

# Prevention Obligations Applicable to Naturally Occurring CBRN Events

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## 1 Introduction

Naturally occurring CBRN events refer to emergency situations caused by natural hazards that have the potential to release CBRN substances. The most prominent examples include volcanic eruptions and seismic activities, which may emit dangerous gases, and epidemic outbreaks caused by infectious diseases. While natural phenomena have long been understood as ‘acts of God’ with very limited room for prevention, in modern times there is growing recognition that even the risks posed by natural hazards can be mitigated and that the magnitude of their impact heavily depends on man-made choices. Laws and regulations have thus a specific role to play in these contexts.<sup>1</sup> A feature that the hazards discussed in this chapter have in common is their low probability but potentially high impact, which poses many challenges for their regulation, due to scientific uncertainties and difficulties in understanding what is actually required to prevent and to be prepared to respond.

This chapter aims to identify whether any obligations to prevent naturally occurring CBRN events exist under international law and to explore their content (section 2); to discuss the implementation of these obligations in light of the lessons learned from past and present emergencies (3); and to draw some conclusions on the status of prevention obligations applicable to naturally occurring CBRN events (4). The chapter focuses on naturally occurring events that have the potential to release CBRN substances on their own, while natural events impacting on CBRN facilities (so-called ‘Natech’ events, short for Natural Hazards Triggering Technological Disasters) are discussed elsewhere in this volume.<sup>2</sup>

<sup>1</sup> KC Lauterbach, *Disaster Law* (Routledge 2014).

<sup>2</sup> See ch 11 by Creta and ch 15 by Balboni, as well as ch 3 by Venier on general prevention obligations.

## 2 Sources and Content of Prevention Obligations Related to Naturally Occurring CBRN Events

As detailed in Chapter 3, the main duties to prevent emergency situations include the duties to adopt adequate legal and policy frameworks; to adopt ad hoc measures to mitigate specific risks and to perform risk assessments; and to cooperate in prevention activities with other States and International Organisations (IOs). The main sources of these duties are general principles of international law (such as sovereignty, solidarity, due diligence) and rules pertaining to specific branches of international law. This section explores to what extent these obligations can be applied to naturally occurring CBRN events and also whether there are any ad hoc prevention obligations specifically designed for such events.

Adopting adequate legal and policy frameworks and ad hoc hazard mitigation measures and engaging in international cooperation on prevention activities remain the main obligations in terms of prevention also in relation to naturally occurring CBRN events. For instance, with reference to volcanic risks it has been stated that '[i]n many cultures, volcanic risks are perceived to be susceptible to governance with the objective of achieving their effective mitigation and have become the responsibility of the institutions and stakeholders of relevant social communities'.<sup>3</sup> Volcanic risks demand ad hoc prevention measures, including regular monitoring of unrest periods, the movement of tectonic plates and of the volcano's surface, as well as adequate assessment of the likelihood of eruption and the potential consequences. Policy and legal instruments must be informed by the outcomes of risk assessments. Other ad hoc risk mitigation measures may include ensuring that people do not live near the most dangerous areas around the volcano.

Volcano hazard monitoring is recognised as an international Standard And Recommended Practice (SARP) under the terms of Annex 3 on 'Meteorological service for International Air Navigation' to the Convention on International Civil Aviation.<sup>4</sup> Pursuant to Standards 3.5 on 'Volcanic ash advisory centres' and 3.6 on 'State volcano observatories', Member States shall ensure that those centres and observatories have the capacities to monitor significant pre-eruption

3 RJ Bretton, J Gottsmann and R Christie, 'The role of Laws within the Governance of Volcanic Risks' (2017) *Advs In Volcanology*. The same authors clarify that 'volcanic risk governance' includes 'all attempts to manage the three constituent variables of risk including steps to mitigate volcanic hazards (there are very few successful examples of this), reduce the exposure of people, assets etc. and reduce their vulnerability when exposed', *ibid* 24.

