

## **Summer Heat Waves in Europe: A Case Study**

### **Introduction:**

In 2022, Europe experienced a record-breaking heat wave with documented temperatures up to 8 degrees Celsius above average.<sup>2</sup> The combination of heat, droughts, and forest fires led to almost 62,000 deaths,<sup>5</sup> mostly women, with Italy, Greece, and Spain feeling the most significant impact.<sup>6</sup>

### **Facts of the case:**

The record-setting heat during the summer of 2022 impacted many countries throughout Europe. Reports released the following year collected data from 35 countries and counted over 61,000 excess deaths related to the heat from May 30 to September 4, 2022.<sup>3,8</sup> Of these deaths, vulnerable groups were identified as women and elderly populations.<sup>1,3,5</sup> Notably, “only a small share of heat-related deaths came from heat stroke.”<sup>5</sup> Other related illnesses that contributed to both morbidity and mortality rates during this time included syncope, fever of unknown origin, dehydration, and others.<sup>7</sup> Of the European countries studied, Italy, Greece, and Spain had the highest death rate, while Italy, Spain, and Germany had the highest number of deaths.<sup>5</sup> The 2022 economic losses caused by weather and climate totaled EUR 52.3 billion, roughly two-thirds of which were related to heat waves, cold waves, droughts, and forest fires.<sup>4</sup> This greatly exceeds the average since 1980.<sup>4</sup>

### **Epidemiological aspects of the event:**

Elevated temperatures increase the risk of heat-related death and illness, such as heat exhaustion, heat stroke, and dehydration. A study analyzing rescue service data in Germany from 2014 to 2022 found ever-increasing rates of rescue service deployment per 100,000 every year since 2014, with the exceptions of 2020 and 2021, likely due to the COVID-19 pandemic.<sup>7</sup> These deployments were studied during the summer months of June to August, stratified by age groups, and coded for syncope, fever of unknown origin, heat stroke, and exsiccosis (dehydration), as these are considered potentially heat-associated.<sup>7</sup> Temperature data was collected alongside these values. Days with significant heat burden were defined with the terms “heat warning,” “heat days” ( $\geq 32$  degrees Celsius), “heat waves” (5 or more consecutive heat days), and “heat weeks” (weeks with mean weekly temps  $\geq 20$  degrees Celsius).<sup>7</sup> The study then compared the differences in deployments for days that were given a heat definition and days that were not.<sup>7</sup> Deployments overall and deployments related to heat-associated diagnoses were found to be higher during days with a heat definition, as the risk ratio also increased during these days, with heat waves at the highest.<sup>7</sup> Interestingly, the study found that the average temperature of days with a heat warning increased after 2017, possibly leading to “a difference between the perceived temperature of the heat warning and the actual measured temperature.”<sup>7</sup> Previous data on mortality shows adjustments to summer temperatures and deployment changes during the pandemic. Due to these circumstances, the study was unable to conclude the effects of heat preventive measures.<sup>7</sup> The research did consider the limitation of variations in heat-associated diagnoses in the analyzed records.<sup>7</sup> Alertness of rescue service personnel may also have created a bias, as noted in the study.<sup>7</sup> Finally, a single weather station was used for temperature records, which did not accurately reflect the temperature of the city, and “nocturnal temperatures and indoor climate were only considered during the heat warning days and heat week parameters.”<sup>7</sup>

**Management of the event:**

Considering the “wake-up call” that came out of the 2003 summer heat wave—which caused more than 70,000 excess deaths—it is alarming how unprepared the continent was for the 2022 summer heat wave.<sup>6</sup> Weather events are often difficult to predict or plan for, but general trends in climate alterations are notable and should be acted on. After 2003, “many countries...had active prevention plans in place,” but the nearly 62,000 deaths in 2022 suggest that these plans are insufficient.<sup>6</sup> Although EU statisticians noted the severity of the heat, droughts, and fires, and raised the alarm in August of 2022, the data on heat-related deaths from that year were not available until a full year later in a study that prompted many news reports.<sup>5</sup> As a result, public health responses in 2022 were limited due to inadequate planning and unsatisfactory attention to the problem as it was happening.

**Communications of the event:**

The trends in rising summer temperatures leading up to 2022 should have prepared the European continent for record-setting heat that summer.<sup>1</sup> As the summer progressed and the heat intensified, adaptation strategies developed after 2003 were found to be insufficient.<sup>1</sup> Additionally, the lack of data being reported on heat-related mortality resulted in delayed communication of the severity of the toll of the heat wave until the following year.<sup>3</sup>

**Summary:**

The severe effect of climate change that led to such high temperatures throughout the summer of 2022 led to an excess of heat-related illness and death. Such morbidity and mortality are largely preventable yet require an adequate response system to be implemented to address the scale of the issue. Heat in a given environment impacts all people in that environment; a fact that must be taken into account in the design of preparedness and response planning. Such changes will allow for improvement in mitigation and recovery efforts.

## References:

1. Barcelona Institute for Global Health. Record-breaking heat in the summer of 2022 caused more than 61,000 deaths in Europe. IS Global. Published October 7, 2023. Accessed May 28, 2024.  
<https://www.isglobal.org/en/-/el-calor-record-del-verano-de-2022-causo-mas-de-61-000-muertes-en-europa>
2. Copernicus. Europe in 2022: Extreme heat. Accessed May 28, 2024.  
<https://climate.copernicus.eu/esotc/2022/extreme-heat>
3. Erdenesanaa D. Summer heat wave kills 61,000 in Europe last year, study says. The New York Times. Published July 10, 2023. Accessed May 28, 2024.  
[https://drive.google.com/drive/folders/19h\\_oO-6XgR6dvNZsV1BV0nkR4rEY\\_CfK](https://drive.google.com/drive/folders/19h_oO-6XgR6dvNZsV1BV0nkR4rEY_CfK)
4. European Environmental Agency. Economic losses from weather- and climate-related extremes in Europe. Published October 6, 2023. Accessed May 28, 2024.  
<https://www.eea.europa.eu/en/analysis/indicators/economic-losses-from-climate-related?activeAccordion=309c5ef9-de09-4759-bc02-802370dfa366#:~:text=Economic%20losses%20from%20weather%2D%20and%20climate%2Drelated%20extremes%20in%20Europe.-Published%2006%20Oct&text=Between%201980%20and%202022%2C%20weather,EUR%2052.3%20billion%20in%202022.>
5. Niranjana A. Heat wave last summer killed 61,000 people in Europe, research finds. The Guardian. Published July 10, 2023. Accessed May 28, 2024.  
<https://www.theguardian.com/environment/2023/jul/10/heatwave-last-summer-killed-61000-people-in-europe-research-finds>
6. Ramirez R. Nearly 62,000 people died from record-breaking heat in Europe last summer. It's a lesson for the US, too. CNN. Published July 14, 2023. Accessed May 28, 2024.  
<https://www.cnn.com/2023/07/10/world/deadly-europe-heatwave-2022-climate/index.html>
7. Steul K, Kowall B, Oberndörfer D, Domann E, Heudorf U. Rescue service deployment data as an indicator of heat morbidity in Frankfurt / Main, Germany (2014-2022) - Trend association with various heat exposure indicators and considerations for outreach. *Int J Hyg Environ Health*. 2023;254:114250. doi:10.1016/j.ijheh.2023.114250
8. Treisman R. Heat waves in Europe killed more than 61,600 people last summer, a study estimates. NPR. Published July 12, 2023. Accessed May 28, 2024.  
<https://www.npr.org/2023/07/12/1187068731/heat-waves-europe-deaths-study>