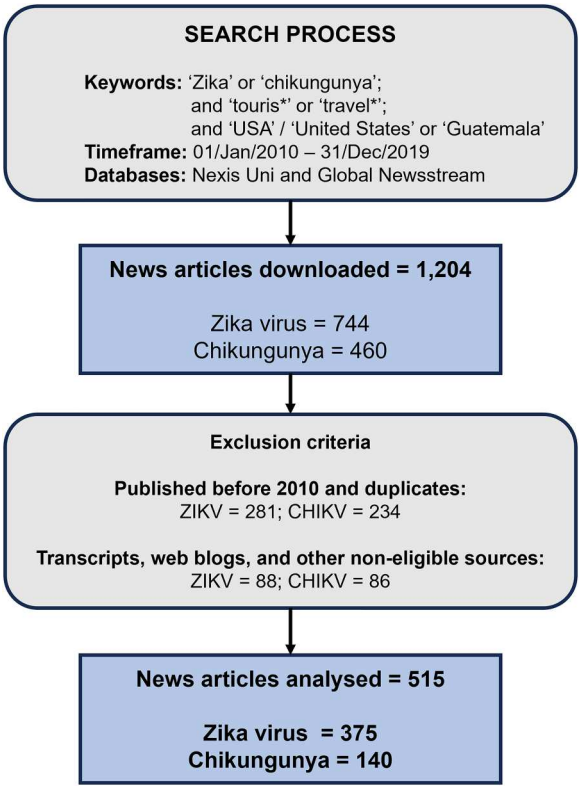

Figure 2. News articles search and selection process.

messages, guidance messages, and tourism-related messages, adapted from Sell et al. (2018). Further, other codes were added to capture the characteristics of CHIKV and specific information about tourism. The codes were not mutually exclusive. (See Appendix 1 for definitions and examples).

Intercoder reliability assessment (Riffe et al., 2014) was conducted by having two coders review about 25% of the news articles (126/515) randomly selected. Six coding comparison rounds were run to assess the intercoder agreement, determined by the Kappa coefficient calculated by NVivo 12©. After each round, both coders identified the disagreements via dialogue, and modified definitions to assure reliability of the coding process (Riffe et al., 2014). The codes with Kappa values over 0.61 were kept as they represent strong or excellent agreement (McHugh, 2012). Some codes were also kept if considered important to the analysis or if there were only few news articles coded during the intercoder agreement sessions. Once the intercoder agreement assessment was completed, text frequency queries, coding comparisons, crosstab, and matrix coding analysis were conducted in NVivo 12© (Bazeley & Jackson, 2013) to identify patterns.

Results

Overall, Zika virus outbreaks (375, 73%) received more coverage than chikungunya virus (140, 27%), accounting for almost three-quarters of the total sample of articles (Figure 3a). In the Americas, the emergence of CHIKV was first announced in December 2013 (Yactayo et al., 2016). For that year, we found only 5 news articles published (4% of the CHIKV total), contrasting with 98 published articles during 2014, which represents almost 70% of our total CHIKV sample. Taking a monthly insight to