4 Convention on International Civil Aviation (1944). Annex 3 on 'Meteorological service for International Air Navigation' (2007).

and eruption activity and the release of ash into the atmosphere and to report relevant information as quickly as practicable. The World Organization of Volcano Observatories (wovo),<sup>5</sup> a Commission of the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) provides a network for institutions engaged in volcanic surveillance and 'responsible for warning authorities and the public about hazardous volcanic unrest' (as indicated on the wovo website). WOVodat is a comprehensive global dataset on volcanic unrest which allows standardisation of data collection and aims at improving eruption forecasts. This is an example of international cooperation on prevention activities aimed at increasing understanding of natural hazards and assessing associated risks. Interestingly, it has been suggested that in terms of cooperation in understanding volcanic risks, the adoption of the Sendai Framework will result in greater emphasis being placed on 'the importance of not only the collection and interpretation of monitoring data but also the better characterisation of unrest periods'.<sup>6</sup>

One important aspect that is particularly relevant for the present discussion are the health implications of the dangerous gases following a volcanic eruption. The Pan American Health Organization (PAHO) for instance recalls the importance of integrating health considerations into volcanic risk monitoring and suggests that the analysis of volcanic risks and of community vulnerability is one of the few prevention measures available to mitigate volcanic risks to people's health.<sup>7</sup> Some scholars have noted that more studies are needed on both the acute and chronic health effects of volcanic ash and have recommended 'a more systematic approach to multi-disciplinary studies in future eruptions [...] including establishing an archive of ash samples and a website containing health advice for the public, together with scientific and medical study guidelines for volcanologists and health-care workers'.<sup>8</sup>

A recent case brought to the attention of the European Court of Human Rights (ECtHR), declared inadmissible for failure to exhaust domestic remedies, concerned the lack of adequate regulatory frameworks and ad hoc measures to mitigate the risk of eruption of Mount Vesuvius in Italy, one of the most dangerous volcanoes in the world not only for the magnitude of a

5 <<https://wovo.wovodat.org/index.php>> (all links were last accessed on 20 June 2021).

6 RJ Bretton, J Gottsmann and R Christie (n 3) 32.

7 PAHO, 'Guía de preparativos de salud frente a erupciones volcánicas. El sector salud frente al riesgo volcánico' (2005), 50.

8 CJ Horwell and PJ Baxter, 'The respiratory health hazards of volcanic ash: a review for volcanic risk mitigation' (2006) 69 Bull Volcano 1.

potential eruption but also considering the high number of people residing in the areas around the volcano.<sup>9</sup> In its decision, the Court emphasised that the domestic legal framework allows the applicants to bring proceedings to administrative courts, and clarified that evidence was provided by the government on the adoption of risk mitigation measures, including the establishment of a monitoring system that regularly provides seismological data, the adoption of measures to support people to move away from the residential areas close to Vesuvius, as well as preparedness measures, such as the adoption of an emergency evacuation plan that had been updated in light of the outcomes of a simulation exercise carried out in 2006. On the other hand, the applicants complained about the lack of information on the emergency plan and the lack of training.

Turning our attention to infectious diseases, ad hoc measures to prevent their spread generally refer to reducing the risk of spill-over events, *ie* of new viruses jumping from animals to humans, and to immunisation. Looking at spill-over events, scholars have recently suggested that knowing more details about the origin of an outbreak is crucial to putting in place adequate risk mitigation strategies.<sup>10</sup> For instance, with reference to the current pandemic, potential causes that have been identified include the wildlife trade at the Huanan market in Wuhan or an accident during scientific research,<sup>11</sup> so any prevention strategies would need to address these aspects in terms of, for example, restrictions on the wildlife trade or improved safety standards in both field research and laboratories. Scholars have called for an investigative process on the origins of SARS-CoV-2 that should be 'transparent, collaborative, international, and, to the extent possible, devoid of political interest',<sup>12</sup> but it is not clear to what extent finding a definite answer about the origins of

9 *Viviani et autres contre l'Italie*, Requête no 9713/13 (ECtHR 24 Mars 2015). It must be noted that the jurisprudence of national and regional courts can either reinforce existing obligations or clarify what is actually needed to ensure respect for them, and this is particularly the case for legal frameworks applicable to the emergency management field, which are still in the process of consolidation.

