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Hajj Pilgrims' Perceptions of Trust and Internet Use for (Emergency) Information

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Cover Page Footnote

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This empirical study examines the patterns of internet use during Hajj, with the broader aim of providing suggestions on how organisations can improve risk communication at crowded religious venues using traditional and new media. The research team adopted a convenience sampling strategy to conduct in-person surveys of 348 Hajj pilgrims in the vicinity of the Grand Mosque in Madinah, Saudi Arabia during the October 2013 season. Of these, 150 pilgrims used the internet and their responses were analysed using simple descriptive statistics and binary regression analyses. The findings of this study suggest that Hajj pilgrims prefer accessing the internet through their smartphone devices and laptops, and both first timers and repeat pilgrims trusted websites hosted by the Saudi Arabian authorities, and their group leaders. Additionally, findings suggest that the trust in information sources and patterns of social media use differed by demographic characteristics such as age, language and economic characteristics. This underscores the need for diversifying the use of both traditional and new media communication channels to increase the diffusion and penetration of risk information for varied groups. Cross-checking of government efforts with such empirical studies helps demonstrate whether the funds expended to improve risk communication and raise hazard awareness are on point to make the pilgrims safer. The paper concludes by acknowledging that although the internet and social media are revolutionising the kinds of information available to pilgrims, they may lead to a loss in the sanctity, simplicity and equanimity of partaking in a pilgrimage, or bring harm to pilgrims through the misuse of personal data collected through social media sites. Suggestions are made to authorities and event organisers to keep a balance between traditional and modern practices of conducting a pilgrimage and designing information and communication technologies. A call for inspiring pilgrims to not only be consumers of information, but rather, providers of information by being ever vigilant is made. Presently, few pilgrimage destinations are using the power of the internet and social media for garnering pilgrims' participation in risk communication and crisis preparedness which is a missed opportunity.

Key Words: Hajj pilgrims, risk communication, trusted sources, internet use, social media, risk warnings

Introduction

Increasingly, emergency management stakeholders around the world are using the internet as a tool for disseminating risk information and raising awareness in simple and easy to understand formats for speedier and effective crisis management (Crowe, 2011; Houston *et al*., 2015; Veil, Buehner & Palenchar, 2011). With its universal reach, the internet serves as a cheap multi-channel risk communication tool. It helps motivate individuals of varying demographic characteristics to become consumers and disseminators of information which aids in diffusion and acceptance of warning

messages and ultimately their protective action behaviors (Starbird & Palen, 2012; Taibah, Arlikatti & Andrew, 2017; Taibah, Arlikatti, Andrew *et al*., 2020).

More and more government agencies are augmenting the use of traditional risk communication channels such as TV, radio or face-to-face methods, with social media via the internet (Wukich & Mergel, 2016; Gupta & Gulla, 2010). Thus, various social media platforms are serving as conduits for providing preparedness guidelines to communities and real-time information to raise situational awareness as an emergency unfolds. Such information is useful in all phases of the disaster management cycle (Wukich, 2016). There are also instances where private sector organisations are using the internet to seek suggestions from the public through crowdsourcing, as was done by the British Petroleum (BP) (a multinational oil and gas company), following the 2010 oil spill in the Gulf (Crowe, 2011; Gao, Barbier & Goolsby, 2011). During the 2010 Haiti and Chile earthquakes, a free 'crowdsourcing' application called 'Ushahidi' provided multisector agencies with maps and real-time data for situational awareness, which in turn helped first response organisations address the needs as they arose (Ushahidi, n.d.).

Thus, the internet has transformed consumers from merely being 'receivers' to 'contributors' of information. In the face of emergencies, it allows people to share eyewitness accounts and experiences virtually with others. Data mined from internet websites is further helping to analyse disaster victims' needs for relief assistance and support from outsiders, and improving crisis management (Ragini, Anand & Bhaskar, 2017). The ability to update information easily and in real time is yet another advantage the internet affords for risk communication and emergency preparedness (Veil, Buehner & Palenchar, 2011). Microblogging sites like Twitter have the capability of disseminating community sourced information by tweeting and retweeting, and building solidarity and a crowd-powered recommendation system. Starbird and Palen (2012) conclude that considering such crowds as a working collective could help in identifying local people who first introduced the original information of value and are the influencers, and can be reached out to help with crisis communication.

However, in this context there is scant evidence in the existing social media literature on how pilgrims use the internet for seeking and sharing risk information. This line of enquiry is especially important because pilgrims are a unique population who are motivated by their faith to undertake some of the most complicated and oftentimes life-threatening journeys. Gaillard and Texier (2010) espoused that our religious beliefs embedded in socio-cultural norms contribute to how we perceive environmental threats. This in turn influences how we respond to them, either positively through strength and prayers that help cultivate resiliencies, or negatively through discriminatory practices (Taibah *et al*., 2017) or fatalistic behaviours. The positive effect in relation to risky situations is noticeable among pilgrims who embark on arduous journeys with the full knowledge of the risks involved. For such devout pilgrims the 'pull factor' of their destination (Fuchs & Reichel, 2011), outweighs their perceived risk factors.