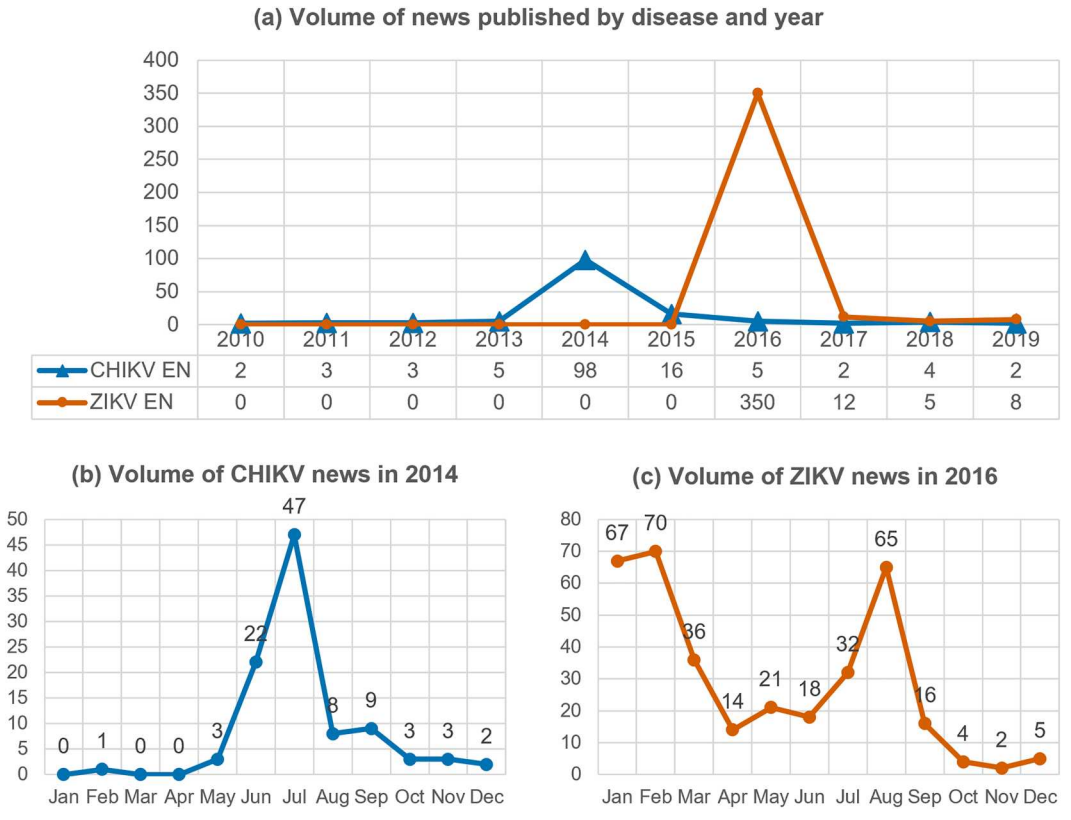

Figure 3. News articles published by disease (CHIKV, ZIKV) by year (2010–2019).

2014, almost half of all of the publications were published between June and July (Figure 3b), which coincides with a report of locally transmitted CHIKV cases in the continental US in mid-July (Kuehn, 2014). Before 2013 and after 2015 the total number of articles published was minimal (Figure 3a).

Zika news coverage showed a similar pattern. The first case of ZIKV in the Americas was confirmed in Brazil in May 2015 (PAHO, 2015), followed by a growing concern of a potential link with increasing cases of microcephaly in newborns around October 2015. In February 2016 the WHO declared ZIKV as a Public Health Emergency of International Concern (PHEIC) (Lowe et al., 2018). The first case of local transmission in mainland US was in late July 2016. Accordingly, we found no ZIKV news published before 2016, with a sudden increase in 2016, reaching 350 news articles published, which represented 93% of our ZIKV sample, and followed by a volume decrease in subsequent years (Figure 3a). Most of the news published in 2016 appeared in January, February, and August, representing more than half (58%) of all the ZIKV news published that year (Figure 3c).

Tourism-related messages

Overall, 98% (506/515) of the articles analysed included tourism-related messages, with 64% (329/515) providing recommendations on safe travel, 88% (451/515) implying that tourism is a driver of MBD spread, and 21% (107/515) showing that the tourism industry was being affected and/or had responded to the impact of ZIKV or CHIKV outbreaks (Table 1). However, the frequency of messages differed by disease.

Most of the news analysed (62%) promoted that it was not safe to travel to areas with MBD local transmission, while only 10% stated that it was safe. Messages mentioning that it was not safe to

Table 1. Frequency and percentage of news articles mentioning tourism-related messages.

	Total ($n = 515$)	%	ZIKV ($n = 375$)	%	CHIKV ($n = 140$)	%
Tourism-related messages – Overall	**506**	**98**	**375**	**100**	**131**	**94**
Suggested travel behaviour	***329***	***64***	***291***	***78***	***38***	***27***
It is not safe to travel to areas with MBD local transmission	319	62	283	75	36	26
It is safe to travel to areas with MBD local transmission	52	10	47	13	5	4
Tourism and the spread of MBDs	***451***	***88***	***322***	***86***	***129***	***92***
Implies tourism is a driver of MBD spread	392	76	266	71	126	90
The MBD may spread or is present in the US	320	62	216	58	104	74
Transmission in the US will not be widespread	164	32	128	34	36	26
Tourism sector challenges and response	***107***	***21***	***98***	***26***	***9***	***6***
Impacts or challenges for the tourism industry	93	18	86	23	7	5
Response or coping strategies from the tourism sector	51	10	47	13	4	3

travel were more prevalent in the ZIKV news (75%), than in CHIKV (27%), from which most articles targeted women and couples that were pregnant or wanted to conceive (245/283). Overall, we found that 76% of articles implied that tourism activity could drive disease spread; travel-related or imported MBD cases was one of the most prevalent messages in the news about CHIKV (90%). More than half of the articles (62%) mentioned that MBD was spreading, reflecting the ongoing outbreaks (Table 1).

A smaller set of articles alluded to how MBD epidemics impacted the tourism industry (18%), mostly on ZIKV (86/93) (Table 1). Of the 93 news articles mentioning impacts to the tourism industry, most of the news for both ZIKV (63/86, 73%) and CHIKV (5/7, 71%) mentioned that the MBD caused negative impacts, via trip cancellations, and a decrease of visitors to certain tourism destinations. However, a small number of ZIKV (11/86, 13%) and CHIKV (1/7, 14%) articles recognised an increase of visitors, often after a location had implemented effective coping strategies to contain the outbreaks or due to visitors travelling to destinations less affected by MBD. Almost half of the articles on both ZIKV (42/86, 49%) and CHIKV (3/7, 43%) mentioned that tourism businesses were not impacted by the MBD outbreaks, although acknowledged that the pattern could change in the future.

