Lost in Translation? Exploring the journey from press releases to news articles during volcanic crises, and its impact on perceptions.

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Abstract

The world in which we communicate has changed rapidly in recent years; information from official bodies can be posted, shared, translated, re-interpreted and disseminated rapidly via online news outlets and social media. The increased use of the internet means that science communication can be spread more than ever, from online news to press releases being shared on social media. The modern drive of the press industry can cause news about events to be sensationalised to create interesting stories, therefore potentially impacting the public perceptions of a volcanic crisis. This study aims to better understand how the 'translation' of press releases by the mainstream media impacts the behaviours and perceptions of the global community during a volcanic crisis. Here we show that translation from press releases to news articles is not always linear and different media companies translate press releases differently. This therefore impacts public perceptions of volcanic events as the news articles do not always portray the events accurately and the public's perceptions can be impacted by many extraneous factors. It is thought that this research will be the starting point into more research into press release translation and that the results of this study can show the true impact of sensationalist language within the press industry.

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Chapter One – Introduction

During a volcanic crisis, effective communication between volcano observatories, local government, civil defence authorities, the media and the public is crucial in ensuring the safe management of the situation. A breakdown in this chain of communication may lead to unsafe behaviours, mistrust of authorities, economic impacts, anxiety, or at worst, fatalities (Williams and Krippner, 2019). Over the past 100 years, various stakeholders have made progress in volcanic crisis communication, but the 21st century presents significant challenges (Fearnley et al., 2018).

The world in which we communicate has changed rapidly in recent years; information from official bodies can now be posted, shared, translated, re-interpreted and disseminated rapidly via online news outlets and social media. So-called 'fake news' is able to spread fast. Widespread use of the internet means that crises communications must now be fast paced and sustained, pushing the limits of those working in internal communication (Driedger et al., 2008). Social media can provide positive outcomes during a crisis, such as during the Queensland and Victoria floods of 2010/11 (Bird et al., 2012), but also presents opportunity for miscommunication; for example, by the interpretations of amateur scientists being picked up by news outlets and spreading fear throughout communities in hazardous areas (Williams and Krippner, 2019). The modern drive of journalism to create different angles and interesting 'stories' can lead to conflicting comments from multiple sources that could cause public doubt about how well a hazard is being monitored and managed (McGuire et al., 2009). It is therefore becoming increasingly important to understand how the language used in various types of media and communication impact on public behaviours and perceptions during volcanic crises.

1.1 Aims

This project aims to better understand how the 'translation' of press releases by the popular media impacts the behaviours and perceptions of the global community during a volcanic crisis. The work has relevance for volcanic hazard communication, but also to the broader realms of geological hazards communication and risk analysis.

1.2 Research Questions

To achieve this aim, the project will focus on two research questions:

1. How is the language used in volcanic crisis press releases variably ‘translated’ into news articles?
2. How is this language viewed and interpreted by the general public, and what impact does it have on their perception of volcanic hazards, risk and uncertainty?

Chapter Two - Literature Review

This literature review will provide a basis of knowledge around the subject area of this study. It will give an insight into how science and volcanic crisis communication has been done in the past, as well as presenting an understanding of news media and the current impact on public perceptions. The findings of this research, will not only become a basis of the research thesis, but will allow for results to be compared to previous understandings of the topic.

2.1 Case Study

The case study that will be used within this research is Kilauea, located on Big Island, Hawaii, USA. The volcano can be described as a shield volcano, with a mainly basaltic makeup (USGS, 2021). The surface of Kilauea is dominated by the products of past sustained eruptions; it consists of, 67% tube fed pahoehoe, 14% surface fed pahoehoe and 16% ‘a‘ā (Holcomb, 1987). According to United States Geological Society (USGS), the volcano’s East Rift Zone has nearly continuously erupted from 1983 to 2018 (USGS, 2021). The U.S. Geological Survey's Hawaiian Volcano Observatory (HVO) is responsible for the monitoring of Kilauea. This includes determining the amount and composition of gases emitted by Kilauea Volcano and monitoring changes in gas emissions (USGS, 2021). In May 2018, Kilauea experienced its largest lower East Rift Zone eruption and caldera collapse in at least 200 years, leading to the opening of eruptive fissures on the 3rd May, extending for around 6.8 km (Tang et al., 2020). The event was preceded by multiple earthquakes which continued through the eruption. On the 4th May an earthquake accompanied a fault slip of approximately 5 m. Lava erupted at rates of over 100 cubic metres per second and eventually covered around 35.5 square kilometres of land (Neal et al., 2019).

The volcano was closely monitored for months prior to the eruption and eruption indicators were observed from the 1st of April 2018. These observations included the gradual inflation, surface deformation and remarkable change in the seismic velocity only ten days prior to the eruption beginning (Olivier et al., 2019). During the eruption, HVO quickly established 35 temporary monitoring stations to constrain the evolving volcanic hazard (Shiro et al., 2021). 29 resident members of HVO quickly set up 24 hour operations and established a presence in the local emergency operations centre to advise civil defense (Williams et al., 2020). The team worked under complex conditions, such as earthquakes and damage to the HVO facility to develop solutions. This

included, development of hazard assessments, working with emergency departments, conducting fieldwork and attending public meetings (Williams et al., 2020). Along with the HVO team, agencies collaborated in the management of the volcanic crisis. These agencies included, The National Park Service, National Weather service and the Hawaii State Emergency Management Agency, along with many others (Williams et al., 2020).

The local, national and global interest in the eruption remained high throughout the aftermath of the crisis, meaning that USGS had to give daily briefings to the media and participants in weekly meetings (Williams et al., 2020). The USGS also continuously communicated with the public by answering direct enquiries and providing up to date information on their websites, including twitter (Williams et al., 2020). Since the cease of eruption activity, HVO have continued to engage with residents about the presence of scientists and technicians in the area as rebuilding takes place (Williams et al., 2020). The eruption was one of the most destructive eruptions in Hawaii in the past 200 years (Patrick et al., 2020). The eruption destroyed 700 structures, covered dozens of farms and miles of highway, potentially destroying livelihoods (Neal et al., 2019). No official casualties were recorded, but it is impossible to quantify the emotional toll on the population disrupted by the eruption (Patrick et al., 2020). Emissions of ash, gas and lava, producing Vog (volcanic smog), which had an environmental impact. Vog on air quality and the ecosystem, potentially having long lasting effects on the population's health, especially those with pre-existing conditions, and also the variation of wildlife found in the area (Tang et al., 2020).

2.2 History of Volcano Science Communication

2.2.1 Definition of Science Communication

Science communication has a vital role to play in modern society. It empowers the public to attain an interest and ability to engage with science whenever they need to do so. Science communication can be defined as the use of appropriate skills, media, activities and dialogue to produce responses, such as awareness, enjoyment, interest, opinions and understanding (Burns et al., 2003).

2.2.2 Volcano communication in historical arts and literature

Throughout history, volcanoes have fascinated humanity. Historical records show that volcanic crises have been recorded and communicated since as early as the third millennium BC; this communication has continued to evolve through time and into the present (Chester et al., 2018). In the 1980s, it was established that even before there were written records of volcanoes, volcanic activity was depicted in art, orally through folklore, and often formed part of religious rituals (Blong,

1984; Chester, 2005). Mount Vesuvius was the most common volcano celebrated in literature and art; due to the ready market for vividly coloured images of erupting volcanoes (Pyle, 2017).

Discovered on December 18, 1994, the Chauvet-Pont d'Arc cave provides some of the earliest manifestations of prehistoric art (Nomade et al., 2016). Previous research found that ages of volcanic eruptions in the area, using 40Ar/39Ar, between 29 ± 10 ka and 35 ± 8 ka (2σ), which overlaps with the first Aurignacian occupations of the cave (Nomade et al., 2016). It is thought that spray shaped signs found within the cave are depictions of strombolian volcanic cones visible from only kilometres away (Nomade et al., 2016).

The eruptions of Mount Etna were some of the first to be known by European observers. Records of eruptions can be dated back to as early as the Ancient Greek and Roman era (Chester et al., 2018). Etna's eruptions feature in classical literature, usually through reflections of mythological characters. As well as through the use of poetic language, which scientists later translated into fact (Chester et al., 2018). Mount Etna was not the only volcano that influenced historical art, for example, Olson et al.(2004) discussed the inspiration behind Munch's iconic painting 'The Scream' as potentially being the 1883 eruption of Krakatau. Munch was known to live in Christiana, Copenhagen during the 1880s, where the Royal Society of London reported a red glow in the sky due to the eruption (Olson et al., 2004).

2.3 Volcano Crisis Communication

2.3.1 What is volcano crisis communication?

Science communication has a vital role to play in modern society. It empowers the public to attain an interest and ability to engage with science whenever they need to do so. Science communication can be defined as the use of appropriate skills, media, activities and dialogue to produce responses, such as awareness, enjoyment, interest, opinions and understanding (Burns et al., 2003).

This research thesis focuses on volcanic crisis communication. Volcanic crisis communication has previously been described as all forms of communication during a volcanic crisis. This includes communication between equipment and scientists. Also, the interpretation by scientists and communication between scientists and officials during the decision making process (Fearnley et al., 2018). For the purpose of this research, volcanic crisis communication must also include communication between those parties and the general public. It can therefore be described as the following: 'the communication that takes place between scientists, officials, stakeholders and the

general public during a volcanic crisis'. Fearnley and Beaven (2018) argue that, within volcanic areas, volcanic crisis communication is an "important part of everyday life". Translation and two-way communication of credible and relevant information during a volcanic crisis enables all involved to understand the situation (Fearnley and Beaven, 2018).

2.3.2 Early media involvement in volcano crisis communication

The 1883 eruption of Krakatau was the first eruption to receive global interest (Dörries, 2003) due to the introduction of undersea telegraph lines in the mid-19th Century that allowed for global communications. Newspapers had the new ability of being able to report the event only a day after it occurred, therefore increasing interest across the world. The 1883 eruption had double importance as both a media and natural event; it linked far-flung colonies closer than ever to Europe, and consequently changed how science was performed and perceived by colonies (Dörries, 2003).

Some of the first photographs taken of volcanic phenomena, such as of pyroclastic density currents deposits, were taken by scientists at La Soufrière, St Vincent, after it's 1902 eruption (Anderson and Flett, 1903). Work on these eruptions and the simultaneous eruptions of Mount Pelée played an important role in the advancement of volcanic science, especially in the understanding of pyroclastic density currents (Pyle et al., 2018). These photos were a turning point in science communication, especially for those who attended the subsequent lectures (Williams and Krippner, 2019).

2.3.3 Significant moments in volcano crisis communication

Mount St. Helens, Washington, erupted cataclysmically on the 18th May 1980 after two months of seismic and intermittent phreatic activity, monitored by scientists (Peterson, 1990). The eruption lead to the death of 57 people, including volcanologist David Johnston, and the destruction of wildlife, including over 600km² and around $1 billion of damage (Peterson, 1990). As part of the two month monitoring activities, the geological survey also translated the information to those who were unfamiliar with the science of volcanoes; reporters and the public (Geological Survey, 1984). The eruption was one of the first volcanic crises to receive high public interest across the world. It was one of the top ten international news stories of 1980 according to polls by the Associated Press, making it one of the most significant volcanic crises in modern history (Geological Survey, 1984). The Geological Survey worked harmoniously with news representatives, regardless of their lack of training or experience, to provide the public with regular updates (Geological Survey, 1984).

The 1980s eruption of Mount St. Helens also saw the development of the volcano alert level system (VALS). This was first outlined in a 1985 report from the United Nations Disaster Relief Organisation; first described as 'Stages of Alert of Volcanic Eruption (UN. Office of the Disaster Relief Co-ordinator (UNDRO), 1985; Fearnley et al., 2012). The cyclic eruptions between 1980 and 1986 (Swanson and Holcomb, 1990) allowed development of accurate warnings to be formed 3 weeks in advance for 19 out of the 21 eruptions (Bailey et al., 1983) and the system has been used in volcanic crisis communication ever since. VALS provides a progressive alert level based on eruption indicators. It also provides an approximate time period of eruption and a recommended disaster plan (Fearnley and Beaven, 2018).

The impact of the 1980 eruption and the changes in modern media meant that coverage of the renewed volcanic activity of 2004 was intense (Frenzen and Matarrese, 2008). At the media peak, there were 24 satellite trucks at the volcano and media calls from around the world at a rate of 2 per minute (Frenzen and Matarrese, 2008). The media relationship between the 1980 and 2004 eruptions of Mount St. Helens indicates how international media coverage increases the public and media's behaviour towards volcanic crises. Without the media coverage of the 1980 eruption, the public and media interest in the 2004 renewed eruption may not have been triggered to the same scale.

One of the most notorious volcanic events in recent history was the 1985 eruption of Nevado Del Ruiz in Colombia, which took the lives of 23,000 people. The huge loss of life has since been attributed to poor and ineffective communication (McGuire et al., 2009). Scientific studies predicted the likelihood of a potential future volcanic crisis and the vulnerability of several towns to eruption generated lahars (Scarpa et al., 1996). However, the government's lack of will to act meant that they were insufficient in giving reliable warnings. This meant that there was a lack of emergency management plans and hazard maps put in place before the event took place, therefore contributing to the tragic outcome (Scarpa et al., 1996). Lessons were learnt, including the importance of hazard assessment, identification of vulnerable populations and sufficient communication across the populations effected (Scarpa et al., 1996).

When media coverage of Ruiz did begin to occur, the differences in cultures across the cities played a role in the crisis response. The government of Manizales, which was not in the path of the eruption, was attentive to the potential of Ruiz. However, smaller cities, such as Tolima, had governments who were poorly informed and sceptical (Hall, 1992). This difference in views of the crisis therefore impacted the media within the two areas. The Manizales newspaper gave extensive coverage of Ruiz while Tolima's dependence on the capital's media meant that volcanic coverage

was sparse, impacting the awareness and readiness for an eruption (Scarpa et al., 1996). This cultural difference, as well as the obvious lack of education from the eruption of Mount St. Helens in the management of this eruption proves the importance of the implantation of sufficient training, communication and alert systems across both the global North and the global South.

Following the Nevado de Ruiz event, there were many advances in volcano science communication, including hazard demonstration videos that were used before the 1991 Pinatubo eruption (Fearnley et al., 2018). Public education was critical and complicated during the Pinatubo crisis due to scepticism and lack of education among the officials and population of Luzon, Philippines (Newhall and Solidum, 2018). With no indication of when the eruption would occur, scientists had to quickly find ways to educate the public about volcanic crises. The use of crisis communication in the Pinatubo eruption did save thousands of lives, however, it is noted there are lessons learnt from the crisis including the importance of immediate communication and recognising the trust between scientists, officials and news media (Newhall and Solidum, 2018). The lessons learnt in the Pinatubo eruption contributes to education and understanding for further volcanic crises, especially those with complicated hazard communication (Newhall and Solidum, 2018).

It is not always a simple solution of solely implementing effective communication. Communication issues between scientists and authorities during the 1995 to 2002 eruptions of Montserrat were compounded by the complex socio-political factors of a colonial administration (Clay et al., 1999; Haynes et al., 2008). These intricate relationships and roles of the ministries, departments and organisations involved in the crisis were not always clear, and confused many of the scientists involved in the monitoring and response in the disaster (Aspinall et al., 2002). This complex social landscape, along with the lack of money in the UK government's Montserrat disaster crisis fund, meant that the communication and response to the disaster was delayed, impacting negatively on the population (Aspinall et al., 2002). This vulnerability of the community shaped largely by pre existing poverty was revealed, particularly through the social crisis that occurred as an impact of the event (Hicks and Few, 2015). The long and drawn out nature of the event meant that the government's response to the crisis was widely accepted as unsatisfactory, leading to the implementation of crisis programmes in 1997 (Clay et al., 1999). However, it is important to remember that the experience of Montserrat is atypical, due to the unique colonial relationship between the population and the government. Therefore, caution should be taken in drawing lessons for future crisis (Wilkinson, 2015). The event does, however, prove the importance of community engagement and dialogue with government officials to create positive outcomes during crises (Wilkinson, 2015).

2.3.4 Public Perceptions of Volcano Crises

There is a wide variety of previous research on public perceptions of volcanic risk and what sources lead to these perceptions. Haynes et al. (2008) carried out research focusing on the public perceptions of those who had been affected by the Montserrat eruptions. From interviews, it became clear that perception of volcanic risk was influenced by the opportunity for public feedback and the perceived role of elites involved in the communication process (Haynes et al., 2008). Both quantitative and qualitative results identified friends and family as the most trusted source of information and the world press was rated worst. Figure 1 Figure 1 shows the percentages of trust and distrust in different sources (Haynes et al., 2008).

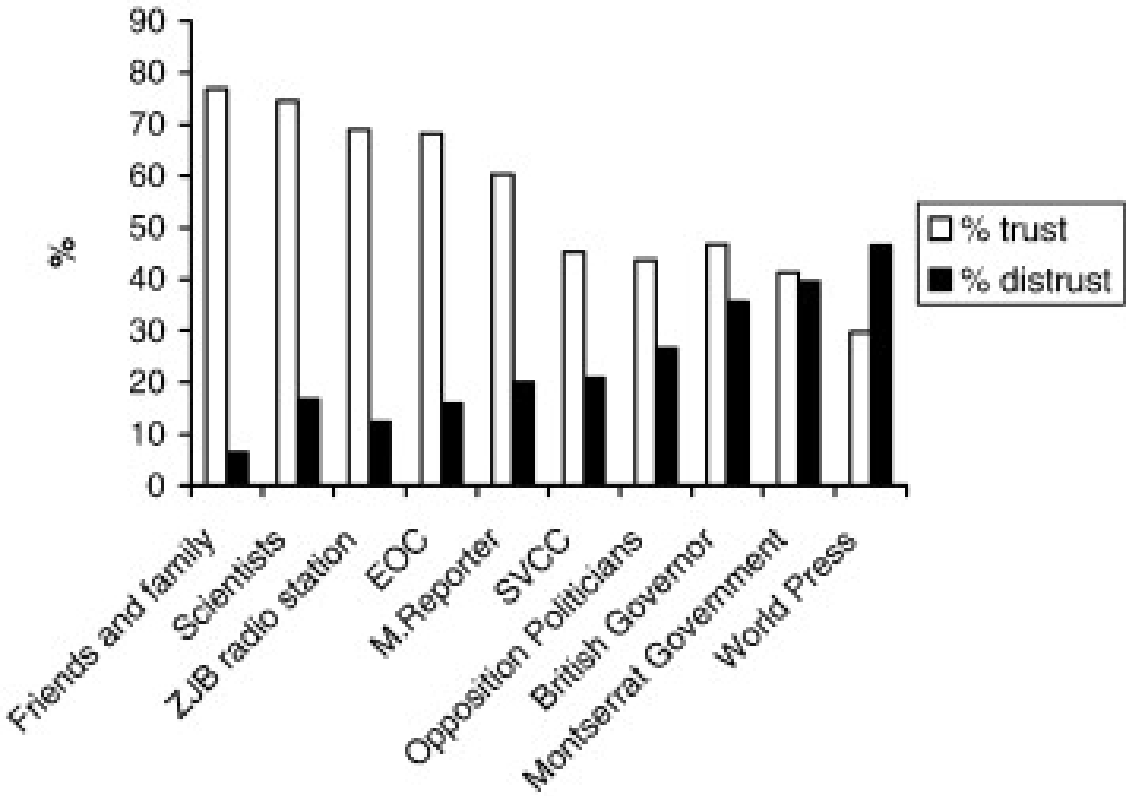


Figure 1 "Results of a hazard perception study on Montserrat, Caribbean, showing the percentage of respondents who trusted or distrusted various sources of information on the volcano (Haynes et al., 2008)."

Similar research was conducted by (Paton et al., (2008) in which people's interpretation of their experience of both volcanic hazards and public education programs influences their risk perception were researched. It was found that when communities do not engage in hazard-related conversation, they are likely to transfer the risk and responsibility to others in the community (Paton et al., 2008). It was also found that if this engagement by agencies does not take place, the public may overestimate the effectiveness of mitigation and reduce their effort to manage the risk themselves (Paton et al., 2008). Similar results were found when researching the public perception of volcano related hazards in Santorini. The lack of education and large amount of time since

previous eruptions meant that the public had time to forget about the potential risk (Dominey-Howes and Minos-Minopoulos, 2004). It was therefore recommended that education programmes were to be introduced for the population of Santorini to help implement risk management strategies (Dominey-Howes and Minos-Minopoulos, 2004). Overall, all of the papers mentioned above indicate that risk perception relates and is influenced by community engagement and discussion to increase knowledge of volcanism and therefore the perception of risk (Dominey-Howes and Minos-Minopoulos, 2004; Haynes et al., 2008; Paton et al., 2008).

Past literature of public perceptions doesn't only relate to volcanism, but crisis communication in general. It was found that organisational responsibility in a crisis equates to the degree to which the public blames organisations within crisis (Coomb, 2000). Similarly to the findings of the literature by Haynes et al., (2008) and Paton et al., (2008) discussed earlier, the organisation-public relationship has a huge part to play in the managing of a crisis. Coomb., (2000) and Marra., (1993) argue that a well maintained relationship means that communities will suffer less from financial and emotional damage (Marra, 1993; Haynes et al., 2008). A favourable relationship may alter the public perception of a crisis and generate positive attitudes of a response (Kim and Lee, 2005), therefore meaning the public has a general positive attitude of crisis management and communication within officials and organisations for the future (Park and Reber, 2011).

2.4 The Changing Role of the Media on Public Perception

News media can have positives within science communication. News media is the most efficient of all the available channels of science communication across the globe, reaching and impacting on many lives. Science journalism and news are a vital force in raising global awareness on scientific topics and can provide information about scientific discoveries as well as analysing science risks and benefits or to lead society in science debates (Nguyen and Tran, 2019). News media can have a huge impact on public perception of science, such as volcanism. When it is done accurately and efficiently, it can provide the public with well-educated perceptions on science, in this case, volcanic crisis. According to Ofcom (2020), TV remains the most-used platform for news (75%), followed by the internet (65%) (OFCOM, 2020).

2.4.1 Print News

The emergence of periodical newsbooks and news sheets spread across the cities of Europe from 1609, reaching England in 1621 and by the end of the 18th century English journalism had developed

into a successful format (Keeble, 2005). Early newspapers responded to only religious and economic concerns, wanting to keep public affairs out of citizens hands. However, this censorship failed and the newspaper became a key part in representing public opinion (Nerone, 2008). The introduction of the British Electric Telegraph Company in 1845 revolutionised and changed print media again. It allowed international communication and therefore meant that journalism could begin to report on worldwide affairs (McGillem, 2020). Since then, the popularity of newspapers increased, however, today's digital age has transformed the print based and one way nature of journalism that was known in the past (Bird, 2009). Research shows that fewer people than ever are reading print media and young people are no longer reading newspapers as they mature (Bird, 2009). In 1994, journalists made their way onto the internet and only a few years later, online journalism was the cutting edge of news reporting (Meek, 2006). This increase in the use of technology lead to media convergence. Meaning newspapers, TV news, and online formats all use the same information and leading to fewer jobs in journalism, even online journalism (Bird, 2009) and despite the strong change from print news to online new consumption, revenue of newspaper firms fell by over 30% (Bhuller et al., 2023). According to Ofcom, newspaper circulation has decreased from 30 million in 2003 to 12.4 million in 2017 (OFCOM, 2018). Figure 2 shows the reduction in this consumption of print newspapers, from 2003 to 2017 (OFCOM, 2018).

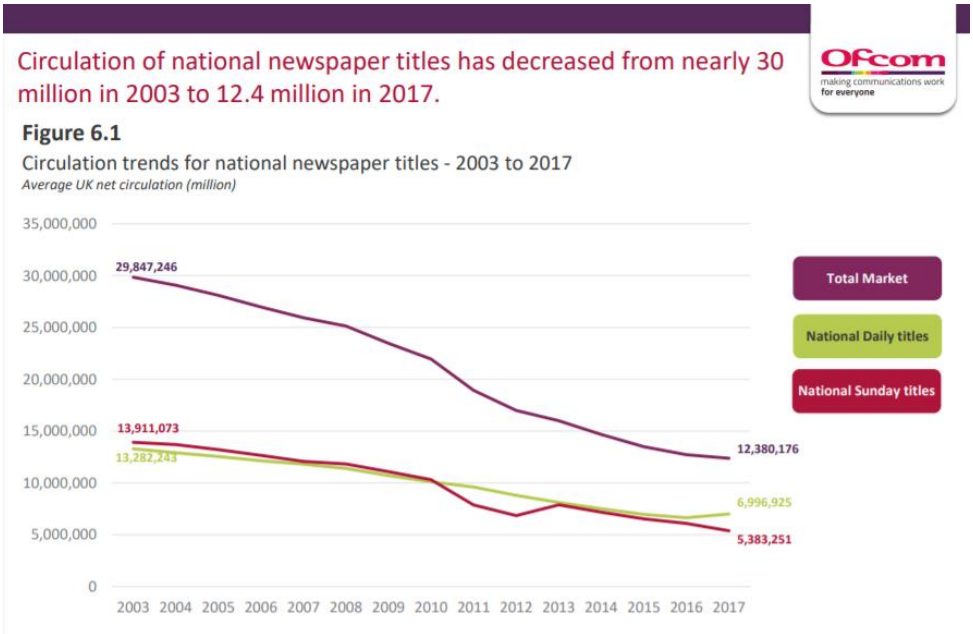


Figure 2 The reduction in consumption of newspapers from 2003 to 2017. This shows the difference between the total market, the daily market and the Sunday market. (OFCOM, 2018).

As mentioned above, the eruption of Krakatoa was one of the first volcanic eruptions reported in UK print journalism, in August 1883 and this eruptions was reported in The Morning Post newspaper (The

British Newspaper Archive, 2013). To do this, the countries used telegraphs to spread news and communicate, including the Batavia telegraph cable that connected Java to Singapore (Burns, 2009). The article includes simple language about the eruption and includes a time line of events, including the destruction of towns and houses (The British Newspaper Archive, 2013). As well as this, the newspaper also included illustrations of the eruption, shown in Figure 3 (The British Newspaper Archive, 2013). This, in many cases, would have been the first time a UK citizen had seen even an illustration of a volcano.

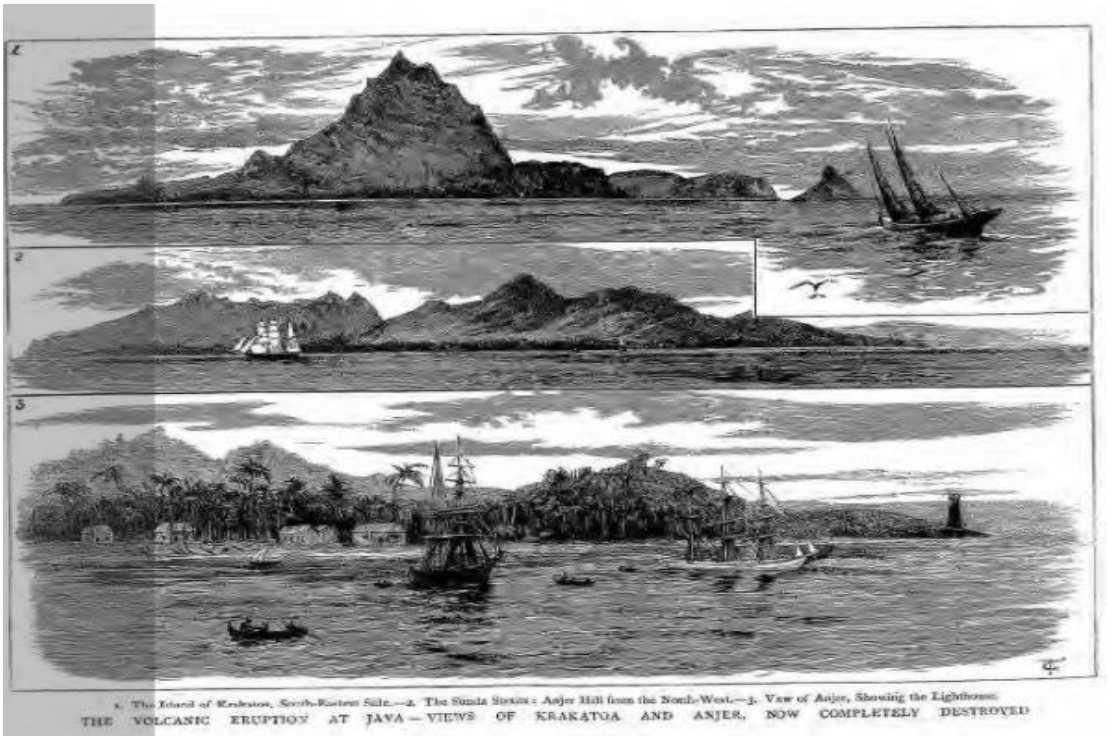


Figure 3 Newspaper article illustration about the 1883 eruption of Krakatoa. This shows the changes in the volcanic landscape before and after the eruption (The British Newspaper Archive, 2013).

2.4.2 Online News

The first type of digital journalism was invented in 1970, in Great Britain. This was in the form of teletext and involved displaying words and numbers on television screens. It was then patented by BBC in 1971 (Kawamoto, 2003). Electronic versions of newspapers then evolved in the 1980s, mainly in the form of videotext, using services such as America online before making their way onto the World Wide Web in 1994 and 1995 (Salwen et al., 2004). Worldwide, online news grew rapidly during the late 1990s, as journalists took advantage of the ease of the World Wide Web. By the end of 1996, there were 1600 worldwide online newspapers (Salwen et al., 2004). As of present, the way news is consumed has changed dramatically. In 2020, more than 2 out of 3 of the population of Great Britain

were reading or downloading online news, this was more than 3x the amount from 2007 (Watson, 2021). Figure 4 shows this growth from 2007 to 2020 (Watson, 2021).

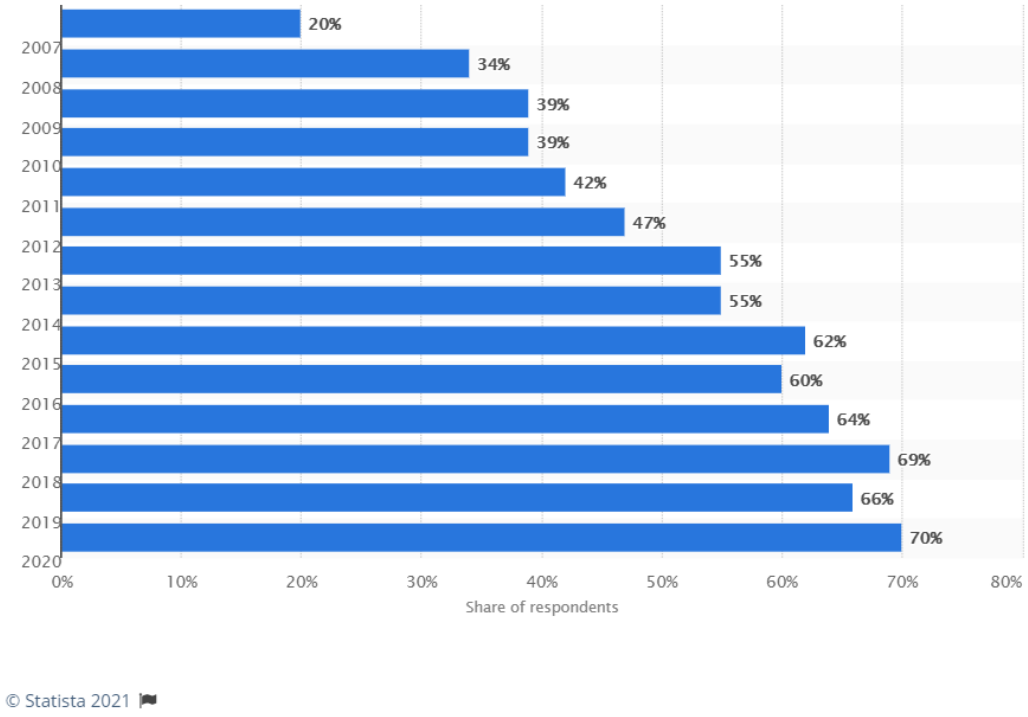


Figure 4 The results of a study showing increasing consumption of online news from 2007 to 2020 . This shows the different percentage of respondents using online media as a source of news.(Watson, 2021).

During a volcanic event, crisis management teams connect with journalists, through press releases and through direct contact (interviews) to inform about the event. When it comes to connecting with journalists, appointing one dedicated person to talk to the media will have benefits for future or repeat contact, meaning trust is developed and the media will hopefully allow the remainder of the team to carry on with monitoring (McGuire et al., 2009). McKinnon (2017) conducted research on scientific journalism in Australia, by asking journalists about their use of press releases. The journalists questioned said that they used press releases as a background or starting point for a story. All said they would follow up from the press release in some way, by either contacting the researcher directly or reading the journal, but none of them said that they plagiarised the PR or copied it directly (McKinnon et al., 2018). However, traditional means of collecting information has

changed and online media has altered that process, potentially due to different aims in journalism, such as advertising and clickbait.

Clickbait refers to a certain type of web advertising that is designed to entice readers into clicking the accompanying link. It is usually spread across the internet and social media as short teaser messages or headers (Potthast et al., 2016). This is becoming a rapidly growing issue in online journalism, with the increasing use of misleading statements and fake news, to reach the increasing goal of profit or popularity (Zannettou et al., 2019). News media plays an important role for the public and victims impacted by disasters, with the increase in viral fake news, it is important that journalists work hard to deliver accurate information (Richardson, 2017). An example of misinformation used during a crisis is that used during Hurricane Maria in Puerto Rico. Radio journalists used unverified information from victims when reporting the crisis, rather than official information from scientists (Nieves-Pizarro et al., 2019).

Along with the negatives of online news, such as fake news, there is positives to the increasing use of online media and journalism (Lunga, 2019). One of the positives notes is the citizens engaging in conversations, not only with each other but with journalists and scientists. This doesn't only mean that there is a promotion of online voices and freedom of expression but also means that the public are educated about global matters (Lunga, 2019). This is particularly important in science communication and emphasises the importance of accurate reporting.

2.4.3 The Rise of Social Media

In recent years science communication has continued to evolve, due to the onset of 24-hour news coverage on television and the growth of the internet. The use of social media has increased over the last 10 years; as of 2015, 65% of adult Americans used social media, compared to only 7% in 2005 (Perrin and Duggan, 2015) and as of 2018, there were 4 billion people around the world using the internet and social media (Kemp, 2018). Social media brings many pros and cons to scientific communication in the modern age. The positive aspects that social media bring, are mainly based around the ability to spread information and connect across the globe. This includes the ability to talk directly with scientists, the use of the hashtag to allow the public to find information on a topic easily, which also means that information spreads rapidly. The universal use of social media has become a priority for organisations in order to improve and enhance communications with users (Fan et al., 2013).