For example, the Hindu pilgrimage to Sabarimala in the State of Kerala (India) attracts 30 million annually. It requires believers to undertake a long trek of 74-87 miles through forests, in a mountainous region to reach the temple situated at an elevation of 4,135 feet. Many pilgrims have been injured or have lost their lives due to massive congestion from crowd crush, stampedes, landslides, spread of food and water-borne gastrointestinal illnesses, airborne contagions and flaring up of pre-existing health problems (Joseph, Babu, Dev & Pradeepkumar, 2016; Taibah *et al*., 2017). Another, is the largest annual mass gathering of Muslims the Hajj pilgrimage which attracts 2.5 million pilgrims from over 140 countries, to perform rituals during the holy month of Ramadan. This is considered the Islamic faith's fifth pillar and all Muslims are obligated to perform a pilgrimage to Makkah and Madinah in the Kingdom of Saudi Arabia (KSA) if they have the resources and are physically capable, at least once in their lifetime, if not annually. The scale and spread of the various sites which form the pilgrimage requires rigorous, tiring travel, often in peak summer heat as rituals need to be completed over a prescribed six-day period (Raj & Bozonelos, 2015).

These circumstances present unique challenges for Hajj management authorities and the government of Saudi Arabia as well as private tour operators who are trying to keep the pilgrims safe from crowd crush/ stampedes and heatstroke like the events which occurred in 2004, 2006 and 2015 which caused 250 deaths, 360 deaths, and 769 deaths respectively (Yamin & Albugami,

2014; Taibah *et al*., 2017). This type of congestion also increases the likelihood of infectious disease spread, requiring the Hajj authorities and the KSA government to constantly refine their procedures to keep visitors and citizens safe (Taibah & Arlikatti, 2015; Taibah *et al*., 2020).

Major research questions

While previous studies have dealt with how internet-based applications have been used to spread emergency information, they have failed to evaluate the trustworthiness of the sources that provide the emergency-related information and how that is likely to impact pilgrims' preferences and perceptions for receiving risk information at crowded religious gatherings. This study aims to fill this gap by understanding the nuances of internet usage patterns of Hajj pilgrims in Saudi Arabia. This line of research will be helpful to crisis managers, emergency personnel, tour operators, and government agencies alike who are concerned with the safety and security of tourists. It has practical implications for improving risk information diffusion and eliciting multi-way participation i.e. tourists as consumers and providers of risk information to the authorities, so as to take better protective action decisions and be safer. It may also help private sector entities in creating apps for different types of consumers (religious or leisure tourists) to raise their situational awareness of risks.

A review of relevant literature on internet user characteristics, trust and risk perceptions of tourists, and the value of internet-based applications for crisis management, have contributed to the formulation of the following four broad Research Questions (RQ):

RQ1: What are the most trusted information sources for Hajj pilgrims?

RQ2: Which are the most effective media channels for emergency related information for Hajj pilgrims?

RQ3: What are the patterns of internet and social media use by Hajj pilgrims?

RQ4: How does internet use differ by the demographic characteristics of Hajj pilgrims?

The subsequent sections begin with a review of literature to guide the quantitative survey questionnaire design. This is followed by the methods section which elaborates on the convenience sampling strategy to conduct interviews with pilgrims in English or Arabic. The analysis section describes the descriptive and inferential statistics, and the binary logistic regression analysis conducted. The findings and discussions section explain what were considered trustworthy sources of information, and what emerged as the internet and social media usage patterns, and whether these were influenced by pilgrims' demographic characteristics and needs. The paper concludes with limitations of the study, and the practical implications for religious venue managers, government agencies, tour operators and citizens alike, on ways to ensure that pilgrims of varying characteristics receive timely risk information and also serve as not only consumers but providers of information on the internet for better risk communication.

Literature Review

Internet user characteristics

The internet serves the role of a social service provider, connecting users with common interests and values and helps develop a sense of community. Internet users are heterogeneous in nature and may be classified into three major groups reflecting their use patterns --- social users, leisure users, and information users (Hamburger & Ben-Artzi, 2000). Social users typically access the internet to chat with close friends and relatives, participate in discussion groups, and satisfy their general communication needs. Leisure users or entertainment seekers are individuals who typically use the internet for browsing the web, gaming and recreational purposes, or for seeking product differentiation information, checking sports scores, entertainment, reading, shopping, etc. Finally, information users access the internet to seek work-related information or look for credible sources to answer their questions. Howard, Rainie and Jones (2001:385) also suggested that the internet is a useful platform for people to engage in 'common forms of daily social interactions'.

Time spent on the internet is influenced by the digital divide which is the gap between those with ready access to computers and the internet, whether due to age or economic reasons and those that do not (Hargittai & Hinnant, 2008). According to the Organization for Economic Co-operation and Development (OECD) an international organisation that works as a knowledge hub for data sharing and analysis with world governments

and policy makers, 60% of the people aged 15-29 listed eight or more reasons for using the internet (e.g., playing online video games and downloading music and videos), while only 14% of those aged 50-74 years listed eight or more reasons for using the internet (OECD Annual Report 2008). Older adults who are new to computers are likely to doubt their ability to learn how to use such technology and become quickly frustrated (Gatto & Tak, 2008).

According to the Pew Research Center (2009), the average number of gadgets owned by a teen is around 3.5 (e.g., cell phone, mp3 player, computer, etc.), while the number for older adults is under 3. Thus, the younger generation seems more attuned to using the internet than the elderly. More recently, Vošner, Bobek, Kokol and Krečič (2016) studied the attitudes of active older internet users towards online social networking and found that people aged 50 years and over, continue to use social media at lower rates than those in younger age groups.