10 According to Relman, key details that should (and could) be revealed include: 'a plausible and suitably detailed recent evolutionary history of the virus, the identity and provenance of its most recent ancestors, and surprisingly, the place, time, and mechanism of transmission of the first human infection'. D Relman, 'To stop the next pandemic, we need to unravel the origins of COVID-19', 117(47) PNAS (2020) 2.

11 F Lentzos, 'Natural spillover or research lab leak? Why a credible investigation is needed to determine the origin of the coronavirus pandemic' (2020) Bulletin of the Atomic Scientists.

12 Relman (n 10) p. 2.

the outbreak will be possible, due to both technical difficulties and political hurdles.<sup>13</sup>

As the International Health Regulations (IHR)<sup>14</sup> do not enshrine any requirements on preventing spill-over events (or on investigating their origins: these are the central questions surrounding the ‘one health approach’),<sup>15</sup> the source for the current WHO-led investigation is the Resolution adopted in May 2020 by the 73rd World Health Assembly (WHA, with the explicit consent of 140 States and no vocal opposition), which requests the WHO Director General:

to continue to work [...] to identify the zoonotic source of the virus and the route of introduction to the human population, including the possible role of intermediate hosts, including through efforts such as scientific and collaborative field missions, which will enable *targeted interventions* and *a research agenda to reduce the risk of similar events occurring*, as well as to *provide guidance on how to prevent infection* with severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) in animals and humans and *prevent the establishment of new zoonotic reservoirs*, as well as to *reduce further risks of emergence and transmission* of zoonotic diseases.<sup>16</sup>

The WHA thus recently managed to reach wide consensus on the need for an investigation into the origins of the pandemic and on the investigation’s purposes and final aims, *ie* to propose targeted interventions, a research agenda and guidelines aimed at reducing the risk of spill-over events in the future.<sup>17</sup> The outcomes of the study will probably also inform the ‘impartial, independent and comprehensive evaluation’ requested by the same Resolution in order ‘to review experience gained and lessons learned from the WHO-coordinated

13 <<https://www.nature.com/articles/d41586-020-03165-9>>.

14 International Health Regulations (2005).

15 See ch 29 by Antoniazzi.

16 WHA Res 73.1 ‘COVID-19 response’ (2020) para 9(6) (emphasis added).

17 For the time being, the only document publicly available on this investigation are the Terms of Reference for the Chinese part of the study released in July 2020. The studies will aim ‘to (i) explore how the circulation of SARS-CoV-2 might have started and (ii) gather evidence from the cluster of cases identified in December 2019 for potential links and clues as to its origin’. The second phase of the investigation will explore more in detail some of the first part’s findings, looking at other countries. See WHO, ‘WHO-convened Global Study of the Origins of SARS-CoV-2: Terms of References for the China Part’ (2020) <<https://www.who.int/publications/m/item/who-convened-global-study-of-the-origins-of-sars-cov-2>>.

international health response to COVID-19 and to make recommendations to improve capacity for global pandemic *prevention*, preparedness and response'.<sup>18</sup>

Another measure to prevent the spread of infectious diseases is immunisation. From an international law perspective, the main issues here concern enabling global equitable access to vaccines. The WHO Resolution recognised 'the role of extensive immunization against COVID-19 as a global public good for health in preventing, containing and stopping transmission in order to bring the pandemic to an end, once safe, quality, efficacious, effective, accessible and affordable vaccines are available'.<sup>19</sup> The Immunization Agenda 2030 (IA2030), also recently adopted by the WHO,<sup>20</sup> aims at providing 'a long-term strategic framework to guide a dynamic operational phase, responding to changes in country needs and the global context over the next decade'.<sup>21</sup> Since these developments, however, 'the global legal landscape has shifted from a rhetoric of global public goods to a reality largely based on nationalism', considering that wealthy nations secured more than 2 billion doses of potential Covid-19 vaccines using Advance Purchase Agreements (APA).<sup>22</sup> The next few months will tell us more about the extent to which the international community is ready – in terms of political will and technical capacity – to ensure prompt access to vaccines for the entire world population.