The type of impacts and coping strategies mentioned varied depending on stakeholders involved and context, reflecting that not everyone was affected by or responded to the MBD 'crisis' in the same way. For example, articles described how airlines did not report abrupt cancellations, but restaurants in an affected destination reported a sudden decrease in customers. Trips for recreational purposes were cancelled or modified, but trips to visit family or do business were not affected. Some of these messages were based on statistical evidence (i.e. airline reports, cancellations in a hotel), while others focused on visitor perceptions (i.e. surveys, pregnant women's anecdotes). Particularly in ZIKV news, many of the references to cancellations or changed plans concerned women or couples that were pregnant, while non-high-risk individuals showed no desire to change plans.

Of the few articles (51) mentioning coping strategies used by tourism industry stakeholders to respond to epidemics, most were in ZIKV news (47/51) compared to CHIKV news (4/51). The most common strategy mentioned was policy changes from airlines to allow cancellations and changes to alternate destinations (26/51); communication campaigns and promotions to the public about MBD (20/51); inter-institutional coordination to implement prevention and control actions (14/51); specific vector control strategies in the country (i.e. tackling mosquito breeding sites, providing repellent to visitors) (13/51); and lodgings offering discounts or implementing vector control strategies in their facilities (13/51). Fewer articles focused on insurance providers (11/51), mostly stating that an emerging travel alert or the fear of contracting an illness are not considered as a reason to cancel trips for the insurance policies; followed by strategies implemented by cruises (7/51); and awareness, vector control and symptomatic case identification in borders, airports, and/or touristic attractions (5/51).

Risk-related messages

Risk-elevating and risk-minimising messages

Overall, there were slightly more articles presenting risk-elevating messages (ZIKV 94%, CHIKV 99%), than risk-minimising messages (ZIKV 91%, CHIKV 96%) (Table 2 and Table 3). The most prevalent risk-elevating messages found in over half of the articles referred to the transmission route being mosquito-borne (ZIKV 82%, CHIKV 94%), and messages alluding to the MBDs as a growing health problem, whether because it was an increasing threat, or because it was spreading or establishing itself in the region (ZIKV 51%, CHIKV 77%). Statements about the most severe outcomes of an infection were also among the most frequent risk-elevating messages, including that people infected with CHIKV can face severe joint pain (83%), and that being infected with ZIKV during pregnancy could cause birth defects (81%). Regarding risk-minimising messages, there were only two messages present in over half of the articles for both ZIKV and CHIKV which alluded to efficacy actions. The most prevalent risk-minimising messages mentioned efforts by diverse institutions (i.e. public health personnel, universities, government agencies) to prevent or control the disease (ZIKV 66%, CHIKV 65%), followed by messages suggesting actions to prevent mosquito bites and/or breeding sites, like dumping standing water or using air conditioning (ZIKV 53%, CHIKV 61%).

Guidance messages

Knowing the symptoms of a disease is important for diagnosis; however, we found that only half (52%) of the news analysed described the symptoms of an infection, mostly within CHIKV articles (87%). Only around 31% of the articles suggested seeing a doctor and/or getting tested to confirm a diagnosis, and 8% alluded to how to manage the symptoms once diagnosed with any of the MBD (Table 4).

Recommended travel behaviours, risk messages, and protective actions

In this section we focus on co-occurrence of information in articles – specifically, articles that recommended a given travel behaviour, along with information about the MBD and behaviours to prevent, control, or treat an infection. Of the 283 Zika articles suggesting that travel is not safe,

Table 2. Risk-related messages in Zika virus news (2010–2019) ($n = 375$).

	f	%		*f*	%
Risk-elevating messages – Overall	**354**	**94**	**Risk-minimising messages – Overall**	**342**	**91**
Transmission routes and MBD information			***Self-efficacy***		
You can get Zika infection from a mosquito	309	82	Individual mosquito control efforts	200	53
You can get Zika infection from sex	153	41	Infection can be prevented with mosquito repellent	154	41
Asymptomatic people could spread Zika	93	25	Infection can be prevented by wearing appropriate clothing	134	36
Zika could be in the blood supply	30	8	Infection can be prevented by using safe sex practices	100	27
Outcomes of an MBD infection			***Collective and response efficacy***		
Infection during pregnancy could cause birth defects	304	81	Public health or institutional mosquito control efforts	248	66
Infection could cause GBS or adult neurologic disease	76	20	Mosquito control efforts are effective	22	6
			Efforts are underway to protect the blood supply	19	5
MBD could be uncontrollable or have unknown characteristics			***Risk of an MBD is low or can be controlled***		
Zika virus infection is a growing health problem	191	51	Serious adverse events occur in a limited number of infected people	158	42
Zika is not yet fully understood by science	115	31	Zika virus infection is rarely fatal	39	10
No or limited countermeasures	100	27	Spread of Zika virus or cases are decreasing	18	5
Mosquito control efforts are not effective	44	12			
Zika is a new disease in the Americas	39	10			
Challenges in testing and-or diagnosis	28	7			

Table 3. Risk-related messages in chikungunya virus news (2010–2019) ($n = 140$).