Education has also been defined as a contributing factor in varying internet use. A study by Howard *et al*. (2001) reported that individuals with higher levels of education were more likely to use the internet for acquiring information than those with fewer years of formal education. The latter tend to use the internet for browsing, gaming, or gambling. The knowledge gap hypothesis suggests that the differences in skill levels explain such differences in internet usage. Highly educated individuals may also be well-versed in searching the internet and finding content than the less educated or illiterate. They may also be in jobs requiring higher efficiency that motivates them to use the internet to find answers to meet the demands of their job (Lwoga & Chigona, 2017).

Income level is also a relevant indicator for examining internet usage differences. Di Maggio, Hargittai, Celeste and Shafer (2004) posited that individuals from a higher economic status use the internet more for productive gains, than those with lower incomes who are likely to view buying a computer as 'expensive' and an unnecessary expense. Explaining their lower adoption rates Lunn and Suman (2008) reported that over 75% of non-adopters of the internet were unemployed. While, Lwoga and Chigona (2017) found that as income levels rise, internet usage increases. They argued that both the level of income and the number of sources the user accessed were useful in distinguishing between people who use the internet for obtaining information and those who do not.

Language of the content on an internet site also influences consumer usage as it affects their ability to find useful information (Starbird & Palen, 2012). Hence, it is important to reach out to the targeted population using their native language (Brynielsson, Granåsen, Lindquist, *et al*., 2018), so that both native and non-native speakers can get the requisite information on a website (Kralisch & Bereendt, 2005). Time spent online is an important indicator as it demonstrates interest (Zhou, Fong, Tan, 2014) and the efficacy of this medium for communication purposes. Such trends quickly change people's lives because the internet is not only a gateway for information but also an avenue for enhancing interpersonal communication and connectivity. The internet also offers users a variety of content and increases chances of meeting and befriending people from various parts of the world.

Tourist trust perceptions and internet use for crisis management

Ponnapureddy *et al*.'s (2017) study of German tourists' trust perceptions found that they are influenced by both general trust and specific trust where the former is inspired by the trustworthiness of others (possibly hotels operators/ managers) and the latter is inspired by believable, authentic, information communicated through a hotel's marketing brochure. These two types of trust positively influenced tourists' intentions to take a certain action (in this case to book a hotel with sustainability attributes for their vacation).

Scholars have also found that tourists' trust in a certain place is an important antecedent to the person returning to that place. However, trust is a multi-dimensional construct that is affected by the place's reputation (Wang, Law, Hung, et al., 2014). Thus 'trust is a key quality for success in managing the marketing of tourist destinations' and 'trust towards a destination, influences specific components inherent in an individual's behaviour, such as attitudes' (Artigas *et al*., 2017:327). These studies suggest that pilgrimage venue organisers, government and private sector agencies alike, need to be cognisant of how pilgrims' trust perceptions will influence their decisions to take positive actions as does the destination's reputation in inspiring tourists to return.

Ho, Lee and Hameed (2008) suggested that often times social pressure from peers, familiarity and knowledge of the internet, and religiosity, were positively correlated with online religious information seeking activities. Gupta and Gulla (2010) acknowledged that Indian pilgrims visiting the Vaishno Devi Shrine in North India (situated in a cave at an altitude of 5200 ft.), found the internet useful for obtaining information on where and how to reach the shrine, and timings of the rituals. This enabled navigating the shrine easier, increased pilgrim comfort levels and reduced the time spent in long ticketing lines. They concluded that it potentially influenced tourists' decisions to visit again, and suggested that further studies need to examine how use of the internet can help further improve religious tourists' overall experiences.

However, some scholars bemoan the advent of modern tourism infrastructure and self-monitoring, analysis, and reporting technology (SMART), like Internet of Things (IoT) devices that make use of sensors, chips, software, online connectivity via the internet or Bluetooth, security cameras, smartphones, and watches that combine the of use artificial intelligence, machine learning, and big data analysis for decision making. They propose that these appear to have diluted the spiritual experience of going on a pilgrimage, and commodified its very nature to a more ostentatious touristic experience (Qurashi, 2017). The increasing power of new technology has also led to a worldwide debate on the moral reasons for protecting personal data including prevention of harm, informational inequality, informational injustice and discrimination from using information out of context and encroachment on human dignity (Van den Hoven 2008; Van den Hoven *et al*., 2020). This portends that the organisers of such pilgrimages have a vital role to play in using this new media prudently and managing the privacy of pilgrims. Simultaneously, pilgrims have to also make their own interpretations of what data they really need, and the information they are willing to share to enhance their experiences, and the sources they can trust to ensure safety and security.

In the safety, security, surveillance and crisis management arena, there is a growing trend to develop specific algorithms for mining social media data to assist agencies in effective, real-time crisis management (Ragini *et al*., 2017), and for planning, responding, and researching emerging crises (Houston *et al*., 2015). The practice of reusing and re-sharing social media content is important because,

> *re-sharing is often times seen as a tacit endorsement of an online actor and a confirmation of the trustworthiness of the content which potentially raises the profile of the account from which the information is shared. It also has implications on the diversity of actors and ideas circulating and who is considered to be relevant within these virtual conversations* (Wukich & Mergel 2016:305).

Scholars have found that the efficacy of using social media for broadcasting warning messages depends on how much trust users have in the agency that is disseminating this information (Brynielsson *et al*., 2018). This suggests that closely reviewing pilgrims' reactions to various types of information sent and received, and actions taken through multiple social media platforms will help reveal preferences, trends and attitudes that can be used to improve risk communication through this medium. This can inform emergency managers on how to make adjustments to message content, before, during and after an emergency.