To understand the importance of social media, it is important to be aware of how information spreads and the speed it spreads at. Within social media, the organisations do not need to seek out the relevant audience, users are linked in various ways, including hashtags, searches, friends and followers. Cascading is one of the processes in which information is spread via social media. Cascading is a process in which a particular message or piece of information is passed onto the first group of receivers and then is passed onto the next until an extensive network of audience is built up (González-Bailón et al., 2013). However, not all posts will be spread by cascading, in some situations, smaller chains and networks will collide, therefore spreading posts wider (Tsugawa and Ohsaki, 2015; Zhang and Vos, 2019). Previous research has shown that negative information, or misleading information is likely to spread quicker than positive or neutral messages (Tsugawa and Ohsaki, 2015). The virality of a message is measured by the number of reposts and the time elapsed from the original posting to the reposting (Nth Reposting). It was therefore found that the virality of negative posts was 1.25 times the speed of positive or neutral posts (Tsugawa and Ohsaki, 2015). Within a crisis, this could potentially mean that misleading, false information could be spread faster than factual information, consequently distorting the public's perceptions on the event. This easy connection and quick spread of information allows volcanologists to stop fake rumours and also allow the public to engage and express any misunderstanding about the situation (Williams and Krippner, 2019).

However, there are consequences and ethical issues to using social media in crisis communication, including the issue of the rapid spread of misinformation, which could be extremely difficult to stop. Further issues include: amateur scientists posting their own interpretations, the ethical impacts of sharing disaster images (Williams and Krippner, 2019) and the potential for data protection or privacy infringements. To prevent these possible ethical issues and drawbacks of social media, users must take into consideration the accuracy of their post (Hicks, 2019). Hicks (2019) advised that users always double check the accuracy of the information they were sharing, as well as being wary of language barriers and misleading translation across languages, and to reinforce information from official sources. This is particularly important across the geosciences and geohazards, where information can gain attention internationally (Hicks, 2019).

While social media is becoming increasingly important in modern day life, it is important to take into consideration the people on the other side of the digital divide, those who don't have access to ICT, due to economic issues or lack of skills. The use of the internet, or lack of, could prevent these people from accessing the information they need in a crisis, so more traditional forms of communication must also be considered when primarily using social media to communicate during a crisis (Watson and Finn, 2013). This traditional media and communication comes in the form of print

news and radio, which still remains an important part of crisis communication; especially across parts of the world where internet access is less readily available.

The 2010 eruption of Eyjafjallajökull volcano, Iceland, was one of the first eruptions that saw scientists, the public and the aviation industry using different aspects of social media to communicate impacts across Europe; including the impacts on the aviation industry (Watson and Finn, 2013). The grassroots service (Stranded in Europe group) used multiple platforms: Facebook, a blog, and an SMS text messaging system that enabled members of the public to communicate and assist one another during the crisis, without having access to the internet (Watson and Finn, 2013). As well as this, the Queensland, Australia flooding also saw the extensive use of social media (Bird et al., 2012). Community-initiated Facebook groups were created so people affected could communicate. Administrators of the groups sourced their data from agencies such as the Bureau of Meteorology and State Emergency Service (Bird et al., 2012). This therefore reduced the likelihood for fake news and rumours to be spread, consequently impacting public behaviour. As of present, there has been a larger increase in the use of social media during a crisis, including the 2018 Kilauea lower East Rift Zone (LERZ) and the 2017 Mt Agung eruption. Due to increased risk of the spread of false news, it is important to research the terminology used on social media during and crisis and begin to fully understand how best scientists can utilise the tool to its full potential (Williams and Krippner, 2019). By researching this terminology, the impact of this on public perceptions can be further understood.

Research taking place on the public response to news reports on the Mount Kusatsu-Shirane 2018 volcanic eruption resulted in a further understanding of the public perception of volcanology experts. The perceptions are a mix between positive and negative views (Yamada, 2020). Positive comments suggested that no one should take blame for the failings or inability to predict small eruptions, due to the science being young and therefore still developing. There were comments of encouraging nature, of the public wanting volcanologists to be given more training and also the understanding of the importance of data collection. The public expressed an interest in this data being spread and an explanation of how this information could be used for future crisis (Yamada, 2020). However, the research showed a high number of negative comments. Previous articles have found that news articles are more likely to collect higher volumes of negative comments from anonymous users. These negative comments included: animosity towards experts due to little knowledge of how past and current disasters can be connected to future risk reduction and also that risk reduction efforts by scientists were not sufficiently communicated to the public. These negative comments were given by some people who had felt previously disappointed by experts due to failures in seismic or weather forecasting, both of which can have detrimental effects on the public.

These failures could therefore lead the public to interpret volcanoes in a negative way due to the shortfall of experts in the past (Yamada, 2020).

Overall, previous literature helps to understand the changes in news and science communication throughout time and the impacts that this has on communities. There does however seem to be a gap in the previous literature that this research will address, this is in terms of how this translation happens between officials and press and how this then impacts perceptions of these volcanic events, by the use of Kilauea 2018 as a case study.

Chapter Three – Methodology

This chapter provides a rationale for the mixed methodological approach utilised during this project, details the quantitative and qualitative techniques implemented to address each objective of the study, and discusses ethical considerations of the research project.

This study implements content analysis to evaluate both the language used in media articles and press releases, and the responses of focus group and survey participants. Surveys and focus groups were used to explore how language used in press releases and media impacts public perceptions of a volcanic crisis.

I am a 24-year-old British female, who has always lived and has been educated within the UK, through my Bachelors and Masters degrees at the University of Hull. I hold a BSc in Geology meaning I approach this research as a geologist with a background in physical science, rather than social science, even that surrounding geohazard. My interest in the social implications of geoscience led me to this aspect of research. Due to the lack of grounding in this area, I have built an understanding of this type of research throughout the process of this Masters by Thesis research, through reading previous works on the subject but also through the delivery of the research itself. My UK locality determined my decision to focus on UK participants, who both speak the language I do but have also been exposed to similar media around volcanic hazards as myself. I acknowledge that I have a previously unrecognised bias in that I value higher education and that I viewed this type of education as important towards expertise. On reflection, this therefore means that I lack knowledge on expertise from a different aspect, including from those without a background in higher education, including those who have gained expertise from self-education, or from community or indigenous knowledge, including potential first hand experience of natural hazards..

I am conscious of my bias as a British, educated woman and therefore lack understanding of the views from those outside of my experience. This study purposefully focussed on the perceptions and understanding of people who are not local to the volcanic eruption, I looked to avoid recruiting participants with a cultural or scientific knowledge or connection to the study area. I did this because I wanted to understand how the news media affects peoples understanding of volcanic eruptions, without the influence of other knowledge inputs. However, this means that broader views, especially from those who deal or live with volcanic activity on a closer basis were not taken into account and this could considered to be a significant limitation of this work.

I approached data collection and analysis as a physical scientist and so I assumed that all data collected was a form of truth, as I have come across in my previous studies and therefore I could be a neutral observer throughout the study. However, throughout the study I realised that the social science aspect of this research was different to that of the previous research I had done and that my biases did impact the analysis and interpretation of the results I had collected. That said, during my thesis I aimed to adopt a critical and reflective approach but can appreciate that my positionality is not static and depends on the people involved with this study and strive to be respectful towards different perceptions and experiences that may be different to my own. I aimed to do this by avoiding obvious bias and be as neutral as possible during the study.

3.1 Approach to the Research

In this research, social science methods were deployed to understand the public's perceptions of volcanic crises, intertwining the psychological (science of human behaviours) and sociological (science of social groups) aspects of social science (Bhattacherjee, 2012). These two aspects were combined using surveys and focus groups, which focused on the way individuals perceive volcanic crisis and the media and also on how these perceptions are discussed within a group format.

A mixed analysis approach combining data analysis, content analysis, surveys and focus groups was employed here, rather than an isolated method approach (e.g., involving surveys alone). This combination of methods, which can be used to allow triangulation (Flowerdew and Martin, 2005), was used to enable more thorough exploration of topics than a single method approach may provide, allowing research questions to be addressed in more depth.

Mixed methods approaches are often used in social science; it is common to combine the use of quantitative and qualitative methods to increase and explore different levels of a subject (Sporton, 1999). Mixed methods can be used in different ways; connection (having one data type build on the other), merging (to compare or relate results from both data types) and embedding (to explain one data type results by the other) (Guerra-Santin et al., 2016). In this research, qualitative analysis is used to explore themes raised by the quantitative data collected in the study, as a connected approach, where one type of data builds onto another. The data collected through the content analysis, surveys and focus groups were analysed separately before being brought together to form the basis of the analysis and discussion, similar to the mixed methods approach completed previously by Sundar et al., (2020).

It is important to consider the challenges of the mixed methods approach. One challenge, particularly given the restrictions of time, is the ability to 'do justice' to both areas of study, 'it is hard to have both breadth and impact' (Davis et al., 2010). This was mitigated during this project by focussing on a discrete case study. In doing this, the project aims not to be wholly representative of all volcanic events, but to examine one case study in detail and generate insights transferable to other events.

3.1.1 Using a case study approach

For this research, the 2018 eruptions of Kilauea was chosen as the case study of focus of the media, press releases and focus groups. This case study has many positive attributes for usage in this research, firstly including its country and origin. The event occurred in Hawaii, USA, this therefore mean that all press releases and releases via the government were done in the English language, therefore reducing the need for translation. The press releases completed by the UGSG were also done on a daily basis throughout the event and were published easily online, reducing the need to speak to officials of the USGS for this information to be released, it is all public data and can be used freely. The media coverage in the UK was also substantial, potentially due to the lack of language barriers but also the popularity of US news across UK news coverage and the popular knowledge of the USA as a country. The time frame also proved to be a positive aspect of using this case study, due to the event taking place less than 5 years ago, it remains potentially fresh in participants' minds and media can be found easily across the web. It can also be assumed that the culture of the USA has not changed massively in terms of volcanic crisis over the past 5 years in terms of finance and knowledge on volcanic and natural events, however policy documents on this could not be located so we do not know for sure. This therefore means that reference to monitoring, the USGS and the government can be compared to current knowledge on the event.

However, there are aspects of the study that mean it could not be used to generalise all volcanic events across the world. Mainly this is due to the culture of the USA, including the financial culture as well as the USGS providing monitoring and management of natural hazards across the country. The USA has a large knowledge on natural hazards and monitoring of these hazards is embedded into their culture. As one of the most financially wealthy countries in the world, they also have the money to constantly monitor these events and therefore tend to have differences to those countries who do not have this access. However, there are overwhelming uses for an in depth case study on one event, for example the use of this case study across other contexts, for example the use in other natural hazard events, as well as other geographic, social and economic events. This culture,

especially the general culture of the USA, is similar to that of the UK and is easy for UK participants to understand. Countries that do not have this sort of management or financial security, as well as general culture, could not be easily compared to this case study. It is also important to remember the specific nature of the eruption as volcanoes can be categorised into many types, this volcanic event was relatively calm and slow moving compared to others and therefore not all events play out the same.

3.1.2 Content Analysis

Content analysis is an accepted method for analysing documents and can be described as both a systematic and objective means of describing and quantifying phenomena (Shelley and Krippendorff, 1984). It can be defined as a method of analysing written, verbal and visual communication and was first used as a method for analysing newspaper articles in the 19th century (Harwood and Garry, 2003).

Content analysis is a highly flexible research method that can be used for varying research goals and objectives, across qualitative, quantitative and mixed modes of research frameworks (White and Marsh, 2006). An advantage of the method is its ability to deal with a large volumes of textual data at one time (Elo and Kyngäs, 2008), as for the 126 media articles collected for this study. The major benefit of content analysis is the ability to categorise large volumes of text. Categorisation of these texts provide a simplified piece of qualitative data that represents both the explicit and inferred communication within the text(s) (Hsieh and Shannon, 2005).

Content analysis has been used to investigate volcano media in a number of studies. Calabrò et al (2020) examined multiple aspects of Italian newspaper articles (including La Gazzetta del Sud and Il Giornale di Sicilia) during the 2002-2003 eruption of Stromboli. The quantity of information and most common words was recorded. The assumption was made, prior to the study, that the words mentioned the most frequently across articles were the ones that reflect the greatest concern or importance in a crisis (Calabrò et al., 2020). Other aspects of the wording in the article were also taken into consideration, including the word position in the text and the position of the article within the paper. The same was applied to images, such as the size and positioning (Calabrò et al., 2020). Overall, the methods proved to be effective in finding the results that were set out by (Calabrò et al., 2020). These results, in summary, found that the media reported on the eruptions confusingly and did not choose to report on aspects of the event that were considered normal within the country, therefore not providing a well rounded account of the event. The methods also led to the

understanding of how much government and scientific information was used within these articles and how the journalists wrote about the event in a catastrophic fashion (Calabrò et al., 2020).

In another study, Yamada (2020) applied a content analysis method of data to the comment sections of online news reports in relation to the Mt Kusatsu-Shirane eruption of 2018. The work sought to summarise the public response to the 2018 eruption using online news articles and the comments connected to these articles. In this research, comments deemed suitable (1651 comments) were annotated into categories based on a coding scheme. These categories included fatalism, eruption prediction and government attitude (Yamada, 2020). In this thesis content analysis is carried out on language of media rather than individuals' comments. However, within the second part of Yamada's study, it was important to represent a small population of individuals to understand potential factors that impact public perceptions. To do this, surveys were completed beforehand to understand more about the participants' social attributes. It is important to analyse the methods used and the limitations of these for the possibility of use within the thesis. Due to the anonymity of the internet, users' social attributes were not obtained, meaning that it was difficult to identify the commenters and therefore it was noted that the study possibly didn't represent the wider population (Yamada, 2020).

Content analysis has also been used in other areas of risk perception, such as environmental risk perception. In an example by Wakefield and Elliot (2003), content analysis was used to investigate landfill perceptions. Content analysis techniques were used to identify and quantify topics and timing of newspaper coverage and were collected between the first site publicity and six months after the opening of the landfill. This content was then categorised based on a coding scheme (Wakefield and Elliott, 2003). While the methods worked and language was able to be analysed through the content analysis, it was found that the newspapers were selective and inconsistent. This therefore meant that not all issues were covered (Wakefield and Elliott, 2003).

Although content analysis has many advantages, it also has limitations. Content analysis cannot analyse data which is not included in the study, for example, many articles that were released during the eruption period may have been missed for a range of reasons, this includes lost articles or those that were not found in a suitable format, therefore meaning an entire population of content is not analysed (Allen, 2017). As well as this, content analysis can miss key aspects of communication, such as imagery and videography that may be included within modern media. With regards to the content analysis of focus groups, visual and verbal communication, such as tone and body language, are not

analysed. This means that the researcher might examine one dimension of the content, while missing key aspects of the communication (Allen, 2017).

3.1.3 Pre-Focus Group Questionnaire

There are many benefits of conducting surveys during research. Surveys provide a powerful way of gaining insight into participant perceptions. This is illustrated in the work of Baird et al., (2013), which used surveys to investigate perceptions of water resources in indigenous areas within Canada's first nation communities. In this case, survey responses were used to develop policies and resources needed to address the barriers that the population were facing (Baird et al., 2013).

Survey creation and completion, especially with the use of modern software, is rapid and inexpensive. The ease of administration, whether remotely or in person, is a major advantage of surveys. As well as this, surveys provide an ability to collect responses from a large number of participants (DeFranzo, 2020).

The key limitation of surveys is the effectiveness of questioning and reliability of the respondents. Respondents may be unable to provide accurate answers due to not understanding of the question provided, due to boredom, or due to not wanting to present themselves in an unfavourable manner (DeFranzo, 2020). Survey questions may lead to unclear outcomes if they contain errors, or are interpreted differently by different respondents (DeFranzo, 2020). Care was taken to ensure that questions created for the survey in this study were clear and straightforward, to enable participants to provide meaningful responses.

3.1.4 Focus Groups

Focus groups originated in sociological research in the 1920s (Merton and Kendall, 1946) but were primarily used in market research for several decades (Templeton, 1987), before regaining popularity by social scientists in the 1990s (Wilkinson, 1998). Since then, focus groups have been used increasingly as a research tool throughout the social sciences, as well as other academic fields such as education and geographical sciences (Alasuutari et al., 2018). Over the past 10 years focus group use has surged as a popular technique for collecting qualitative data, especially amongst social researchers (Morgan, 1996).

The use of focus groups in investigating complex behaviours allows for study of the interaction between participants, also known as the group effect. This group effect has more benefits than the

sum of individual interviews as it allows participants to both query each other and explain themselves to one another (Morgan, 1996). This therefore allows for a deeper understanding of the participants' perceptions and therefore a more in-depth dataset, as it enables participants' agreements and disagreements about the subject to be studied. This discussion aspect of focus groups is seen by many to be the strongest advantage of focus groups (Acocella, 2012).

Focus group interaction can take place either between the participant and a moderator, or solely among the participants. The second is possibly the most advantageous as it means that aspects of the topic the moderator had not taken into consideration can be brought up and discussed, therefore increasing the data set within the results and discussion aspects of the research (Acocella, 2012).

The limitations of using focus groups need to be recognised during the research process. Cognitive issues, especially for the participants themselves, can easily occur, without anyone (including the moderator) recognising. One of these issues is related to the dynamics that emerge when participants are asked to share information or views that are individually possessed and may lead to participants choosing to withhold this vital information (Acocella, 2012). Social aspects that arise during focus groups must also be considered, for example, some participants may be more talkative than others and therefore more willing to share views. Research has previously showed that these problems increase with the increase in the number of participants (Latané et al., 1979). To account for this, the focus groups in this study were kept to a small size, 3 participants in each group and 9 in total.

Focus groups have been used in social volcanology research to collect qualitative data, especially in areas that have been affected by volcanic crisis. During research on volcanic culture in Indonesia, Donovan (2010) conducted semi-structured interviews and general discussions would take place while conducting general day-to-day activities with the families. These conversations with purpose became the main source of information into the events of the eruptions and allowed researchers to form an understanding into the residents personal reactions to the event (Donovan, 2010).

Focus groups have also been used in general crisis communication. Harro-Loit et al (2012) conducted research using focus groups for multiple crises, including the 2005 flood in Pärnu. The technique of these focus groups allows participants to interact with each other and present arguments and reasonings directly to the group (Morgan, 1996; Harro-Loit et al., 2012). This allowed interviewees to

expand responses by comparing experiences, reflections and conversations and allowed for the discovery of a complex picture of shared knowledge and beliefs (Harro-Loit et al., 2012).
This type of research was also carried out by Lundberg and Asplund (2011) with Swedish personal involved in crisis communication. These focus groups had two distinct parts, a group interview and a group discussion part. The groups were given themes to think about and talk about in a round robin fashion, as well as a discussion between the people within the group, this gives everyone the opportunity to talk (Lundberg and Asplund, 2011).

The focus groups carried out in this research were most similar to that of the Harro-Loit et al. (2012), due to the similarity of the environment; they were conducted in a controlled research environment, rather than in normal day to day life such as in the Donovan (2010) study. However, the group aspects of the semi-structured interviews used by Donovan (2010) and Lundberg and Asplund (2011) are comparable to the focus groups of this research.

3.2 Research Question 1: How is language translated from press releases to news articles?

3.2.1 Data collection and management

Collection of press releases was the first aspect of the data collection process. These releases took two forms: “Eruption Status Reports”, from the Hawaii Volcano Observatory section of the United States Geological Society (USGS) online archives, and those released to Hawaiian citizens by the Civil Defence Agency before, during and after the eruption. Releases were obtained for Kilauea activity ranging from 1/5/2018 to 14/8/2018, which was close to the end of the eruption and is therefore when news articles became sparsely created.

The press releases were added to a database, coded with the abbreviation ‘KP’(USGS) or ‘KC’ (Civil Defence Agency) and categorised by tagging with various attributes. These attributes include date and time of report release, date and time of download, and weblink to release.

Collecting these articles provided evidence of the expert information that was being released to not only the citizens of Hawaii, but also to the media, throughout the eruption period.

The next step of this data collection process was the locating and collecting of UK media articles that were released during the eruption period. These articles were collected on the site LexisNexis. To

find the correct articles, for the correct time period of the eruption, filters were used within the LexisNexis search. These filters were as follows; the search 'Kilauea volcano', the date range from 1/5/18 to the 30/8/18 and the specification that UK media articles were the only articles to come up within the search. Media articles were placed within a database, assigned their own individual codes beginning with 'KM' and categorised based on the individual characteristics of the articles. These characteristics included the article headline, date created, author, name of website/paper etc.

3.2.2. Content Analysis of media articles

The media articles and press releases were analysed for linkages between each other, such as mentions of the same events or even quotations within the media articles taken from the press releases, to ascertain the source of each media article. This was completed manually; a sample page from the notebook used for this purpose is presented in Figure 5.

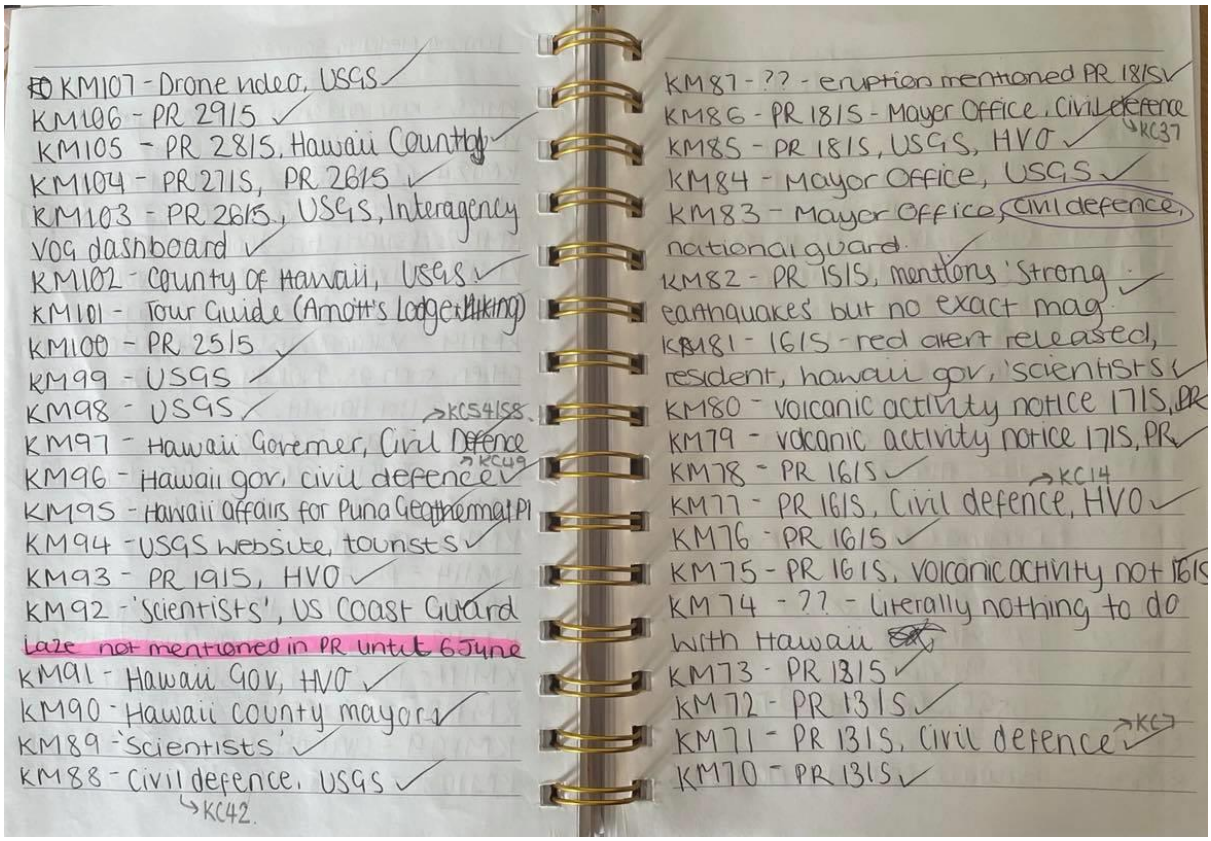


Figure 5 A sample page from the notebook showing the links between media articles and their sources. This was completed for all news articles collected within the study and all sources connected to the news article were reported.

A timeline of linkages was produced and press releases that generated the highest amount of UK media interest were identified. Qualitative data analysis software (QSR NVivo 12) was then used to

carry out a full content analysis of the press release with the most related articles, and of the 15 articles stemming from it.

The language within the articles was analysed by coding into themes (including positive, negative and scientific language- see Table 1 of all categories used). During the content analysis process further themes emerged, such as language around death and destruction. Infographics were created to display the findings of this work.

Table 1 References to themes within the articles and the overall number of mentions of these themes within the articles collected. This included all articles connected to KP6.

Coded Themes within the News Articles	Number Of Overall Uses of the Categories
Factual Language	59
Sensational Language	24
Negative Language	8
Reference to Earthquakes	35
Reference to Monitoring	12
Reference to Previous Eruptions	11

3.3 Research Question 2: How does this language impact public perceptions of volcanic crisis?

3.3.1 Quantitative Data

Surveys were created as part of the research to gain pre-focus group knowledge of the participants' perceptions on volcanic crisis and the media articles related to the study. These surveys were created with a range of questions, from tick box questions to open questions where participants could describe and explain their perception in full. This survey was created using Jisc surveys. The results of these surveys were then analysed prior to the focus groups and questions were tailored towards the answers of the questions in the survey.

3.3.2 Qualitative Data

Three focus groups, each with three participants were completed during the research process. Participant recruitment was the first stage of the focus group research and had to be done virtually, due to Coronavirus (COVID-19) restrictions. This consisted of posting advertisements on social media, such as Facebook or Twitter, with information about what was needed of the participants and how to contact me. This process led to recruitment of 9 participants for the focus groups, 6

within the 20-40 category and 3 within the 40-60 category; these categories allowed me to research the different aspects of the study I had looked to find, including the difference in perceptions with ages and the difference when reading the press release and media articles in different orders. Participants were sent a participant information form to read and sign, this therefore gained participant consent and then completed the survey at this point.

Post survey and pre focus group, a set of questions was created as a guide to lead and direct the focus group participants in answering the research questions. While the majority of these questions were broad, they were primarily based upon the participants' answers to the survey questions and were created to begin discussions between the participants, with occasional inputs from the moderator to further understand or clarify the participants' ideas. These questions included those surrounding how they perceived both the media articles and the press releases and also their perceptions on safety and priorities based on those.

Focus groups began with introductions and general rules of the focus groups to ensure the smooth running and comfort of the participants and breaks were included to ensure that participants remained focused throughout. Focus groups 1 and 2 started with the press release first, answered questions based on that and then read the media article. A similar set of questions was then asked to see how the media article and the language used throughout impacted their original perceptions. Focus group 3 did this in the reverse order, this therefore created an understanding of how the order of these pieces of information impacted the perceptions and therefore, how this may have impacted the perceptions of the UK public and the residents of Hawaii at the time.

3.3.3 Analysis of focus Groups

Once focus groups were completed, the first task in analysis was to transcribe recordings of the focus group meetings, which was done using the transcribe option on Microsoft teams. This was then thoroughly examined to make sure the transcription was accurate and did not have any errors, which could be caused by a number of factors, such as accents or the speed at which the participant was talking. Once this transcription was completed, the use of names and other potentially identifying information was removed to protect the participants' anonymity within the rest of the study.

Focus group transcripts were then analysed using a manual form of content analysis. This involved looking through the transcripts both individually and then together to create themes based around the previous content analysis of the media but also new themes and categories that emerged throughout the discussion. This was done as a pen and paper method and involved highlighting and pulling out quotes participants had said and discussion that had been had between participants and

myself throughout the focus group. These themes were then looked into further and patterns of perceptions of the media and the press releases were determined both individually for the participants but more so for a group. This took into consideration the participants age, gender and overall knowledge of the subject and allowed for these categorisations to be understood more clearly and in depth. These quotes and discussions were consequently linked back to findings within the content analysis of the media articles and press releases and discussions were compared to previous ideas within the study.

Once the focus group transcripts had been analysed and highlighted, these comments and discussions were then categorised into different themes again. These are listed in Table 2 below. This allowed for more discussion to be created and the link to media and press releases to be created. This also allowed for an understanding of how the different media impacted the participants' ideas and perceptions of not only the volcanic crisis discussed, but volcanic events in general. The focus group transcriptions could also be used to analyse how the participants perceived the press release compared to the media articles related to that press release.

Table 2 Focus group research themes of analysis.

Media Usage
If is doesn't effect me, I don't care
Lack of Understanding vs Disinterest
Opinions of the Tabloids
Role of Media and Social Media

3.4 Ethics

Ethical approval for this research was granted by the Faculty of Science and Engineering Ethics Committee, University of Hull. Written informed consent was obtained from all participants. Ethical considerations of this research is discussed below.

3.4.1 Anonymity

Anonymity of participants was a key ethical component that was considered during this research and was completed from the outset of the participant engagement. This included the surveys and the focus groups. In anonymous data, the research cannot trace research data back to the individual participant and therefore the reader cannot do so as a result. In this way, the reader obtains a general understanding of the participants that took part within the study, in this instance, their age.

This means that the personal identity of the participants are not revealed and privacy issues or invasion do not need to be concerned about (Allen, 2017a). Anonymity and confidentiality was adhered to during the study by creating pseudonyms for participants throughout the focus group transcript (Appendix III). Keeping participants information confidential means that not only names are protected, but any other factors that could giveaway a participant's personal life, such as street names and places (Allen, 2017a).

3.4.2 Consent

Consent forms (Appendix I) were created for participants before taking part in the surveys and focus groups. This participant information form was created to ensure that participants had a clear understanding about what they were doing throughout the study before agreeing to participate. Informed consent is one of the founding principals of ethics and it intends for participants to enter research voluntarily with full information prior to entry (University of Oxford, 2023). There are two main stages that were adhered to within the research, first stage was to give participants information in the form of participant information forms and the second stage was to gain signed consent.

3.4.3 Confidentiality

Confidentiality refers to separating or modifying any personal, identifying information provided by participants from the data (Allen, 2017a) and in this case, removing all personal factors such as email addresses and phone number away from the public eye. Keeping participants information confidential is the most important ethical consideration in this research and any research. Within this research, it means keeping participants personal information, such as email and numbers, private and secure. Without this, participants information could be leaked or used by others, causing negative implications. Information such as emails and mobiles numbers were not required long term and therefore was not taken and/or kept on any system. To keep information that was needed long term confidential, it will be kept on a university approved, password protected cloud storage (Box). Therefore, meaning that only the researcher(s) will be able to access it. Although the nature of the research is not sensitive, keeping the participants safe is the main priority, protecting their information is the first step.

3.4.4 Data Management

The data used will mainly be materials in the form of newspapers/media sources. These materials belong to the media outlet/owners (such as the BBC) but are not copyrighted and are free to use. Personal information through the use of surveys will also be collected, this information will then be transformed into data, however none of this information will be identifying and will exclude factors such as names and numbers. To secure the data, it will all be stored on a university of Hull approved,

password protected, cloud storage (Box). This information will be stored securely and privately and only researchers will have access to any identifying information, such as information that is not included in the final thesis. Potential further research that includes the information taken from the research done within this thesis, will only be done with consent from the participants. Without this consent, further research on this thesis will not be undertaken. Any identifying information will not be kept long term; however, permanent academic staff (Rebecca Williams) will keep research on BOX for a number of years, this allows for further potential research to be done on the data/information taken within this period.

Chapter Four- How is the language used in volcanic crisis press releases variably 'translated' into news articles?

The aim of this chapter is to further understand how the media translates and interprets press releases issued by both scientists and government of Hawaii, during the 2018 eruption of Kilauea. This allows the understanding of the themes and focuses of the articles both individually and also as a whole, by focusing mainly on one press release and the articles connected to it. To do this, content analysis of the articles and press releases was carried out using the qualitative analysis software, NVivo. This allowed the creation of broader analysis, down to the analysis of individual words and phrases using the creation of themes and categories that occur throughout the media articles as a group. The use of this analysis allows for the understanding of the media articles as a whole but also how different article types (broadsheet, tabloid etc) use different methods of language to draw in readers and provide coverage on a volcanic event. This chapter investigates this research question by looking into the translation from press releases to media articles by doing the following; looking at the initial data collection process, followed by the language analysis. This is within the form of words clouds and initial quantitative analysis, followed by looking into themes of language found within the news articles in comparison to the press releases.

4.1 The relationship of media coverage to press releases of the 2018 eruption

During the 2018 Kilauea eruption, the USGS released official press releases once a day, which were published via their official website with updated summaries posted to USGS official social media such as Facebook and were then shared by relevant parties such as, those impacted by the eruption. For example, a USGS Volcanoes update posted on the 19th June 2018 was shared 677 times (a way of resharing with a person's own followers) with over 1000 reactions to the post (a way of readers registering their interest and appreciation for the post). These press releases followed a similar structure on the daily basis, giving the basic information about the eruption that day, including summit elevation and alert level coding. This was then followed by a more detailed explanation of the volcanic activity of the past 24 hours. This included lava flow and direction of the flow, fissure openings and other relevant information. Following this was a range of contact information, including emails, phone numbers and relevant parties to contact for those in need of further

information, therefore offering more opportunities for a two way conversation between the USGS and all parties with an interest in the eruption, including the Hawaiian residents and the media. An example of this can be found in Figure 6. Press releases were also released by the Civil Defence, a government agency within Hawaii. These press releases followed less of a structure and mainly included a brief summing of the USGS findings for the day but also included advice for residents to maintain safety for the public throughout the eruption.

All press releases start with the date and time of issue, followed by the simple measurements of the volcano and the alert levels.

U.S. Geological Survey
Saturday, May 5, 2018, 11:42 PM HST (Sunday, May 6, 2018, 09:42 UTC)

KILAUEA VOLCANO (VNUM #332010)
19°25'16" N 155°17'13" W, Summit Elevation 4091 ft (1247 m)
Current Volcano Alert Level: WARNING
Current Aviation Color Code: ORANGE

Lower East Rift Zone Eruption
The intermittent eruption of lava in the Leilani Estates subdivision in the lower East Rift Zone of Kīlauea Volcano continues. Fissure 7 stopped erupting in mid-afternoon. A new fissure erupted this evening near fissures 2 and 7, and lava fountains reached as high as about 70 m (230 ft). Early this morning, new ground cracks were reported on Highway 130, but no heat or escaping steam was subsequently observed.

Seismicity and deformation are consistent with continued accumulation of magma within the rift zone.

Residents should remain informed and heed Hawaii County Civil Defense closures, warnings, and messages (http://www.hawaiicounty.gov/active-alerts).

For maps showing the locations of eruption features, please see https://volcanoes.usgs.gov/volcanoes/kilauea/multimedia_maps.html

For information on volcanic air pollution, please see: http://www.ivhhn.org/vog/

HVO geologists will be in the area overnight to track and report to Hawaii County Civil Defense on the activity, and other scientists are closely tracking the volcano's overall activity using various monitoring data streams.