Finally, mention must be made of the obligation to prevent the international spread of infectious diseases that lies at the very core of the WHO Constitution (Articles 2 and 21)<sup>23</sup> and of the IHR (Article 2), which provide the basis for a 'stronger and more coordinated collective action' on global disease control.<sup>24</sup> Prevention here refers to minimising the risk of (domestic and) international spread through, for example, the timely detection of

18 WHO Res (n 16) para 10 (emphasis added). UNGA Res A/RES/74/306 (preamble) has welcomed this initiative.

19 WHO Res (n 16) Para 6.

20 WHO Decision WHA73(9) (2020).

21 WHO, 'Immunisation Agenda 2030. A global strategy to leave no one behind' (2020).

22 AL Phelan et al., 'Legal agreements: barriers and enablers to global equitable COVID-19 vaccine access' (2020) 396 *The Lancet* 800.

23 Among the tasks assigned to the WHO, Article 2 lists '(g) to stimulate and advance work to eradicate epidemic, endemic and other diseases', while Article 21 establishes that the World Health Assembly 'shall have authority to adopt regulations concerning: (a) sanitary and quarantine requirements and other procedures designed to *prevent* the international spread of disease' (emphasis added). Constitution of the World Health Organization (1946).

24 S Negri, 'Communicable disease control', in GL Burci and B Toebes, *Research Handbook on Global Health Law* (Edward Elgar 2018) 268.

suspected cases (surveillance),<sup>25</sup> the timely notification to the WHO and the international community (notification), and prophylaxis.<sup>26</sup> The most important novelties introduced by the revised IHR are exactly the duties to ‘develop, strengthen and maintain [...] the capacity to detect, assess, notify and report events’ (Article 5(1)) and to promptly notify the WHO (*ie* within 24 hours) of all events within their territories that may constitute a Public Health Emergency of International Concern (PHEIC) (Article 6). The revised IHR confers an enhanced role to the WHO in terms of preventing the international spread of diseases by granting the organisation the authority to declare a PHEIC. The WHO has a specific role to play also in terms of surveillance, and an integrated global alert and response system has been set up relying on around 250 surveillance networks globally, including the Global Outbreak Alert and Response Network (GOARN).<sup>27</sup>

To sum up, with reference to naturally occurring CBRN events, some ad hoc prevention obligations exist but they are limited to the prevention of the international spread of infectious diseases under the terms of the IHR, which are usually understood as mainly covering preparedness and response and have thus not been dealt with in detail in the present chapter. Looking at the other prevention measures, *ie* minimising the risk of spill-over events and immunisation, the interest of the international community has been growing during the current pandemic outbreak. In relation to the prevention of other CBRN natural events, volcanic hazard monitoring is an established standard and recommended practice at the international level under the terms of the International Convention on Civil Aviation. Interesting developments in this field include collaboration activities related to harmonising the methodologies for data collection and risk assessment, for which the Sendai Framework provided the reference policy framework. A crucial gap that has emerged however is the lack of studies on the health effects of volcanic ash, which would need to be integrated into volcanic risk assessments.

25 Surveillance is defined as ‘the systematic ongoing collection, collation and analysis of data for public health purposes and the timely dissemination of public health information for assessment and public health response as necessary’. IHR, Article 1 Definitions. From this definition, it is clear that surveillance has an important role to play in terms of risk assessment, which is among the prevention measures identified in the present chapter.

26 The development of surveillance and notification capacities is generally understood as a preparedness measure, to which ch 17 is devoted; the actual use of such capacities is considered to be part of the response phase (see ch 18). The present chapter is limited to discussing to what extent surveillance and notification as required under the IHR can ensure prevention of the international spread of outbreaks.

27 See <<https://extranet.who.int/goarn/>>.

### 3 Lessons Learned with Respect to the Prevention of Naturally Occurring CBRN Events

Some lessons learned from past events of naturally occurring CBRN events have offered the opportunity to evaluate the implementation of prevention duties as discussed above.