In summary, there is a consensus among researchers that internet-based applications help governments in managing risks in two ways. The first is for dissemination of critical information at different points in time including real-time information and the second, is through the analysis of data and content generated by users, before, during and after a crisis.

Method

Respondents

The second author coordinated data collection with the ***Transportation and Crowd Management Center of Research Excellence*** (TCMCORE) in Saudi Arabia, which provided a research team of 21 data collectors and three supervisors. Of these, 17 were male and 4 were female surveyors, all of whom were proficient in conducting interviews in both English and Arabic. On October 28, 2013, during the annual Hajj pilgrimage, the team conducted in-person surveys of 348 respondents selected using a convenience sampling strategy in the vicinity of the Grand Mosque in Madinah. Although the data collection was part of a larger risk communication study, for this paper, only data related to respondents use of the internet during Hajj were analysed. Thus, the final analysis was conducted on 150 respondents of the total 348.

Survey instrument

A mix of multiple choice and rank order type questions were included in the survey to describe the pilgrims and their patterns of internet usage including, time spent browsing the internet for social or knowledge purposes, location while accessing the internet, technology used for accessing the internet, and demographic characteristics of the users. The responses were either dichotomous (Yes/No), Likert type scale (four levels from 'Not at all' to 'Very great extent'), or nominal data such as age, nationality, language spoken.

In response to **RQ1** - What are the most trusted information sources for Hajj pilgrims? respondents were provided with a list of agencies and peers (GDCG representatives (police, fire, etc.), Tawafa establishments, Ministry of Hajj and Umrah, pilgrimage missions, group leaders, residential/hotel managers, and other pilgrims), and asked to rate their responses on trustworthiness using a 4-point Likert scale with responses ranging from 'Not at all' to 'Very great extent.'

In response to **RQ2** - Which are the most effective media channels for emergency related information for Hajj pilgrims? Respondents were asked to identify the top three most effective means of receiving emergency related information from a list of 11 channels, which were reclassified into four major dimensions: (1) printed materials (i.e. pamphlets, billboards); (2) smart technologies (i.e. text messaging, internet, social media); (3) outreach activities (i.e. messages at mosques, health clinics and public events, bilingual staff outreach); and (4) traditional mass media (i.e. television, radio) (see Taibah *et al*. 2017 for elaboration). The total frequency for the top three responses for each medium were calculated.

In response to **RQ3** - What are the patterns of internet and social media use by Hajj pilgrims? Respondents were asked 'Where do you access [the internet]?' with response choices listed as, (1) devices used (smartphone and/or laptop) and (2) locations (cybercafé, a library, a lounge / media centre, and/or their current place of stay). The responses were coded as 1 if they used the device and the same for any of the locations listed and 0 otherwise. There was a possibility that the respondents used the device but not at the listed location or used another device but not at the listed location choice. Hence, cross-tabulation of frequency of device and location was assessed to understand the patterns of internet usage. Subsequently, three questions captured social media use among pilgrims during the Hajj. The first question asked: 'Do you use social media?' If the respondent answered 'Yes', they were prompted to report 'Which social media technologies?' The choices listed were Facebook, Twitter, Instagram, Chatting Apps (WhatsApp, Viber), and Blogs. Using social media might include looking at posts, interacting with others, liking / commenting on posts, or writing your own content. The respondents were asked to rank their responses on a four-point Likert Scale ranging from 'Not at All' to 'Very Great Extent.' To further examine which types of pilgrims typically posted information on these sites, respondents were asked: 'Do you provide comments about your Hajj experience on social media?' The respondents were provided with a dichotomous choice of either 'Yes' or 'No.'

Finally in response to **RQ4** - How does internet use differ by the demographic characteristics of Hajj pilgrims?, respondents were asked, 'What sorts of websites have you visited in the last month?' Interviewees could choose one or more from, (1) Chatting Websites, (2) News Websites, (3) Emergency Related Websites, and (4) Hajj Websites. internet use was re-classified into two service categories: (1) Social use and (2) Information use (a slight variation to Hamburger and Ben-Artzi's (2000) three categories of use). The differences between the types of sites listed are indicative of the types of activities that users were interested in whilst on pilgrimage, visiting the shrine sites. For example, a chat website is a site at which the user can engage in dialogic interactions and is thus distinct from other websites on which users merely access information. If respondents reported having accessed websites for the purposes of chatting, they categorised as social use, while website visits related to news, emergency management, and the Hajj were categorised as information use.

Demographic characteristics

Respondents' educational levels were coded as a categorical variable with three possible choices listed as, 'Not a High School graduate', 'High School graduate', and 'College degree graduate'. The age of respondents was controlled for and varied between 18 to 65 years with a mean of 43 years. A proxy for income was computed from the respondent's country of residence, which was further classified based on the World Bank's

Classification of the world's economies, estimated as the Gross National Income (GNI) per capita in 2015. Specifically, (1) low-income: $1,025 or less; (2) lower-middle: between $1,026 and $4,035; (3) upper-middle-income: between $4,036 and $12,475 and; (4) high-income: $12,476 or more. However, for the final analysis, respondents from low-income economies and lower-middle income economies were combined into one category.

To understand whether language preferences affected internet use, respondents were asked, 'What language(s) do you speak?' Responses varied from listing one language to multiple languages including English, Arabic, Urdu, Hindi, etc. It is important to remember here that responses were only collected in English or Arabic. This variable was recoded under four classifications: (1) Speaking Arabic only or with another language (not English); (2) Speaking English only or with another language (not Arabic); (3) Speaking both Arabic and English, and; (4) Non-Arabic or English language.