Risk-elevating messages – Overall	*f* **139**	% **99**	Risk-minimising messages – Overall	*f* **134**	% **96**
Transmission routes and MBD information			***Self-efficacy***		
You can get infected with chikungunya from a mosquito	131	94	Individual mosquito control efforts	85	61
Asymptomatic people could spread chikungunya	5	4	Infection can be prevented with mosquito repellent	75	54
Most cases present symptoms	10	7	Infection can be prevented by wearing appropriate clothing	64	46
Outcomes of an MBD infection			***Collective and response efficacy***		
Infection could cause severe joint pain while infected	116	83	Public health or institutional control efforts	91	65
Infection could cause long term complications	71	51	Mosquito control efforts are effective	5	4
MBD could be uncontrollable or have unknown characteristics			***Risk of an MBD is low or can be controlled***		
Chikungunya infection is a growing health problem	108	77	Chikungunya infection is rarely fatal	74	53
Chikungunya is a new disease in the Americas	79	56	Lifelong immunity	15	11
No or limited countermeasures	78	56	Serious adverse events occur in a limited number of infected people	8	6
Mosquito control efforts are not effective	15	11	Spread of chikungunya virus or cases are decreasing	4	3
Chikungunya is not yet fully understood by science	14	10			
Challenges in testing and-or diagnosis	8	6			

over 80% also mentioned mosquito-borne transmission (83%) and an infection during pregnancy can be harmful to newborns (84%). Fewer articles mentioned other transmission routes (i.e. sexually transmitted infection, 41%) or infection consequences (i.e. adult neurological disease as an outcome of infection, 22%) (Figure 4a). Even fewer articles mentioned preventive actions to avoid getting infected while travelling. The most common preventive message (65%) suggested individual actions to avoid breeding sites or getting bitten by a mosquito (Figure 4b).

Zika articles suggesting that it is safe to travel presented, in general, slightly more information about the disease; of these, 85% mentioned that ZIKV is mosquito-borne, and 43% mentioned sexual transmission. The most prevalent message referenced ZIKV infection congenital consequences (87%), but only 38% mentioned the potential impacts on the adult neurological system (Figure 4a). Some preventive actions that could be implemented while travelling, were mentioned slightly more often, including general individual efforts (72%), the use of repellent (62%), and wearing appropriate clothing (55%) (Figure 4b).

Only 36 articles about CHIKV suggested that it is not safe to travel, with 100% mentioning mosquito transmission, 86% alluding to the severe joint pain while infected, and 67% referring that it can cause long term complications. This group of news articles presented a higher percentage of protective messages when compared to articles about ZIKV (Figure 5a). The message on individual efforts to prevent infection predominated in 78% of articles, while 72% mentioned mosquito repellent, and 56% the use of appropriate clothing (Figure 5b). Only 5 articles mentioned that it was safe to travel, all of these mentioning that CHIKV is mosquito-borne that causes severe joint pain and might have long term outcomes (Figure 5a). All articles mentioned protective measures like the use of repellent and adequate clothing (Figure 5b).

Among the 319 news articles suggesting travelling as a risky behaviour overall, about half mentioned the symptoms of these diseases (51%), more than one-third included some guidelines for

Table 4. Frequency and percentage of articles mentioning mosquito-borne diseases guidance messages.

	Total ($n = 515$)	%	ZIKV ($n = 375$)	%	CHIKV ($n = 140$)	%
Guidance messages – Overall	***321***	**62**	***195***	**52**	***126***	**90**
Symptoms of MBD infection	270	52	148	39	122	87
Guidelines for medical advice and/or testing	159	31	110	29	49	35
Guidelines on how to treat symptoms	43	8	17	5	26	19

