

Chapter 4.14 - Natural Experiments in a Hazard Context

Hello and welcome to this podcast in our audio series for the WHO Guidance on Research Methods for Health Emergency and Disaster Risk Management. My name is Alice Kim and I am one of the authors of Chapter 4.14, titled *Natural Experiments in a Hazard Context*. This podcast explores the potential utility of natural experiments in Health EDRM, which, given the increasing frequency and severity of disasters, are becoming more common in disaster research.

In disasters, traditional experimental designs, such as randomised trials, might not be feasible or practical for assessing the impact of interventions or the disaster. In such circumstances, natural experiments might be the best option for research, because disasters involve exposures that are unexpected and cannot be controlled.

Natural experiments might be used as an alternative to randomized designs when there is an accidental exposure that can be contained within a sub-population. This is known as an 'as if' random assignment and can be used to infer cause and effect. The unexposed group outside the sub-population becomes the control group, and both groups are assumed to be similar in their pre-exposure characteristics. However, unlike a randomized trial, the researcher cannot control the intervention or exposure because it will have happened as a consequence of the disaster.

The three key elements to consider when implementing a natural experiment are study design, statistical analysis and validation. Study design involves defining the exposure-outcome causal model, determining the causal parameters of interest, validating the argument with quantitative and qualitative methods and forming hypotheses. Statistical analysis of natural experiments might use techniques for group comparisons discussed in other chapters or, something such as the Neyman-Rubin potential outcomes model. Finally, the internal and external validity of the research would be assessed through both quantitative and qualitative methods.

The natural experiment framework can be applied to many natural and anthropogenic hazard contexts, including climate change. One good example is the case of Hurricane Mitch, which hit certain areas of the Republic of Nicaragua in 1998. In one of the natural experiment studies done after that hurricane, researchers analyzed children's vulnerability to the hurricane using an 'as if' random assignment based on the unpredictability of the location of the impact. The exposed group consisted of children from households severely affected by the hurricane, and the control group contained children from households outside of these areas. Validity checks were performed using both quantitative and qualitative methods and findings showed that children living in the areas affected by the hurricane were 30% less likely to be taken for medical consultation when sick, 8.7% more likely to be undernourished, and had an 8.5% increase in labour force participation. Thus, a natural experiment was used to infer the impact of the hurricane on children's vulnerability.

If you would like to find out more about how the natural experiment design might be used to assess the impact of disasters or other health emergencies, please do read our chapter in the

WHO Guidance on Research Methods for Health EDRM, and the further readings that we suggest at the end of it. It's available free on the WHO Knowledge Hub website.

Thank you for listening and goodbye for now.