Data analysis

The data were analysed using descriptive and inferential statistics, including binary logistic regression. Only respondents who reported using the internet while at Makkah were used in the final analysis for this paper (n=150). While descriptive statistics and frequencies were computed for research questions 1 to 4, additionally a binary logistic regression analysis was performed to estimate the probability of pilgrims browsing the internet for websites related to news and emergency management information, versus for social use only.

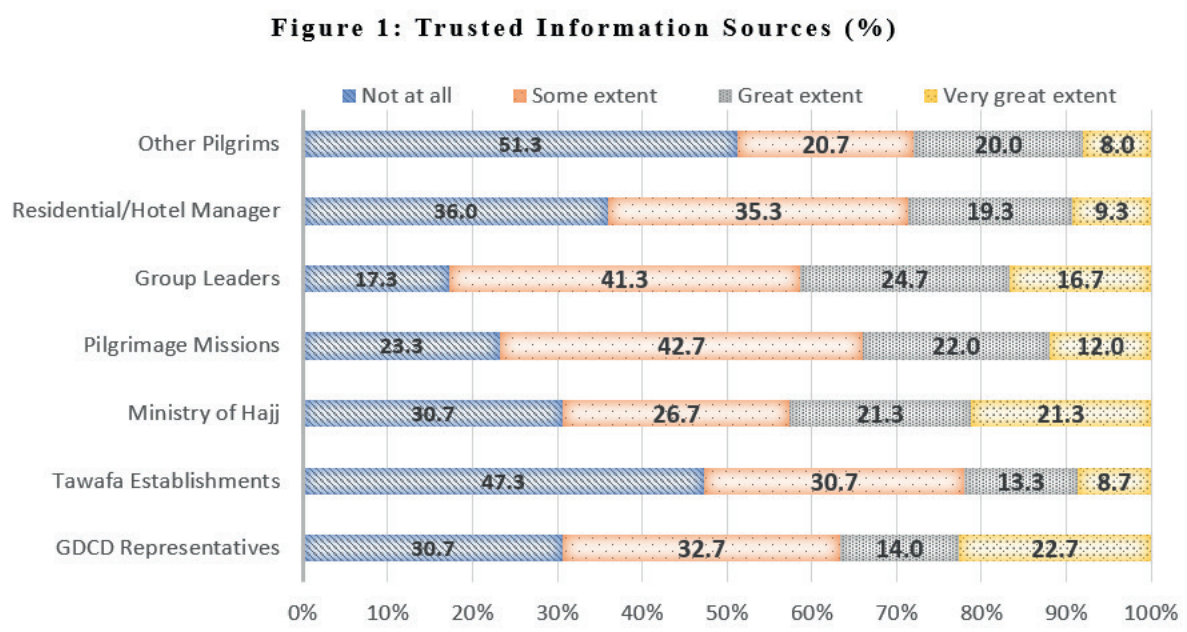
Results

The average age of respondents was 43 years, 55 percent had an undergraduate degree or higher, 42.1 percent were from low-income and low middle-income countries combined, 19.3 percent were from high middle-income countries, and 31.4 percent were from high income countries. Approximately 52 percent spoke English while 11.4 percent spoke neither English nor Arabic. Of the 150 respondents 138 were males and only 12 females, from 36 countries. A majority of the respondents were from India and Pakistan (i.e., about 26 percent) followed by Egypt (i.e., 10 percent). Several other nationalities comprised less than five percent of the sample.

Trusted Information Sources

Respondents indicated that their highest trust was in GDCD representatives (e.g. police and fire department personnel) followed by the Ministry of Hajj and Umrah, i.e., 22.7 percent and 21.3 percent respectively. The

Figure 1: Trusted Information Sources (%)



Ministry of Hajj and Umrah are rightly seen as the primary source of official, authentic information and hence relied upon for important information during a pilgrim's visit to Makkah. Pilgrims also trusted their group leaders for information. Conversely, a majority of the respondents did not trust other pilgrims for emergency / risk information (51.3 percent) and 47.3 percent did not trust information from the Tawafa Establishments. Tawafa establishments are private entities representing individual regions of the world (e.g. the National Tawafa Establishment for Pilgrims of Arabian countries, non-Arab African countries, South Asian countries etc.), who are charged with schedule planning to help pilgrims from a particular region with travel, accommodation, and completing the Hajj rituals conveniently and smoothly (Ministry of Hajj and Umrah, n.d.). It is likely that these for-profit entities may be perceived as exploiting the pilgrims and hence ranked lower on trustworthiness (See Figure 1).

Effectiveness of Media Channels

Respondents identified printed materials (i.e. pamphlets and billboards) as being the most effective in providing emergency information by rating these the highest at 38.0 percent, followed by smart technologies (i.e. internet, social media, and text messaging) at 33.1 percent. Since there is a growing trend in the use of digital media, it should be given priority along with pamphlets for sharing government directives and emergency information with Hajj pilgrims. This new media is more important than printed materials as it is dynamic and can be adjusted in real-time, allowing for updates during crises. Other noteworthy patterns were the continued effectiveness of traditional mass media (i.e. TV and radio) and outreach activities (i.e. at mosques, health clinics, bilingual staff) as the respondents' third choice, i.e., 31.3 percent and 34.4 percent (see Figure 2). This is similar to findings by other scholars who found that when language barriers exist, people trust pamphlets and bilingual outreach staff more than other media (Arlikatti, Taibah & Andrew, 2014).