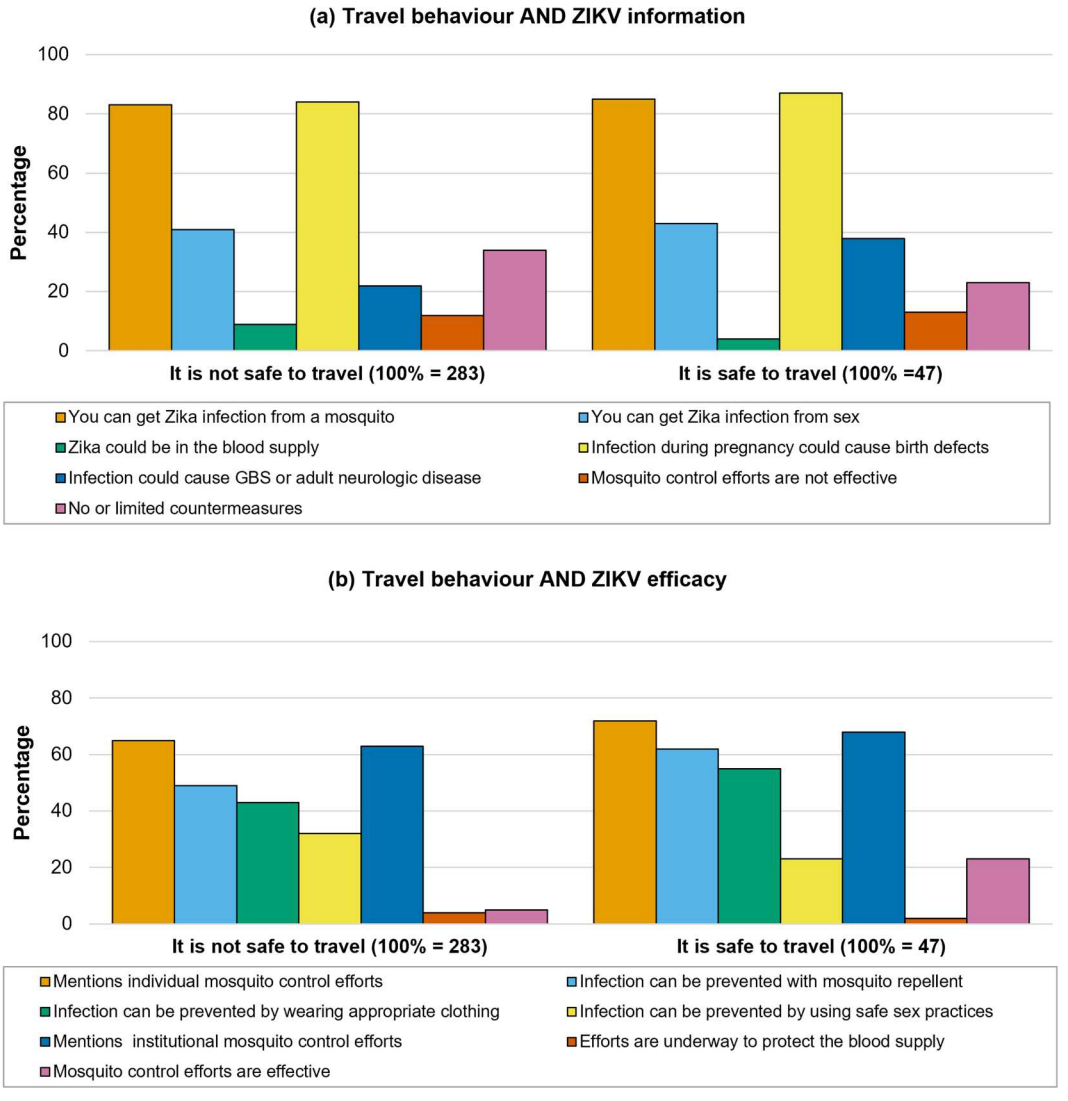

Figure 4. Percentage of articles recommending a travel BEHAVIOUR AND (a) risk messages and (b) protective actions regarding ZIKV. Columns on the left represent the subset of articles suggesting that it is *not* safe to travel. Columns on the right represent the subset of articles that suggested it is safe to travel. The percentages represent the number of each message present in each subset of news articles.

testing (38%), and only 8% mentioned how to treat symptoms. Few articles (52/515) suggested that it was safe to travel despite the MBDs, of which 37% mentioned the symptoms of an infection, 25% provided guidelines for testing, and only 8% made reference to symptom treatment (Figure 6).

Discussion

Experiences with previous epidemics have triggered negative media coverage of tourism destinations, often negatively impacting the tourism sector (Choe et al., 2021; Hugo & Miller, 2017; Novelli et al., 2018). Specially, the recent experience with the COVID-19 pandemic demonstrated the extent of how disruptive an emerging disease can be for the tourism sector (Gössling et al., 2020). Addressing our research questions, results of RQ1 and RQ2 align with what previous

