

Lack of Alignment in Emergency Response by Systems and the Public: A Dutch Disaster Health Literacy Case Study

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ABSTRACT

Objective: Disaster health literacy is vital for emergency medicine and public health preparedness. Conversely, how health and safety information is communicated has a significant impact on disaster health literacy. A lack of alignment between the disaster response and the public's reaction was apparent during a Dutch chemical incident. This case study aims to provide insights into why that misalignment occurred.

Methods: The case study used readily available Twitter data. The tweets represented both the public and the authorities. The tweets were coded, thematically categorised, analysed, and synthesised to generate an explanatory framework describing the obstacles experienced during the emergency.

Results: The analysis identified four areas of concern with regards to the lack of alignment between the authorities and the public: the alert of the chemical incident, the inadequate communication, the problematic disaster management, and the insufficient disaster health literacy.

Conclusion: The case study showed shortcomings in communication and a lack of alignment in the emergency response of the authorities as well as the public's disaster health literacy. Immediate action points were apparent, and a more profound evaluation is recommended to avoid further escalation of an emergency in the future. Trust needs to be built before the next incident strikes.

Key Words: chemical incident, disaster literacy, disaster management, emergency preparedness, health literacy

Disaster literacy is an emerging field of interest for emergency medicine and disaster preparedness. Disaster literacy is defined here as, “an individual's ability to read, understand, and use information to make informed decisions and follow instructions in the context of mitigating, preparing for, responding to, and recovering from a disaster.”¹ Conversely, how health and safety information is communicated to the public has a significant impact on health literacy. In an emergency situation, numerous attributes can contribute to poor information, including, for example, technical and medical terminology in public communications, confusing or unnecessary statistics, nuanced or unclear recommendations and explanations of risk, over-reliance on written communication, a focus on awareness and information rather than action and behavior, and limited use of cultural preferences and practices when targeting and tailoring information and interventions. Therefore, it is crucial that health and safety messages, including public health alerts and emergency instructions, are made accessible in ways that make sense to the populations they target.² Accordingly, the “health literacy responsiveness” of an organization describes how public services make their information, environments, resources, and

supports available and accessible to the people they serve.³

An emergency in the Netherlands in the summer of 2019 revealed the challenges that remain when disaster literacy and the health literacy responsiveness of the authorities fail to align. Therefore, a case study was conducted to gain insight into the reasons why it happened.

METHODS

The case study design was previously used to study chemical incidents^{4,5} and is useful to investigate a contemporary phenomenon in depth within its real-world context⁶; hence, in this case, data were retrieved from Twitter. Twitter is a free social networking microblogging service ([Twitter.com](https://twitter.com)). Tweets are short and concise, with a maximum length of 280 characters. When posted, the tweets are permanent, searchable by hashtags, and publicly available on the Twitter platform. Specific search terms were used associated with the industrial park known as “Chemelot” where the Dutch incident took place: #chemelot, @chemelot, #chemelotwatch, @chemelotwatch and to the official emergency channels: #NLAlert (mobile alert) and #L1

(emergency broadcast) in the period of August 3–4, 2019. The tweets were coded, thematized, and synthesized to form an explanatory framework. Using the codes and themes, thick descriptions were developed to describe the results in detail. As an ethical precaution, personal data from the public Twitter accounts were anonymized in the reporting of results.

RESULTS

The data collection generated 284 references. The subsequent analysis resulted in 359 codes, which were synthesized to generate 4 clusters with 4–9 themes yielding the explanatory framework.

The key results show that during a gas emission emergency in Limburg, the Netherlands, air sirens and mobile alerts were perceived as random, websites were down, and the teletext page for emergencies was not updated. Meanwhile, citizens responded to the situation with various approaches ranging from panic, compliance, and disbelief, to neglect. Due to the lack of communication, people turned to social media to get the latest updates. Some shops and restaurants shut down, keeping the customers inside in accordance with protocol, while others sent their customers home or remained open without further notice. Meanwhile, measures were taken by authorities to minimize the public health impact and stop the accident, which was called off after approximately 75 minutes. However, the shortcomings in the emergency response, communication, and the public's disaster health literacy were apparent, and calls were made to upgrade the preparedness system to prevent casualties in the future.

The following details from the 4 clusters explain the alert of the chemical incident: the inadequate communication, the problematic disaster management, and the insufficient disaster health literacy, which led to the lack of alignment.

1. The Alert of the Chemical Incident

The tweets report that, on Saturday, August 3, 2019, a gas including nitric acid was accidentally released from the plant, OCI Nitrogen, based at the Chemelot industrial park near the Dutch city of Geleen. The leak resulted in a poisonous cloud drifting across residential areas. An eyewitness saw a brown cloud from the gas emission at 11:20 AM near the site. Others were alarmed by the sound of the internal sirens at Chemelot before the official emergency was declared. Around 11:45 in the morning, the air sirens were activated in the vicinity of the industrial park, soon followed by a warning on mobile phones through the NL-Alert system informing the public about the incident and the need to close windows and doors and to stop ventilation. The warning referred the public to information on L1, the regional TV station, which, according to the emergency procedures, was the designated emergency sender. Meanwhile, the emergency response was upscaled from level 2 to level 3, highlighting the increasing

seriousness of the incident for public safety. Eventually, the leak was contained. Tests made by the authorities showed no alarming values in the air, and the emergency alert was called off at 12:30 PM after 75 minutes. No casualties were reported.

2. Confusion Caused by Inadequate Communication by Authorities

The unavailability of verified information caused the confusion; the official spokesperson was not briefed, and information was mainly in Dutch. Throughout the emergency, communication was described as bad, uninformative, unserious, not timely, and too little to explain the situation fully.