Patterns of internet use

64.7 percent (97 of 150) of respondents reported using the internet in Makkah during the Hajj (see Table 1). A majority of the respondents (i.e., 61.9 percent) accessed the internet via a smartphone device, while only 18.8 percent of respondents who reported using the internet during the Hajj accessed it via laptop. The Hajj authorities should therefore, continue developing websites and mobile apps to meet the growing needs of pilgrims to use this medium. Simultaneously, they must continue their commitment to reach out to those less technologically savvy like the elderly by disseminating printed materials and outreach activities using multilingual staff at specific locations such as libraries (40.2 percent), lounge / media centres (i.e., 39.2 percent), and places of residence / accommodations (i.e., 47.4 percent).

Figure 2: Effectiveness of Media Channels for Emergency Information (%)

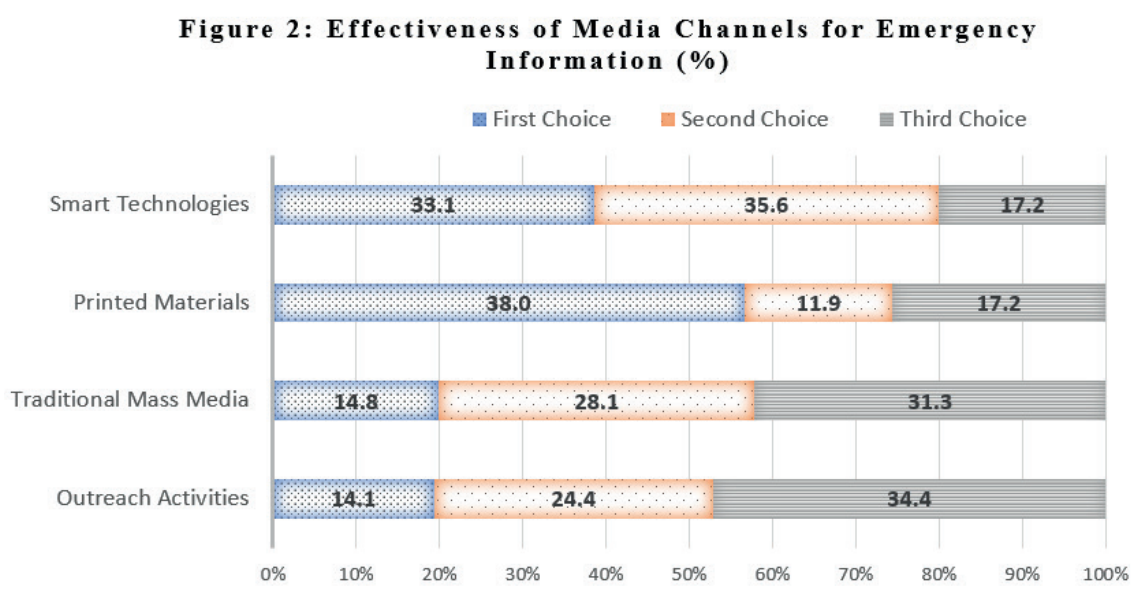


Table 1: Use of Internet Across Modes		
	Freq.	**%**
Used internet in Makkah (n=150)		
No	53	35.3
Yes	97	64.7
Mode of internet use (n=97)		
Smart Phone	60	61.9
Laptop	18	18.8
Cybercafe	22	22.7
Library	39	40.2
Lounge	38	39.2
Residence	46	47.4

Patterns of Social Media Use

56.7 percent of respondents reported using social media. A majority favoured Facebook (i.e., 94.4 percent), followed by Twitter (i.e., 51.9 percent) and chatting apps (50.0 percent). Only 7.5 percent reported accessing Instagram, indicating it was the least popular social media app used by pilgrims. This is likely because a majority of the pilgrims are older adults, while Instagram is more popular among the youth. About half the respondents who used social media during Hajj, posted comments about their varied experiences during the pilgrimage (see Table 2).

Table 2: Patterns of Social Media Use		
	Freq.	**%**
Was social media used during Hajj (n=97)		
No	42	43.3
Yes	55	56.7
Type of social media used (n=54 - 1 missing response)		
Facebook	51	94.4
Twitter	28	51.9
Chatting Apps	27	50.0
Instagram	4	7.5

Predictors of internet use by Hajj pilgrims

Logistic regression models helped explain four types of internet websites accessed by Hajj pilgrims for (1) Chatting (2) News (3) Emergency information and (4) Hajj information. The reported statistical significance of these models with their pseudo-R2 values ranged from 67% for chatting websites to 19% for Hajj information (see Table 3).

There is evidence to suggest that, on average, older adults were less likely to use the internet for information from Hajj Websites (i.e., exp(-0.05) = 0.947, p<0.10). Compared to those from low income economies, those residing in high-middle income economies were less