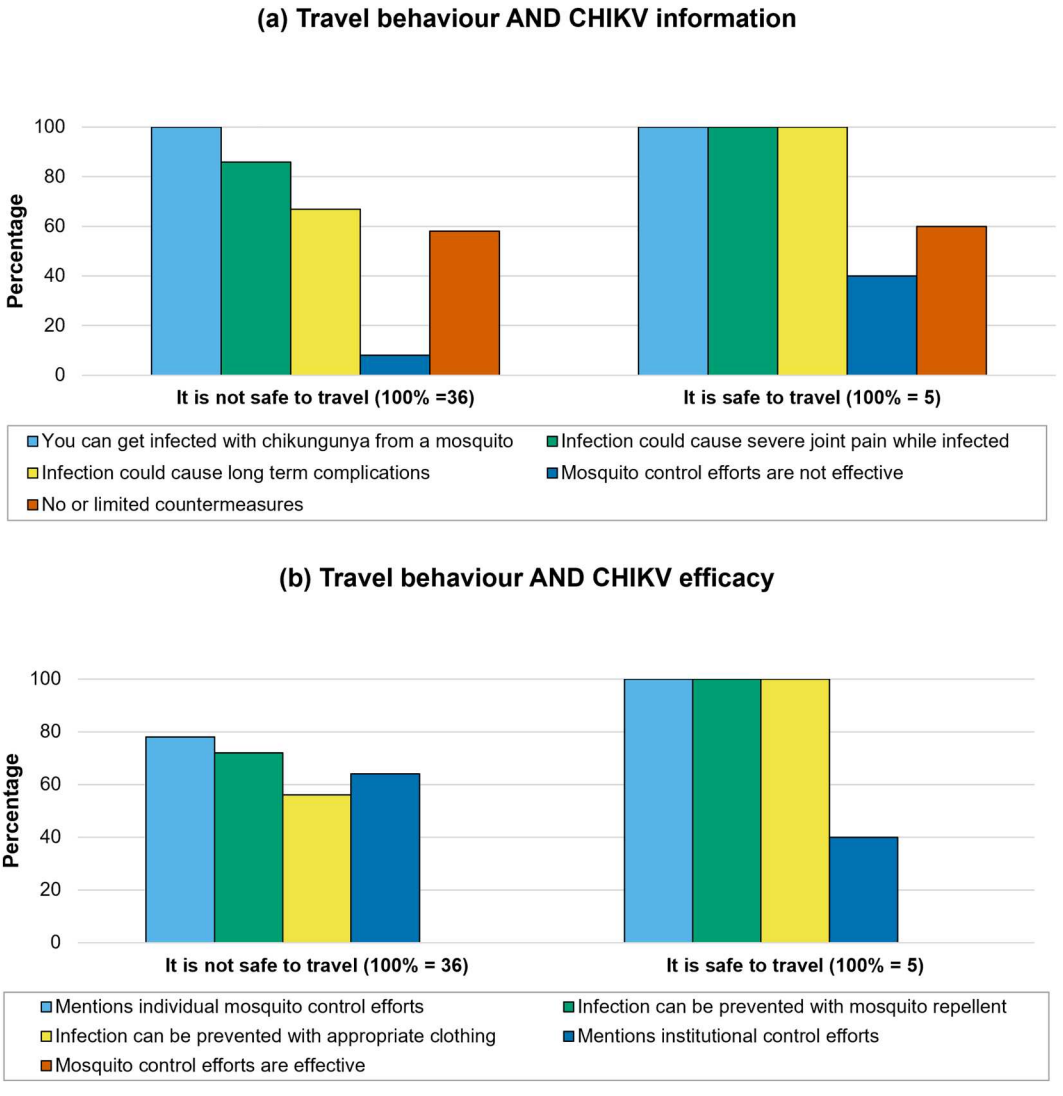

Figure 5. Articles recommending a travel behaviour AND (a) risk messages and (b) protective actions related to CHIKV. Columns on the left represent the subset of articles suggesting that it is *not* safe to travel. Columns on the right represent the subset of articles that suggested it is safe to travel. The percentages represent the number of each message present in each subset of news articles.

studies have found regarding the social amplification of risk framework (e.g. Binder et al., 2015), as we saw a sudden increase in the volume of news articles triggered by MBD-related events (RQ1), and that health messages were unevenly presented, with an overall predominance of messages that can be related to risk amplification (RQ2). These findings can serve to inform practitioners to manage future epidemic-induced tourism crises, as risk communication can serve to mitigate and cope potential impacts of negative media coverage, both proactively and reactively. Especially in news articles that suggest avoiding travelling to certain destinations, there is a need to promote more preventive actions (RQ3), as from the travel industry perspective it would be preferable to inform travellers about how they can travel responsibly, instead of completely avoiding travelling.

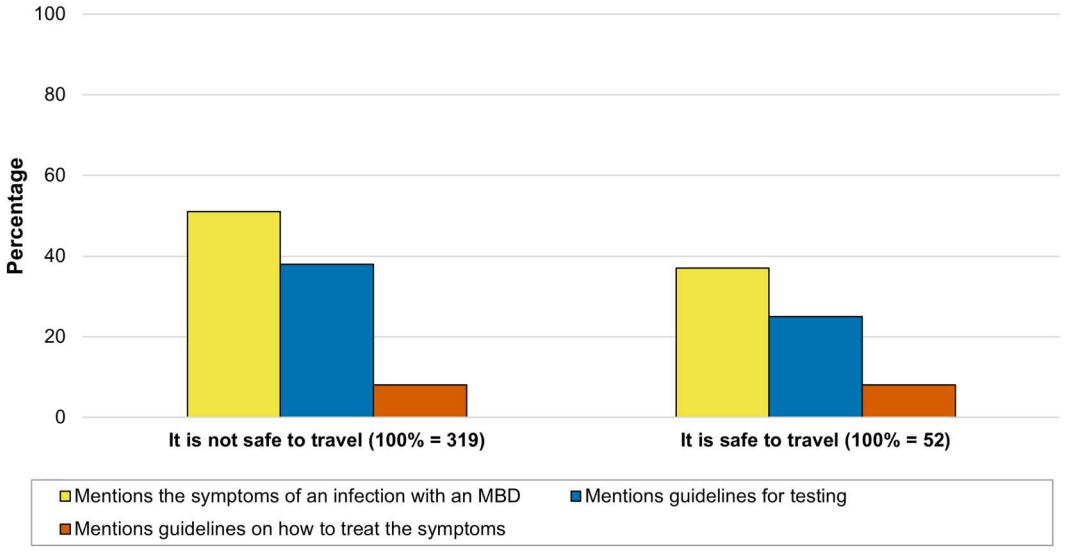

Figure 6. Articles recommending a travel behaviour AND guidance messages if infected. Columns on the left represent the subset of news items suggesting that it is *not* safe to travel. Columns on the right represent the subset of articles that suggested it is safe to travel. The percentages represent the number of each message present in each subset of news articles.