Kīlauea Volcano Summit
Tiltmeters at the summit of Kīlauea Volcano continue to record the deflationary trend of the past several days. Satellite InSAR data show that between April 23 and May 5, 2018, the summit caldera floor subsided about 10 cm (4 in). Corresponding to this deflationary trend, the summit lava lake level in Overlook crater has dropped about 128 m (518 ft) below the crater rim since April 30. Rockfalls from the crater walls into the retreating lake produced ashy plumes above Halemaumau crater today, resulting in light ashfall in the summit area. Rockfalls and ashy plumes are expected to continue as the lake level drops.

Earthquake activity in the summit increased in the past 2 days, coincident with the magnitude-6.9 earthquake on May 4 beneath the south flank of Kīlauea. In the past two days, about 152 magnitude-2 and magnitude-3 earthquakes occurred at depths less than 5 km (3 miles) beneath the summit area. Twenty two magnitude 3 earthquakes were recorded. These earthquakes are related to the ongoing subsidence of the summit area and beneath the south flank of the volcano.

Then followed by the activity for the past 24 hours. This includes volcanic and seismic activity. As well as advice for the residents of the area.

HVO Contact: askHVO@usgs.gov

MORE INFORMATION

Activity Summary also available by phone: (808) 967-8862

Subscribe to these messages: https://volcanoes.usgs.gov/vns2/

The press releases always end with contact information, for those who are in need of more information or those who cannot read the press release.

Figure 6 An example USGS Press Release. This shows the information provided within a typical press releases via the USGS.

According to google trends, the media (newsprint, online, radio, and social media) also showed great interest in the 2018 eruption (see Figure 7 showing the peak of interest in May 2018 compared to a 5 year timeframe).

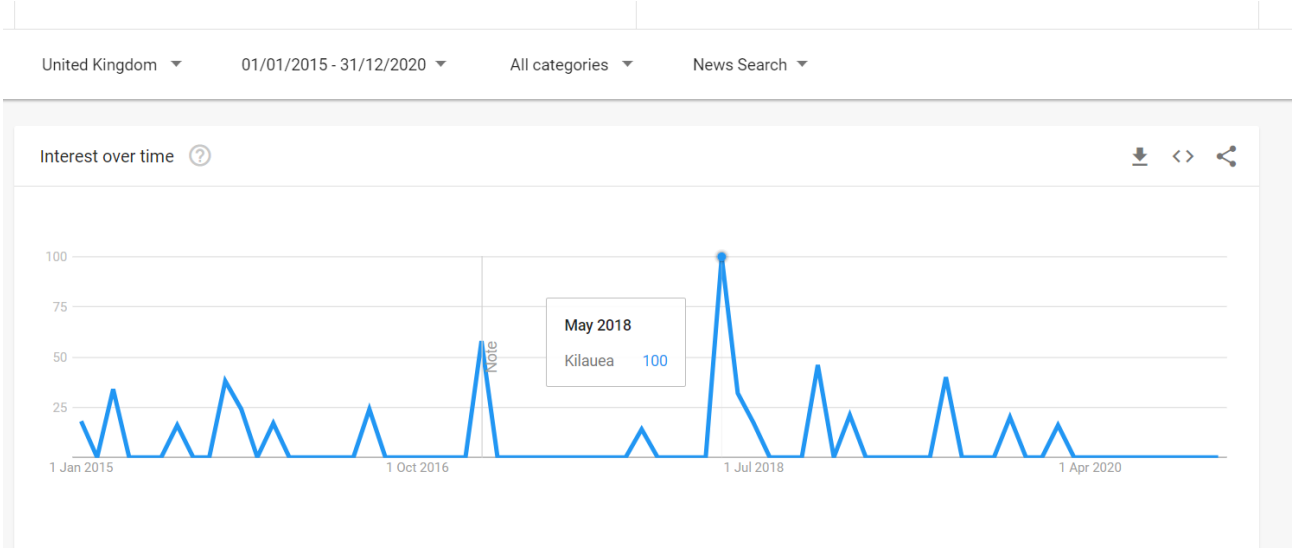


Figure 7 News Searches including the word Kilauea from 1/1/15 to the 31/12/20. This is found via google trends (Source).

In order to understand the relationship between the media coverage and the press releases, the number of occurrences of a particular source within an article was counted (Figure 8). It should be mentioned here that there was a number of press releases that did not get media attention (for example Press Release 20th May 2018) and also media articles that did not relate to any press release (for example KM125 and KM101).

Overall there were 205 individual mentions of sources within the UK news articles that were analysed, these mentions occurred within a total of 126 news articles and all articles were related to at least one source highlighted (Figure 8). The USGS was the most mentioned source of information with 58% of the mentioned sources being USGS and 36% being related directly to the information within the studies press releases. An emergency response organisation, referred to as the Civil Defense Agency was another source that was thoroughly mentioned within the news articles with 12% of the 205 source mentions being those related to the civil defense, this therefore led to the civil defense articles being looked into in more depth.

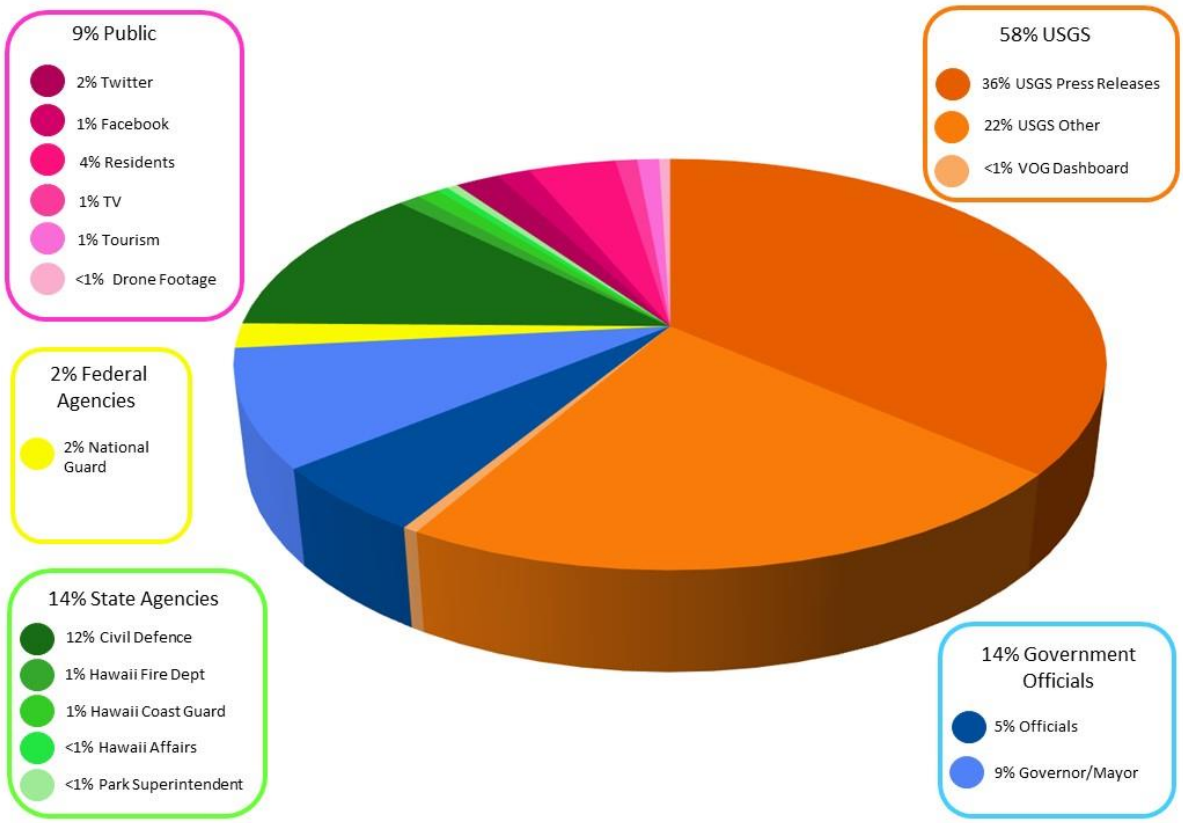


Figure 8 The result of the mentions of sources within all of the news articles collected within the study. This is a representation of the work shown in Figure 5.

Figure 9 presents a timeline linking press releases to associated news articles through time during the eruption from onset in May 2018, to when the eruption ceased in July 2018. The timeline was created to further understand the interest in the event via media articles throughout the whole timescale of the eruption. It is important to state that media articles with no link to press releases (either USGS or Civil Defence) are not included within the timeline and press releases with no media articles connection are also not included.

The majority of the news articles appear during the first major events (including onset of the eruption and the initial threat to homes) of the eruption process (4th May – 16th May). Interest in the eruption waned from the 16th May, which is not a very long period of time considering how long the eruption actually lasted (1st May 2018- September 2018). To further assess this averages were calculated, in which it was found that between the dates of 4th-16th May the average article per day equalled 5.77 compared to only 1.9 throughout the time period of the 17th-31st May. The greatest number of press related news articles occurred as a result of a press release released on the 5th May 2018 (KP6), only one day after the eruptions began. This press release contained information regarding the changes that had occurred between the 23rd of April and the 5th May and advised the public to remain informed using the Civil Defence press releases. This was also the first press release

regarding the 6.9 magnitude eruption, the largest earthquake on the island in over 40 years. This press release is therefore the one chosen to focus on for this study. Towards the end of the eruptions, numbers of individual news articles decreased, and further articles were only released during more significant events, such as those that had the potential to impact on more than the local area, for example, the risk to Puna Power Plant (press release dated 26th May 2018 and media including KM103 and KM104) and an event leading to injuries to tourists on a boat (Press release dated 17th July 2018 and media including KM123).

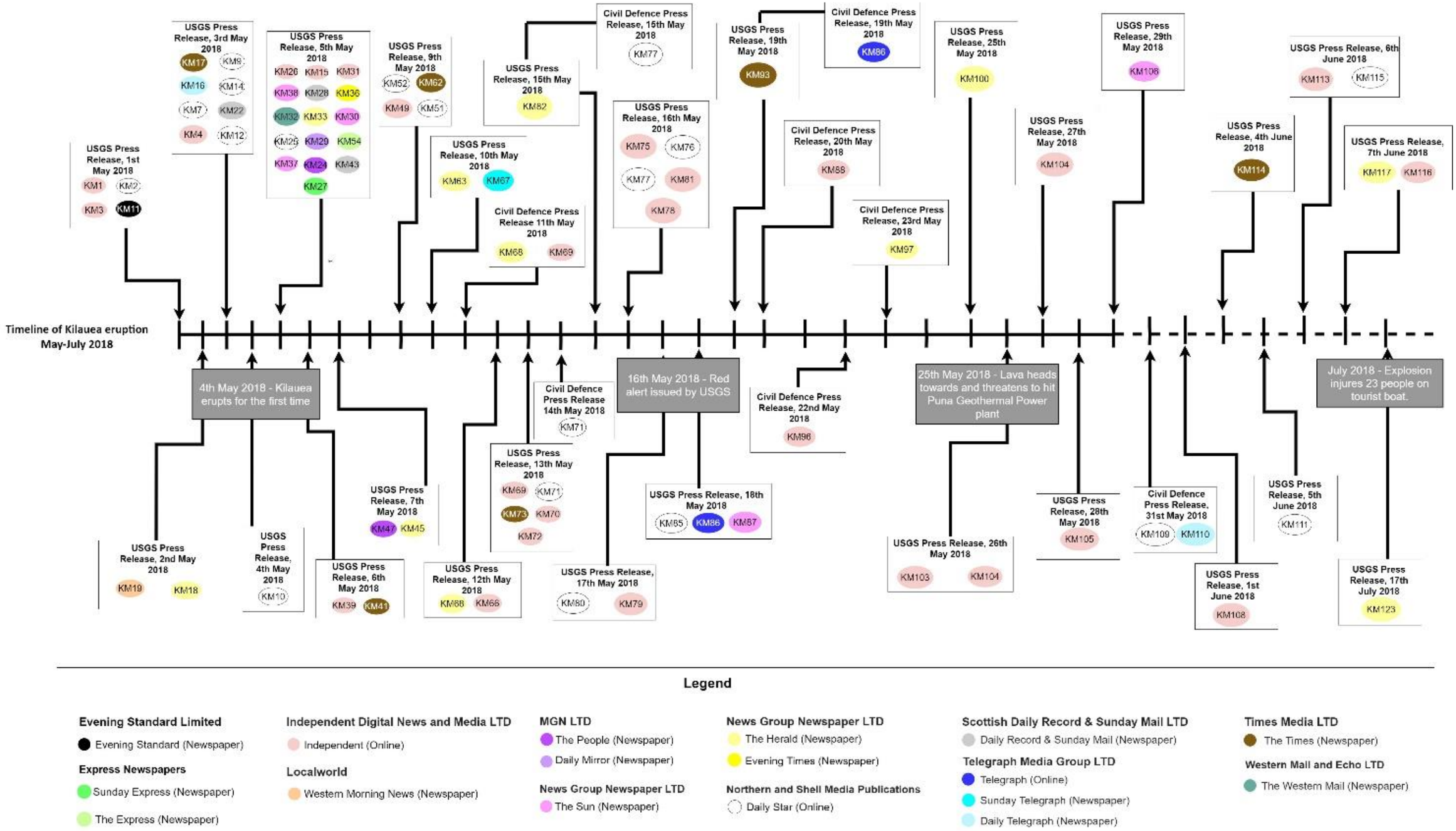


Figure 9 Timeline Linking Press Releases to News Articles. This timeline shows all news articles connected and therefore the press release these news articles were related to. This also shows a comparison of press releases and news articles to major events within the eruption.

4.2 Who was saying what? Content analysis of press releases and media coverage

To understand how press releases were translated by journalists into media coverage, the press release of 5th May 2018 date by the USGS was analysed in detail (KP6). This was the press release which appeared to generate the largest number of related news articles, across a variety of newspaper types (e.g., tabloid and broadsheet). There were 16 articles in total identified to be related to press release KP6 (article codes given in Table 3)

Table 3 Articles related to KP6 (5/5/18) including article code, publisher and date of publication release.

Article Codes	Publisher	Date of Release
KM15	The Independent (Online)	05/05/2018
KM25	Daily Mirror (Newspaper)	06/05/2018
KM27	Sunday Express (Newspaper)	06/05/2018
KM29	The People (Newspaper)	06/05/2018
KM31	The Independent (Online)	07/05/2018
KM33	The Herald (Newspaper)	07/05/2018
KM37	The Sun (Newspaper)	07/05/2018
KM43	Daily Record and Sunday Mail (Newspaper)	08/05/2018
KM24	Daily Mirror (Newspaper)	06/05/2018
KM26	The Independent (Online)	06/05/2018
KM28	Daily Record and Sunday Mail (Newspaper)	06/05/2018
KM30	The Sun (Newspaper)	06/05/2018
KM32	The Western Mail (Newspaper)	07/05/2018
KM36	Evening Times (Newspaper)	07/05/2018
KM38	The Sun (Newspaper)	07/05/2018
KM54	The Express (Newspaper)	09/05/2018

4.2.1 How much of the press release is used in news articles?

The Jaccard's Similarity coefficient can be used to compare two sets of data. In NVivo, the similarity or difference between two pieces of writing can be compared, and a Jaccard's coefficient derived.

This was completed by selecting all media related to KP6 and comparing all articles to the press release within NVivo (Figure 10). This comparison was a direct comparison between the wording within the media articles to the wording within the press release, compared to the manual relationships formed in the pie chart which were done using paraphrases or mentions of USGS throughout the article, rather than the direct comparison we see here. It is important to remember that most, if not all media articles did not quote the press release exactly, but paraphrased and changed the information to make it more understandable for the general public who would be the main target audience. The Jaccard's Coefficient defines similarity on a numerical and percentage scale, with 0 being no relation and 1 being the same as the comparison piece.

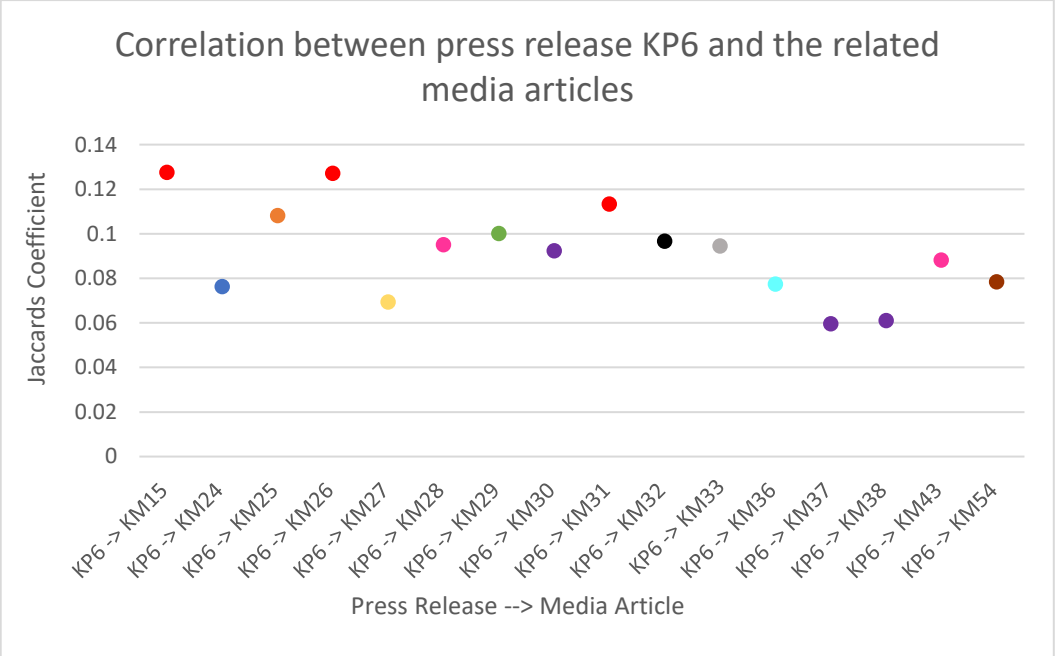


Figure 10 Correlation between KP6 and the news articles connected to it. A higher percentage of the Jaccards Coefficient shows a closure resemblance to the press release.

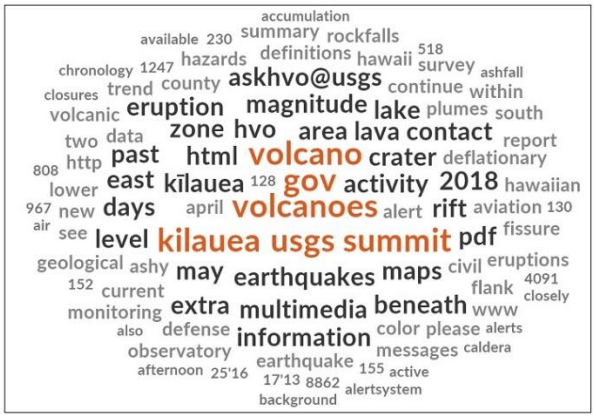
The results of the correlation coefficient analysis (Figure 10) showed that while some media articles were higher in similarity or difference to the press release, none of the articles could be described as being 'very' similar to the press release. The most similar articles, at 12-13% similarity are both from The Independent (KM15 and KM26), and the least similar articles, at only 6% similarity, are both from the Sun (KM37 and KM38). To understand the apparent differences in similarity, the use of language and key themes in the articles was analysed. During analysis of the articles, it was found that the different articles had different focuses throughout and while most did include some geological/scientific explanation, some may have focused more on the impact on people and property than on the science itself. For example, the two articles from the Independent with the

highest Jaccard's coefficients focused more so on the science and volcanic or seismic activity in the area, they were also significantly longer articles with KM15 having 755 words and KM26 having 453 words. Those with lower Jaccard's coefficients were significantly shorter in length with only 50-60 words and focused more on the impact on the residents including the evacuations from homes. Although it must be noted that both of these articles did include some reference to science, it may not have been picked up by the comparative tool due to phrases within the articles such as *"Eight holes, each hundreds of feet wide, opened in the Kilauea volcano."* Although this does take information from the press release, it is not written in a similar scientific manner.

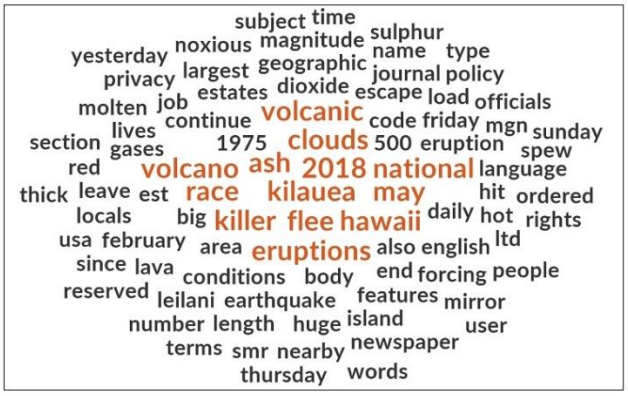
4.3 What was said? A broad analysis of media articles using word clouds.

The word cloud tool in NVivo was used to create a graphic representation of the different types of language found across both the press release and the news articles. Figure 11 presents an illustrative example of the three different articles representing regional (not local to Hawaii) news coverage (Herald), national tabloid coverage (Daily Mirror) and national broadsheet coverage (the Independent) related to the KP6 press release, and the difference in the key words they use. For example, the most common words in the press release are Volcano, Kilauea, Summit, USGS and magnitude. In the Herald the most common words include parks, gas, toxic, lava and communities. In the Independent the most common words include destroyed, lava, residents, eruption, homes and vents. In the Daily Mirror the words most commonly used include clouds, volcanic, ash, flee and killer.

Media Article KM31 – The Independent



USGS Press Release KP6 – 5th May 2018



Media Article KM24 – The Daily Mirror

Media Article KM33 – The Herald

Figure 11 Word Cloud created within NVivo. These word clouds highlight orange for the most popular words within the article and words reduce in size as they are less common within the articles.

While analysing the word clouds and leading on to an in depth analysis, themes for coding of words and phrases were created. These themes can be found in Table 4 below.

Table 4 Content Analysis Coding Themes

Theme 1: Sensational Language
Theme 2: Factual Language
Theme 3: Negative Language
Theme 4: Mentions of Earthquakes
Theme 5: Mentions of Monitoring
Theme 6: Mentions of Previous Eruptions

These word clouds highlight some key differences in the article types, such as the type of language used, and topic of focus. For example, the Daily Mirror includes words such as flee and killer. This

indicates that the articles are referring to the volcano as an event to be feared and an event that could be critical to life. This therefore refers less to the scientific knowledge of Kilauea's eruption style being a flow rather than an explosion. This therefore indicates sensationalism (discussed further later in the chapter) in how the media portrays these volcanic events to the public, therefore impacting their perception. This is in comparison to The Herald, in which words such as lava, crater, summit and vents are used. These words indicate that the media article is more closely linked to the press release and uses more information than other media articles, for example the Daily Mirror. While the media article does seem to focus on a few topics, such as the impact on the environment and people, it uses the press release to give the main scientific information to the public. This therefore provides readers with a broader understanding of the event, rather than a single aspect of the eruption. However, the article does include words such as forced and toxic, indicating there may be a slight form of sensationalism within the article.

4.4 Factual, sensational or negative news?

Using NVivo, words were coded as being factual, sensational, or negative. This was done using manual coding, in which the words and phrases were highlighted and put into individual categories, some of which overlapped. No criteria was formed, e.g. looking for certain words or phrases during this stage of the analysis and categorisation was done purely based on the personal interpretation of the text.

4.4.1 Factual Language

Factual language was found across all 16 media articles, with 59 references made across the group. KM15, a media article in The Independent, included the most reference of factual language across the media articles coded. The Independent is classed as a broadsheet newspaper and is therefore regarded as less sensationalised than tabloids. Some of the articles, although possibly shorted in length than that of The Independent only included one reference to factual language throughout the article. These articles were mainly tabloids such as The Sun and the Daily Mirror. Figure 12 below shows further categorisation and coding within the factual language theme and therefore shows the types of information shown within the category.

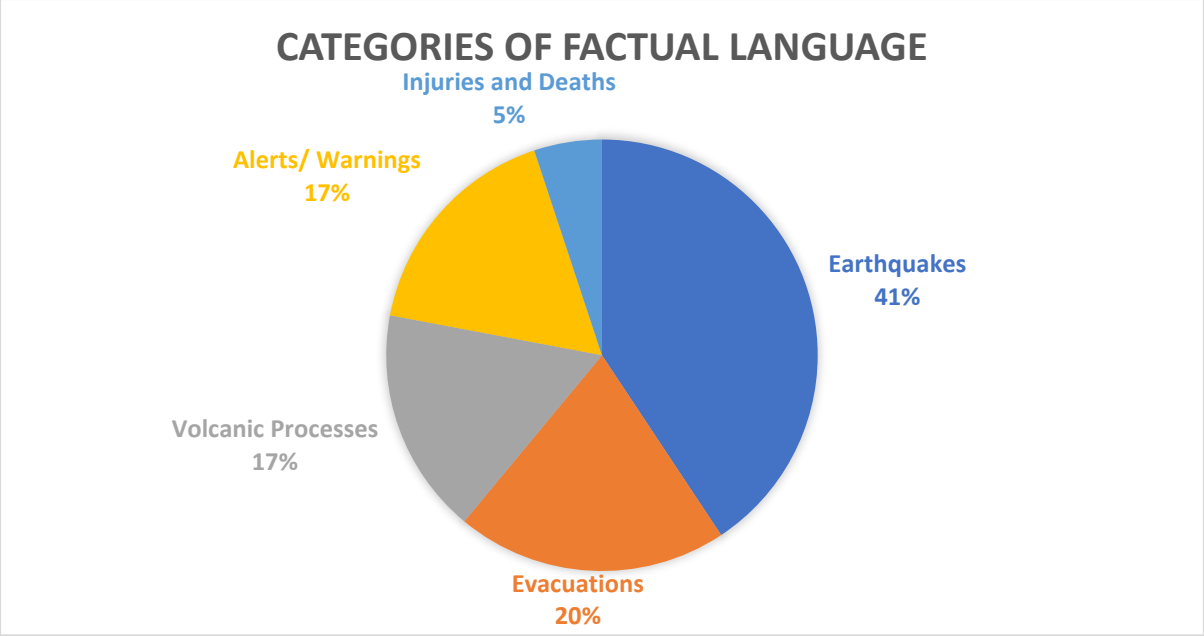


Figure 12 Types of information shown within the factual language category. This is based on all of the articles connected to KP6 and all aspects of the article that were coded as factual were categorised into the following.

The majority of the factual information, which was described as information mentioned or linked in the press release, was linked to the earthquake activity within the region during the eruption. It could be considered that themes such as earthquake activity and evacuation of residents could lead to a wider interest for the UK readers, due to a potential higher level of interest and education on the subjects. This could be especially true for evacuation statistics, as it is more likely to be a topic that UK readers have potentially experienced, for example during flooding events, which have occurred in the UK.

Aspects of the eruption such as scientific information on volcanic processes are less likely to attract readers, potentially due to lack of understanding of scientific terms but also due to the lack of personal experience on the topic, due to the non existence of volcanic events in the UK. The least mentioned topic was that of the lack of death and injury that occurred, this is likely to be due to the fact that no injury occurred, especially at this point in the eruption. However, within articles later throughout the eruption timescale, this may be a different statistic as minor injury did occur later during the eruption process.

The quote below is from the media article KM26, and shows an example of factual language used throughout the articles.

> *"A 2,000 foot long fissure erupts within the Leilani Estates subdivision, on the east rift zone of the Kilauea volcano, igniting a home, and creating a black plume of smoke." (KM26)*

This quote uses information similar to that of the press release, while using language that is easily understood by the general public. This quotation is concise and uses little to no extra information or description to get the message across. It explains simply the volcanic activity that was being experienced at this time during the eruption. Overall, it explains to the public the science behind the event and therefore uses the press release issued by the USGS to do so, this is an example of the 17% that referenced the volcanic processes during the articles.

These quotes follow one after the other within the article KM32. These articles portray two different aspects of factual information.

"Kilauea has been continuously erupting since 1983 and is one of the five volcanoes that make up the Big Island. Activity picked up earlier this week."

"Kilauea tends to ooze lava from fissures in its sides, rather than spout" (KM32)

The first allows the public to be aware of the volcanic makeup of the state, Hawaii as well as the knowledge of continuous eruptions of the volcano for over 20 years. This quote, regarding the continuous eruption of Kilauea and the volcanic makeup of Hawaii's island, could lead viewers and readers to have more of an understanding of the consequent knowledge Hawaiian nationals, scientists and public have of the volcanoes. The second quotation is regarding the type of volcanic activity that Kilauea displays. It states that the volcano oozes rather than spouts, displaying that the volcano doesn't display a violent eruption style, such as that of Mount St Helens. This quotation especially provides a sense of calm and is worded in a way the public reading the media article will understand.

This quotation is from a resident of Hawaii on the impacts of the eruption and can be found within KM31.

""The volcano and the lava – it's always been a part of my life." She said. "It's devastating, but I've come to terms with it"" (KM31)

This quote further shows the readers that residents of Hawaii have a deep understanding of the volcanic processes in the area. Although the resident describes the event as 'devastating', it shows that she has come to terms with living with a volcano and understands the wider impacts of the landscape in which they live. This quote shows the lack of concern or panic that can be insinuated throughout some of the sensational language used in other articles. It can almost display a sense of calm to the readers that the population do not display a sense of panic or fear in the face of this event.

4.4.2 Negative Language

Reference to negative language was made 8 times in only 4 of the 24 articles collected and was therefore only referred to in a very small sample of the media articles analysed. The majority of the negative language that occurred throughout the articles was in regard to that of the anxiety that residents faced throughout the time of eruption and had mention of those that were concerned of the loss of livelihood and homes. It could be observed that this language was used in a sensationalist manner, as many of the residents will have been informed and trained to deal with earthquakes and volcanic eruption from a very young age and therefore use of the words 'jittery' may have not been the correct language to use in this case.

"Rocked an already jittery population." (KM33)

In Hawaii, they educate and prepare the population for volcanic eruptions and earthquake activity form a young age, through programmes such a volcano awareness month in January to help educate the population on volcanic activity and the Great Hawaii shake out that happens yearly and prepares all for the actions to take if a major earthquake hits the island.

This quotation again comes from a resident of the area and can be found in article KM33.

"Tesha Montoya, 45, said toxic fumes escaping from the lava vents were not enough to make her family evacuate, but the tipping point were the earthquakes."

""I felt like the whole side of our hill was going to explode," she said. "The earthquake was what made us start running and start throwing guinea pigs and bunnies in the car."" (KM33)

The language in this quote can be described as negative as to the overall emotion is negative, mainly in the form of fear inducing emotions, potentially due to the shock that came with the earthquake activity that occurred. The quote states that they started 'throwing' their possession in the car, including pets. Although this could be read as quite literal from the readers perspective, it is important to remember the understanding the public have, and in this case, it wasn't the volcanic activity that led to these acts, but the earthquakes. In this case, residents were all safely evacuated at around this time the article was created and so the evacuation that this resident performed may have even been as advised by the government.

4.4.3 Sensational Language

Sensational language occurred within 11 articles and was used 24 times, therefore averaging at over 2 times per article. A lot of sensational language was used throughout the articles, especially the use of words such as 'deadly' and phrases indicating that residents were 'fleeing for their lives'. The eruption of 2018 was not 'deadly' at all, and no one lost their lives during the eruption. Minor injury did occur, however, but not until later on during the event. The use of the word deadly, especially during a nonviolent eruption is sensationalising the impacts of the event. It could be presumed that media use these words and phrases to draw in readers' attention. The use of the word deadly, or any indication of the eruption being deadly or even being likely to cause death was not mentioned once during the press release. This therefore makes it an example of the use of sensational language as it was not based at all on fact.

These two quotations are the headlines of articles KM25 and KM24 and could be described as completely sensational.

"'Apocalyptic' lava ENGULFS homes as Hawaii volcano continues to erupt" (KM25)

"Race to flee killer Kilauea" (KM24)

Within the first quotation (KM25) the use of the word apocalyptic can be instantly described as sensational, purely through the use of the word – mentioned by a member of the public within the article. The lava and the volcanic activity of Kilauea can not be described as apocalyptic, as described above the lava oozed, it was not a violent volcanic eruption. However, it is worth taking into consideration that the use of sensational language in this case is not only limited to the words used, but also how the words are used and written within the article title. For example, using quotation marks around the word apocalyptic indicates that this word has been used officially, however, it was mentioned by a member of the public, rather than a public official such as the USGS or government. The capitalisation again leads viewers to focus on the word engulfs as the main part of the header, this draws in readers attention to the negative and sensational language, potentially increasing readers' likelihood to read the article. The next article (KM24) uses the word 'killer', this word could be thought to be used to draw readers in. Again, it is important to remember Kilauea is a slow moving and well monitored volcano, meaning the risk to life in this case study was low. The impact that this has on people's perceptions of the volcanic crisis increases the likelihood of people believing that all volcanos are life threatening, here, it was not the case as no deaths occurred during the eruption event.

4.5 Geology or People? What do the articles focus on?

As mentioned previously, information on earthquake activity was mentioned many times throughout the articles. Earthquake activity alone was mentioned 35 times throughout the 16 articles, therefore an average of over 2 times per new article. There are a couple of potential reasons why the earthquakes were mentioned many times throughout the articles, especially those at the beginning of the volcanic events. First of all, the earthquake that occurred on the 4th May 2018 was the largest earthquake that had occurred on the island in 43 years. This was therefore a huge event and was widely reported across the media in the UK but it is also mentioned once within the press releases from the USGS for this date.

As well as this, the numerical (Magnitude) scale used to measure earthquakes is more widely understood, especially by the UK public. This potentially means it is more likely to draw in readers attention, therefore increasing sales and/or reads of the article. Due to the lack of volcanic activity within the UK, those who are less knowledgeable on the subject would have less of an understanding of the scientific language used throughout the press releases with regard to the volcanic processes that occurred throughout the eruption. It is therefore assumed that these details could have been less actively discussed within the UK media articles to prevent readers becoming confused by the terminology. It is likely that due to this, media journalists were unable to accurately describe these processes in lay terms compared to those of earthquake activity, which is simply described using the Richter scale, making it much more understandable for those reading the article.

This quotation found in article KM36 was similar to that of many articles analysed throughout the process and directly talked about the earthquake activity that occurred during the eruption event.

"Lava spurted from volcanic vents, toxic gases filled the air and strong earthquakes – including a magnitude 6.9 tremblor on Friday – rocked an already jittery population" (KM36)

This quote alone uses some form of sensational language but mainly talks about the 6.9 magnitude earthquake, the largest earthquake that occurred during this event. This quotation again strengthens the reasoning discussed above, that the measurements of earthquake activity is much easier for the public to understand than that of earthquake activity. As well as this, the earthquake was the largest in Hawaii in 43 years and was therefore also a large piece of news to discuss in this event. However, it may be important for the science behind the link between volcanic and earthquake activity to be discussed, so the public understand more that these events are linked, rather than two separate events, which is especially important for the UK population, who may never experience or have complete understanding of these natural hazards.