Table 3: Predictors of Internet Use by Hajj Pilgrims

	Chatting On-line			Hajj Websites			Emergency Websites			News Websites		
	B	*S.E.*	*Sig.*	*B*	*S.E.*	*Sig.*	*B*	*S.E.*	*Sig.*	*B*	*S.E.*	*Sig.*
Age	-0.05	0.05	0.33	-0.05	0.03	0.08	-0.01	0.03	0.77	-0.01	0.04	0.89
Education Level (1 - 3 Categories)	0.72	0.61	0.24	0.23	0.48	0.64	-0.33	0.49	0.51	0.93	0.78	0.23
Residency Ref: Low Income Economies												
High Middle Economies	-0.21	1.16	0.85	0.53	0.87	0.54	-1.36	0.84	0.10	0.56	0.99	0.57
High Income Economies	-1.45	1.01	0.15	0.75	0.69	0.28	-0.25	0.64	0.69	-0.09	0.88	0.92
Language Ref: Non-English/Arabic												
English Only	-1.69	1.50	0.26	-2.22	1.35	0.10	0.79	1.03	0.44	0.64	1.46	0.66
Arabic Only	-2.59	1.68	0.12	-3.28	1.56	0.04	-1.65	1.49	0.27	22.40	11101	1.00
English & Arabic	-3.41	1.89	0.07	-1.88	1.66	0.26	1.67	1.39	0.23	0.59	1.98	0.77
Frequent use of Internet in Makkah (0-5)	0.57	0.40	0.15	0.14	0.31	0.65	-0.19	0.30	0.52	-0.09	0.48	0.86
Visited Makkah before, (Yes=1)	-0.93	1.00	0.35	-0.18	0.76	0.81	-0.06	0.72	0.93	-0.59	1.12	0.60
Access to Internet												
Lap-top (Yes=1)	3.53	1.36	0.01	-0.39	0.73	0.59	0.34	0.71	0.63	0.14	0.94	0.88
Smartphone (Yes=1)	4.06	1.35	0.00	0.54	0.74	0.47	0.39	0.70	0.58	3.97	1.18	0.00
Current Place of Residence (Yes=1)	-1.87	1.04	0.07	1.81	0.71	0.01	-0.48	0.59	0.42	-0.26	0.75	0.73
Constant	-1.72	3.09	0.58	2.91	2.27	0.20	0.91	2.14	0.67	-3.03	2.99	0.31
Number of Observations		150			150			150			150	
-2 Log likelihood		47.338			86.157			94.354			59.349	
Prob>Chi2		0.005			0.055			0.569			0.032	
Cox & Snell R-Square		0.485			0.196			0.145			0.425	
Nagelkerke R-Square		0.672			0.266			0.194			0.579	

likely to use the internet to search for information related to Emergency Websites (i.e., exp(-1.36) = 0.256, p=.10). Compared to non-Arabic and non-English speakers, on average, those who only spoke one language i.e. either English or Arabic were less likely to browse Hajj Websites (i.e., exp(-2.22) = 0.109, p=.10; exp(-3.28) = 0.038, p<0.05). In other words, respondents who spoke neither English nor Arabic were more likely to chat online (i.e., exp(-3.41) = 0.033, p<.10) and visit websites that were related to the Hajj.

While the access to the internet for chatting is self-explanatory, the likelihood of non-Arabic or non-English speakers seeking information about the Hajj online, indicates the unavailability of such information on-site in their respective regional languages. This is an important finding as lack of key information especially during emergencies can lead to higher casualties or injuries. This underscores the importance for public and private entities charged with the safety and security of the pilgrims, to augment information diffusion through web-based platforms that give users the option to translate the information to a language of their choice. Hajj pilgrims tend to access the internet via their laptop or smartphones. While they generally prefer to visit Hajj websites online from their place of stay (i.e., exp(1.83) = 6.114, p<0.01), they are less likely to chat online from their place of residence (i.e., exp(-1.87) = 0.154, p<.10). We found that laptop and smartphone devices are often preferred by pilgrims for accessing online information, they are also likely to be used to gain internet access for chatting. We did not find evidence that smartphones or laptops were preferred for accessing emergency and Hajj related information online.

Discussion and Implications for Practice

The findings of this study suggest that Hajj pilgrims prefer accessing the internet through their smartphone devices and laptops and trust websites hosted by the KSA government (Ministry of Hajj and Umrah) authorities and their group leaders. This is important in order to enhance and sustain the efficacy of risk communication as these trust levels are demonstrated by first time pilgrims and repeat visitors alike.

Moreover, pilgrims are also likely to share information provided by these sources (Ministry of Hajj and Umrah and group leaders) through various social media sites like Twitter, blogs, Facebook posts, Instagram etc. before (during normal times), during and after a crisis. Along with being transmitters of such information, it is important to convince pilgrims that there is value accrued in participating in a two-way or multi-way communication with government entities and their social networks through these internet supported platforms. Group leaders can be key in monitoring and collecting social media data in case of an emerging crisis, to help raise situational awareness and keep pilgrims safer.

The research findings also suggest a need to raise risk awareness using different social media platforms and disseminating information using other popular languages. These efforts are already underway as initiatives by the Hajj authorities. Currently, the Saudi Arabian Ministry of Media provides livestreaming of Hajj rituals through YouTube, Google, iTunes, Twitter, and Facebook (World Religion News, 2017; Propakistani, n.d.; Hajj 2017, n.d.). The Ministry of Hajj and Umrah also updates the public regularly about Hajj and Umrah rituals, facilities, news, and other updates using internet technology (Khan & Shambour, 2017; Propakistani, n.d.). This Ministry not only provides verified accounts on major social media networks but has also initiated the 'Manasikana' application to enhance its communication with pilgrims through eight main languages. Information including navigable maps, boundaries, weather reports, ritual timings, important Hajj dates and instructions, and safety related information are regularly updated and available (Unmid, n.d.; Online Sense, n.d.). The information from the app can also be accessed offline (Arab News, 2018) which is very useful to pilgrims from low-income countries who cannot afford to buy data packages to access the internet via their phones.