Theoretical implications

Risk amplification triggered by EID-related events

According to the social amplification of risk framework (SARF), a large volume of information flow can serve as a risk amplifier, independent of the content or accuracy of the information itself. Usually, the information flow is triggered by a risk event (Kasperson et al., 1988). The emergence of diseases tends to be novel, unpredictable, evolving, dramatic, and thus newsworthy (Binder et al., 2015; Ophir & Jamieson, 2020; Priest, 2015). Looking at a ten-year period of published news, clearly, Zika and chikungunya viruses were newsworthy topics, shown by the abrupt increase in the volume of news published responding to the outbreaks in the Americas being triggered by particular risk-related events (Figure 3). Even when prior to 2013 for CHIKV and 2015 for ZIKV there were few travel-related cases reported in the US (CDC, 2021a, 2021b), many articles published about ZIKV responded to events like the Pan American Health Organization (PAHO) epidemiological alerts linking ZIKV with increasing congenital anomalies and neurological syndromes in late 2015, the declaration as a Public Health Emergency of International Concern (PHEIC) by WHO in February 2016, and the first locally transmitted case in the US in late July 2016 (PAHO, 2016). Similar results have been found in other content analyses on ZIKV (Jerit et al., 2019; Ophir & Jamieson, 2020; Squiers et al., 2019). Though there were no such specific alerts for CHIKV, it seems that the volume of news coincided with the report of imported cases in the US and the early spread and first peak of cases in Latin America and the Caribbean (CDC, 2021a).

Predominance of some messages over others

Both ZIKV and CHIKV represent an objective hazard to human health, but they also present characteristics that have been associated with elevating risk perceptions, for example being novel or unknown, the possibility of getting infected involuntarily, or the lack of control over their spread (Slovic, 1987). Even when CHIKV and ZIKV share similarities in their symptoms and transmission routes, their specific characteristics might have influenced how they were approached by the media. ZIKV had more presence in the news (73%), while CHIKV was less prevalent (27%). The emphasis on some messages over others has been reflected in other studies, which also showed

higher coverage of general information about the disease and travel avoidance suggestions, and lower coverage of personal efficacy measures (Sell et al., 2018; Squiers et al., 2019). Routes of transmission were classified among the risk-elevating messages (Sell et al., 2018), but other authors label this information as indicators of quality reporting of health threats, along with information about symptoms and personal protection measures (Jerit et al., 2019). Attention should be put on the balance between risk-elevating and risk-minimising messages since strong fear appeals with few efficacy messages can produce defensive responses (Bavel et al., 2020). Along with that, identifying barriers in the adoption and implementation of preventive behaviours could facilitate overcoming them (Squiers et al., 2019).

The dynamic shown in the news between ZIKV and CHIKV, specifically, with respect to the suggested travel behaviours and their potential impact in the tourism industry also differed, probably as a response to the specific consequences each of the infections could provoke. Most of the messages found suggesting that it was not safe to travel came from ZIKV news, and specifically targeted pregnancy. Likewise, most of the articles mentioning a negative impact or challenges in the tourism industry were about ZIKV. Understanding the specific characteristics of an emerging disease could help tourism stakeholders to prepare and adapt to a potential threat. For example, stakeholders may consider using marketing strategies to target visitors that are not in high-risk groups as potential customers (Hugo & Miller, 2017), and/or emphasizing the seasonality of mosquito-borne diseases (i.e. lower risk of infection during dry season) (Kraemer et al., 2015).

Practical implications for future epidemic-induced tourism crises

Risk communication management as mitigating and coping strategies

Coordination among news media, risk communication and public health experts, and tourism industry stakeholders is encouraged, not only to design but also to monitor the coverage volume and the messages transmitted to amplify accurate and timely information for public awareness (Evensen & Clarke, 2012; Squiers et al., 2019). For example, some U.S. federal agencies, like the Centers for Disease Control and Prevention (CDC), already routinely monitor the messaging in news outlets to inform their communication strategies (Prue et al., 2003). Effective risk communication draws not only from multiple disciplines, but also applies this empirical evidence to real-life contexts and stakeholders, thus narrowing the gap between research and practice (Balog-Way et al., 2020); in the context of this study, this could mean partnerships among journalists, tourism representatives, and local health officials to ensure that MBD messaging in local news articles are aligned with relevant best practices from the risk and health behaviour literatures, such as providing personal efficacy information. Planning in advance, collaboration between national and international stakeholders, joint management of communication, and promotional strategies have also been useful to manage crises and recover a positive destination image, along with economic incentives (Hugo & Miller, 2017; Novelli et al., 2018). A certain level of public awareness and perception of risk is needed, not only to avoid fear and panic that can damage the travel industry unnecessarily but to encourage responsible travelling through visitors that are informed to keep themselves safe and healthy, as well as preventing themselves from becoming spreaders of an emerging disease. Often visitors do not conduct pretravel health research, especially if there is a low perceived risk of the destination (Cherry et al., 2016; Kain et al., 2019), which might present the opportunity for an even greater informing role of the news media for travellers.