Mentions of previous eruptions occurred 11 times throughout 7 of the 24 articles taken for analysis. This means that most didn't make reference to previous eruptions at all and those that did made brief comments about those that happened previously. Most of the articles made reference to the constant volcanic activity Kilauea has been showing since 1983. While it is true that Kilauea has shown constant volcanic activity since 1983, it is not true that it has been continuously erupting from this time as many of the articles stated, such as KM32 written by the Western Mail and KM33 written by the Herald. According to the USGS, volcanic activity has occurred continuously but not all of that activity means eruption and this misinformation has the possibility to cause confusion for those readers who are less informed about volcanic activity, especially the type of activity that Kilauea shows, unlike more explosive volcanoes, such as Mount St Helens. From 1983 Kilauea has erupted multiple times, impacting the surrounding landscape and surrounding populated areas, however, the majority of the activity occurred in the form of the creation of new fissures and the lowering and collapsing of the crater (USGS, 2022).

There was also mention of the 2018 eruption showing similarities to that of a previous eruption that occurred in 1955 and lasted for 88 days. Kilauea's 1955 eruption was the longest eruption on the east rift zone for 115 years, all others that occurred between those times only lasted a maximum of two days (Ho and Garcia, 1988). It is true that similarities did occur between the two eruptions, with the Kilauea eruption lasting around three months, similar to that of 1955. An article written on the 3rd of May 2018 by Hawaii News wrote about the similarities of the eruptions only one week into the activity of 2018. They stated that "Geologists have compared the eruptions in Puna that are cutting through the Leilani Estates subdivision to an eruption in 1955. And that could signal big trouble." (Peterkin, 2018). A report written in 1964 and published by the USGS stated a few of the losses caused by the eruption of 1955. They stated that 3900 acres of land had been covered by lava and cinder and 17 homes had been destroyed by the eruption with 4 of them being deemed uninhabitable (Macdonald and Eaton, 1964). From this data, it is understandable as to why the eruption was being compared and was concerned about within the first week of the eruption, due to the long lasting effects of that of 1955.

This quotation from KM15 discusses the impacts of the 2014 eruption and is therefore using it to compare to the events of 2018.

"In 2014, lava burned a house and destroyed a cemetery near the town of Pahoa. Residents were worried it would cover the towns main road and cut off the community from the rest of the island, but the molten rock stalled" (KM15)

As discussed above, previous eruptions have had large impacts on the area and it is therefore understandable that the eruptions were compared to those previously. This type of comparison was actually completed by geologists as a complete comparison can be undertaken. Study of the same volcano, in the same landscape, could help scientists understand and premeditate the impacts of the future of the 2018 events. This quotation, which can be found in article KM15 does not sensationalise the previous eruption, but clearly states the previous impacts and residents concerns during that time. It could however help readers again understand that this type of event is not once in a lifetime and happens regularly, therefore meaning they are well prepared for by all, including geologists, government and general population.

Reference to monitoring occurred 12 times across 7 of the articles within the study and the majority of these references included information that geologists expected the eruption to continue, in one case, perhaps for months to come. Considering the articles analysed all occurred at the beginning of the eruption period, this information is correct and important to include within the articles. However, the majority of the information on monitoring that was included in the press release was missed out of the information of the media articles.

The press release related to the articles analysed (KP6) included a lot of information on the monitoring that took place throughout the eruption period. This information included the use of tiltmeters, Satellite InSAR data and the measuring of lava fountains. None of this however was mentioned at all within the media. It could perhaps be predicted that the media and journalists assumed that readers would not be interested in the information in regard to monitoring as it can be observed that the majority of the articles mainly discuss the impacts the eruption is having on the country and the residents, rather than the scientific facts of the eruption processes themselves. However it is well known that the purpose of the general news media is not always to inform public of the science, it is to report on the impacts, especially that on the people and environment and the science should be left to the press releases that are released to the public, at this time, on a daily basis. However, science section within news media sources could have made more effort to explain the science behind the eruption and in turn used the information within the press release to do this.

This quotation, found in KM26, further explains and indicates the monitoring that was being done on both the earthquake and volcanic activity to a large extent throughout the eruption event.

“Scientists forecast further eruptions and earthquakes, perhaps for months to come, after was rocked by a 6.9- magnitude tremor on Friday, the strongest the island has seen since 1975.”

"The US Geological Survey (USGS) said several new lava fissures had opened in the Leilani Estates subdivision of Puna District, which is about a dozen miles (19km) from the volcano. Not all the fissures were still active, it added. But the Hawaiian Volcano Observatory said, "eruptive activity is increasing and is expected to continue."" (KM26)

Forecasts were being made for months in advance as well as measuring of fissures and understanding of new and old fissures within the volcanic landscape in the area. This proves to the readers the complex monitoring and understanding of the natural hazards that play part of this area's landscape and can almost prove to readers that this volcanic eruption, especially within this state, is not an eruption that causes panic. Although this may be the case in a state such as Hawaii, USA, it needs to be understood that this is not the case in all countries, such as events such as Nevada Del Ruiz, Colombia, where the country was not adapted well enough to monitor and safely evacuate the population.

Homes and evacuation of the residents were mentioned 29 times throughout 15 of the 16 articles analysed for research purposes. The majority of these references referred directly to the evacuation of the residents away from the volcano. Fewer mentions were to do with homes or the effect on homes, even those effects within previous eruptions.

Evacuation did begin to take place on the 4th May 2022, however, no mention of this evacuation occurred within the press release and therefore all information must have been linked to civil defence alerts or press interviews with the public. Although the evacuations come from a place of fact, the way evacuations were described by the media was not always completely realistic. Thorough monitoring was done on the volcano and the pace of lava flow meant that there was the ability to plan and control a response to the eruption, without a sense of panic in the area. The fact that nearly all but one of the media articles mentioned the evacuations indicates that all of these articles has a sense of focus on the people of Hawaii during the eruption, this doesn't necessarily mean it is the primary focus of these articles, as articles can have more than one focus.

"Which saw more than 10,000 people fleeing their homes." (KM37)

This quote can be found within the media article KM37, which is linked to the media article KP6. This shows a sensational way of discussing the evacuations from Kilauea. This uses words such as flee which cause readers to feel as though the evacuation was one of panic, which is untrue. However, it does show that the media article has focus on the impact of people, such as that on homes and the

consequent evacuation. Following this, the Hawaiian GOV allowed for residents to return to their properties on the 6th of May (as stated within KC3) to check on their properties and remove valuables if needed. This therefore indicates the sense of safety that the government felt and further acknowledges a lack of panic.

4.6 Comparison of Media Articles to Real Life Events

Figure 13 Tweet from Graphic News showing infographic released by USGS

Figure 14 News Article Headline from The Times

Figure 14 shows a news article headline relating to the evacuation of residents/ communities close to the volcano and Figure 13 shows an infographic from another news source on social media also relating to this. The media article shows a sense of panic, especially in the way the article is worded, using words such as ‘forced’ and ‘flee’. However, this is quickly diminished by the infographic within the Twitter post. This image/map shows that there was at least 3 days before the indication/start of eruption and evacuation of residents. This therefore strengthens the argument that the volcano was being closely monitored for days, if not weeks before the eruption and therefore evacuations were not panicked but were instead planned and managed by all officials involved.

4.7 Chapter Summary

Overall, this chapter shows that translation of press releases to news articles is not consistent across all press types. Some news companies translate more of the press release than others. The language translated from press releases to news articles has been coded into themes and this is found that there is a large range of language used across the news articles, all connected to one press release. Mostly, news articles focus on the human impact of the event, something that focus group participants said was missing in the press release. However, they focused less on the science in the press release, which allows readers to understand the natural environment causing these human impacts.

Chapter Five - How is the language used by news media viewed and interpreted by the general public: impact on perception of volcanic hazards, risk and uncertainty.

This chapter aims to research further into how the language used in the media is interpreted by the general public and how this impacts their perceptions of volcanic hazards. This was mainly researched using focus groups and discussing press releases and media articles with the participants in small groups. Pre-focus group surveys were also completed so participant's demographics and basic knowledge and perception could be understood prior to these discussions. These focus groups then formed the basis of understanding perceptions of this case study in more detail. The results of the analysis can be found within this chapter. This chapter investigates the research question by looking into the initial public perceptions found via pre focus group surveys, the overall perceptions of the participants from the focus groups and the themes of perceptions discussed during the focus groups.

5.1 Participant demographics

In a pre-focus group survey, a series of questions were created to ascertain participants backgrounds including age, gender, employment status, job type, nationality and education level (Appendix III). Nine people were recruited to the focus groups (split into three groups of three). In particular, it is thought that age, education level and gender might influence someone's perceptions of hazards and risk in general, the perceptions of specific events and the language used in the media and press releases. Previous research on the topic shows that younger people may be better informed in natural hazards in general, however, this research also showed that the most informed on volcanic events was the 35-65 age category (Avvisati et al., 2019). Figures 15, 16 and 17 show some of the demographic information of the participants that took part. In the focus groups, participants were grouped by age. We determined participants' level of expertise by asking whether they had studied Earth Science, Geography or Geology at GCSE, A Level or at University (Bachelors degree or higher). Out of the 9 participants, 3 had no GCSE or above in a GEES subject, 4 had a GSCE in in a GEES subject and 2 had a Bachelors Degree in a GEES subject (this was the participants highest level of GEES education). In this research, differences were mainly found between age groups and education levels but no difference was found as a result of gender differences.

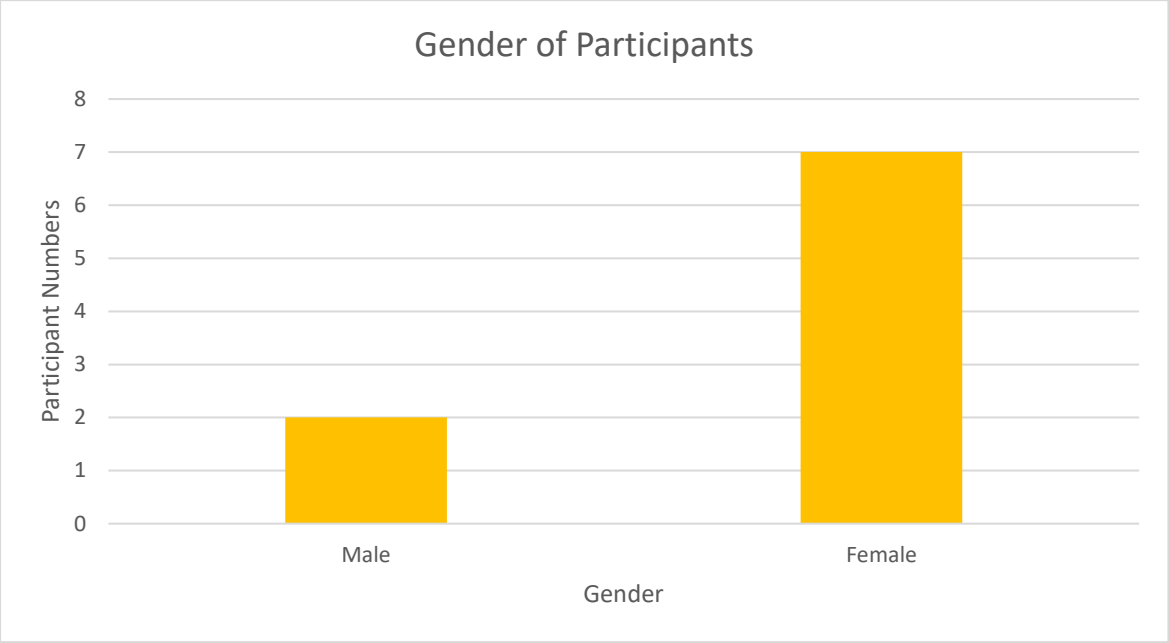


Figure 15 Gender of participants. (Male, female, non-binary, no answer – no response to latter two)

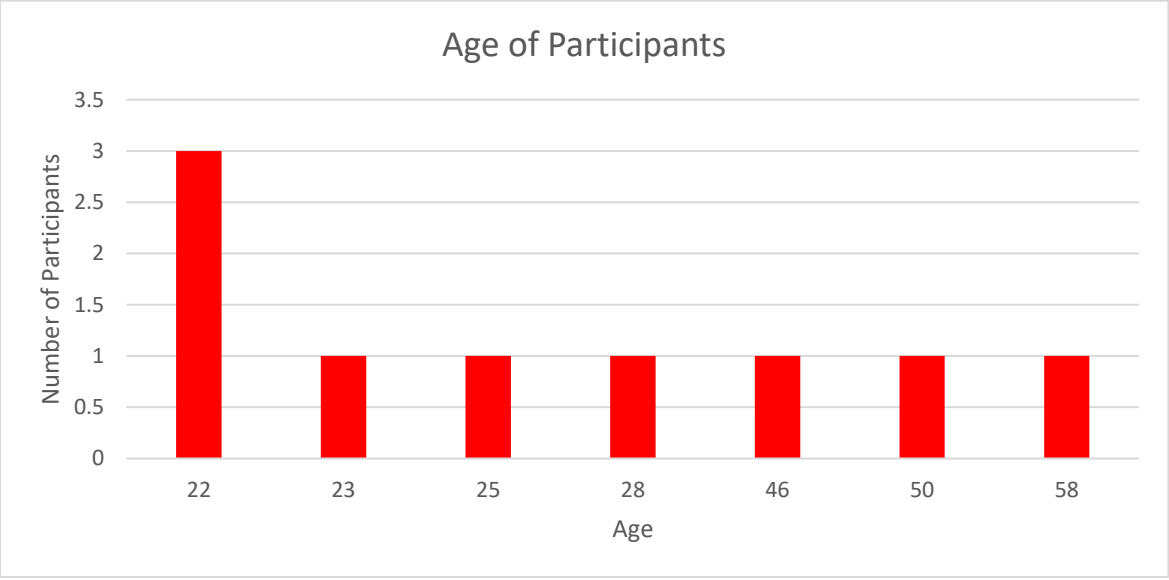


Figure 16 Age of participants.

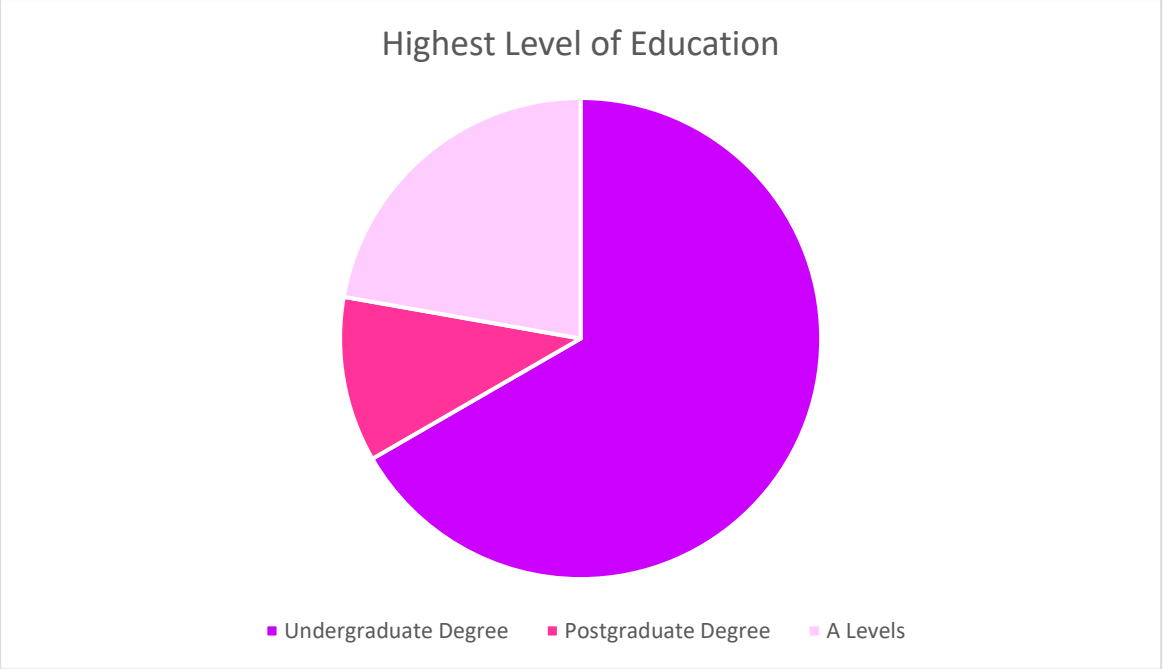


Figure 17 Education levels of participants.

5.2 Pre-focus group survey

Pre-focus group surveys were completed by all participants before the focus groups commenced (Appendix II). Surveys were sent by email for participants to complete in their own time. This allowed for analysis to be completed on these responses prior to the focus group to tailor questions and discussions within focus groups. To understand participants' individual perceptions before the discussions took place, simple questions were asked, some in the form of yes/no questions and some with free text answers that allowed participants to elaborate on their answers. The responses of some of these questions will be presented and discussed below.

5.2.1 Focus group initial perceptions and demographics

Group One

Group one was made up of three 20-40 year olds (two female, one male), all with Bachelor degrees as their highest education level in general, one participant had no GCSE or above in GEE and two participants had GCSEs in a GEES subject. Media usage of the group ranged ever so slightly, with 2 of the group indicating they had daily interaction with the news and one participant indicated no interaction with the media. All participants made it clear that they would mainly only read news articles that interested them, with little media usage throughout the day, mainly through the use of social media, applications or online news websites. Group one read the press release initially with all saying they found the text trustworthy but potentially unclear due to the language used. All

participants said that they were unaware of the Hawaiian eruptions in 2018 and would have probably clicked on the article and skimmed it if they were to see it online.

Group Two

Group two was made up of three 40-60 years old (1 male and 2 females), with a mixed level of education. 2 had a GCSE in a GEES subject and 1 had no GSCE or higher in a GEES subject. All members of the group indicated an at least daily interaction with the media, mainly through morning and evening news on the TV and also through news applications on their phones. Only one participant in the group spoke about the use of social media for media interaction, this was mainly on Twitter. Similarly, to group one, group two initially read the press release and two out of three indicated that they thought the text was trustworthy, however, three out of three of the group found most of the information unclear. The group indicated that the source of the media article would mainly influence their likelihood to read the article and would have potentially clicked on a media source relating to the eruption but not necessarily read it if it wasn't from a source they trusted. Only one member of the group recalled the eruption happening.

Group Three

Group three was made up of three 20-40 year old (all female) all with at least a Bachelors degree or above. One participant had no GCSE or above in a GEES subject and 2 had a Bachelor Degree in a GEES subject. All members of the group indicated an at least daily interaction with the news potentially more with a couple of the participants indicating that they read the news multiple times a day. The participants all indicated that they would not go out of their way to watch the news on TV but do use apps and websites to read the news. This group initially read the two news articles as part of the study. All participants perceived the Independent article (755 words) to be more trustworthy but indicated that they found the Daily Mirror article (61 words) more clear, due to the article being more 'to the point'. All of the participants indicated that they were unaware of the eruptions happening regardless of their increased interaction with the news.

5.2.3 Individual Perceptions and Survey Responses

In order to try and understand how people understood press releases vs news articles, the focus groups were given different material in the pre-focus group surveys. In two of the groups, Groups 1 and 2, participants (6 of the 9 participants) were given a press release (KP6) to read (Appendix IV). In Group 3 (3 of 9 participants) were given two news articles to read (KM15 and KM24) (Appendix V and VI). Participants were then asked a series of questions specifically about how they felt about these materials. A few of these questions are outlined in the figures below. Questioning on clarity

was also asked, with two out of six finding the press release clear, two finding it unclear and two replying unsure. In terms of the news article two out of three found the articles clear and one out of three found them unclear.

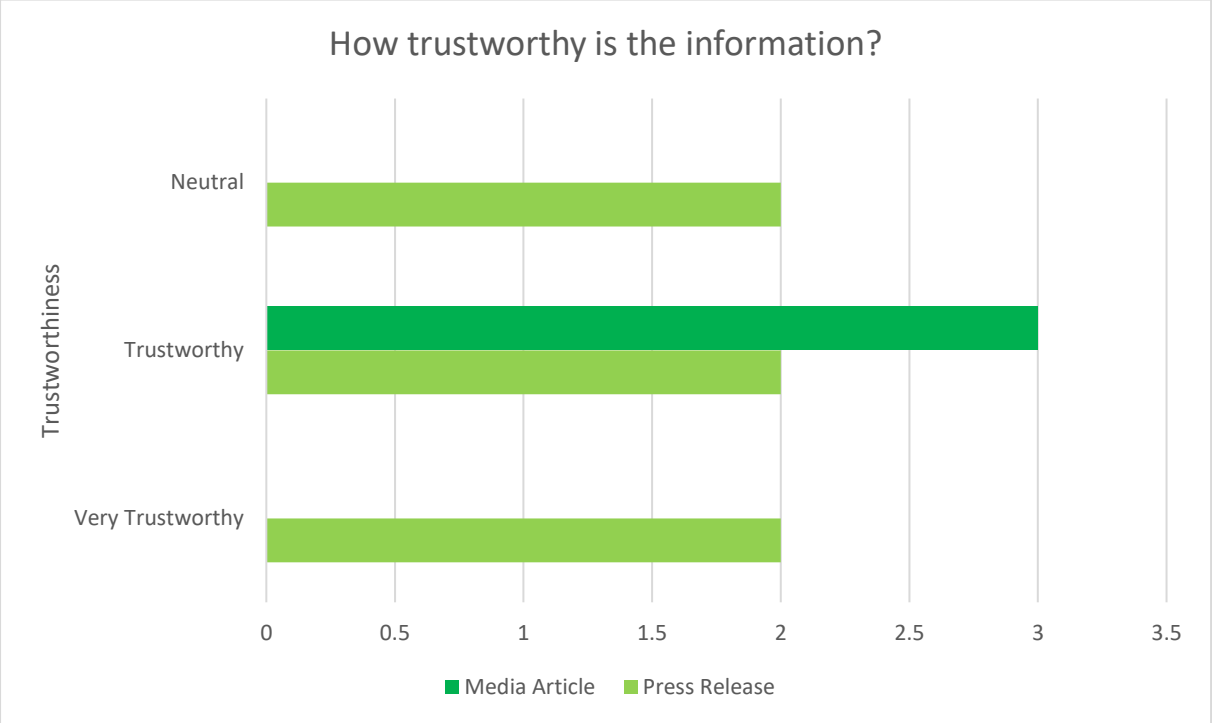


Figure 18 Participant's perceptions of trustworthiness of texts during the pre focus group survey. Participants were given either a press release (Group A) or a news article (Group B) to read and asked how trustworthy the information is.

To investigate the idea of trust of the news articles and press releases, the first question asked participants how trustworthy they felt the provided text was (Figure 18). This gave an initial understanding of individual participants prior levels of trust regarding the sources, without having access to the other piece of text and prior to having discussions with other people surrounding their perceptions of the text. This therefore made the initial perception of trust unfiltered and was only based on the actual text rather than any extraneous sources. The perception of trust for a source is likely to impact the perception of the information the source provides and vice versa. It can be hypothesised that if someone perceives the text positively they were more likely to trust the message it is portraying and if someone negatively perceives the text it is likely they will deem it untrustworthy. This hypothesis is supported by previous literature on the topic, with Bronfman et al., (2016) finding that trust is one of the variables that has the highest influence of risk perception.

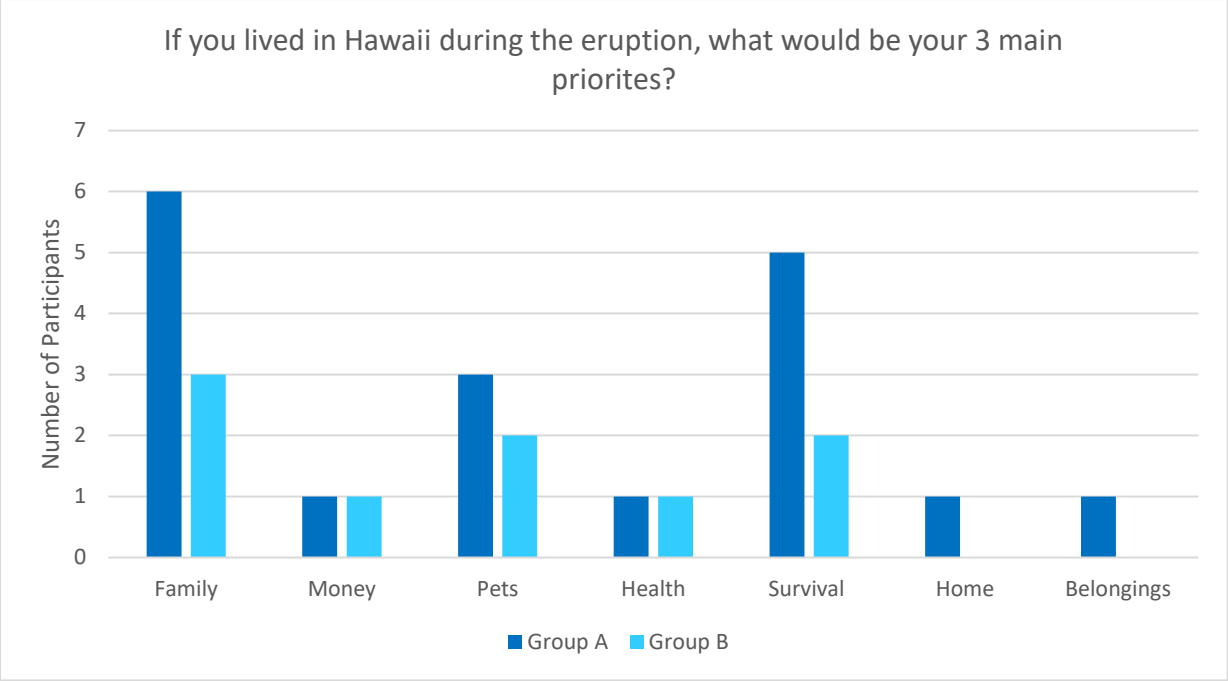


Figure 19 The main priorities participant's imagined if they lived in Hawaii during the eruption . Participants were asked to select three main priorities from a list provided.

After reading the material, participants were given a list of 11 priorities (family, money, pets, health, survival, home, belongings, wildlife, roads, environment and infrastructure) and asked to select which 3 they imagined would be their main priorities if they lived in Hawaii during the eruption (Figure 19). This question hoped to understand participants' perceptions of the main risks during the eruption. This question was repeated after the focus group discussion, to see if this changed after seeing other information about the eruption and discussing this with peers. 5 of the 6 participants who read the press release chose survival as a main priority within the event and 2 of the 3 who read the news article chose survival as a priority. As we move further into the results of the focus groups, we will look into aspects of both the information and outside factors that could lead to these perceptions from the participants. Some of the answers could be argued to be solely to do with the individual priorities of that person e.g., family, however some of the answer could relate to the perceptions of the texts, e.g. answers such as survival, homes and health. Comparison of answers compared to age group is shown in Figure 20. One of the biggest differences shows the priority of money for 2 of the 6 20-40 year old, indicating that this could have been a personal priority. However, one of the participants, from Group A, who chose money as a priority indicated that if your home was gone or you needed to evacuate you would need money to do so. However, answers/ perceptions such as health and homes can also be impacted by other factors such as a lack

of understanding of disaster risk and the impact of tv, film and media on people's perception of hazards.

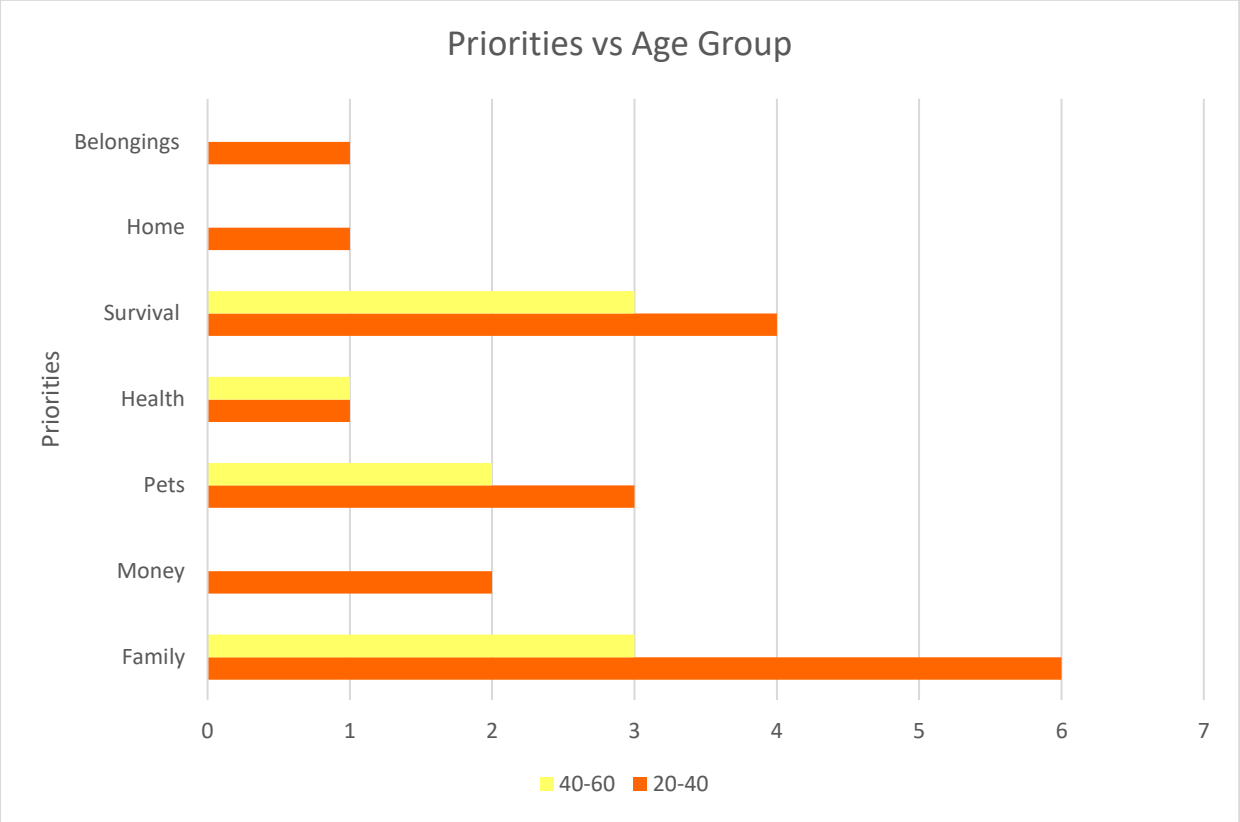


Figure 20 Priorities vs Age Group. Participants were asked what their main priority would be in the event based on the information read. This has been compared across the two age groups.

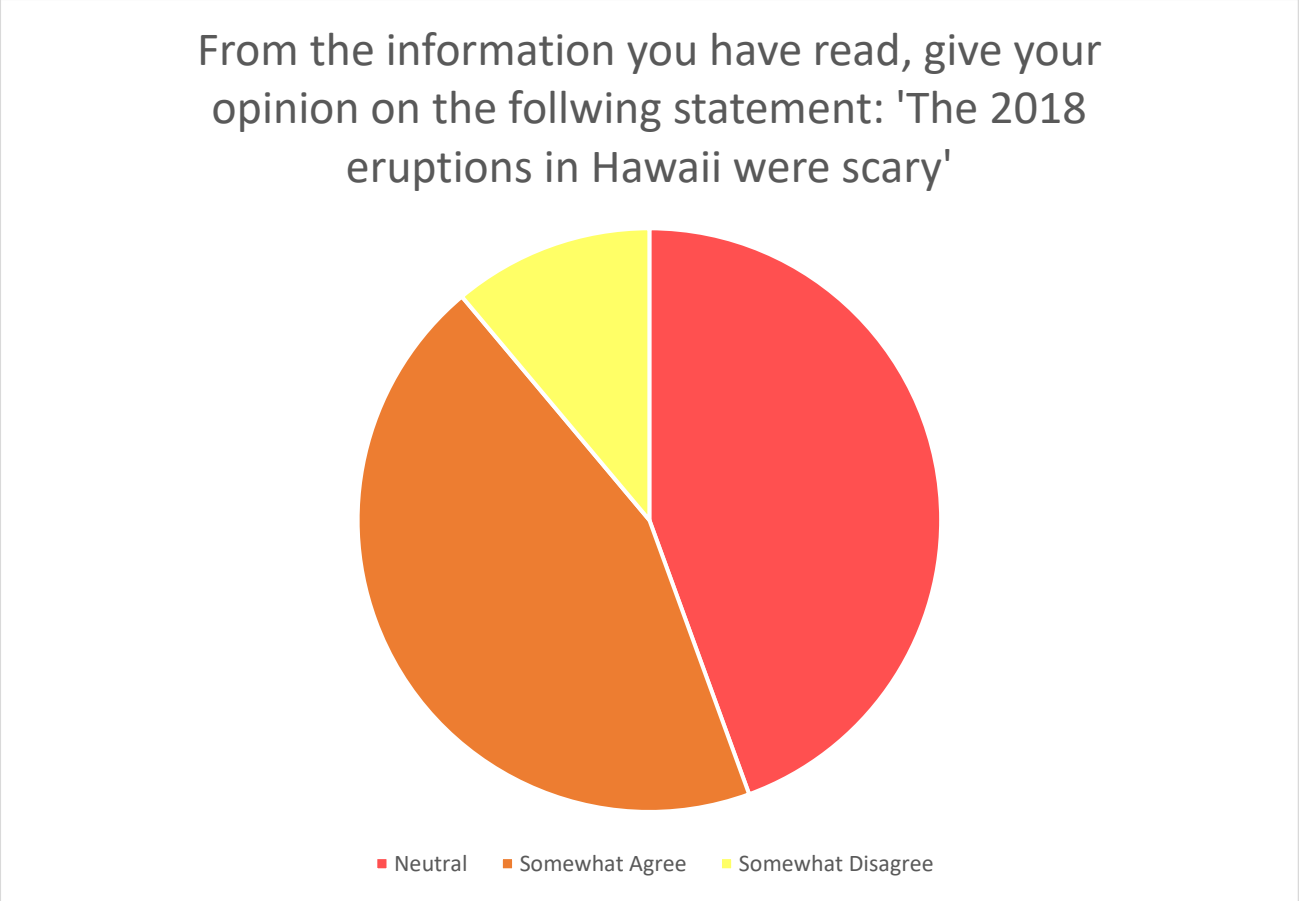


Figure 21 Participants were asked if they perceived the eruptions to be scary based on the information they read. This figure shows the results of that pre survey question.