Some lessons on volcanic risk assessment can be drawn from the 2010 Icelandic Eyjafjallajökull eruption that paralysed the European skies for one week. According to the OECD, this crisis 'highlighted the difficulty of co-ordinating and synthesising scientific input from many different disciplines and institutions and translating these into useful policy advice at very short notice'.<sup>28</sup> Similarly, Alexander discussed the lessons learned from the Eyjafjallajökull eruption and pointed out the need for national and international regulatory bodies to make a more serious effort to evaluate the risks to civil aviation of volcanic eruptions (including catastrophic scenarios and the widest possible range of consequences); to more rigorously define the threshold for safe flying on the basis of evidence-based practice and appropriate meteorological and geological remote sensing; and to broaden the regulation of European airspace to include also natural hazard impacts.<sup>29</sup> Some issues relevant for the protection of health also emerged, such as the need to ensure that different disciplines interact in risk assessment activities and to harmonise data.

Looking at epidemic outbreaks, the PHEICS declared after the entry into force of the IHR highlighted major gaps, especially in terms of prevention of international spread; the poor development of surveillance and response capacities at the domestic level; the lack of compliance by States with the temporary recommendations, without any enforcement mechanism available; the role of the WHO in the PHEIC determination; and the coordination of the international response.<sup>30</sup> The COVID-19 pandemic demonstrated that

28 <[https://www.oecd-ilibrary.org/science-and-technology/scientific-advice-for-policy-making\\_5js33ljcpwb-en](https://www.oecd-ilibrary.org/science-and-technology/scientific-advice-for-policy-making_5js33ljcpwb-en)>.

29 D Alexander, 'Volcanic Ash in the Atmosphere and Risks for Civil Aviation: A Study in European Crisis Management' (2013) 4(1) *Int. J. Disaster Risk Sci.*

30 See WHO Review Committee on the Functioning of the International Health Regulations, 'Implementation of the International Health Regulations. Report of the Review Committee on the Functioning of the International Health Regulations (2005) in relation to Pandemic (H1N1) 2009' (2011) UN Doc. A64/10; 'Report of the Review Committee on the Role of the International Health Regulations (2005) in the Ebola Outbreak and Response' (WHO 2016) A69/21.



surveillance and notification capabilities have improved<sup>31</sup> but also emphasised major shortcomings. The requirement enshrined under Article 6 of the IHR to notify the WHO within 24 hours of the first suspected case of a SARS-like disease (which is key in preventing international spread) was probably breached.<sup>32</sup> Moreover, considering the key elements of any prevention obligation (*ie* knowledge of risk and severity of potential harm), it has to be noted that for many years experts had been warning that the risk of an outbreak with a pandemic potential was very concrete.<sup>33</sup> Despite the fact that the situation in China was dramatically and rapidly worsening, European States were slow in detecting the first cases in their territories and in adopting adequate prevention measures. Furthermore, it may be argued that States had even more demanding obligations to prevent the second waves that arrived in autumn, since they had knowledge that its occurrence was very likely, and they also knew which measures were adequate to limit the spread. Yet, the response was often still inadequate.

Looking at immunisation, during the H1N1 outbreak in 2009, a controversy surrounding vaccine access emerged when news circulated of a conflict of interest between WHO Expert Committee members and the pharmaceutical

31 GL Burci, "The Outbreak of COVID-19 Coronavirus: are the International Health Regulations fit for purpose?" (EJIL!Talk, 27 February 2020), <<https://www.ejiltalk.org/the-outbreak-of-covid-19-coronavirus-are-the-international-health-regulations-fit-for-purpose/>>.

32 There is evidence that the first unusual cases of viral pneumonia emerged in late November – early December in Wuhan and that doctors sought to warn colleagues and public health authorities immediately (see <<https://www.theguardian.com/world/2020/mar/13/first-covid-19-case-happened-in-november-china-government-records-show-report>>; <[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)30183-5/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30183-5/fulltext)>. The official report provided by the WHO can be found at <<https://www.who.int/csr/don/12-january-2020-novel-coronavirus-china/en/>>. The official notification to the WHO was made on December 31st, and that same day, the Wuhan Health Commission published a notice confirming that 27 people were suffering from pneumonia of an unknown cause but that there was 'no need to be alarmed' since the disease was 'preventable and controllable'. The official statement by the Wuhan Health Commission was published at <<http://wjw.wuhan.gov.cn/front/web/showDetail/2019123108989>> but it is no longer available. The need to contain panic is a common concern during the first phases of emergency situations, even if scientific evidence suggests the opposite, *ie* the importance of informing the potentially affected population with clear and complete messages.