Need to promote efficacy messages

When dealing with emerging infectious diseases, protective actions happen at two levels, societal and personal (Evensen & Clarke, 2012). In health behaviour literature the promotion of protective actions is intertwined with the concept of self-efficacy, which refers to people's perception about their capabilities to adopt certain behaviour. Many theories acknowledge personal efficacy as playing a role in personal change, as it precedes the adoption of actions (Bandura, 2004).

Communicating personal efficacy in the news can be represented by the description of how to recognize clinical symptoms or signs, or by the reporting on appropriate personal protective measures. Complementarily, societal efficacy refers to the institutional actions that are or should be implemented to address a disease (Evensen & Clarke, 2012). For example, tourism sector stakeholders can implement actions related to waste management to prevent potential mosquito breeding sites (i.e. bottles, caps, plastic bags) in touristic areas, also marketing the initiative so that the visitors know they are visiting a 'safer place' and aiming to motivate them to pay attention and avoid enabling potential breeding sites.

Previous research on other emerging infectious diseases, as well as other studies addressing ZIKV, has shown that societal efficacy messages tend to appear more frequently than personal efficacy messages (Evensen & Clarke, 2012; Sell et al., 2018; You et al., 2017). We failed to find a similar result with respect to CHIKV, possibly due to this disease being viewed as less newsworthy, as least in the U.S. Accordingly, we found more messages mentioning societal efficacy actions than personal protective actions and the mention of clinical symptoms, except in the news about CHIKV where symptoms had a higher coverage. For both MBDs, the suggestion of specific individual actions was present in around half of the news analysed. Guidance messages on how to treat symptoms or how to get tested were even less frequent.

If the tourism industry aims to avoid a decrease in visitors to certain destinations and to prevent travellers to serve as disease spreaders, more emphasis on communicating personal efficacy messages should be stimulated (i.e. promotional strategies, direct communication with customers). A certain level of risk perception, greater awareness, and self-efficacy have been associated with greater intention to change behaviours and to adopt preventive actions to reduce the infection risk (Cherry et al., 2016; Dahlstrom et al., 2012; Dryhurst et al., 2020; Vos et al., 2018). Besides the specific actions described, societal efficacy messages might also reflect a 'watchdog' role of journalism (especially towards government institutions), thus bolstering public trust and ensuring institutional accountability (Evensen & Clarke, 2012; Jerit et al., 2019). The balance between personal and societal efficacy messages and coordination of public health officials with journalists can be challenging, as there are a set of rules and normative and institutional pressures that guide how news media messages are displayed and what topics are covered (Binder et al., 2015; Priest, 2015).

As the recent situation with COVID-19 has demonstrated, effectively managing the impacts of an emerging disease is a complex and intersectoral process that is still evolving (Hall et al., 2020; Sigala, 2020). Lessons learned from previous epidemics, like Zika virus and chikungunya, should inform intersectoral efforts to mitigate and cope with future crises, where risk communication can serve as a strategy. For example, and along with what SARF describes (Kasperson et al., 2022), diverse communication strategies can be used to address some of the ongoing shifts derived from the pandemic, like changes in travellers' preferences, risk perceptions, and the image of a destination (Hugo & Miller, 2017; Novelli et al., 2018; Teeroovengadum et al., 2021). Although each disease has its own characteristics, the analysis and the findings of this study can be transferrable to other situations with emerging diseases and other risks.

Limitations and future research

Our study focused on analysing newsprint media; however, studies using other sources of information could be compared and complement the findings of this content analysis. For example, although SARF has been widely applied to news media, more recent studies have started to integrate and analyse the role of social media as an information source (e.g. Vos et al., 2018; Wirz et al., 2018), which can be a relevant approach within the tourism field as technology evolves. Further research should integrate the perspective of visitors to better understand how exposure to news media, among other factors, may contribute to shaping travellers' knowledge, perceptions, and travel decisions as a response to diverse emerging infectious diseases and other health risks. To this end, the present study will complement ongoing research employing survey methods with travellers

to better understand their risk perceptions and information seeking behaviours when travelling internationally to places where MBDs are endemic. The implementation of longitudinal studies could serve to comprehend how risk perceptions and travel behaviours can change over time (Neuburger & Egger, 2021; Wirz et al., 2021).

Note

1. The current study was conceptualised and carried out prior to the start of the COVID-19 pandemic in early 2020; therefore, we do not reference this significant event in our study. We return to the implications of our results for thinking about future events – including the evolving state of the COVID-19 pandemic – in the discussion.

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Data availability statement

The data that support the findings of this study are available from the corresponding author, EPR, upon reasonable request.

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