One of the final questions asked participants if, based on the information they read in either the press release or news article, they perceived the eruption to be scary (Figure 21). 3 of out 6 of Group A answered Somewhat Agree with the remaining participants answering neutral, in Group B each participants answered differently, with one saying somewhat agree, one saying neutral and one saying somewhat disagree. The participants' understanding of disaster risk was also important to look at prior to the focus group to gauge how much of an understanding the participants had of volcanic types in general. Eruptions in Hawaii tend to be effusive, comprising lava fountains and lava flows that travel at relatively slow speed. Those with a greater understanding are more likely to know that Hawaiian volcanoes are not typically thought of as 'scary' or 'fearful' but are generally calm eruptions with slow moving lava. Other factors could result in the variety of the emotional response to the information, such as the impact of visual media and prior understanding of volcanic events.

5.3 Focus Group discussions on overall perceptions of media vs press release.

Focus groups were used to further understand the perceptions of the press releases and media articles and further understand the results of the questions asked in the pre focus group survey. A list of questions were generated before the focus groups and were mainly based upon the questions and answers of the pre focus group survey (Appendix II) and further prompt questions may have been asked as a result of the participants answers or discussions within the groups. These prompt questions were not planned and flowed naturally within the discussion.

Media usage and the perception of types of media is likely to have influenced participants' perception of the article and therefore their perception of the event that they are reading about within the article. Most of the participants within the study had similar perceptions of the articles read (The Independent and the Daily Mirror) regardless of age and educational level, they all agreed on the trustworthiness of the articles read but had different views on whether they would choose to read the article or not, which needs to be taken into account during the study.

All of the groups were asked which of the news articles they found more trustworthy with all but one participant agreeing they found the Independent (broadsheet) news article more trustworthy. Only one participant argued that they were equally as trustworthy, with one just being more condensed than the other. However, some participants, especially those within the 20-40 age group, would be more likely to read the Daily Mirror article due to it being short and snappy rather than longer in length (such as the Independent). All agreed that if they were interested in the subject, they would then go on to look for more information through news articles such as broadsheet examples.

The majority of the participants began the study by reading the press release first. Questions were then asked about the press release and their perceptions of it. Both of these groups indicated that while they trusted the press release, especially due to the facts and figures presented, as well as the source (USGS) they found the press release mostly unclear. This was particularly due to the language and figures used being scientific and not commonly used by the general public. The perceptions of the group that read this during the latter part of the study also agreed with these perceptions, agreeing that while they found the information trustworthy, they thought it was unclear due to technical language but also due to the length of the text (492 words).

"I found it unclear as someone that doesn't know anything, some information went over my head and there was a lot of words I didn't really know, all I gathered was that there has been some kind of volcanic eruption. I did have to read it a few times to try and process it." (Participant 1C)

"You understand the words but other than the orange code I didn't understand how significant or severe it was, it was a lot of words." (Participant 2A)

During the discussions, especially during groups one and two, the intended audience of the press release was considered, with all participants agreeing that they thought the press release was potentially for other scientists or internal authorities rather than the public. This perception of the press release is an aspect of press release writing that may need to be considered within the future, which will be discussed further during this study.

Participants in the study discussed their understanding of volcanic hazards, indicating that they believed all volcanic events were explosive, life threatening and scary aspects of the natural environment. These feelings therefore lead us to believe that people perceive the events with a sense of emergency which can be commonly perceived with all natural hazards but more commonly with volcanic crises.

"The big ash cloud, like in Pompeii but the only other reference point I had was a film from years ago with lava in the streets." (Participant 2A)

"It's a massive thing, it could kill people."(Participant 1C)

Perceptions of this ideology of volcanic crises did not change too much during the study of both the press release and the media articles. Only one participant indicated they have learnt that not all volcanic activity is explosive. This could be due to the lack of clarity of the press release and the sensationalism of the media which indicated that residents were fleeing from their homes. An anomaly to this result were the participants with Bachelor Degrees in a GEES subject and the impact of this education will be discussed in the subsections below. However, it can be argued that there are a number of factors that can influence the public's perception of volcanic hazards, which do not include language and information within media articles. These factors influencing perceptions were discussed within the study and include aspects such as visual media, knowledge of volcanic crises etc. These themes are further discussed in the subsection below.

5.4 Analytical Themes

During the study and especially during the focus group discussions, it was understood that language was not the only aspect that influenced the publics perception of volcanic events. This subsection aims to understand a range of themes that impact perceptions along with language, these include media usage, the idea of impact, subject knowledge vs interest, opinions of tabloid media and the impact of visual media.

Media Usage

Media usage was reported and analysed as part of the focus group discussion and split into two categories based on ages of the participants. Ages of the participants has an impact on media usage as well as perceptions of different types of media, in this case, mainly news media.

The 20-40 group were the first group analysed and 5 of the 6 of the participants indicated regular news interaction, this regular interaction was at least interaction on a daily basis. This was mainly in the form of online news websites and phone apps, as well as YouTube, Reddit, radio and podcasts. 1 of 6 of the participants indicated little to no interaction with news media. All interaction that did take place would be through social media, mainly links of news articles that occurred via Facebook and Twitter. This wasn't usual across this age category, as all participants indicated the use of social media as a form of news media access.

"My main source is probably through Twitter and Facebook, but I wouldn't actively go on to a news website it would only be what I see through social media." (Participant 1C)

The 40-60 age group media usage was also analysed and all participants (3 of 3) indicated regular and daily news interaction and usage. All participants indicated they watched or read the news 1-2 times daily at a minimum. The participants suggested that the media interaction was mainly in the form of TV news programmes, such as BBC/ ITV news but they also referred to the use of news apps and websites. The biggest difference between the 20-40 and 40-60 group is that all participants in the 40-60 category said they would never or very rarely use social media as a form of news media access.

"Twice daily for me. Early morning, late evening. Always generally the TV." (Participant 2A)

"I don't (use social media), I use the app, I watched the pings coming if there's a breaking story, but that's not social media, but no, I don't." (Participant 2C)

The focus group discussions indicate, the rising use of online news, such as news websites/ applications and the falling use of TV to engage with the news, especially within the 20-40 age category could indicate where changes need to be made within the journalism industry. This is especially important when considered that all participants within the 20-40 group used social media to engage with the news media. It is important that agencies such as the USGS engage with social media as a way to hazard report, as shown within the chapter (5.2.1) with one participant indicating their only news usage is via social media. The presentation of correct and factual social media posts, in the form of news media links or scientific information, such as that of the USGS is becoming more important as the technology and communication industry changes, it is possible that social media is the only aspect of media some people engage with, as shown within the results of the focus groups. This theory is supported by the work done by (Boczkowski et al., 2018) who found that for many young people, social media had become the main source for news and they no longer relied on traditional news media such as radio, television or newspapers. Similarly, studies completed by (Schwaiger et al., 2022) found that the participants (20-25 year olds with a range educational backgrounds) all said they mostly use social media platforms such as YouTube and Instagram for news media. It was stated that while these platforms were mostly used for entertainment, when they encountered interesting news, they would search further on the topic (Schwaiger et al., 2022). This indicates that the younger population are only reading media that directly interests and effects them and this will be discussed further in the subsection below.

"If it doesn't affect me, I don't care"

This section heading is based on a quote from a participant in Group A and captures a general feeling from many of the group discussions. Leading on from the previous theme, the idea that people don't interact with news articles that don't impact or interest them directly was discussed in depth. 8 of 9 of the participants indicated that they were unaware of the volcanic eruptions that occurred in Hawaii 2018, regardless of the extensive news coverage. However, all participants could recall the 2010 Icelandic eruption of Eyjafjallajökull. This eruption directly impacted air travel across Europe and in group two it was revealed that one of the participants had been directly impacted by these eruptions

"I guess because the impact didn't impact us, its more curiosity. But Iceland impacted us, I got stuck in Portugal." (Participant 2B)

Discussion had across all of the groups also mentioned the possibility that a lack of news media during the eruption could have meant that they didn't know about the eruptions or missed the information regarding them, potentially due to the lack of impact on the UK as a country.

"I have no recollection of that event maybe because it was in Hawaii and it didn't reach us over here and it wasn't so catastrophic that it wasn't big news over here." (Participant 1C)

"Maybe the Hawaii one didn't make the news over here in a rolling news cycle." (Participant 1A)

"They may have mentioned it really off the cuff and then moved on to something that hits a bit closer to home." (Participant 1B)

However, during the study, 126 articles were collected purely for data in this study alone. This indicates that the UK media were releasing an average of 1 article per day over the 3 month course of the eruption, on some days potentially 2-3. This further suggests that people are more likely to skip past news that doesn't impact them, or potentially not recall that information due to the lack of impact or interest in their daily lives.

This lack of interaction indicated within the focus group discussions can be compared to the interaction with local Hawaiian news during the time of the eruption and more specifically, during the time that the UK media articles discussed in the focus groups were released. As can be identified in Figure 22, the video released by Hawaii News Now on Facebook had tens of thousands of interactions. This was in the form of 19,000 Reactions, 34,000 Shares and 4,700 Comments. Compared to a video, shown in Figure 23, released on a day later by the UK Media company the Independent, that received only 53 Reactions and 13 Shares. This is a noteworthy difference in engagement between a local news source and a foreign news source.

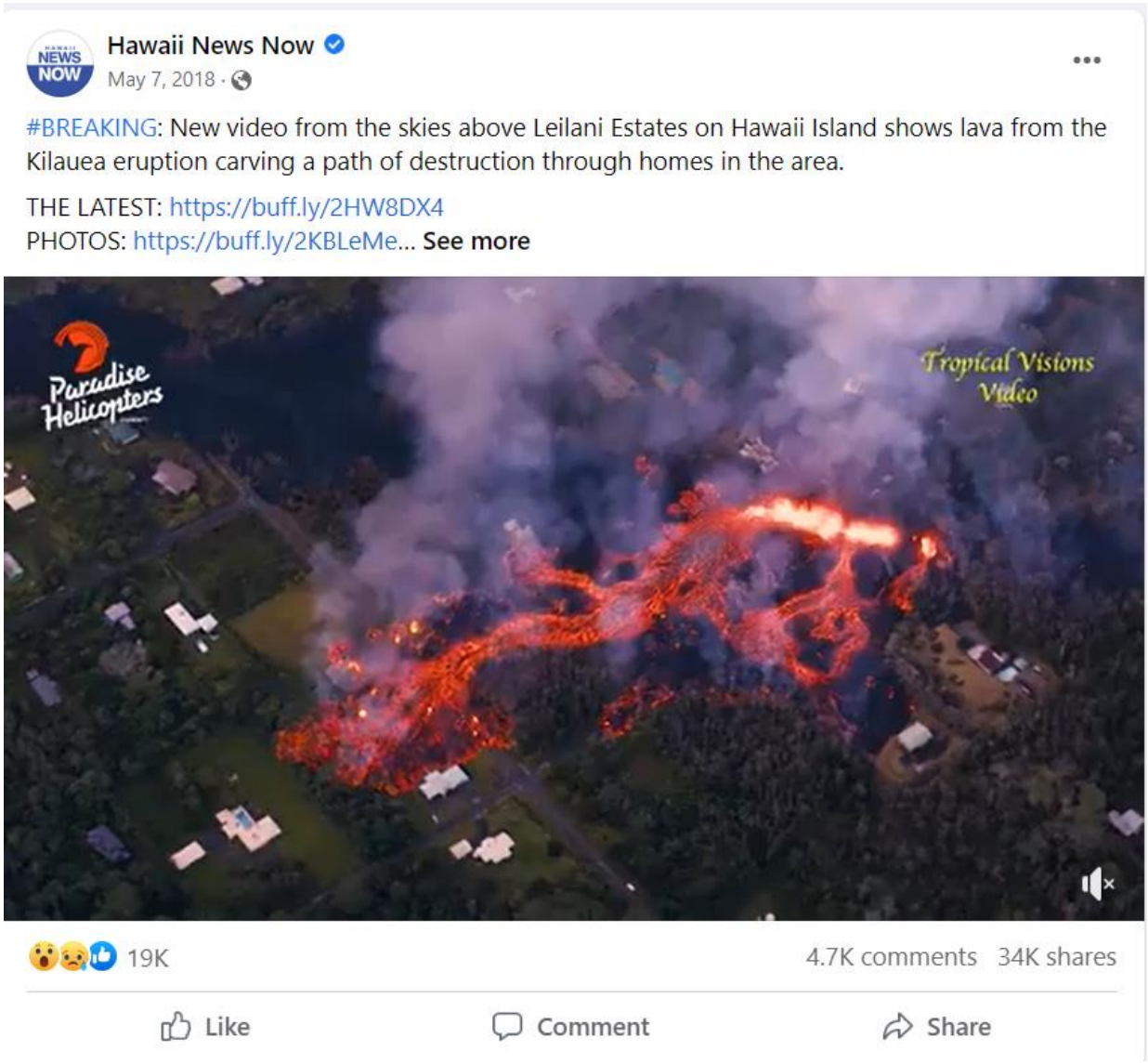


Figure 22 Facebook post by Hawaii News Now, a Hawaiian news company. This shows the number of reactions, shares and likes on the post, therefore showing the number of connections to the post.

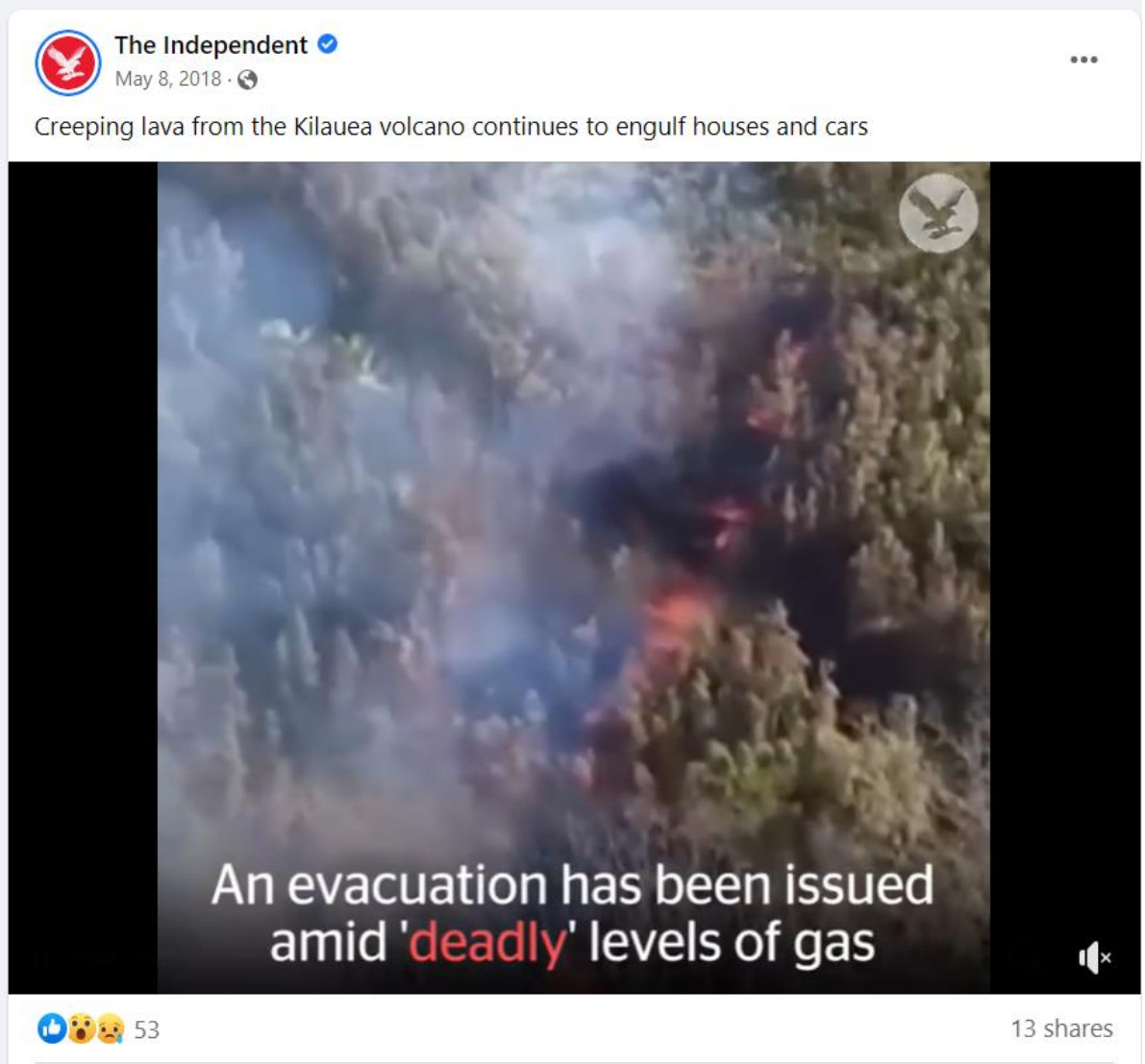


Figure 23 A Facebook post by the Independent, a UK news Company. This shows the number of reactions, shares and likes on the post, therefore showing the number of connections to the post.

UK Media during 2018 was very much focused on Brexit, something that was impacting the British population at the time of the Kilauea 2018 eruptions. It is thus informative during this study to compare the consumption of Brexit news, compared to the news of Hawaii 2018, both within the UK population but also the worldwide population. Figure 25 below shows the comparison of public engagement between the 2 topics in the UK and Figure 24 shows the comparison of public engagement worldwide.

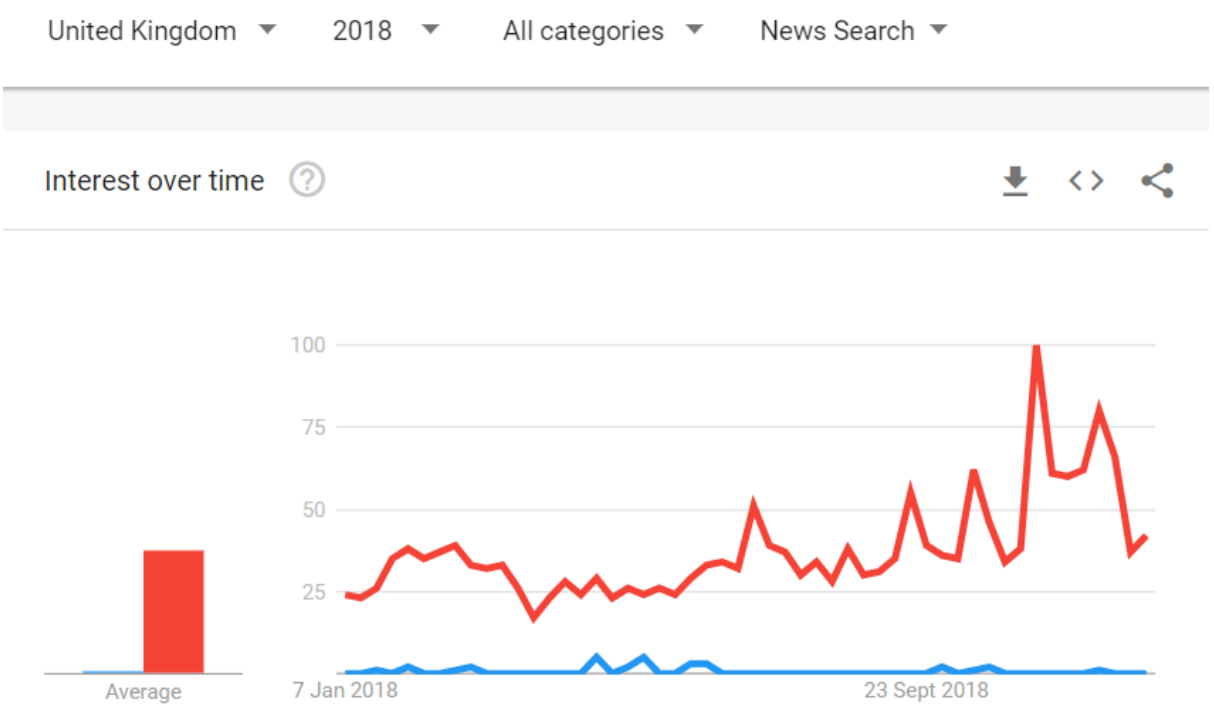


Figure 25 A graph to shown interaction with news searches for Brexit and Kilauea in the UK. Red lines indicate News Searches around Brexit and blue lines indicate news searches around Kilauea.

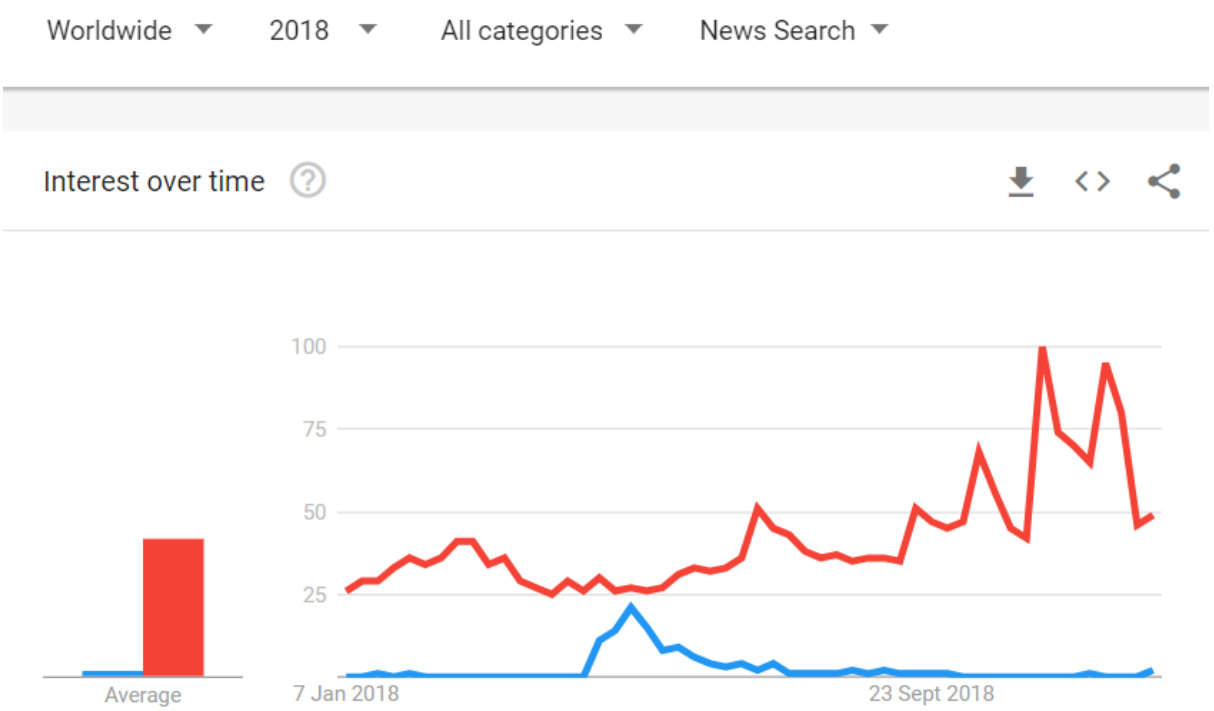


Figure 24 A graph to shown interaction with news searches for Brexit and Kilauea worldwide. Red lines indicate News Searches around Brexit and blue lines indicate news searches around Kilauea. Source Google Trends.

While comparing the UK and the Worldwide data, it can be seen that although the news search on Brexit remained higher across both, the news searches on Kilauea were a lot higher worldwide (Figure 24) than that of the UK data (Figure 25). This could be due to the interest and impact that politics has on the worldwide population, compared to the lack of impact that science, specifically contained natural hazards, have on the worldwide population.

While considering the theme of 'If it doesn't affect me, I don't care' it is important to look further into the potential desensitization to negative news in the modern world. Due to the constant news stream within the modern world, especially due to technological advances such as social media, news applications and websites, it could be argued that the population are becoming desensitized to violent or fear inducing events, in this case, natural hazards, but also in cases such as war, terror and even health fears such as the COVID-19 pandemic. Studies by Scharrer, (2008) looked into the relationship between heavy interaction with violent local news (such as news found on social media) and it's potential contribution to a blunted response to violence in news stories. It was confirmed during this study that desensitization does occur through long-term exposure to violence and ultimately diminishes a psychological response to this type of media (Scharrer, 2008).

Lack of Subject Knowledge vs Disinterest

The lack of education on volcanic events could impact people's perceptions of volcanic eruptions. Due to the UK being a volcano-free country, a lack of subject knowledge could occur, due to the lack of mandatory geographical education that occurs from secondary school age within the UK but also due to the lack of need for this type of education within the country. In 2022, 42.05% of 16 year olds took GCSE Geography, and only 5.45% of the 18 year old cohort took Geography at A Level (UK Government, 2022). This shows that more than 50% of the UK population stop their geographical education by age 16, potentially limiting their interest in events such as Kilauea 2018 but also perhaps that they are less likely to engage with news articles around natural hazard events.

Regions such as Hawaii may have a completely different need for education about these types of events compared to the population of the UK. Educational programmes such as the Great Hawaiian ShakeOut, which happens yearly, not only encourage the population to learn about earthquake and natural hazards but makes sure the population knows how and when to react when earthquake activity does happen (Southern California Earthquake Cente, 2023). Hawaii Volcanoes national park also offers a variety of educational programmes to schools. This provides age appropriate

programmes for school groups focusing on Geology and Ecology and helps teacher's meet Hawaii State Curriculum requirements. This indicates that Hawaii State have requirements within education for students to learn about the geology and volcanology that makes up the state they reside in. Hawaii Volcano Awareness Month also happens every January and provides education to the local residents about the volcanic activity in their state. The Hawaiian Volcano Observatory (HVO) and the USGS 'promotes the importance of understanding and respecting the volcanoes on which we live through community talks and guided walks' (Hawaiian Volcano Observatory, 2023).

Interest and education is important during natural hazards such as volcanic crisis as the media's role during this is not to educate on the science behind volcanic eruptions, but to inform about the event itself. This hypothesis is supported by the mission of the BBC, which is to "to act in the public interest, serving all audiences through the provision of impartial, high-quality and distinctive output and services which inform, educate and entertain" (BBC, 2023). It seems, from the focus groups, that only those with an interest would even seek out news on volcanic crisis, or even read the headlines of these news articles. Those without an interest would potentially read a headline, indicate that this news is not relevant to them, and scroll past or potentially click on, briefly read the article then click off.

"The main source (of news interaction) is probably reading headlines." (Participant 1A)

"I'd probably click on it, read it for a minute and click off on it, if I'm being perfectly honest." (Participant 1A)

This therefore means that potentially, the 57.95% of population who stop their education in geography at 16 will potentially be less willing to read these articles, this could potentially be due to feeling as if they would not understand the article or the science behind the eruption, regardless of the language used in articles, this is supported by the focus groups with 3 of 9 participants (33%) not having GCSEs in a GEES subject and only 1 participants having memory of the news articles on the eruptions. On the other hand, it could also mean that the people who do read the articles are more likely to perceive the language used within the articles are fearful or scary, therefore perceiving the event in the same way (National Park Service, 2022).

Level of education, especially in disaster risk reduction can influence the level of awareness of seismic and general risk of natural hazards. Bernhardsdottir et al., (2016) provided a comparative analysis of earthquake risk reduction effects within school across multiple countries, including Iceland, Italy and Portugal. In Italy 70% of the schools studied carried out emergency drills once a

year and drills appeared to be considered among the most valuable aspects of the children's education, therefore increasing the education and knowledge on disaster risk reduction. In Portugal however, the drills were mostly for fire safety and authorities paid much less attention to potential earthquakes. This could have therefore led to the lack of awareness for local seismic hazard events and therefore a lack of sufficient earthquake training (Bernhardsdottir et al., 2016). Due to the lack of education on disaster risk reduction in the UK, it is therefore assumed that the general population, especially those with little geographical education, would have a lack of awareness of seismic events and therefore little interest, especially when these hazards do not have impact on the population of the UK.

This idea of level of education impacting perceptions of disaster risk reduction is backed up by the focus group research, this is shown primarily by the perceptions of the participants with Bachelor's Degrees in a GEES subject. These participants had a wider and further understanding of the eruptions that took place in Hawaii, even without a memory of the eruptions. These participants understood the volcanic makeup of the state and understood the education of the residents within the area, therefore meaning they understood the lack of emergency or distress for residents within the area. This therefore proves an increased understanding of disaster risk reduction and management.

"Hawaii sees so much volcanic activity, I feel like they wouldn't be shocked and scared. I think they have a completely different mindset because they're so used to it, it's the norm and they know what it feels like. They have such a better connection with the environment, they have monitoring, planning and tests and trust in the government. I think there would be resistance for evacuation, I think there would be a lot less panic" (Participant 3B)

Opinions of the Tabloids

The age groups overall showed very split opinions of the tabloid newspaper, the Daily Mirror. The 20-40 group indicated that although they thought the Independent newspaper was overall more trustworthy, they would potentially be more likely to read the tabloid newspaper due to the fact it was shorter and easier to read.

"I found the daily mirror one to the point so if it were breaking news story it would be easier for me." (Participant 3A)

Only one member of the group indicated they would always try to avoid tabloid newspapers and stick to what they saw as more trustworthy sources such as the BBC or the Guardian. The drop in trust in the media is thought to be linked to the increase in the number of people who are now

actively avoiding reading the news (Kersley, 2022). It was found that 40% of 18-24 year olds regularly avoided reading the news with an overall news avoidance percentage of 38% in the UK. During this research, it was also found that 49 of the participants said they do not trust the Daily Mirror (Kersley, 2022). These figures further support the idea that a large percentage of the population have little trust in the tabloids, regardless of age.

"I think I would pick to read the Independent because I try to avoid tabloids and just scare mongering, I try not to buy into it." (Participant 1B)

Research done on 18-25 year olds in Australia led to the conclusion that using a particular news source was not important to many in the sample with some participants making comment such as "I wouldn't care [about the news source]. I just don't notice, really. I don't care." (Williamson et al., 2012). This could therefore indicate why the present study led to the conclusion that the 20-40 year old group did not have a particular negative opinion of the tabloids and in some cases were more likely to read this over broadsheet news coverage such as the Independent.

The 40-60 group all indicated that they thought the Daily Mirror articles was sensationalised and that they would be extremely unlikely to read anything they came across from the tabloids.

"I agree, most people have their favourite paper so they trust that one over others." (Participant 2B)

"Not the daily mirror." (Participant 2A)

This could be due to the difference in where they access the media, the 40-60 group are more likely to search out the news they are looking for rather than coming across it on social media.

The information in Figure 26 shows the data released by OFCOM about news sources and the differences between 'young adults' and 'older adults'. The data in this infographic shows the difference, especially within the 65+ category which indicates 72% of these participants used BBC One to interact with the news compared to 20% for the Daily Mirror. This is compared to the vast amount of 16-24 year olds using a range of social media platforms to interact with the media compared to no social media for 65+ (Jigsaw Research, 2022). This use of the Daily Mirror as a news source directly relates to previous research discussed, with 49% of the adult population not trusting the Daily Mirror as a news source and only 20% of the older population using the Daily Mirror or Mail as a news source (Kersley, 2022).

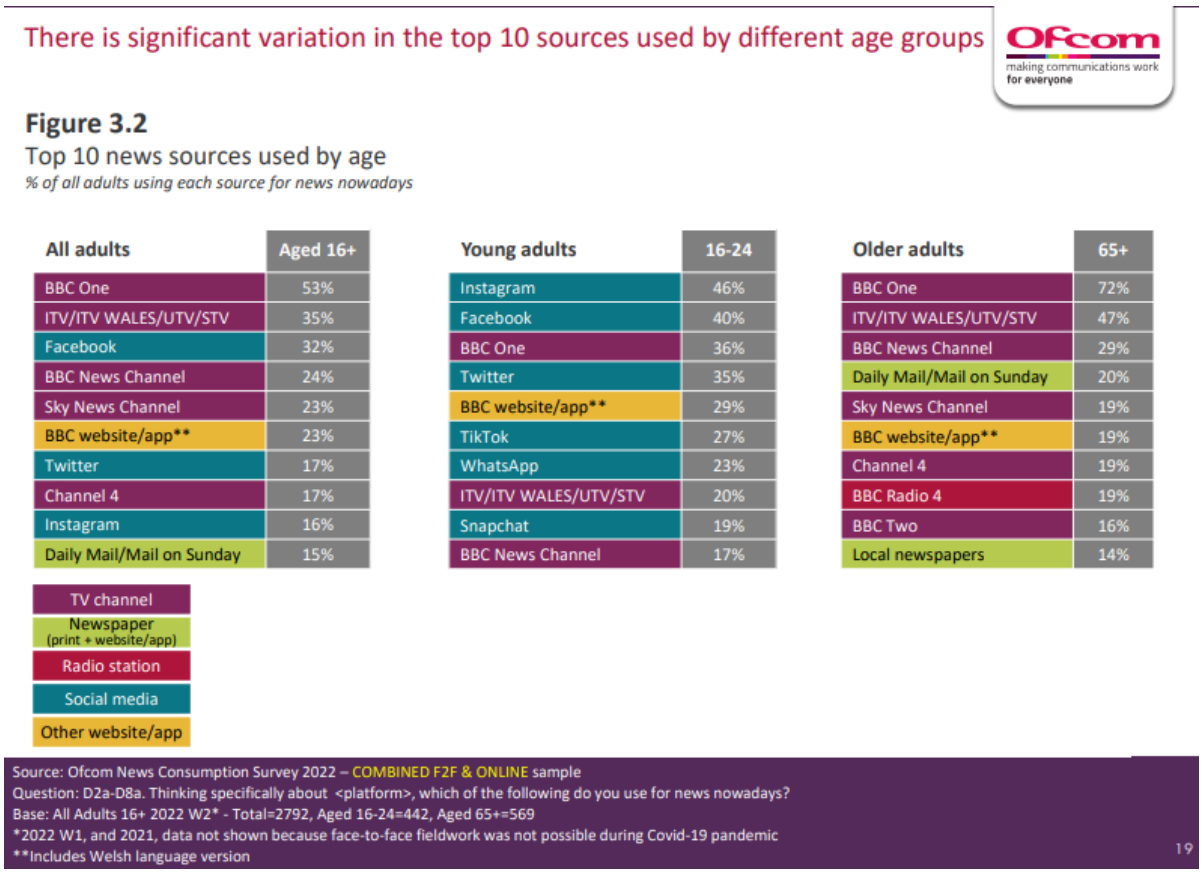


Figure 26 OFCOM information showing the differences in news sources by age. This shows the difference between the 16-24 category and the 65+ category (Jigsaw Research, 2022).

It is likely that boycotts of the tabloid, such as the boycott of the Sun in 1989 (Foos and Bischof, 2022) have also led to the perceptions that the 40-60 age group participants have on this type of media. The 20-40 group may be unaware of boycotts such as this, which occurred 39 years ago and are therefore more likely to read and trust the tabloids, more so than the 40-60 group.