Furthermore, the Saudi authorities offer free Wi-Fi access on public transportation systems like buses so that pilgrims who cannot purchase expensive international data plans can be connected to government sites and social media sites on the go. Khan and Shambour (2017) analysed the quality of 10 selected applications used by Hajj pilgrims based on characteristics such as engagement, functionality, aesthetics, information, and subjective quality and found that the 'Manasikana' app scored 2.62 out of 3, clearly demonstrating that pilgrims are benefiting from this application.

The results of this study also show that the trust in information sources is not the same for all Hajj pilgrims. This underscores the need for diversifying the use of both traditional and new media communication channels so that pilgrims can receive and cross-check information from each other and also from multiple channels. Local Hajj authorities can continue to rely on face-to-face communication and traditional media channels including T.V., radio, pamphlets, billboards, and bilingual staff outreach during the Hajj.

Efforts must be continued to improve public service announcements, flashing signs on major thoroughfares, and information provided to pilgrims at points of embarkation (their own country) and disembarkation (in KSA) through licensed tour operators. Simultaneously, dedicated and trained personnel should be recruited from safety and security agencies, to monitor the posts and data shared by pilgrims to ensure that no rumours are being spread. This is key to ensure that in case of an emergency at the pilgrimage sites, people adopt the actions recommended by trusted sources and not fall prey to erroneous information which can be detrimental to their health and safety (Arlikatti, Huang, Yu, *et al*., 2019).

Conclusions

This empirical study examined the general patterns of internet use by 150 pilgrims during the October 2013 Hajj pilgrimage season and focused specifically on pilgrims' preferences for specific websites regarding different types of information. As with any study, this study is not without its limitations. First, the data were collected during the 2013 Hajj season, and internet use has changed globally in the past eight years. Future research should update the data to explore changing usage trends and their impact on risk information diffusion, acceptance and protective action decision making. Second, our sample of pilgrims includes mostly male and only a small number of female pilgrims. This is likely to have biased our findings and also limited the generalisability of the findings. Future studies should strive to get a more representative sample of female respondents to understand if they have different internet usage patterns or needs for information. Third, the quantitative survey design may have limited pilgrims' responses and prevented respondents from elaborating on other challenges or share vital information. Future studies could adopt a mixed methods approach to draw out a wider range of responses.

In conclusion it is important to acknowledge that although the internet and social media are revolutionising the kinds of information that are at the fingertips of pilgrims, they come with their share of risks and challenges. Firstly, pilgrims overusing smart technologies like smart phones for taking photos / selfies, posting live on Twitter / Instagram / Facebook, may lead to a loss in the sanctity, simplicity and equanimity of the shrine site and the religious tenets of partaking in a pilgrimage (Quarashi, 2017). Secondly, if pilgrims' personal data collected through social media sites is misused and they come to harm, they may lose trust in the organisers, and refuse to return, and even claim compensation, causing loss of reputation to the host country. Hence, we join the call by other scholars to ensure a balance between the traditional and modern practices of conducting a pilgrimage (Quarashi & Sharpley, 2018) and designing information and communication technologies that account for human values such as 'preserving privacy' in their design systems (Van den Hoven *et al*., 2020).

Despite these limitations, risks and challenges, this empirical study makes a valuable contribution as it is the first one of its kind to examine internet use by Hajj pilgrims. The outcomes have practical implications to enhance and provide effective online information for emergency and non-emergency communication at crowded pilgrimage venues. Some specific recommendations from this study for multi-sector organisations are:

- Information related to the main pilgrimage venue, timings of various rituals, travel requirements, accommodations, risks involved at shrine sites and various other related information and announcements should be available in multiple languages through traditional and social media, to cater to the needs of a varied demographic of pilgrims.
- Both mobile and web-based compatibility of websites should be envisioned for important information sharing and services from the time of arrival of the pilgrims to the time of departure from the religious venues. This will ensure that there is no digital divide or information asymmetry for pilgrims from different countries.

- The religious venue management authority (e.g. Ministry of Hajj and Umrah) should set up a nodal agency to allow pilgrims to submit real-time crisis information, eye witness reports or grievances, either face-to-face or through the internet. This will increase the trust that pilgrims have in the organisers and also assist the crowd and public safety management agencies in ensuring safety and security of religious tourists—especially first timers.

- Pilgrim group leaders from various countries who have the trust of their peers, should be identified and provided with online informational training before they embark on the pilgrimage and also upon arrival at the venue, on how to receive, disseminate and upload critical information to and from peers in their groups either through social media or more traditional and face-to-face methods, so as to reach the minorities in their groups.

- Strategic public facilities and locations should be identified as shelter locations for pilgrims to gather in case of emergencies and evacuation and sheltering plans should be communicated via websites and apps, to Tawafa establishments, group leaders, pilgrims and hotel owners to raise awareness and preparedness levels of pilgrims.

- After the pilgrimage season is over organisers at all levels should examine the efficacy of the multiple media channels for ease of use, accuracy, timeliness and availability, to fine-tune before the next pilgrimage season.

Information collected from religious tourists using social media, if leveraged effectively, can help pilgrimage venue authorities better manage emergency situations. Classifying and analysing texts received through multiple social media platforms can help emergency responders locate people at risk, or create situational awareness, or as a planning tool for responding, and researching emergency situations. Technologies can also be used to inspire pilgrims to not only be consumers of information, but rather, providers of information by being ever vigilant about emerging threats and risks. Presently, few pilgrimage destinations are using the power of the internet and social media for garnering pilgrims' participation in risk communication and crisis preparedness. This missed opportunity should be tapped into.

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