Some municipalities in the region used both air sirens and the mobile NL-Alerts, while in other municipalities, only sirens were used, not the NL-Alert or vice-versa. Also, some areas were unnecessarily alerted. The designated broadcaster L1 was not informed at first. Hence, it took time to switch from entertainment to alert mode. Reports were made on national news before L1 was aired. The teletext emergency page, 112, referred to the incident in 2 sentences. Twitters questioned why a method from the 80s or 90s was still in use and when the plans were last updated. Some Twitters did not own a television, and others asked whether teletext was available on the Internet.

After 40 minutes, the Chemelot website informed the public about a smoke emission alert and that they were “busy getting the situation under control.” They advised people to close windows and doors and turn off ventilation. The local mayor made a statement but was “not perceived as reassuring” due to the lack of a proper briefing. The police and other safety authorities shared information via Twitter after some delay. They encouraged the public to find verified information without referring to the official lines of communication such as L1, the emergency broadcaster. The fire brigade reported on the measurement of nitric acid; however, no facts or values were published. Instead, the impact was judged as not dangerous. Yet, concerns were raised: “Just because the cloud is not visible anymore, does it mean that it is actually safe?” Twitters reported that shop owners nearby reacted in various ways. Some kept their customers indoor until it was safe, while others let the customers go home before closing. Notably, some did not react to the alert at all and kept going as if nothing was happening. The same was observed for the mail delivery staff.

3. The Problematic Disaster Management

The emergency response revealed deep problems for the authorities, and they were deemed “1-0 behind from the beginning.” It was experienced as problematic that the emergency instructions by many authorities did not comply with the established procedures and referred to various digital sources instead of the designated source. For instance, the official emergency broadcaster, L1, was notified too late, and their

homepage was out of order: “Error 503 Backend fetch failed.” Twitters found it variously hilarious and sarcastic. For example, “The communication from L1 was completely laughable,” and “Windows and doors closed, ventilation on hold... and then wait for around half an hour until there is something on L1 teletext ☒.” The flaws raised serious concerns. References were made to Bhopal: “This time it went OK, but what about next time?” Tweets reported that incidents happened often, reflecting “Not again” in various ways and “Why did they not learn?” An in-depth evaluation was called for as well as an update of guidelines. A few defended the situation and asked others to be patient, follow the instructions, and wait for more information from the authorities referring to the difficult circumstances.

4. Insufficient Disaster Health Literacy

Recognizing that disaster health literacy concerns the ability to access, understand, appraise, and apply information to manage health concerns in a disaster, the tweets revealed that finding information from the authorities was a challenge in the beginning. Hence the public shared information with each other on social media. Questions were raised concerning the wind and its direction, details about the gas and its values and its dangerous effects on public health, being outdoors at the time, and whether it was safe to eat the rucola salad from the garden. Furthermore, the warnings were not always easy to understand. Uncertainties were raised, for example, regarding the terms “acute,” “smoke emission,” “air alarm and siren.” In contrast, others challenged why some did not understand what to do. With regards to the assessment of the information, ambiguity was apparent, as when people questioned the information from authorities and wondered what to do and whether the authorities could be trusted. Last, how the public applied the information received varied considerably and led to compliance for some and non-compliance for others. Compliant people informed others about what to do and explained what they did themselves in the exact situation, whereas non-compliant people said, for example, “Just ignore the alert” and “Sitting on the marketplace – nothing is wrong.”

Citizens encouraged the continued writing of complaints to the city council to improve the safety of the region. Others refused and compared it to “pulling a dead horse.” Finally, emotions and attitudes played a critical role. The negative attitudes included fear, worry, frustration, impatience, doubt and uncertainty, disbelief, mistrust, stubbornness as well as bizarreness, irony, and sarcasm, in contrast to the more positive emotions indicating trust and humor, as well as joy and relief when the incident was over.

DISCUSSION

All disaster emergencies and crisis events are, by nature, chaotic and highly dynamic, creating physical, emotional, and social disorder. Therefore, communication during and

immediately after a disaster situation is a critical component of response and recovery. However, in this case, the chemical incident revealed flaws in the Dutch emergency response, including problematic disaster responsiveness, inadequate communication by a wide range of stakeholders, and insufficient disaster health literacy within the public. These flaws undermined public trust in the authorities.

Social media should replace the outdated methods of television and teletext. Social media, with its ability to connect the whole world within minutes of a calamity, have the potential to save tens of thousands of lives per event and help target assistance to the most needy survivors of a disaster.⁷ In Belgium, a decision-support system was recently adopted to aid public health officials in the event of an emergency.⁵ In contrast, the Dutch regional emergency policy was characterized as “pulling a dead horse.” It is unlikely that the flaws can be mended without political will and combined efforts by all stakeholders involved. The inadequate disaster health literacy of the public was present among some, but not all. It is suggested that pilot-testing and evaluation be used routinely to inform the selection of media type, message, and point of contact¹ in order to enhance the disaster literacy of vulnerable populations. As a rapid assessment, the case study has limitations. The analysis was based on readily available Twitter data; however, a more profound evaluation, including multiple sources, can provide richer nuancing of the findings.

CONCLUSION

The case study revealed a lack of alignment in the emergency responsiveness between authorities and the public due to confusion and inadequate communication, problematic disaster management, and insufficient disaster health literacy among the public. An upgrade of disaster health literacy and the emergency preparedness is warranted to build the communicative infrastructure, as well as public confidence before the next incident strikes.

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Conflict of Interest Statement

The author has no conflict of interest to declare.

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