5.5 Chapter Summary

In summary, perceptions of the public are influenced by the language which is translated from press releases to news articles. This language can impact their views of the events and potentially cause perceptions that are not realistic due to sensationalism within some of the news articles. However, the perceptions of the public are influenced by extraneous factors that impact their trust and perceptions of the news articles in general and also their science literacy. These extraneous factors can include education, interest in the subject and trust in news publishers, such as their trust of tabloid media.

Chapter Six Discussion

6.1 Summary of Findings

The project aimed to better understand the translation of press releases by the popular media, by focusing on news articles related to the case study eruption of Kilauea in 2018. This in turn then aimed to understand how these translations impact public perceptions of a volcanic crisis, including hazard risk reduction perceptions. To do this, the study focused on two main questions:

1) How is language used in press releases translated into news articles?
2) How does the language of news articles impact the public's perception of volcanic hazards?

These questions were addressed through two chapters, using data drawn from content and thematic analysis of written materials (press releases and news articles) and discussions from 3 focus groups. Here, these different methods are brought together to consider the wider implications of this work on the broader theme of communication during volcanic crises. At the end of this chapter, the limitations of the study are discussed and it concludes with potential implications of the study and recommendations for future work.

6.2 How is language used in press releases translated into news articles?

The first phase of this study collected 63 press releases and 126 news articles published regarding the eruption of Kilauea, Hawaii, between May to September 2018 to first understand the link between news pieces and press releases. The spike in news articles occurred around the beginning of the eruption, especially when large earthquakes began to occur and residents began to be evacuated. This was therefore the press release I chose to focus on during this study. Figure 9 shows the connection directly between these articles and press release and Figure 8 shows the relationship between the news articles and mentioned sources within them. For this study, the press release KP6 and the articles related to this press release were chosen to study in detail.

Language used within KP6 focused directly on the science behind the event and changes in volcanic and earthquake activity in the region. Language within this press release is very to the point and technical, only telling the reader the measurements and science behind the event, without the use of sensationalism. This language includes information on fissures, lava fountains, seismicity and deformation. The press release talks about this in terms of measurements and facts and contains very little extra language or information.

On the basis of the articles following from press release KP6, the results showed that while none of the news articles were exact, language and word wise, to the press release, with all being less than 15% related, according to the correlation coefficient, some of the news articles were more related to the information within the press release than others. It was found that the UK broadsheet articles, such as those from the Independent, were around 8% more related than those from tabloid articles such as the Sun, who used sensationalist language to describe the eruption such as 'lava gushing down the street'. However, maps linked within the press release show that lava had not travelled more than 150m since the eruptions had begun, 5 days prior (Figure 27).

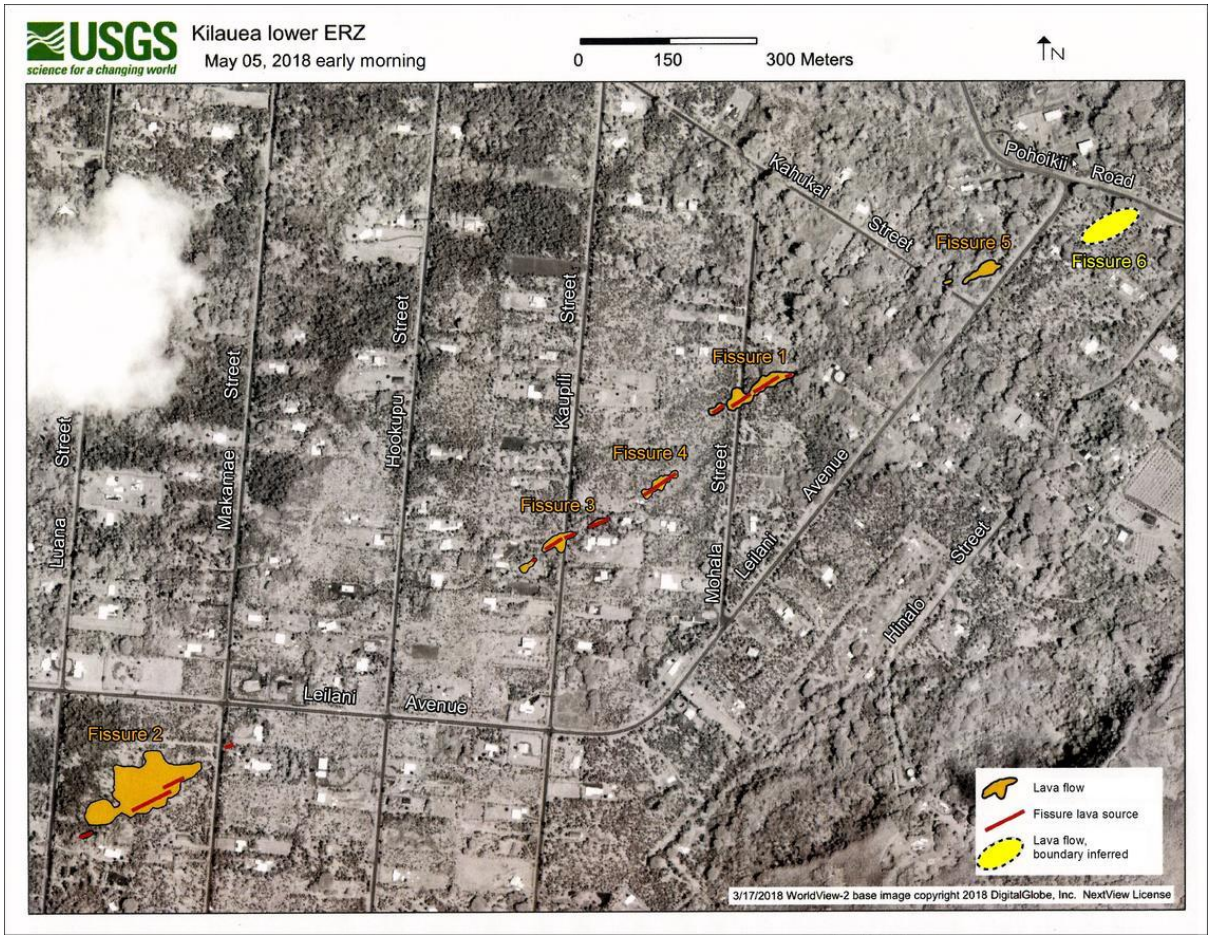


Figure 27 Map linked within KP26 showing the lava flows from fissures since the beginning of the eruption. This includes the ability to see length and distance of lava flows compared to the fissures.

The lava flows in this eruption were slow moving and lacked immediate danger to life, signalling that the language used within news articles such as KM38 was mistranslated and therefore potentially misleading for those who read the article, this can be described briefly as sensational language. Previous research into 'fake news' has demonstrated how this type of information is harmful to those who read it and has impact on many types of emotional cognition. These impacts range from misperception to attitude formation of the topic and biased decision making (Guo et al., 2021).

Content analysis of the news articles aimed to understand further what the news articles focused on, which parts of the news articles were related to the press release and conversely, what aspects of these articles were sensationalised, drew on other sources, or even fabricated as part of creating the story. While all of the articles (16 of 16) included factual language, i.e., language found within the press release, the majority of these facts were related directly to the earthquake activity that coincided with the volcanic activity at the time. This could primarily be due to the fact that the earthquake that happened during the Kilauea eruptions was the largest in Hawaii for 40 years. Or, it could also be down to the ease of understanding earthquake measurements compared to volcanic eruption measurements. Earthquakes are measured on a Magnitude scale, measured numerically with a higher magnitude relating to a larger earthquake and is therefore a way of drawing viewers into reading these articles. Information within the press release gives detailed measurements on the volcanic changes such as ground deformation and gas releases that are harder for the public to understand. This could be the reason news articles tended to focus on the earthquake aspect of the event.

When designing this study the assumption was that with the regular and well disseminated press releases from the USGS the news articles would have relied heavily on this material to create news articles that are factual. Most of the news articles did tend to attempt to present the volcano monitoring and status data while using language that was friendly and understandable for the general public. However, the media use a number of sources, rather than just press releases. For example, civil defence releases, giving information on evacuation and impact on the residents, as well as resident interviews and quotations. However, some of the sources included social media such as Facebook and Twitter, which cannot always be deemed completely reliable. However, this needs to be improved by the press, to reduce sensationalism and prioritise the public having a correct understanding of the event and this could be done by talking to scientists to have a further understanding of scientific terms and how to translate this science into language that is understood by the general public. Previous similar research presented similar findings to that of this study, finding that science journalists, creating press releases, have been found to communicate highly technical language, which isn't fully understood by non-experts (Brechman et al., 2009). There will always be a potential dilemma while translating science publications into the press. This is primarily due to the publics unfamiliarity with geology (Stewart and Lewis, 2017). It is important to remember that press industries are impelled to make stories readable and interesting, this is particularly difficult during news articles related to science due to the technical nature of the stories (Brechman et al., 2009).

6.3 How does the language of news articles impact the public's perception of volcanic hazards?

To understand how this language is read and understood by people, and how this may impact their perception of volcanic hazards, a survey and focus groups discussed one press release and two contrasting news articles in detail (one from The Independent, one from The Daily Mirror). Participants were asked to read a piece of text and answer simple questions in a pre-focus group survey. The focus groups then explored participants understanding of the material and the eruption. 2 groups were given the press release to read first, and 1 group the news articles, to try and understand how the different texts could influence their perceptions. During this, participants were also asked their opinions of the press releases and the news articles.

6.3.1 Trust versus Speed of Read

During the focus groups, participants were asked to read two media articles (one from The Independent, one from The Daily Mirror), so that perceptions of the articles and therefore the language within them could be analysed and compared. All participants indicated that they felt that the broadsheet article was more trustworthy, it included more information on the event, and therefore told them what they felt they needed to know. However, some stated that they would be more likely to read The Daily Mirror, a tabloid article, due to wanting to read something short and snappy. A similar finding was reported in research by Shuckburgh et al., (2021) which focussed on climate change and news articles related to climate change. In that research, participants indicated they would find articles that are dramatic more interesting to read and would be more likely to choose them (Shuckburgh et al., 2012). These were mainly the opinions of the 20-40 category within the present study, indicating that a younger reader may be more likely to read an article that is shorter, regardless of thee way they feel about the trustworthiness.

"The shorter one (The Daily Mirror), I don't think I'd have time to sit and read the longer one I'd be bored." (Participant 1C)

However, this is not how the 40-60 group felt, as negative opinions of the tabloids were more common within this group and they would therefore be more likely to read a longer article from a media source they trusted, rather than a shorter one from a tabloid article.

6.3.2 The impact of ‘clickbait’

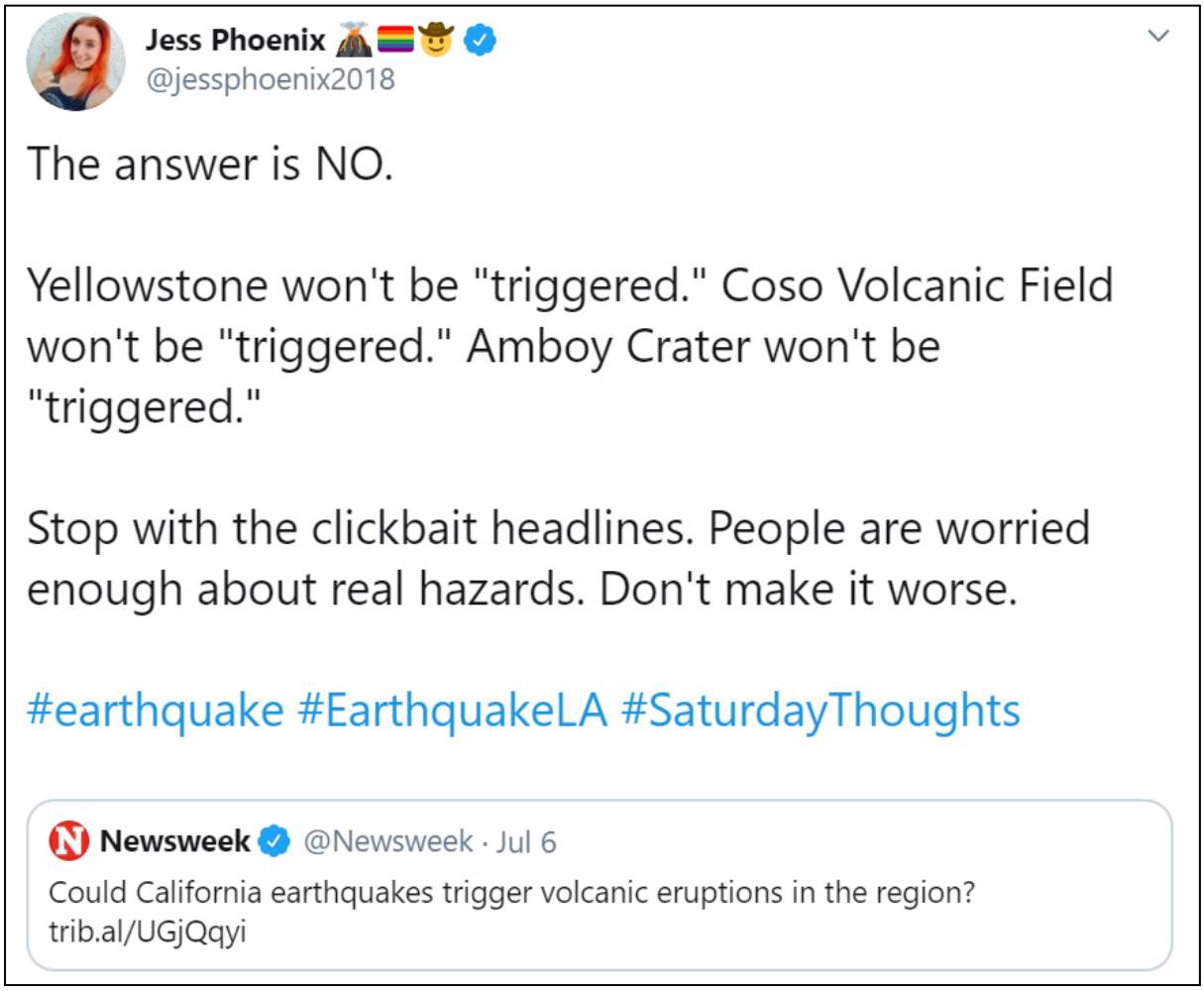


Figure 28 Tweet from @jessphoenix2018 on twitter (6/7/2019). This tweet further looks into the idea of clickbait media within the scope of volcanic events.

The idea of media trust and media usage across different age categories is an aspect of news media that needs to be taken into consideration in the future, with the rise of media apps and websites, readers can choose what they click into and read and are more likely to fall for clickbait media headings and shorter articles. Clickbait can be defined as a way of structuring headlines to generate but not fulfil a readers interest, therefore meaning readers are compelled to click to obtain the information (Lu and Pan, 2020). Previous research on the communication during volcanic events labelled clickbait stories indicated that some of the main challenges within communications during volcanic events (Williams and Krippner, 2019). This could lead to warped perceptions of the events.

Additional previous research has proved that the rise in clickbait articles leads to a lower perceptions in news credibility (Kaushal and Vemuri, 2021), therefore reducing the likelihood of the public engaging with the news. This could lead to a lack of understanding in the outside world and could cause negative implications for the future as the lack of news consumption could be passed through generations. News media needs to potentially be reduced in length but still inclusive of all information needed for readers to understand the event. This could be done by reducing repetition and stating the key facts about the event, whilst keeping the readers interested, which is important within the press industry. This could therefore entice readers, especially younger readers to choose to read more trustworthy news sources, such as the Independent. This idea is supported by previous work in the field, where it was found that only short articles in newspapers are fully read. People are more likely to look for articles they are interested in, meaning that only 25% of article are seen by the public (Holmqvist et al., 2003).

Following on from this, participants in group one were also asked to describe the events based on the Daily Mirror. These descriptions included the following:

"Dark and grey and ash in the air and I think things would be broken, it would be so hot."(Participant 1B)

"Burning trees from the lava. Earthquakes is cracking walls but not flattening the place. Roofs caved in." (Participant 1A)

"People would be panicking" (Participant 1B)

These quotations from the participants show the picture based upon the language within the Daily Mirror article. Overall, the participants imaged a dark, ashy eruption, causing destruction and panic, which is not something that occurred or what the press release indicated was occurring. Therefore, the language within this news article led to a perception of the eruption that was unrealistic and almost film like, rather than having an understanding of the actual eruption type. This unrealistic view of volcanic events can be formed through sensationalised and dramatic depictions of these events, with previous research showing that unrealistic representation can have negative impacts on understanding of events (McGowan and Scarlett, 2021).

6.3.3 The impact of education

Language within the news articles is not the only aspect that influence the publics perceptions of a volcanic crisis. First of all, education level of the public can impact their understanding of natural hazards, such as volcanic events (Petal and Izadkhah, 2008). Within the focus groups, this difference in education levels was evident. Within group 2, there was a difference in understanding and

perceptions between participants with an undergraduate degree and participants with A Level as highest educational level.

"My visualisation is slightly tainted because I read it on the news. From what I recall it wasn't a movie scene, it was slow moving lava, people had enough time to get out. It wasn't a type of panic." (Participant 2B)

"Because I didn't understand, I'd struggle. The big ash cloud, like in Pompeii but the only other reference point I had was a film from years ago with lava in the streets." (Participant 2A)

These two quotations indicate that a higher level of knowledge or exposure to a subject could lead to an improved understandings and therefore perceptions of natural hazards, therefore volcanic crises, with the participant with a higher level of education having more of an understanding of the event and potentially, more of an interest. Previous research has investigated the potential increased knowledge disparity in older and less educated individuals and their reliance on traditional media, rather than science blogs, compared to more educated individuals (Su et al., 2015). This aspect of interest towards a topic also needs to be taken into consideration while analysing the comparison between education level and understanding of events. Previous research on disaster risk reduction shows that education, especially environmental and disaster risk education can lead to the development of a culture of safety. This is especially important for vulnerable communities, making them as a consequence more resilient to the impact of disasters (Petal and Izadkhah, 2008).

Despite someone's level of education, if a topic does not interest them, they will perhaps be less likely to have a high level of understanding due to not actively looking into this topic. This active pursuit into understanding could be within the form of reading the news or researching further into the topic. Although this is an issue, previous research into self selective news consumption has found that the increased use of social media has increased the likelihood of incidental exposure to the news articles, especially for young people who use social media for other purposes (Fletcher and Nielsen, 2018). This could mean that increased consumption for young people especially is on the horizon and could therefore have positive impacts on public perceptions within the future, even for those less interested in the topic.

6.3.4 The impact of direct connection

In the Shuckburgh et al., (2012) study on climate change in the news, participants were asked to read news articles on climate change and give their perceptions. The participants within that study indicated they were most interested in science that was related to aspects of their lives (Shuckburgh et al., 2012). This is similar to aspects of the discussions in the focus groups in this study, where participants indicated that they would be unlikely to read articles that didn't relate to their interests

or daily lives and that mostly, they would be unlikely to read news they would deem negative or bad news. Participants also indicated that they feel a desensitisation to negative news, potentially meaning that even though these news articles on disaster events are being read, they are not being remembered or fully consumed by the public.

"We're all massively desensitised to negative news." (Participant 1A)

"If it doesn't affect me I don't care." (Participant 1C)

Although it may be common that the public only choose to read news articles that directly impact their lives, it is important to create informative articles that both interest the public and educate them in aspects of the world they may not generally come in to contact with, in this case, volcanic events for UK public. Although the participants in the study feel as though these types of articles do not impact them, informative and truthful news could prepare for all sort of events where perceptions within disaster risk will be tested. For example, an understanding of the comparisons and contrasts within natural disasters could be used in wider events, such as weather events and flooding, all of which appear within the UK. This could also be again set out in even wider settings such as pandemics, in which perceptions of disaster risk reduction will be utilised by the wider public.

Overall, while news articles influence how the public perceive volcanic crises, these perceptions are not linear across all age groups, interests and education levels and also are influenced by many other factors, such as opinions of the media, disinterest, educational levels and visual media. It was found during focus groups that press releases and media articles are missing information that the public feels they need to know as part of these events. News media translated from press releases lacks the scientific information behind the volcano and event, while the press release misses the human impact that the public feel is needed. The results of this study show that the press industries need to make news articles surrounding these events less sensationalised but up keep the ability to draw readers in, especially the younger generation who self select news articles. This is shown by the results of participants feeling as though they need more information on the event itself.

"I guess it doesn't tell you anything about what's going to happen. What's the contingency plan, what are the government going to do about it for the residents, what's going to happen in a week or how long its going to last." (Participant 3A)

This change in news articles could be in the form of shortening articles (Holmqvist et al., 2003), while including all the information the public needs to understand the event in full. The idea of a non linear approach to news and science was summed up within a discussion during the focus groups:

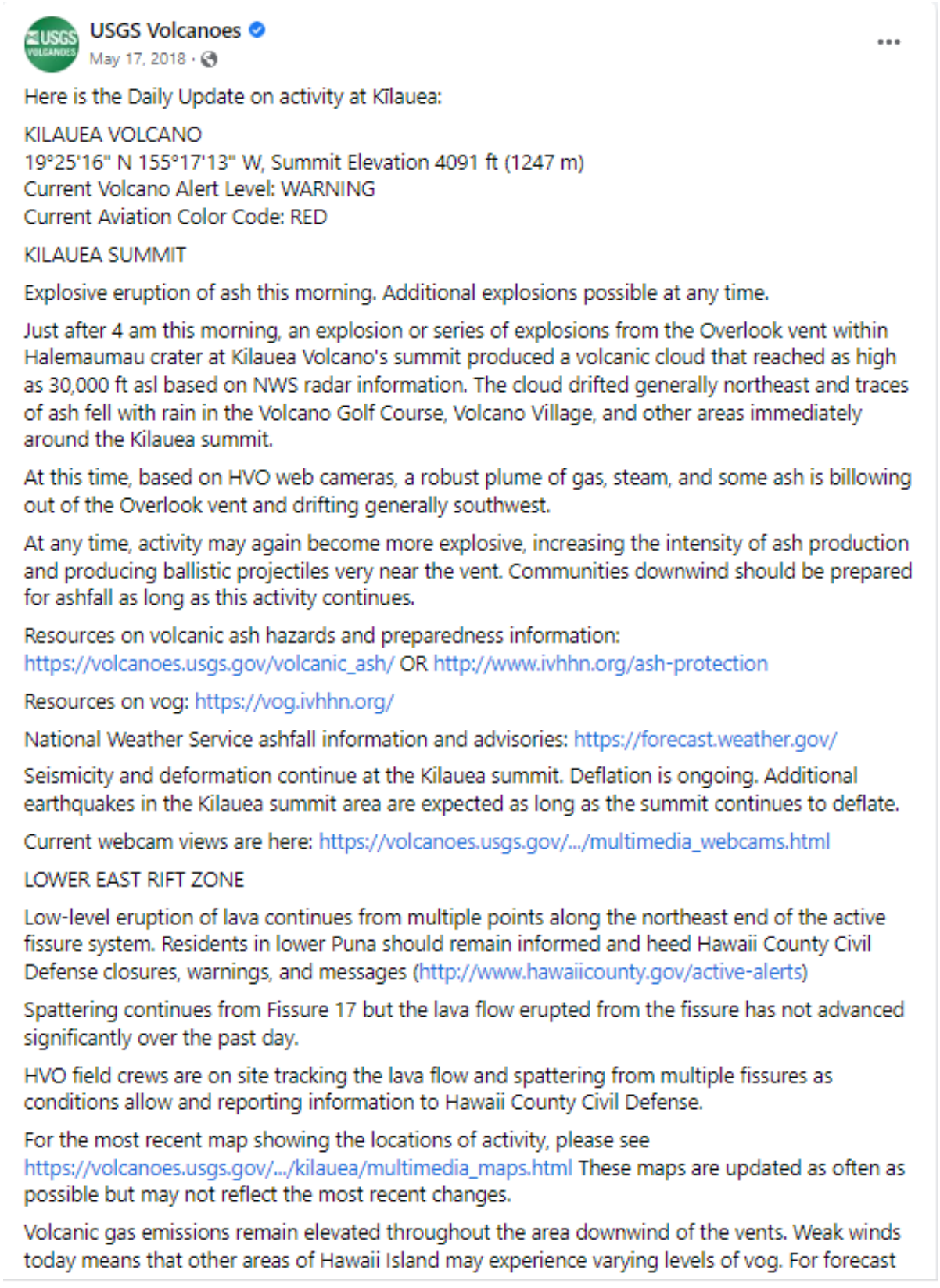
"I learnt that people have different responses, and I didn't think that was going to be the case. I guess it shows that in media to communicate volcanic eruptions you can't just have one method, you need different media for different people, not a one size fits all approach." (Participant 1A)

6.4 Contribution of the results

The Evolving Role of Press Releases

Past and present, press releases have an influence on how the public view the outside world, due to their influence on news media. The way that the press release chooses to portray the event effects the publics views and more so, how the media portrays this news (Haythornthwaite, 1989). The role of press releases has always been complex and they often perform more than one function at a time (Haythornthwaite, 1989), these functions can range between influencing news reports, informing the government and within modern times, informing the public.

Press releases now could potentially have a bigger role to play in society during a volcanic eruption, than only communicating the events with the press – as they are now widespread and available to the public, such as those on the USGS website. The USGS also publish their press releases directly to the public via social media most noticeably via Facebook (Figure 29 Facebook post from USGS Volcanoes showing the press release information for that day. This is publicly available for everyone to see.). This information is public, searchable and free for everyone to view.



USGS Volcanoes
May 17, 2018 ·

Here is the Daily Update on activity at Kīlauea:

KILAUEA VOLCANO
19°25'16" N 155°17'13" W, Summit Elevation 4091 ft (1247 m)
Current Volcano Alert Level: WARNING
Current Aviation Color Code: RED

KILAUEA SUMMIT

Explosive eruption of ash this morning. Additional explosions possible at any time.

Just after 4 am this morning, an explosion or series of explosions from the Overlook vent within Halemaumau crater at Kilauea Volcano's summit produced a volcanic cloud that reached as high as 30,000 ft asl based on NWS radar information. The cloud drifted generally northeast and traces of ash fell with rain in the Volcano Golf Course, Volcano Village, and other areas immediately around the Kilauea summit.

At this time, based on HVO web cameras, a robust plume of gas, steam, and some ash is billowing out of the Overlook vent and drifting generally southwest.

At any time, activity may again become more explosive, increasing the intensity of ash production and producing ballistic projectiles very near the vent. Communities downwind should be prepared for ashfall as long as this activity continues.

Resources on volcanic ash hazards and preparedness information:
https://volcanoes.usgs.gov/volcanic_ash/ OR http://www.ivhhn.org/ash-protection

Resources on vog: https://vog.ivhhn.org/

National Weather Service ashfall information and advisories: https://forecast.weather.gov/

Seismicity and deformation continue at the Kilauea summit. Deflation is ongoing. Additional earthquakes in the Kilauea summit area are expected as long as the summit continues to deflate.

Current webcam views are here: https://volcanoes.usgs.gov/.../multimedia_webcams.html

LOWER EAST RIFT ZONE

Low-level eruption of lava continues from multiple points along the northeast end of the active fissure system. Residents in lower Puna should remain informed and heed Hawaii County Civil Defense closures, warnings, and messages (http://www.hawaiicounty.gov/active-alerts)

Spattering continues from Fissure 17 but the lava flow erupted from the fissure has not advanced significantly over the past day.

HVO field crews are on site tracking the lava flow and spattering from multiple fissures as conditions allow and reporting information to Hawaii County Civil Defense.

For the most recent map showing the locations of activity, please see
https://volcanoes.usgs.gov/.../kilauea/multimedia_maps.html These maps are updated as often as possible but may not reflect the most recent changes.

Volcanic gas emissions remain elevated throughout the area downwind of the vents. Weak winds today means that other areas of Hawaii Island may experience varying levels of vog. For forecast

Figure 29 Facebook post from USGS Volcanoes showing the press release information for that day. This is publicly available for everyone to see.

During the focus groups, the majority of the participants who read the press release first agreed that the press release KP6 was trustworthy but unclear and potentially uninformative for the general reader - the language used is too technical and there is a lack of information about the impacts or management that was occurring in response, which is a role of civil defense. However, these results were different to those who read the press release second. Those who read the news articles first seemed to all be in agreement that the press release was clear but that some of the language was technical and therefore potentially harder to paint a picture of the event. They all agreed that the press release would be much easier to understand and probably very helpful to someone who lived in Hawaii and needed this information. This perceptions is backed up by previous research, which found that risk communication is more effective if the audience needs are understood and relevant (Hicks et al., 2017). In the current research, Hawaiian press and residents are the identified audience. This lead to participants agreement that for UK residents, the news articles are a better source of information. Those who read the news articles first appeared to find the press release easier to understand, perhaps because they'd already developed knowledge of the eruption from the news article.

"I mean I understood it but I'd much rather go to a newspaper if I was looking for news updates. If I was in Hawaii maybe I would want to read it, but as someone who is not in Hawaii it doesn't tell me the key facts I want to know." (Participant 3A)

To see how press releases have changed over time, I looked at a USGS press release on activity at Kilauea from 2008. I found that it was much more detailed. This brief look into older press releases shows the difference however between the modern status reports shown in the 2018 eruption and a press release of activity from Kilauea 10 years earlier. The press release from 2008 is much more detailed, including definitions of the terms used. In this study, participants found the press release difficult to understand and left them wanting more explanation and left them confused, indicating that scientists should perhaps strive to create press releases like this again, especially because of the more widespread access (direct dissemination) to the public, due to the increased use of social media.

Press releases are not the only tool the USGS use to communicate with the general public. For example, a series of YouTube videos were created during the eruption, which shows that the USGS does strive to make education during volcanic events more open and accessible to the public (USGS, 2018). From watching a handful of these videos, it is important to notice that the videos range in technicality, however, the introduction of scientific jargon, as long as it is well explained, can aid in scientific understanding for both Hawaiian residents and the public from non volcanic countries.

These videos can therefore open opportunities for a wide range of people, from those who are illiterate, to those in other countries wanting to learn more about volcanic crises, from a trusted source. YouTube has been found to be an effective teaching and learning source, potentially due to it being one of the largest resource for online video (Burke et al., 2009).

The Role of the Media During Hazard Events

Many of the focus group participants who read the news articles second indicated that the news articles shown provided a sense of comfort that the press release didn't. The participants indicated that the news articles provided information that was easy to read, lacking in scientific terminology they didn't understand and overall told them the information they felt as though they needed to know. This included information on residents, such as evacuations and impact on homes and the environment, this is something that the press release didn't cover.

However, those who read the news articles first thought differently. These participants felt as though the news articles did not provide the information needed from the media about the event. This therefore meant the news articles did not provide the comfort the other groups felt. These participants felt as though they didn't understand the science in terms of volcanic activity and felt as though they didn't understand the event as a whole. This finding is similar to previous research done into news media impact during Hurricane Katrina. Results in that study found that the news media focused on the built, human and social aspects of the Hurricane, rather than the natural aspects of the event (Miles and Morse, 2007). This therefore indicates that while the public is interested in the human impact of events, there is a need to understand the science or management strategies behind the eruptions as well, which is backed up by all focus groups, mainly focus group 3.

Overall, news media needs to portray the overall event, rather than just the impact on people, or just the science, to ensure that the population had a full understanding of these events. However, the role of news media within the eyes of the public must be taken into consideration while analysing the efficiency of the articles in connection with a natural disaster event. The news media has a role to create stories that are interesting and draw people into reading them. As brought up in the focus groups, with the fall of newspapers and the rise of news apps and websites, consumers can choose what they see and read. This means they may be less likely to read scientific news articles unless they are interested in the topic presented. The role of modern medias is to entice people to read, regardless of their interests and portraying the impact on people rather than science may be the way to do that. This is due to the majority of the public having traits of sympathy and empathy,

this was something discussed in the focus groups, with participants feeling as though the new articles tapping into their need to know about how these events influence and impact people, more so than the science behind the event.

The Role of Popular Media in Hazard Perception

Due to the limited uptake on volcanology education within the UK the population, the use of cinema may influence formation of perceptions of volcanic crisis. This could therefore lead to misinformation on the complexities of volcanic hazards, including but not limited to the differences that occur between volcanic events – especially the characteristics of eruptions – which can differ massively. This media usage is not only limited to film, but also stretches to TV, video games and social media. Previous research looked into the portrayal of volcanoes in video games where it was found that while there were accuracies within the games, there were also a number of inaccuracies, such as the tendencies to overexaggerate aspects of the volcanoes to increase entertainment factors. This could therefore lead to a lack of accurate understanding of volcanic systems (McGowan and Scarlett, 2021). However, serious geo-games have become a popular tool to engage the public with natural hazard risk, these games provide a more accurate depiction of natural events while engaging players in the topic (Forrest et al., 2022).

During the focus group discussions, perceptions coming from the impact of visual media was mentioned by at least one of the participants.

"I learnt a lot about how volcanoes act in different ways, they don't all explode like I thought they did." (Participant 2A)

"The big ash cloud, like in Pompeii but the only other reference point I had was a film from years ago with lava in the streets." (Participant 2A)

The majority of the population engage with volcanic hazard scenarios in the form of mainstream films and games and come across these events by chance through these types of media source. Previous research looked into the impact of popular film depictions of natural hazards and how this impacts the public views of these events. It was found that while popular media on hazards including film and literature provide information on natural hazards, this media can vary in accuracy. These dramatic representations have been found to create altered views of and behaviours towards natural hazards and can even increase the likelihood of risk when they do occur (Sigurdsson and Lopes, 2015). This could be due to directors and producers caring less about the accuracy of their portrayals and more about creating excitement and interest for the viewers.

While it can be argued that the role of film is to excite and engage viewers, especially dramatic disaster genre films, more can be done to make these films accurate, while still creating an interesting watch for viewers. This will therefore reduce the risk of viewers having warped perceptions of events, such as volcanic crisis but will also increase their ability to understand that not all volcanic activity creates destruction and danger to life. In the case of Kilauea, participants were interested to find out that not all volcanoes are the same and these perceptions were primarily based upon film.

6.5 Limitations of the research

6.5.1 Limitations of a Case Study Approach

The case study chosen for this research was Kilauea 2018, an eruption that took place 3 years before the focus groups occurred and therefore an event that would have potentially been memorable for participants. This case study was chosen due to the high number of personally memorable news articles released at the time. However, even more recent events, such as that of the Icelandic eruptions of 2021 could have been chosen which would potentially gain different results due to the event being even more memorable for the participants. The case study was also chosen as all press releases, news articles and information on the event in general, released by the USGS and Hawaiian government were all in the same language, English, therefore making the text easier to compare and contrast without the difficulties of language barriers.