33 See <<https://www.nationalgeographic.com/science/2020/04/experts-warned-pandemic-decades-ago-why-not-ready-for-coronavirus/>>. On preparedness obligations related to epidemic outbreaks, see ch 17 by de Guttry.

industries that produce the vaccines. This news prompted Indonesia's refusal to share influenza samples with the WHO Global Influenza Surveillance and Response System (GISRS), in protest against the inequalities in the distribution of vaccines developed through the GISRS. According to one possible interpretation of the IHR, these samples may constitute 'public health information' about a potential PHEIC and therefore may have to be shared with the WHO. On the other side, the IHR recognises each State's sovereignty to adopt its own health policies. Furthermore, a virus discovered in a nation's territory can be defined as a 'genetic resource' of that nation (which cannot be shared or used without that nation's consent) under the terms of the Convention on Biological Diversity. The Pandemic Influenza Preparedness Framework, adopted in 2011, sought to solve this controversy by identifying international norms with respect to sharing novel influenza viruses with pandemic potential, as well as sharing pandemic vaccines developed from those viruses.<sup>34</sup> Under this framework, WHO intends to distribute pandemic influenza vaccines to countries on the basis of public health risks and needs; however, the COVID-19 pandemic demonstrates that this commitment does not appear to be enough to guide national decisions on vaccine distribution.

#### 4 Concluding Remarks

The present chapter has explored obligations to prevent naturally occurring CBRN events under international law. In addition to the main sources of prevention obligations under general principles of international law and under other branches, ad hoc prevention obligations and international cooperation requirements on prevention activities have been investigated in relation to some examples of natural CBRN hazards, namely volcanic eruptions and infectious diseases.

The adoption of adequate legal and policy frameworks and of ad hoc hazard mitigation measures; the conduct of risk assessments; and international cooperation on prevention activities remain the crucial obligations in terms of prevention also in relation to such events. The legal obligations discussed

34 See Report of the Open-Ended Working Group of Member States on Pandemic Influenza Preparedness: Sharing of Influenza Viruses and Access to Vaccines and Other Benefits, WHO Doc. A64/8 (2011). For a discussion on the dispute, see D Cohen and P Carter, 'WHO and the Pandemic Flu Conspiracies' (2010) *British Medical Journal* 340; on the new framework, see R Gatter, 'The New Global Framework for Pandemic Influenza Virus and Vaccines Sharing', in IG Cohen, *The Globalisation of Health Care* (OUP 2013).

in the present chapter represent a rather fragmented and weak framework, which is, however, complemented and reinforced by soft law instruments and is expected to be further consolidated by relevant practice.

In relation to volcanic eruptions, the dangerous gases emitted may have important consequences on health and the environment, as well as on infrastructure including civil aviation. In fact, volcanic hazard monitoring is an established standard and recommended practice at the international level under the terms of the International Convention on Civil Aviation. As noted above, interesting developments in this field include collaboration activities related to harmonising the methodologies for data collection and risk assessment, for which the Sendai Framework provided the reference policy framework. However, one important aspect that has been neglected until now are the health implications of the dangerous gases following a volcanic eruption: more studies would be needed in order to integrate health considerations into volcanic hazard monitoring.

Looking at epidemic outbreaks, the evaluation of the international response to COVID-19 will shed light on the main weaknesses of the global health crisis prevention system. The interest of the international community has recently been growing in relation to two key prevention measures, *ie* the prevention of spill-over events and equitable access to immunisation, as demonstrated by the recent wide consensus at the WHA on the need to deepen our understanding of the origins of the outbreak and to propose adequate solutions to minimise the risk of such events in the future. The world is currently facing an unprecedented global health crisis that is having deep societal and economic implications. Complex as it may be to address the question of the extent to which epidemic outbreaks can be prevented, this is exactly the moment when we have the opportunity to devote resources to investigating the efficacy of the prevention requirements enshrined under the international law applicable to infectious diseases.

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