

### Case study 1

#### Data quality in citizen science: climate research

SOURCE: Herodotou, C., Scanlon, E., & Sharples, M. (2021). Methods of promoting learning and data quality in citizen and Community Science. *Frontiers in Climate*, 53. <https://doi.org/10.3389/fclim.2021.614567>

“The “Heatwave: Are you coping?” investigation has been designed in collaboration with the Royal Meteorological Society and support from the BBC Weather (see <https://nquire.org.uk/mission/heatwave-are-you-coping/contribute>). The mission was an outcome of a workshop with citizens and organizations interested in weather issues, which was organized by the Open University UK, as part of the UKRI funded project EduCS: EDUcating Citizens and organizations in Citizen Science methodologies. Workshop attendees were asked to brainstorm, vote, and rank ideas for research investigations they would like to design using nQuire. How comfortable people feel in extreme weather conditions was one of the two most popular investigations (alongside the impact of climate change). The investigation with more than 1200 responses, was launched on the 7th of August 2020, during which England experienced a heatwave and was ended in September 2020. The purpose of the mission was to explore how people's experiences of hot weather may differ depending on where they live and work, and how people are able to adapt their routines to heat. Citizens were asked to take their first temperature recording around 3–4 pm, when maximum daily temperatures are normally observed. The rationale behind the mission was to collect data about how different people are affected by extreme weather conditions and how working and living conditions could be improved. Results could, for example, help people plan for heatwaves in the future. In terms of the learning benefits for citizens, the mission was an opportunity to learn about what forecast temperatures mean in practice, how to make and record measurements, and how to increase personal comfort in a heatwave.

Citizen Science temperature measurements have the unique value of providing data about air temperature on scales smaller than those measured by the official meteorological service, and such data could be possibly used in weather monitoring or even forecasting [..]. Yet, the quality of weather data collected is a major challenge and a source of bias, often related to possible overheating of the thermometer by, for example, not being shielded. This was an issue raised and discussed during the workshop, with weather scientists expressing concerns about the quality of data collected and whether amateur scientists could actually offer reliable recordings.”

#### Questions for discussion:

- 1) What are the challenges for data quality that researchers might face in the case above? What are the reasons for those challenges? Please, fill in the table below.
- 2) Reflect on your experience in participating in research! What have been the most challenging aspects in securing the quality of data in the projects that you have participated in?

3) What can be done to mitigate the problems raised by the case? Please, fill in the table below.

Challenges for ensuring data quality	Recommendations

### Case study 2

#### Data quality in citizen social science

SOURCE: Heiss, R., & Matthes, J. (2017). Citizen science in the social sciences: A call for more evidence. *GAIA-Ecological Perspectives for Science and Society*, 26(1), 22-26.

<https://doi.org/10.14512/gaia.26.1.7>

In the citizen science project called *Young Adults' Political Experience Sampling (YAPES)*, school students from Austria took part in independent data collection to gather their political experience every day and send the data to a research group by email or WhatsApp. They were asked to photograph, document and comment on everything that was politically interesting and important to them. The scientists used data to identify the political issues that young people face in their everyday lives. The project focused on various aspects, including the places where political engagement occurs, the channels through which political information is received and the content of political communication among young people. Typically, researchers have limited access to this kind of data, often relying on surveys or a small number of qualitative interviews. The citizen science approach enables the collection of large amounts of real-life data. Despite being initially designed as a small-scale pilot project, YAPES managed to involve 254 volunteers who gathered a total of 1768 observations.

However, there are several challenges to implementing citizen science in social sciences projects like YAPES, including quality of data and ethical considerations. Ensuring data quality is a fundamental issue in citizen science, but it may be even more important in social science research. Instead of purely objective measurements facilitated by technical devices that are common in natural science projects, social science research heavily relies on human observation. Activities like observing, counting, documenting, and photographing are inherently subjective due to the observer's perception. Moreover, the measurement process can be biased and affected by the individual characteristics of volunteers, such as their political views etc. The ethical concerns are related, for example, to data sharing and privacy, especially when citizens use their smartphones to collect and submit data which could include sensitive information about themselves or others they observe. For instance, sharing data concerning an individual's political beliefs or interpersonal behaviour might raise greater ethical considerations than sharing data about a local species of insects in a natural sciences project.

#### Questions for discussion:

- 1) What are the challenges for data quality that researchers might face in a study like YAPES? What are the reasons for those challenges?
- 2) In your view, what are other considerable ethical challenges for citizen scientists collaborating with social scientists? How to address these challenges?
- 3) What can be done to mitigate the problems raised by the case? Please, fill in the table below.

Challenges for ensuring data quality	Recommendations