The use of the case study, Kilauea 2018 presents some limitations to the implications this research has to the wider field of volcano science communication. First of all, the Hawaiian eruption took place in the USA, an English speaking country and so all data, including the press releases, did not need to be translated within the research but also within the media articles connected to them. While this allowed for the study of metaphorical 'translation' of science language into every day language, it did not test the literal translation between languages that may occur in the reporting of other volcanic eruptions. For example, this study would be more difficult to replicate in the UK with the case study of Anak Krakatau, in which all press releases are released in Indonesian. These press releases would therefore need to be translated, by a professional translator, into English to provide valuable results within this research. However, this research could be replicated by local researchers in the local language to try to understand these additional language barriers. For this research though, an English speaking country/event was chosen to prevent issues with translation barriers.

Some geological surveys do not release data to the public, which is something the USGS do. In this study we were particularly interested in how these scientific details were reported in the news media. Choosing a volcano where this information was not released would have limited this aspect of the research. The USGS not only release their press releases openly to the public, both on their website and through social media such as Facebook, they release raw data, including measurements taken from the volcano within these releases. Whereas the Philippine Institute of Volcanology and Seismology (PHIVOLCS) for example, do not release raw data to the public. Rather, PHIVOLCS release limited data, including sulphur levels of the volcano but do not release any other raw measurements such as changing topography and tilt of the volcano. This lack of raw and scientific data within the press releases could cause a limit to comparing other case studies with Hawaii 2018, as press releases would need to create and publicise the same data type.

Case studies remain open to inferencing and intuitive judgement, meaning that case study research can be open to subjectivity. This can mean that case studies may not provide a basis for wide range inferences about a population (Clifford, 2010). Within this study, the use of a single case study within this research has allowed for the detailed information needed to generate detailed results and therefore be able to answer the research questions comprehensively (Clifford, 2010). The case study chosen provided the scope needed for this event as it included the properties needed for rigorous research to answer the hypotheses of this study (Clifford, 2010). This included the coverage by the UK press, access to press releases and the modern aspect of the study, with it occurring in 2018. This study provides a deep dive analysis into one event and the participants understanding and perceptions of the news and press releases connected to it. Kilauea provided positive aspects for this research, including language opportunities without the need of translation, memorable and recent news articles and also the ability to access data and archived press releases easily on the eruption through the USGS website and the Civil Defence website.

6.5.2 Limitations of Focus Groups

Focus groups were chosen as the methodology to understand how the language used in news articles impacts the publics perceptions of volcanic crisis. The use of focus groups allowed for a discussion-based opportunity to address this research question. The aim was that group discussion would allow for a greater depth of discussion than would be allowed through a more widely distributed survey or a more rigid one to one interview. The focus groups presented an opportunity to look into the perceptions of a snapshot of the public and therefore answer the research question at a fuller depth.

However, in this case the focus groups had some limitations, this was mainly down to the number of participants recruited for the focus groups. The number of participants recruited was 9, meaning only 3 groups of 3 participants could be created for the focus groups. This was mainly due to Coronavirus (COVID-19) and the challenge the pandemic created in recruitment and participation. Focus groups recruitment had to be through social media and the actual focus groups needed to be held online. Other means of recruitment, such as visiting community groups, were not possible during this time. The lack of focus group participants mean that generalisations of the public cannot be made and to improve the ability to generalise, larger participant numbers would be recommended.

6.6 Recommendations

6.6.1 Recommendations for Future Research

Future research in this field would be recommended, to improve upon the findings and help strengthen the results of the research. Firstly, it is recommended that this research be completed with a larger number of participants for the study, therefore allowing for more generalised conclusions based on the UK public. This could be done using wider age groups, rather than 20-60 used here, but could also be implemented using a different variable, such as education level or gender to form conclusions based on a potential different and wider set of results.

Secondly, Hawaiian residents could also be included within the study. This could be in terms of these participants reading the same articles and press release, or even potentially Hawaiian news articles. The impact of introducing Hawaii residents could provide a wider range of results, meaning that comparisons can be made, especially comparisons on the understanding of disaster risk and reduction and how risk communication can be perceived by those who are directly impacted by the risk itself.

6.6.2 Practical implementation

This research aims to provide practical implantation in terms of how official bodies such as the USGS and the press industry communicate risk within the future. This is not only in terms of volcanic events but also disaster risk in general. This research establishes the importance of understanding the audience for disaster risk communication and the needs of this audience in terms of providing the correct detail across press releases and news articles. Providing this information will lead to public perceptions that are based on fact, rather than sensationalist language, therefore improving education and science literacy for the general public.

6.7 Conclusion

In conclusion, language translated from press releases is never exact but some articles do provide the information that press releases do not. This is mainly the human aspect of the eruption. In terms of scientific translation, sensationalism needs to be reduced within news articles to increase science literacy and therefore mean that public perceptions of volcanic crisis are more realistic of the actual event. Overall, language within news articles do influence how the public perceive volcanic crises, sensationalist language can cause perceptions of events that are not realistic. However, these perceptions are not linear across all ages groups, interests and education levels and also are influenced by many other factors, such as opinions of the media, disinterest, educational levels and visual media.

Reflecting on this piece of work, I acknowledge that the sample size is a severe limitation that I encountered throughout the research process. The COVID-19 pandemic halted my ability to be able to conduct my focus groups in the way I wanted to do so and made it harder to even recruit participants to take place. People who agreed to take part didn't reply to emails or attend focus groups therefore meaning I had to find other participants and further delay my study. As a physical scientist, I underestimated the challenge of working with people and the specific challenge of recruitment for a focus group. Originally I had planned to contact local community groups who may have been willing to participant in the focus groups in person. But this approach was abandoned during the ongoing pandemic and subsequent lockdowns. Ultimately, I relied on my own and my supervisors personal social media for recruiting participants. I strived to include a range of different backgrounds, both educationally and culturally. However, the limits of my own social networks mean that this didn't work out as expected and I relied too heavily on friends and family as a last minute resort. This sample size therefore limits the strength of my analysis and the findings are not as robust as I hoped them to be. Whilst I have been able to draw out key findings based on the small number of participants, the perceptions discussed cannot be generalised outside of the study.

However, this thesis provides a basis to future studies within this scope of study. I still believe this topic is important and deserves further study into the area. Whether this be focused on volcanic crisis or natural and social crises in general. The use of focus groups in creating a wider understanding of peoples perceptions of events could lead to further education and coverage on certain events, to make sure that the public, despite them facing this crises or not, have a general understanding of certain events in the future. This study created understandings of perceptions of volcanic crisis, in relation to the media, including social media and news articles as well as the use and potential future use of press releases within a natural hazard event. This study could also be

used as a basis within a range of hazard events, such as floodings, earthquakes etc. but is not limited to environmental hazard events.

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Appendix

Appendix I Participant Information Form

Dear Participant,

Thank you for your interest in taking part in this research, you are invited to participate in the Media Impacts on Perceptions of Volcanic Crisis Project. This survey is the first stage of the project and is used to determine social attributes as well as your opinion on the research topic.

The project team consists of the following people Elena Jones (Masters by research student), Natasha Dowey, Rebecca Williams and Lewis Holloway (academic staff at the university of Hull, supervisors). This research contributes towards Elena Jones' masters research project. The findings of this research will be drawn up into a final report, which has the opportunity to impact how volcano crisis communication is perceived, with learnings for organisations that publish emergency press releases and news media.

Please read the information below, and if you choose to take part, please tick the box to show that you agree to participate.

- Participation involves taking part in an online Focus Group discussion. This will involve about 6-8 participants and will be led by 2 of the Media Impacts on Perceptions of Volcanic Crisis Project team. The Focus Group discussion will be recorded so that we can analyse the discussion afterwards.
- Participation is completely voluntary: you do not have to take part if you do not want to. You can choose to withdraw from the research at any time, before or during the Focus Group discussion. You do not have to answer any of the questions during the discussion if you would prefer not to.
- After the Focus Group, the recording will be transcribed (turned into a Word document). This will be anonymized, so that it does not include your name or any personal details and you will instead be given a code name. The recording and any personal details we have (e.g. your name and email address) will be deleted. When we report on our findings, we will do so confidentially. This means that we may use comments you have made during the Focus Group, but we will not use your name or any other identifying information.
- A Focus Group discussion cannot guarantee absolute confidentiality because other members of the Group will be able to see and hear your comments and we cannot prevent them repeating those comments elsewhere. We will remind participants of this at the start of the discussion, and ask participants to respect each other's confidentiality.
- You can choose to withdraw your comments up until the point we have transcribed and anonymized the recordings; after this point we will not be able to identify your own comments and thus will not be able to withdraw that data.
- You can choose to not answer any questions that you do not want to. If you choose to answer just some questions, and not others, that is fine.
- All information collected as part of the research will be stored in a database using the University's secure cloud storage system Box. Information will be analysed by the researchers on their home or university computers using appropriate analysis software.

- This research has been approved by the Faculty of Science and Engineering Research Ethics Committee. If you have any queries or concerns about the nature of the research you can contact the Committee at fose-ethics@hull.ac.uk
- If you have any questions about the project, please contact Elena Jones @elena.jones-2017@hull.ac.uk.

1. **Survey and Focus Group research: Sample Consent form (to be read and signed following the PIS)**

Media Impacts on Perceptions of Volcanic Crisis Project – Consent form for Surveys and Focus Group discussions

Please read each statement and initial each one to indicate your agreement with that particular statement.

☐

I confirm that I have read and understand the Media Impacts on Perceptions of Volcanic Crisis information sheet. I have had the opportunity to consider the information and to ask questions. Any questions asked have been answered satisfactorily.

☐

I understand that my participation is voluntary and that I am free to withdraw before or during the Surveys and Focus Group discussion.

☐

I agree for the online Focus Group to be recorded, and for my comments to be transcribed and analysed as part of the research process.

☐ I can request that any or all of my data is withdrawn from the study and deleted by contacting the named researchers on the information sheet, up to the point that the data is anonymized.

☐ I understand that any personal data will be stored securely in line with GDPR requirements. Any personal data will be destroyed at the end of the project. Transcripts will be anonymized.

☐

I understand that anonymized results will be used for research purposes and may be used in a masters of research report or used in other ways to academic and non-academic audiences. Data will be anonymized so that no identifiable information is present

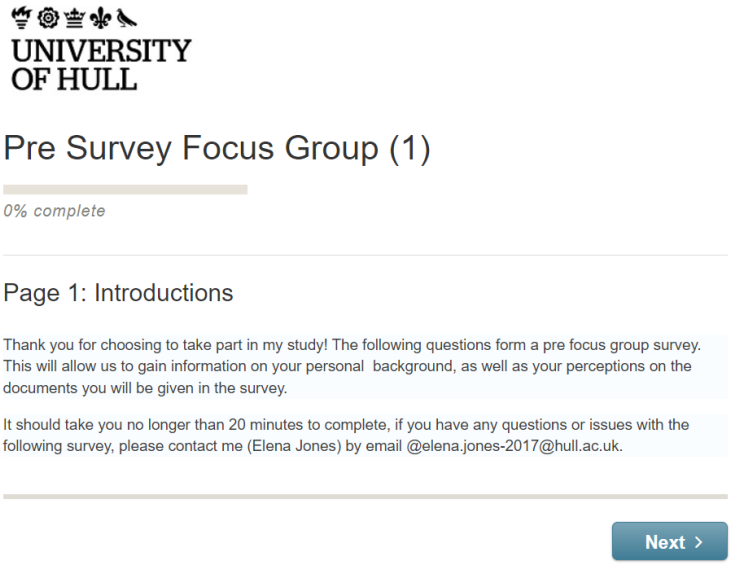
☐

I hereby voluntarily and freely give my agreement to be involved in the above study.

Name:

Date:

Appendix II Blank Surveys



UNIVERSITY OF HULL

Pre Survey Focus Group (1)

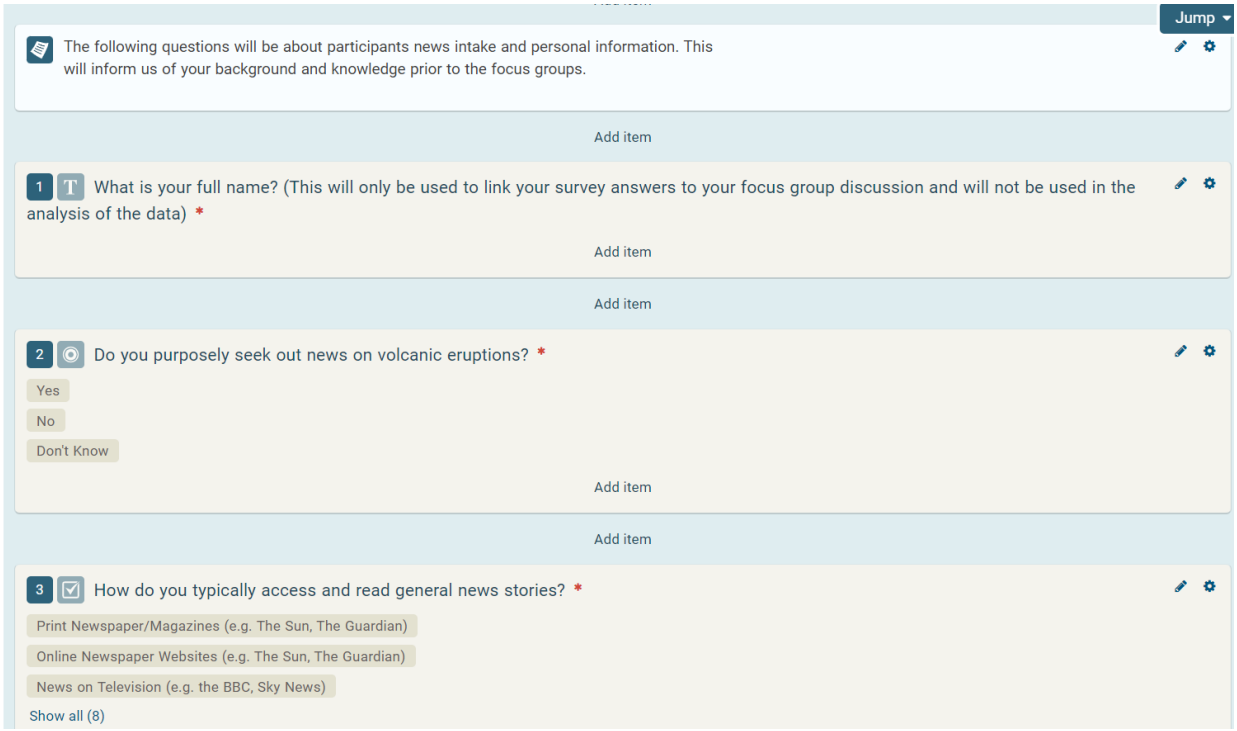
0% complete

Page 1: Introductions

Thank you for choosing to take part in my study! The following questions form a pre focus group survey. This will allow us to gain information on your personal background, as well as your perceptions on the documents you will be given in the survey.

It should take you no longer than 20 minutes to complete, if you have any questions or issues with the following survey, please contact me (Elena Jones) by email @elena.jones-2017@hull.ac.uk.

Next >



Jump

The following questions will be about participants news intake and personal information. This will inform us of your background and knowledge prior to the focus groups.

Add item

1 What is your full name? (This will only be used to link your survey answers to your focus group discussion and will not be used in the analysis of the data) *

Add item

Add item

2 Do you purposely seek out news on volcanic eruptions? *

Yes

No

Don't Know

Add item

Add item

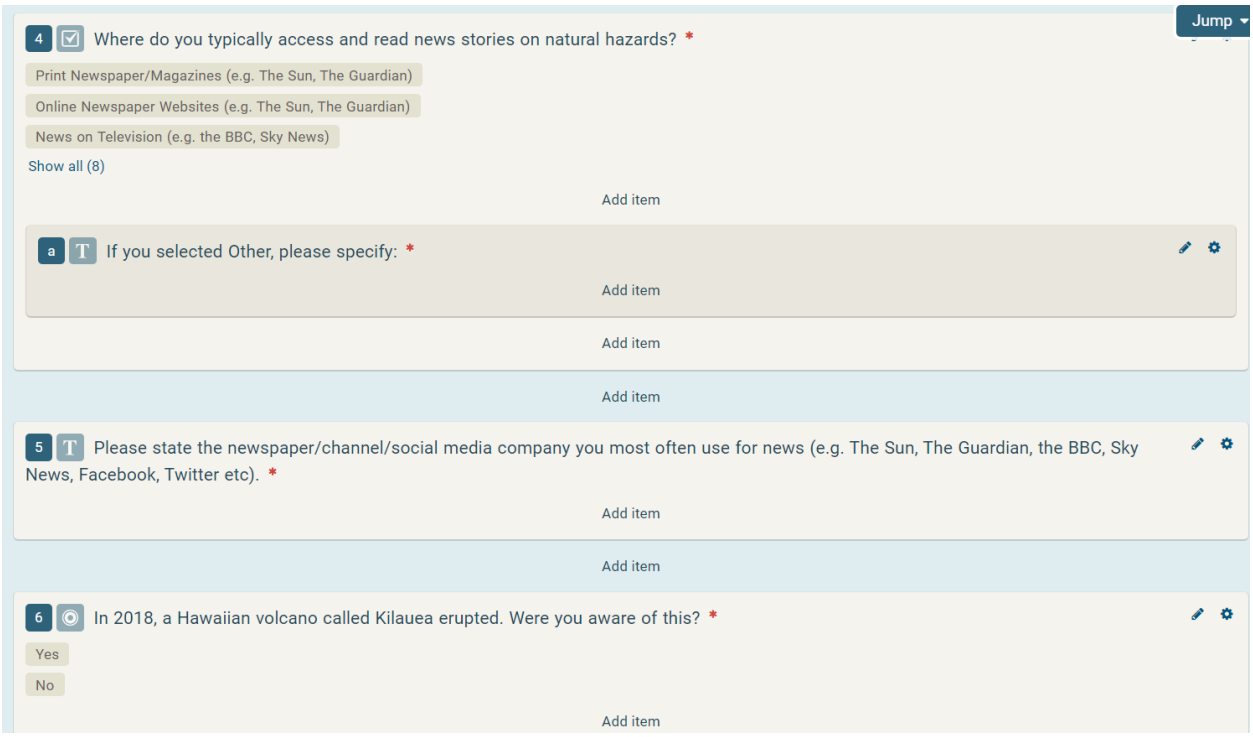
3 How do you typically access and read general news stories? *

Print Newspaper/Magazines (e.g. The Sun, The Guardian)

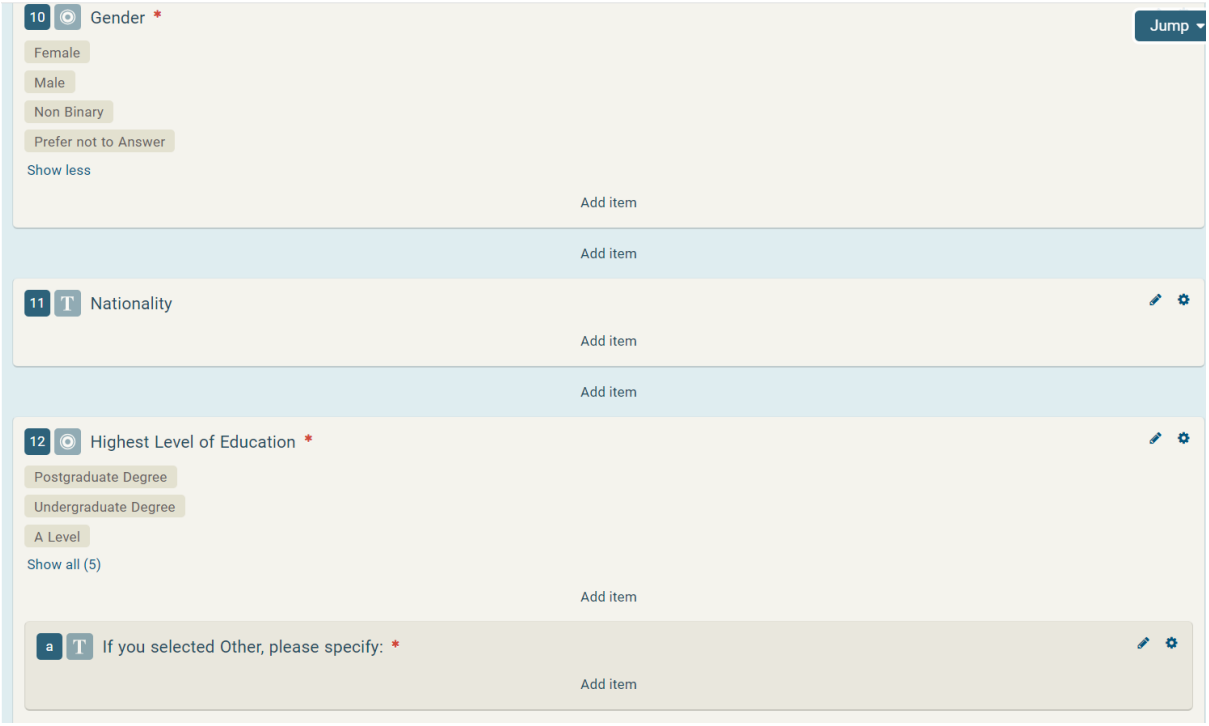
Online Newspaper Websites (e.g. The Sun, The Guardian)

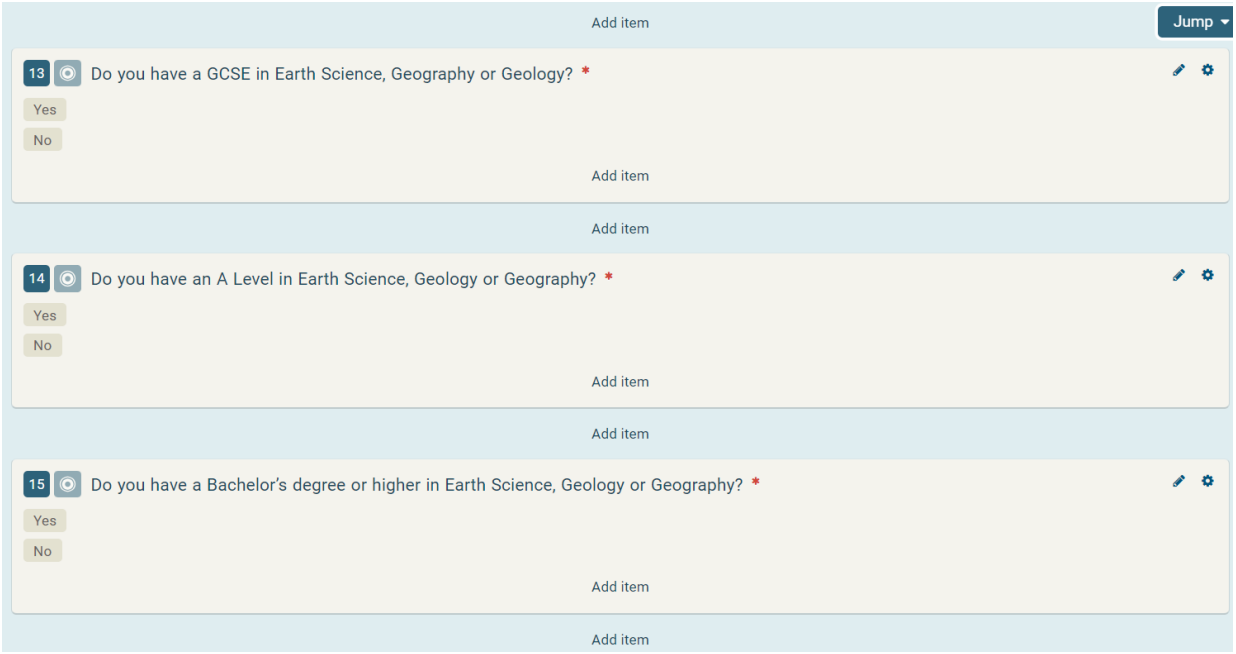
News on Television (e.g. the BBC, Sky News)

Show all (8)


Jump
4 Where do you typically access and read news stories on natural hazards? *
Print Newspaper/Magazines (e.g. The Sun, The Guardian)
Online Newspaper Websites (e.g. The Sun, The Guardian)
News on Television (e.g. the BBC, Sky News)
Show all (8)
Add item
a If you selected Other, please specify: *
Add item
Add item
Add item
5 Please state the newspaper/channel/social media company you most often use for news (e.g. The Sun, The Guardian, the BBC, Sky News, Facebook, Twitter etc). *
Add item
Add item
6 In 2018, a Hawaiian volcano called Kilauea erupted. Were you aware of this? *
Yes
No
Add item


Jump
7 Age *
20
21
22
Show all (32)
Add item
Add item
8 Employment Status *
Employed
Unemployed
Retired
Show all (4)
Add item
Add item
9 Job Type (E.G. Teaching, Engineering, Civil Service, Construction, Retail etc)
Add item
Add item


10 Gender *
Jump
Female
Male
Non Binary
Prefer not to Answer
Show less
Add item
Add item
11 Nationality
Add item
Add item
12 Highest Level of Education *
Postgraduate Degree
Undergraduate Degree
A Level
Show all (5)
Add item
a If you selected Other, please specify: *
Add item


Add item
Jump
13 Do you have a GCSE in Earth Science, Geography or Geology? *
Yes
No
Add item
Add item
14 Do you have an A Level in Earth Science, Geology or Geography? *
Yes
No
Add item
Add item
15 Do you have a Bachelor's degree or higher in Earth Science, Geology or Geography? *
Yes
No
Add item
Add item

p. 3 Survey Part Two

Jump

Add item

Please click on the link and read the following extract of information. The following questions will be based upon this.

https://static.onlinesurveys.ac.uk/media/account/141/survey/757398/question/kp6_pic_survey.jpg

Add item

16 How trustworthy is the information? *

	Very Untrustworthy	Untrustworthy	Neutral/ Don't Know	Trustworthy	Very Trustworthy
Trust	☐	☐	☐	☐	☐

Add item

Add item

17 How clear is the information? *

	Very Unclear	Unclear	Neutral/ Don't Know	Clear	Very Clear
Clarity	☐	☐	☐	☐	☐

Add item

Jump

18 If you lived in Hawaii during the eruption, what would be your 3 main priorites? *

Family

Money

Pets

Show all (11)

Add item

Add item

19 After reading the information, how do you feel about the eruptions of Kilauea in 2018? *

Add item

Add item

20 From the information you have read, give your opinion on the follwing statement: 'The 2018 eruptions in Hawaii were scary' *

	Completely Disagree	Disagree	Somewhat Disagree	Neutral/ Don't Know	Somewhat Agree	Agree	Completely Agree
Opinion	☐	☐	☐	☐	☐	☐	☐

Add item

Add item

21 Imagine a scenario in which you had a holiday to Hawaii booked in June 2018, would you cancel it? *

Yes

No

Don't Know

Add item

Add item

Appendix III Participant Information Table

Participant Number	Age	Gender	Highest Education Level in GEES
1A	23	Male	GCSE
1B	22	Female	None
1C	22	Female	GCSE
2A	50	Female	None
2B	46	Male	GCSE
2C	58	Female	GCSE
3A	28	Female	None
3B	22	Female	Bachelor Degree
3C	25	Female	Bachelor Degree

Appendix IV Press Release KP6

U.S. Geological Survey
Saturday, May 5, 2018, 11:42 PM HST (Sunday, May 6, 2018, 09:42 UTC)

KILAUEA VOLCANO (VNUM #332010)
19°25'16" N 155°17'13" W, Summit Elevation 4091 ft (1247 m)
Current Volcano Alert Level: WARNING
Current Aviation Color Code: ORANGE

Lower East Rift Zone Eruption
The intermittent eruption of lava in the Leilani Estates subdivision in the lower East Rift Zone of Kīlauea Volcano continues. Fissure 7 stopped erupting in mid-afternoon. A new fissure erupted this evening near fissures 2 and 7, and lava fountains reached as high as about 70 m (230 ft). Early this morning, new ground cracks were reported on Highway 130, but no heat or escaping steam was subsequently observed.

Seismicity and deformation are consistent with continued accumulation of magma within the rift zone.

Residents should remain informed and heed Hawaii County Civil Defense closures, warnings, and messages (http://www.hawaiicounty.gov/active-alerts).

For maps showing the locations of eruption features, please see https://volcanoes.usgs.gov/volcanoes/kilauea/multimedia_maps.html

For information on volcanic air pollution, please see: http://www.ivhhn.org/vog/

HVO geologists will be in the area overnight to track and report to Hawaii County Civil Defense on the activity, and other scientists are closely tracking the volcano's overall activity using various monitoring data streams.

Kīlauea Volcano Summit
Tiltmeters at the summit of Kīlauea Volcano continue to record the deflationary trend of the past several days. Satellite InSAR data show that between April 23 and May 5, 2018, the summit caldera floor subsided about 10 cm (4 in). Corresponding to this deflationary trend, the summit lava lake level in Overlook crater has dropped about 128 m (518 ft) below the crater rim since April 30. Rockfalls from the crater walls into the retreating lake produced ashy plumes above Halemaumau crater today, resulting in light ashfall in the summit area. Rockfalls and ashy plumes are expected to continue as the lake level drops.

Earthquake activity in the summit increased in the past 2 days, coincident with the magnitude-6.9 earthquake on May 4 beneath the south flank of Kīlauea. In the past two days, about 152 magnitude-2 and magnitude-3 earthquakes occurred at depths less than 5 km (3 miles) beneath the summit area. Twenty two magnitude 3 earthquakes were recorded. These earthquakes are related to the ongoing subsidence of the summit area and beneath the south flank of the volcano.

HVO Contact: askHVO@usgs.gov

MORE INFORMATION

Activity Summary also available by phone: (808) 967-8862

Subscribe to these messages: https://volcanoes.usgs.gov/vns2/

Appendix V The Independent Article KM15

The INDEPENDENT

Section: AMERICAS; Version:5

Length: 755 words

Byline: Samuel Osborne

Body

Thousands of people have been evacuated from their homes on 's Big Island after the spewed lava into residential areas and a series of earthquakes, including the largest to strike the state in 43 years, shook the island.

Multiple new vents, from which lava is spurting out of the ground, have formed and residents were warned to watch out for dangerous levels of sulphuric gas.

A 6.9 magnitude quake followed closely after a 5.8 magnitude, both occurring near a town whose residents already faced mandatory evacuations due to bubbling lava.

The latter, more powerful earthquake occurred in almost the same location as a 1975 tremor that killed two people, according to the US Geological Service, but there were no reports of casualties.

Read more

Hawaii residents flee 'curtain of fire' and contend with earthquakes

Drone captures lava spewing out of ground after Hawaii volcano erupts

Hawaii volcano erupts sending fountains of lava into residential areas

Lava pours from Hawaiian volcano in mesmerising timelapse video

Big Island has been placed on high alert as scientists and local officials warned residents seismic and volcanic activity is likely to continue.

A spokeswoman for the Hawaiian Volcano Observatory,Janet Babb, said the earthquakes were caused as a result of the volcano adjusting to the shifting magma.

"The magma moving down the rift zones, it causes stress on the south flank of the volcano," Babb said. "We're just getting a series of earthquakes."

The lava lake at Kilauea's summit crater dropped significantly, suggesting the magma was moving eastward towards Puna, a mostly rural district of forests, papaya farms and lava fields left by previous eruptions.

A plume of ash rises from a crater in the Mount Kilauea volcano after a magnitude 6.9 earthquake struck the area, near

Pahoa

, Hawaii (EPA/

USGS

HANDOUT)

Officials ordered more than 1,700 people out of Big Island communities near the lava, warning of the dangers of spattering hot rock and high levels of sulphuric gas that could threaten the elderly and people with breathing problems.

Two homes were burned by lava from the volcano.

No injuries or deaths have been reported, but the governor of Hawaii, David Ige, activated the Hawaii National Guard to provide emergency help.

Several more eruptive lava fissures have formed, bringing the total to six, according to the Hawaii County Civil Defence Agency.

Drone footage captures lava flowing out of ground in Hawaii

Although no significant lava flows have yet formed, additional outbreaks of lava, which can reach temperatures of about 2,100 degrees Fahrenheit (1,150 Celsius), were expected, the agency said.

Hawaii Volcanoes National Park has evacuated all visitors and non-emergency staff. The quakes triggered rock slides on park trails and crater walls, while narrow fissures appeared on the ground at a building overlooking the crater at Kilauea's summit.

The University of Hawaii at Hilo and Hawaii Community College have both closed campuses to allow students and employees to "attend to personal business and priorities."

Authorities already had closed a long stretch of Highway 130, one of the main arteries through Puna, because of the threat of sulphuric gas.

Lava is seen coming from a fissure in

Leilani

Estates subdivision on Hawaii's Big Island (FREDERIC J. BROWN/

AFP

/Getty Images)

AYCEID ServicetoService

Kilauea has been continuously erupting since 1983 and is one of five volcanoes to make up the Big Island. Activity increased earlier this week, indicating a possible new lava outbreak.

Earlier this week thecrater floor began to collapse, triggering earthquakes and pushing the lava into new underground chambers.

The collapse caused magma to push more than 10 miles (16km) downslope towards the populated southeast coastline.

Residents have faced lava threats before.

In 2014, lava burned a house and destroyed a cemetery near the town of Pahoa. Residents were worried it would cover the town's main road and cut off the community from the rest of the island, but the molten rock stalled.

Lava flows over a road in the

Puna

District as a result of the eruption from Kilauea on Hawaii's Big Island (Byron Matthews via AP)

From 1990 through 1991, lava slowly overtook the town of Kalapana, burning homes and covering roads and gardens.

Kilauea hasn't been the kind of volcano that shoots lava from its summit into the sky, causing widespread destruction.

From 1990 through 1991, lava slowly overtook the town of Kalapana, burning homes and covering roads and gardens.

Kilauea hasn't been the kind of volcano that shoots lava from its summit into the sky, causing widespread destruction.

Instead, ittends to ooze lava from fissures in its sides, which often gives residents at least a few hours' warning before it reaches their property.

Additional reporting by agencies

Appendix VI The Daily Mirror Article KM24

Edition 1, National Edition

Section: FEATURES; Pg. 2

Length: 61 words

Body

THICK clouds of ash and red-hot molten lava continue to spew from Hawaii's Kilauea volcano, forcing 1,500 locals to flee for their lives.

The Big Island was also hit by a huge 6.9 magnitude earthquake yesterday, the largest since 1975.

Officials have ordered people to leave the nearby Leilani Estates area to escape noxious sulphur dioxide gases from Friday's eruption.

Classification

Language: ENGLISH

Publication-Type: Newspaper

Journal Code: SMR

Subject: KILAUEA VOLCANO ERUPTIONS (90%); VOLCANIC ERUPTIONS (90%); VOLCANIC ASH CLOUDS (88%)

Geographic: HAWAII, USA (90%); National Edition

Load-Date: May 6, 2018

Appendix VII Group One Transcription

Transcription of Focus Group One

Researcher: How often do you look at the news in general, how often per day or week do you read the news.

Participant 1A: For me probably several times a day but never really for that long, its really just looking at headlines that interest me.

Participant 1B: I'm probably the same as 1A, but I do listen to the times morning briefing on the way to work in the morning and I listen to the smart seven, the top seven headlines in seven minutes.

Participant 1A: If I'm trying to learn the use I listen to a lot of long form videos which are 20 minutes long but only every couple of days, the main source is probably reading headlines.

Participant 1C: My main source is probably through Twitter and Facebook, but I wouldn't actively go on to a news website it would only be what I see through social media.

Participant 1A: On occasion I watch news night.

Researcher: Would you say that mainly interesting social media headlines are what you tend to look at?

Participant 1C: Yeah

Participant 1B: I do check it on my phone when you scroll and see the top stories once a day but sometimes I don't read them, during covid I was reading them all the time though. Like 1A said, when there is something your interested in you do go looking for it.

Participant 1A) For me I go on the BBC website and look at the headlines.

Participant 1B: Yeah same

Researcher: 2 of you said you found the information trustworthy, what about it made it trustworthy

Participant 1C: I'm going to say there was a lot of big words and it made me think, it looks scientific, there's no pictures so it looked like a scientific source, with big words and a lot of information to me that's trustworthy.

Participant 1A: I completely agree, to me I thought it was dry readings, its not sensationalised at all its just giving you technical detail about what happened. I didn't get much information from it. As someone that doesn't understand volcanoes I didn't particularly understand parts and what that means in terms of the effects on anything. It wasn't sensationalised it just seems like facts.

Researcher: Did you all feel the same

Participant 1B: yeah I agree, there's a lot of figures. It someone goes to the effort to find numbers it must be trustworthy, unless they made them up but I don't think they did.

Participant 1A: None of the numbers are outrageous to me, knowing very little about volcanoes. It seemed like it as from an official source.

Researcher: Did you think the information was clear or unclear and why?

Participant 1C:; I found it unclear as someone that doesn't know anything, some information went over my head and there was a lot of words I didn't really know, all I gathered was that there has

been some kind of volcanic eruption. I did have to read it a few times to try and process it. I know absolutely nothing about volcanoes though.

Participant 1B: I don't know, I feel like maybe I skimmed it because there was a lot of information and I wasn't really invested in it because it doesn't grab your attention.

Participant 1A: Id probably say it was clear about what it was trying to communicate to the people it was trying to communicate it to.

Researcher: Who do you think that is?

Participant 1A: I think it was a very internal authorities, this is the situation. It didn't seem to tell the public what they needed to do. Its informing the people who need to know and it seems targeted at them. Maybe it is reasonably clear. It seems logically laid out and they describe what is happening reasonably well in terms of the numbers etc. but in terms of a member of the public I wanted to know what I should be doing and in terms of that its unclear.

Researcher: is there anything you're left wanting to know when you read this

Participant 1A: I think what sort of damage it was doing and how people should respond but I don't know it that was its aims or intentions.

Participant 1B: As a person who thinks about people, I think id be much more interested in what happened to people and how they coped with the effects but I'm not sure if that was the focus and what it was trying to get across .

Participant 1C: it's a scientific report not a news article so its not telling the general public its telling the people who know about volcanoes. Which is why it doesn't make any sense to me.

Researcher: Could you explain a bit more about what you put for your answer about how it made you feel?

Participant 1B: I think when you get overloaded with technical language it desensitises you to the people and how its effecting peoples lives because we talk all the time about natural disasters and when we get into technical terms it makes up focus on that and not people that have lost lives and homes from them.

Participant 1A: If I can add, volcanoes aren't a good thing, even though its not telling you people have died, you can probably assume its not a good thing.

Participant 1C: I', a bit clueless when it comes to the news, I don't really follow it. I'm a bit out of the loop.

Participant 1B: do you think its you or the media coverage??

Participant 1C: I mean I have no recollection of that event maybe because it was in Hawaii and it didn't reach us over here and it wasn't so catastrophic that it wasn't big news over here. It was only in 2018 so I should have been aware that it had happened.

Participant 1A: it must have been a kind of regional thing compared to Iceland that stopped flights in Europe, you hear about that because its directly effecting us in the UK but maybe the Hawaii one didn't make the news over here in a rolling news cycle because the news pick the flavour of depression of the day it just goes completely over your head.

Participant 1B: I think people do want to hear what effects them directly so news companies need to keep up with that demand. They may have mentioned it really off the cuff and then moved on to something that hits a bit closer to home. I think news is like that, you never hear the same story two days in a row. It has its time in the spotlight and goes, I think it was a minor thing and it wouldn't have really got much press. I couldn't imagine it getting shared on Facebook.

Researcher: Do you think if these stories has come up on your news app, social media etc, it would have been something you clicked on anyway?

Participant 1C: yeah, a volcanic eruption I think is a massive thing, as far as I'm aware they don't happen all the time, unless I'm really out of the loop with volcanoes (Everyone laughs). Things like that, even thought they might not effect us, they will have effected the town and Hawaii, not the town, I don't even know where it was. It's a massive thing, it could kill people. So if something like this, bearing in mind I don't check the news as often as I should, that came up on my Facebook id be inclined to find out what's happening even reading the article you showed us, I was like how did I not know this had happened. I would have been intrigued I would have wanted to know.

Participant 1A: Id probably click on it, read it for a minute and click off on it, if I'm being perfectly honest.

Participant 1B: Same

Participant 1A: if it was closer and seemed more of a widespread threat then yeah. Its not like a war or anything, a volcano, its not human controlled, these things just sort of happen.

Researcher: Reads answer on survey out

Participant 1A: That's basically what I said earlier, I'm not a geologist I don't study volcanoes, its giving me all of these numbers and I don't know how big that makes the volcano or how much destruction it could cause. Like 1B said, no reference to human effects and wildlife.

Researcher: so it left you wanting to know more?

Participant 1A: Yeah

Researcher: What would be your one main priority and why?

Participant 1A: I think I put family, that's sort of obvious. Then pets, that would be the next thing after human members of my family. Then belongings, but not in terms of monetary value unless its small ad easily transportable, more sentimental things. I would want to lose things with memories attached.

Researcher: whys that your priority over losing your home or surviving?

Participant 1A: I suppose, that releases didn't say get out of your house and survive, this is a life or death situation, I think in my brain, you think of lava like slowly moving but you can get away from it in a car, unless it's a PF and then you die. You cant stop your home being subsumed by lava. I think if I'm assuming the lava is threatening my house I'm accepting its gone and taking my valuables.

Participant 1C: I think mines the same, I put survival, if it's a massive thing, I'm not going to worry about my personal stuff I'm going to worry about if I live or die

Participant 1A: I love how were joking when millions of people could have died and we don't know

Participant 1C: That's the thing we don't know if there were deaths or the effects, because the words in the article don't make any sense to me, I cant decipher how big this was. I don't know if it effected only a small amount of people, if it would burn my house down or if it was a volcano in the middle of nowhere that wasn't going to really have any effect on anyone. Immediately my instinct would be to survive it and do everything I can to live.

Participant 1A: I think in the piece it was mentioning earthquakes so presumably people living there felt the earthquakes, they would know something was going on.

Participant 1B: the people are probably pretty well adapted, they probably teach it at like primary school like what to do. If there was a quake here we wouldn't know what to do. I think I put family, survival and money. I was thinking, if your house was gone, you'd need money for a new house or a flight. Probably family is the morally right thing *everyone laughs*.

Researcher: What made you choose your answer about a holiday cancellation?

Participant 1B: I think I would cancel because why would go somewhere with volcanoes erupting. I don't know how big Hawaii is, id like to go but I feel if I had a holiday booked that year I would just go another time, its probably not the best time to go see the sights.

Participant 1C: I think I would want to establish how big it was and how much of an issue it would cause. If the volcano wasn't where I was going and I had a holiday booked id probably still go if it doesn't effect me. If it was a massive eruption and it had destroyed everywhere I wouldn't go. I probably need to understand the magnitude.

Participant 1A: I think if it had already happened is moralise it by saying these people need the tourism but really I just want to sit on the beach.

Researcher: What if it was happening but it was very low magnitude?

Participant 1B: so it could get worse?

Researcher: well it could impact your holiday?

Participant 1A: if it could get worse, you would probably read the news and I probably wouldn't go.

PART TWO

Researcher: which article is more trustworthy and why?

Participant 1C: the first one

Participant 1B: the first one from the independent. They're just more trustworthy than the daily mirror.

Participant 1C: it went into a lot more detail the other one was very short. I like facts and figures to tell me what's happening.

Participant 1A: I think they are equally trustworthy, the first one gives you more information but the daily mirror one is an extremely condensed version.

Participant 1B: it doesn't tell you anything that's a lie

Participant 1A: they might have sensationalised it a bit, saying locals were fleeing for their lives, it sounds very urgent, whereas you compare it to the independent that says there were no casualties. It gives off a slight different vibe but I don't know how you're going to mitigate that f you're

condensing it to 3 sentences. I don't think its giving an inaccurate impression like its not saying peoples shoes were being burnt as they ran away rom the lava kind of thing, they haven't gone to that extreme I just think the independent is a little bit more in depth.

Researcher: how do they differ

Participant 1A: the daily mirror reads like it was written by a bot *everyone agrees* it sounds like information has been gathered and put together for clicks. I don't think there has been any editorialising, a bot has condensed information and thrown it out there to give people a hot fix of headlines. The other one seems like a real person and it's a bit more researched.

Participant 1B: I agree, you get more information from the independent but it kind of just repeats a lot and then delves in a little bit but it kind of recycles what it already has said.

Participant 1C: I think the shorter one is what you would see on the front page of a newspaper and get your attention to then go to another page to read the full article and that would be the other one.

Participant 1A: the daily mirror one reads like external links on websites, like ads. You just read them absentmindedly. I'm not sure the independent article adds that much in terms of context. To the average person that doesn't really care but its more informative and better put together but maybe not that useful.

Researcher: if you were scrolling on social media and these two came up what would you be more likely to click on?

Participant 1C: the shorter one, I don't think id have time to sit and read the longer one id be bored. Personally, it doesn't really effect me, id want to know briefly what's happening and wouldn't want to go into much detail. Id want to know the effects, how big it was and if it had hurt anyone and that's all I would need to know I think.

Participant 1B: do you think you only really care when its effecting you or someone you know?

Participant 1C: Yeah, id probably be more bothered or if I was going on holiday to Hawaii.

Participant 1A: probably click the daily mirror one to use it as a gateway article to read about it properly somewhere else. To be honest I hate the independent and the daily mirror but at least I wouldn't have to read a lot.

Researcher: does the media source impact your likeliness to read the article?

Participant 1A: for me definitely

Participant 1B: I think I would pick to read the independent because I try to avoid tabloids and just scare mongering, I try not to buy into it

Participant 1A: I don't think I would click on either

Participant 1B: the guardian is my go to, but id pick the independent over the two

Participant 1C: I don't know any of them, I don't know what's good or bad, I just read whatever I see

Participant 1A: I don't normally get my news on Facebook, I go to news websites I'm interested in

Researcher: which ones would you look at

Participant 1A: BBC or the guardian, or maybe even reddit, you can filter out a lot of trash.

Researcher: for the independent, how did it make you feel and why

Participant 1B: I think it made me feel a bit more informed, it had more information in interested in like casualties and evacuation. Information such as magnitude doesn't mean much to me and I assume the general public who haven't studied it or that don't have an interest. Peoples main concerns are the impacts. It's a natural thing, you cant stop it but you can control how you deal with it

Participant 1A: the independent one gave you a sense of calmness, like they go through the history and it tells you they deal with these things often. It tells you two homes burnt down, in the grand scheme of things that's not a lot. It's the opposite of worrying, on the scale of the volcano erupting it seems like a good outcome. It gives you historic context and the effects and how prepared they were for it, how to evacuate and the steps to take. In the grand scheme of things not a huge crisis, not a good thing but not out of the ordinary.

Participant 1B: like kind of routine, they knew what to do, they've done it before.

Participant 1B: I definitely agree with 1A calmness comment, they didn't want to create a panic, they understood what to do and who needs evacuating.

Researcher: does how you feel differ when you read the daily mirror article?

Participant 1A: the daily mirror one doesn't give you any historical content or mitigation its kind of cliff hangery, if you wanted to know the outcomes you would have to find another source. Its clickbait, but not in an inaccurate sense, in a, we want quick looks at this news, you don't know everything about it though other than evacuations and earthquakes.

Participant 1B: I think in the daily mirror one you pay attention more but I automatically ignore anything that comes from that source. If you sent those without who wrote it I would probably feel differently.

Participant 1C: to me, it doesn't make a difference, I don't know the difference between sources and preferences, ill read anything from anywhere. I like it because its short and snappy if it effected me more I would look for more information but if it doesn't have anything to do with me ill look at a snippet.

Participant 1A: I think for informing the public the sweet spot is somewhere between the two.

Researcher: did you find it more clear than the press release

Everyone; Yeah

Participant 1C: these words I understand and in terms of what I wanted to know was the impact on people and evacuations, that's what the articles get across rather than the press release. The release says what the volcanoes doing but I personally just want to know what's happening to people, the effects not the science.

Participant 1A: I wonder if the report was emerging information so its important for people to know the technical stuff, the article was written after so they could recount effects. The first one could have been from when they were putting plans in action rather than seeing the effects

Researcher: do you think people in Hawaii have more of a scientific knowledge and would therefore understand the press release more, do you think its aimed more at them than us in the UK

Participant 1B: they'd be more use to the terminology, I think it was probably more for providing information to authorities or news companies. I don't know if it was for the average Hawaiian citizen. I would say they would have more knowledge, that's natural, they need to know more than us

Participant 1A: I think they probably know more roughly what magnitude are bad because I don't know how it works at all. I don't know if they'd understand more than us for like fissure measurements for example. If they had a big earthquake in the past but it's a lower magnitude than this one, they would know its worse for example.

Researcher: do the articles change your priorities or not

Participant 1A: for me no, I think your priorities are more human nature based. Unless you have a plan, you just fall back on human nature, unless the immediate information is immediately clear on what to do.

Researcher: so are your survey answers more human nature based rather than based off the information

Participant 1A: yes, unless it told me directly what to do, id only have one evacuation plan, that's not going to change. You're not going to not save your family because the media told you to not help your family.

Participant 1B: I think it would depend on travel, you wouldn't be able to take belongings if you couldn't drive.

Participant 1C: possibly I think survival is the main factor still

Participant 1A: you're always going to get people who don't listen, you cant stop that, its part of human nature. People have a desire to fight, I don't have that id be running shit scared.

Researcher: based on the daily mirror, if you lived in Hawaii, what would you be experiencing

Participant 1A: you'd have the telly on, getting rolling news, authorities come to the house to tell you to evacuate, you're a bit shocked after the earthquake, if you were a traveller you'd be shocked, you'd evacuate to the coast.

Researcher: What about outside

Participant 1B: smoking

Participant 1A: yeah a plume of smoke

Participant 1B: yeah dark and grey and ash in the air and I think things would be broken, it would be so hot

Participant 1A: I don't know how big Hawaii is so I don't know if you would see lava or a distant smoke fume. Burning trees from the lava. Earthquakes is cracking walls but not flattening the place. Roofs caved in I don't know

Participant 1A: in terms of people, people packing their cars

Participant 1B: people would be panicking

Participant 1A: I don't think so, people would be rushing around but level headed, not mass panic, I don't think the media would be telling people to run for their lives.

Participant 1B: I think if it doesn't happen a lot to that magnitude, if it was the first time in your life you would panic if you had to evacuate, but people are all different

discussion about warning systems

Participant 1B: so people knew a few days before then

Participant 1A: so I think that's why I don't think they would panic, they could process it, it wasn't a last minute thing. Scientists are good nowadays.

Researcher: Have you learnt anything?

Participant 1A: I learnt about the eruption. I learnt that people have different responses, and I didn't think that was going to be the case. I guess it shows that in media to communicate volcanic eruptions you cant just have one method, you need different media for different people, not a one size fits all approach.

Participant 1B: I agree.

Participant 1A: were all massively desensitised to negative news

Participant 1C: if it doesn't effect me I don't care

Appendix VIII Focus Group 2 Trasncription

Researcher: How often do you look at the news?

Participant 2C: At least daily for me, yeah.

Participant 2B: Yeah, probably the same several times a day.

Participant 2B: I generally look at the BBC News app on my phone at breakfast. Keep an eye on Twitter throughout the day and then probably have the 6:00 O'clock news on the TV when I get home

Participant 1A: Twice daily for me. Early morning, late evening. Always generally the TV.

Researcher: Would do you social media to track the news or would you say that you don't really do that?

Participant 2C: I don't, I use the app, I use the I watched the pings coming if there's a breaking story, but that's not social media, but no, I don't.

Participant 2A: No from me.

Participant 2B: Yeah, I tend to use. I keep an eye on Twitter quite a lot throughout the day, so I see a lot of news through there.

Researcher: that's probably the only social media that you would use news wise, would you say?

Participant 2B: Uh, yeah, pretty much. I mean, I use like Facebook and Instagram as well, but they tend to not be news sources particularly, yeah.

Researcher: I saw that most people thought that the information was trustworthy. So what made you think it was trustworthy or not trustworthy? If you put not trustworthy?

Participant 2B: Yeah, so I saw it come from the US Geological Survey, so I mean they are the people who kind of monitor this kind of thing. So that was what introduced the level of trust. Mainly, I guess the nature of the way the information was written as well it was. It was very factual. It wasn't sensationalist or trying to make it sound like some exciting story. Which newspaper might do.

Participant 2A: Yeah, it was the again the US Geological Society. It was there in the header. I know it to a be trustworthy source, and I think for me it was very technical. So I think that's probably why a trusted it.

Participant 2C: I was I don't know for that because I it was very technical and I'm not familiar with it all.

Researcher: The language.

Participant 2C: The language and the source, to be honest, so it looked very technical. It look very trustworthy as you say. I trust it a lot more than something that I you know I saw pop up on. Not that I'm on Twitter, but on Facebook all that. It sounds significant, but I don't know whether it is and that wasn't it was a scam. Reading the fact that it was code orange, you think that's quite scary, a code orange. It's probably not as scary as red though. Yeah, it looks trustworthy, but I don't know enough about it to make the judgment.

Researcher: Did you think it was clear or unclear, why?

Participant 2B: Some bits are clearer than others, there's alert levels and warnings. In isolation they don't mean a lot, I don't know how bad orange or red are, so I think the report assumes a certain level of understanding. They talk a lot about fissures, if you don't understand the language you don't understand what a fissure is, I've been watching a lot about the volcanic eruption in Iceland at the moment so I understand it a little more but I wouldn't have beforehand.

Participant 2A: It is similar for me, the orange, you understand the words but other than the orange code I didn't understand how significant or severe it was, it was a lot of words. It was only the orange code because I didn't understand the rest.

Participant 2C: its similar, I understood the words but I don't know the impacts. The residents were informed but it felt as though it was written for a scientist rather than the public.

Researcher: That was my next question, who do you think it was written for?

Participant 2A: Not the public, if it was a citizen id find it hard to understand. I feel like it's a briefing for people who understand volcanoes.

Participant 2B: I agree with that, I think its of use to scientists but if it was just aimed at scientists I think it would be even more technical. People that live there have more of an understanding than us, so maybe both. Scientists involved would want even more detail.

Researcher: Is there anything you're left wanting to know more about?

Participant 2B: there's a lot of facts, it talks about deflation retrends and measurements but they don't seem to say anything about the indications of endings or it getting worse. I guess it doesn't include any trend summaries.

Participant 2A: Similar, is the risk going up or down. If its going down, a forward look, can it be prevented. Was it being monitored, was it predicted and was there any previous volcanic activity from the volcano.

Participant 2C: I think that covers it for me, was it the first time? It sounds like its not, but what's next, that's missing. Are they going to provide daily updates, are the warning levels increasing and how are they going to cascade it. Next steps are missing.

Researcher: How did it make you feel and why?

Participant 2B: anyone who wants to know more can you easily, it was reassuring, you're not on your own. I think it would depends where you were, as to how you felt, if you lived next to these cracking highways or fissures you would be worried. IF you lived on the other side of the island you wouldn't be.

Participant 2C: The initial read, scary. It's a significant incident with a code orange. Reading it more, there's a lot of detail, I wouldn't want to be in Hawaii. I've been to Iceland and seen what they can do. The news with impact on aviation, I'm glad we don't have volcanoes in Manchester.

Participant 2A: I agree, I had a little think, it depends, where I live, would it be difficult to access the information. Would there even be internet access? I've been to Pompeii and that is where my mind goes.

Researcher: Top priority and why?

Participant 2B: Survival, if you don't survive the rest of them are irrelevant.

Participant 2A: Family. Once you're a parent, your survival is less important.

Participant 2C: Family, pets, survival. For the same reason.

Researcher: From this piece of information, what would it look like, what would you be experiencing?

Participant 2A: Because I didn't understand, id struggle. The big ash cloud, like in Pompeii but the only other reference point I had was a film from years ago with lava in the streets. Because I didn't understand the information Id struggle to picture it purely from the information, Id imagine there would be a lot of panic but I'm not sure.

Participant 2B: My visualisation is slightly tainted because I read it on the news. From what I recall it wasn't a move scene, it was slow moving lava, people had enough time to get out. It wasn't a type of panic.

Participant 2C: I was recreating a little bit of Iceland with the ash and rocks but it did say rock fall rather than rocks being thrown out of the volcano but that was the image for me, ash and rocks flying around.

Researcher: If you had a holiday booked would you cancel it and why?

Participant 2B: I put no, Hawaii it several different islands no my no is based off not going to that island but I would hope to see it. I'm actually going soon so if the volcano is erupting still id like to see it.

Participant 2C: Id say not, not just the lava flow but also the not knowing, not knowing what would happen and if your holiday would get ruined. I would stuck in isolation during Hurricane Katrina, so not the risk of the volcano just the disruption of the holiday.

Participant 2A: I wouldn't go because of the disruption to my holiday too, I would definitely cancel.

Part 2

Researcher: Which article is more trustworthy and why?

Participant 2A: not the daily mirror

(even laughs in agreement)

Participant 2A: there's not facts or content its just sensationalism.

Participant 2B: yeah even the headlines, its going for the drama.

Researcher: How are they different from each other

Participant 2C: One extreme to another, the sensationalism of the mirror, the independent had some good stuff in but did have some drama.

Participant 2A: yeah still used terms such as spews which you don't get in the report.

Participant 2C: Still a lot more information than the mirror.

Participant 2A: they covered the back story, its been continuously erupting for years which dials down the drama. It contradicts itself a little but it's a better article with more information.

Researcher: do you think the source impacts your likelihood to read it?

Participant 2C: yes for me.

Participant 2B: I agree, most people have their favourite paper so they trust that one over others.

Participant 2A: if I was online id read both. It's a natural curiosity, if I saw that headline id click to look and then maybe read another one.

Participant 2B: It depends on the story I would maybe read other sources or if it was something where I thought the first source had not be truthful I'd look elsewhere but if I'm not interested id not look around.

Participant 2C: Same for me, sometimes you do just read the sensationalist stuff.

Participant 2B: sometimes its hard because now you need to pay for example the telegraph.

Researcher: Have these articles changed how you feel about the eruption?

Participant 2B: Slightly, I guess they give more impact on people living there. The report didn't say about evacuations. It talks about the past eruptions so its giving different information.

Participant 2C: yeah its giving more context, the report left you thinking well what is that? It shows you its significant enough for evacuations. Also it talks about gas levels.

Participant 2A: in the same, the gas and the heat of the lava. The context the eruptions had been happening for years and the activity earlier in the week. I think it wouldn't panic, a more measured approach. There wouldn't be accidents that occur due to the evacuations.

Researcher: Did people find it more clear than the press release

Participant 2C: it was an easier read.

Participant 2B: I'm not sure it was more clear because it was less detailed but definitely an easier read.

Participant 2A: I agree

Researcher: Would you agree that the press release is clear in what it needed to tell peopled but the articles were clearer for the general public?

Participant 2B: yeah, that's a reasonable summary

(everyone agrees)

Researcher: has reading the articles changed your priorities?

Participant 2A: I think the preparation time, knowing they had a week to prepare, I picked health originally but now I'm not in a flee situation I could protect my home potentially. The essentials, pack while you can. I'm not sure if there are anything you can do but if there was I could do that with the time.

Participant 2B: I think id agree, if I had several days or hours, that takes survival choice as a given. Protecting the home is difficult with the lava so I would focus on possessions that mattered to me.

Participant 2C: I would speed through my first priorities including family and the dog but they would still come first. Once you've cleared your mind of those you can do the other stuff.

Researcher: What would you be experiencing after reading these?

Participant 2B: I think the articles give it a more personal feel so it makes you concerned about the people. Id not be worried if they were in immediate danger but if they lost houses and possessions.

Participant 2C: if you're in Hawaii its less panic, its less scary just concerning. It does put the human impact there, peoples lives could be massively disrupted. The report is like how big it is but this shows the disruption.

Participant 2A: the articles dials down the drama, the human impact. It goes back to 1983, the people have got out safely this time but there's a chance it will happen again.

Researcher: have you learnt anything from this?

Participant 2B: I think there is enough information to have learnt the scenario for this eruption. I think id be interested to go and look at the other websites in the report. It has certainly opened up more than the reports I saw at the time.

Participant 2C: I learnt about the eruption I'm not sure how I missed it at the time. I vividly remember Iceland.

Participant 2B: I guess because the impact didn't impact us, its more curiosity. But Iceland impacted us, I got stuck in Portugal.

Participant 2A: I agree, I think its interesting how there's different types of reporting. I learnt a lot about how volcanoes act in different ways, they don't all explode like I thought they did.

Appendix IX Focus Group 3 Transcription

Researcher: How often do you look at the news?

Participant 3A: I don't watch the news but I do read it for about 3 hours a day.

Participant 3B: I probably read it everyday, twice a day about morning and night. I watch it occasionally maybe once a week when its on before something, I don't go out of my way though.

Participants 3C: I try to do that every day.

Researcher: Which article was more trustworthy and why?

Participant 3A: the independent is generally perceived as a more reliable paper than the daily mirror and the daily mirror has had some questionable articles in the past. I try to avoid the tabloids unless its gossip.

Participant 3B: the independent, from the language it uses and the amount of information and facts in the article. Words such as, sulphuric gas, that sound a lot more informed.

Participants 3C: the independent is more trustworthy because it has more information

Researcher: How clear did you find the articles?

Participant 3A: I found the daily mirror one to the point so if it were breaking news story it would be easier for me, but I would always try to go and look at another media source for more information. I suppose it depends on what I am looking for. If you want a lot of information the independent is clearer but the daily mirror is more to the point so its easier to read. Sometimes I'm not really too bogged down with the details.

Participant 3B: I thought they're both really clear, but the daily mirror is so to the point they've had to be really specific with what they include. So its less dramatized but its also less empathetic towards the populations its literally just what happened.

Participants 3C: I think the daily mirror is more clear and to the point but possibly they were looking for different audiences, some people might be looking for more information.

Researcher: what is your main priorities and why?

Participants 3C: I think family would come first if you have a family. Usually families may have items considered a good investment and communication devices, probably money too. Money is helpful to get through things and the investment just came to my mind because I'm sure some items will be valuable, as well as survival supplies.

Participant 3A: I chose family, you cant replace family so that's my priority. Then pets because I have a dog. I chose survival and family and pets. I could be given all the money in the world but I still wouldn't be happy if I didn't have my family.

Participant 3B: I put family, house and survival. In my head if I was evacuating, if I was on medication, if I didn't know where I was going to be or if I can go to the shops, it would be good to give that help to others. Family obviously, but also other families, I feel like people around you would become your family too in that situation. Then survival, because I cant focus on being healthy if I don't survive.

Researcher: how do you perceive the eruption would look like, what do you think you would be experiencing?

Participant 3A: from what I understand, Hawaii has pretty active volcanoes so they have a good system in place for evacuation. I think there would be a lot of panic but I think the Hawaiian observatory would be prepared. I also know they monitor it so it didn't happen without knowledge so I assume a lot of people would be evacuated before the worst happened or in a safe place. When it does erupt, a lot of ash, I imagine its very dark and daunting, you cant see sun. you cant fly when a volcano erupts which is why evacuation is important. But I assume people wouldn't be in that area. Houses would be damaged but I don't think there would be a high casualty rate, the Hawaiian residents are prepared. If an eruption here we would panic. The one that happened in Iceland, everyone was in pure panic because it effected the whole of Europe but I don't think that would happen in Hawaii.

Participant 3B: because Hawaii sees so much volcanic activity, I feel like they wouldn't be shocked and scared. I think they have a completely different mindset because they're so used to it, it's the norm and they know what it feels like. They have such a better connection with the environment, they have monitoring, planning and tests and trust in the government. I think there would be resistance for evacuation, I think there would be a lot less panic. From the media you imagine it as a film, with lava spurting and everyone running around but I feel like that's not actually happening.

Participants 3C: the first thing that came to mind is chaos, but controlled chaos. Combining 3Aand 3B perspectives I think there would be a put of a resistance in a way because people are used to it. For me, if you see it all the time and then suddenly its in the news you see it as an important event. I think there's always people who trust the government and some that don't. There could be potential resilience from outsiders but I think it would be chaos, like controlled chaos.

Researcher: was there anything you were left wanting to know?

Participant 3A: I think the daily mirror didn't go into much detail so if id read that I would have had to look someone else but the independent gave a lot of information but it focused on what has happened in the past and now. I guess it doesn't tell you anything about what's going to happen. What's the contingency plan, what are the government going to do about it for the residents, what's going to happen in a week or how long its going to last. The short term plans and impacts, if they had explained what's going to happen e.g. This is what people are doing you would feel more calm. I think if they went into that detail id feel okay with it.

Participants 3C: I do agree with 3A to have a brief contingency plan, if I was reading this I would feel bad for people in Hawaii like are they trapped. Also is there any international aid or responses, if an international body has responded it'll be a bigger risk internationally.

Participant 3B: I'm similar, it says 1000s of people have been evacuated but where. It doesn't tell you where, it doesn't give me any hope that these people have been provided shelter. Are they in mainland USA, like where is this evacuation too? It talks about the environment a lot and the physical aspects of the eruption but I'm not sure that's the right thing for a news article. People read the news for people, people read journals and articles for information like this. So I think its bordering on too scientific I think it could possibly be more human based.

Participant 3A: its as if they've gone on wiki and asked 'what can I find about volcanoes'

Participant 3B: yeah and its kind of telling you everything about the volcano. Like okay cool but are they dead.

Part 2

Researcher: Did you find this more trustworthy that the article and why?

Participant 3A: I thought it was more trustworthy because it from the USGS. It tells lots of information people don't really know about, so people know what's going on. A lot of contact details people can contact. I also like the external links so I'm not just relying on one piece of information, I can increase my knowledge if I wanted to. It also comes from an official body. It also gives a colour code, I saw orange and that's not red so it makes you feel a little bit more relaxed.

Participants 3C: I think they're similar in trustworthiness. The title is to the point so I know what I'm going to read and who its from. I know its going to be about the environment. Also I like the alert level code that's helpful. But the report is written straight to the point so its very convincing in my point of view.

Participant 3B: I think the same, based on the source and the layout, the date, time and coordinates makes you trust it more. The more specific the more trustworthy. The information is scientific but also understandable so people can read more about it. It seems that they have written a lot of these reports before the way that the info comes across reads really well.

Researcher: did you find it clear or unclear to read and why?

Participant 3A: not really, I mean I understood it but id much rather go to a news paper if I was looking for news updates. If I was in Hawaii maybe I would want to read it, but as someone who is not in Hawaii it doesn't tell me the key facts I want to know, I feel like I have to read between the lines. In the article it tells you what's happened and then goes into the nitty gritty so I don't really have to read more into it or look for that information but with this I feel like I do.

Participants 3C: I kind of lost it in the second bit. In the first bit I was reading it and although I couldn't understand it more I kind of got it. When it talks about the civil defence I know that's important but other than that I kind of lost it.. its too technical.

Participants 3B: I think the information itself it very clear but it depends what you want. Fissure 7 means nothing to me, I don't know what or where it is. I think if you know about volcanoes its good information but its not relevant to a crisis situation or the residents at the time I think its more of an afterthought reports but I don't think it would be a good piece of information for people that needed advice at that time.

Researcher: have your priorities changed?

Everyone; No

Researcher: do you think your priorities are more human nature based?

Participant 3A: I think anyone who doesn't say family is a bit of a narcissist. I think it depends on where you are in your life and what you have. It can depend on your culture or where you live. Someone in a poorer country could have a different set of priorities but I think its purely based on you and not the situation presented.

Participant 3B: my priorities wouldn't change for anything. They would really only change if I was really rich, I would still have family as my first priority but I would potentially take an item that was worth a lot but right now I don't have anything that's worth more than my own life.

Researcher: has the information changed what you think you would be experiencing?

Participant 3A: I don't know, I think it proved my point that these places are well prepared for natural disasters and they have a lot of plans, they have volcanic institutes in Hawaii and the whole of the US and they know what they're doing. I think people would still be panicking but I do think they know what they would be doing. I don't think it changed my perception, just strengthened it.

Participants 3C: I think it makes me realise if I am a civilian near an active volcano I wouldn't just seek news articles, I would look for multiple resources from the scientists and the government. I think it would still be controlled chaos. I am from a volcanic island but my family don't trust the government so my family would prepare for future disasters from more than just governmental help.

Participant 3B: I think they way this report is, it shows they know everything, they know when things are going to happen, they predict it right. The population of Hawaii would be a lot more ready than I first thought, they would have survival bags ready because they have pre warning. They wouldn't be so scared they had to evacuate, because they had pre warning. Nothing says they have to urgently evacuate, the articles make you feel like its immediate but they report shows its been going for a long time so I don't think they would be as scared as I initially thought.

Researcher: was there anything you were left wanting to know?

Participant 3A: the people element, I don't think that's the point though. I wasn't thinking, they didn't mention that but I would look for other articles for more information. Like with the independent and daily mirror, you think, its terrible they didn't mention these things, but with this you don't think that. You understand its scientific and that's all it really needs.

Participants 3C: I guess for me its about how far and how bad the impacts are. With reading this you want to know if its urgent.

Participant 3B: because of the scientific jargon, you lose sight of what its talking about. You lose sight of the event that's happening you think its just talking about how a volcano works. So it kind of leaves me confused and uninformed, I feel like I've just done some uni work. So like 3A said I would go and look for more about people

Researcher: did you learn anything?

Participant 3B: we all have the same view, the same priorities, regardless of where your from or if you study, you always have the same priorities because its human nature so you always care for each other.

Participant 3A: I learnt a little bit about reading into things more and what the articles are trying to tell you and now I know what I want from my news articles and I can look for a media outlet to give me those things. The daily mirror doesn't give me enough information and the independent doesn't give me that people aspect so I might look at all my news stories from the BBC because that ticks my boxes I've learnt more on that.

Participants 3C: its nice to know everyone has the same priorities and also look at other resources, different sources have different sources and readers.