



A Short Note on Global Epidemiology

Charles Langelier*

Department of Infectious Diseases, Department of Medicine, University of California, San Francisco

Abstract

The study of various associations between environmental exposures and adverse human health effects has benefited greatly from environmental epidemiology. However, there is a perception that it frequently fails to provide sufficient quantitative risk assessment information. The Health and Environmental Sciences Institute launched a project in 2017 to address this concern by bringing together representatives from government agencies, industry, and academia from the epidemiology, exposure science, and risk assessment communities to discuss the use of environmental epidemiology for quantitative risk assessment and public health decision making. As part of this project, experts in epidemiology, exposure science, toxicology, statistics, risk assessment, and one meeting with funding agencies were held to look into incentives and obstacles to using epidemiological data to its full potential in quantitative risk assessment. Prior to the meetings, workshop participants were given a set of questions, and two case studies were used to back up the discussion.

Keywords: Epidemiology; Environmental epidemiology

Introduction

In order to ensure that human data can more consistently become an integral part of quantitative risk assessment, five key ideas emerged from these meetings: 1) reducing confirmation and publication bias; 2) enhancing communication with funding agencies to raise awareness of research needs; 3) creating alternative funding channels geared toward supporting quantitative risk assessment; 4) making data available for reuse and analysis; and 5) fostering cross-disciplinary and cross-sectoral interactions, collaborations, and training.

In order to demonstrate the necessity of a multi-stakeholder effort to guarantee that epidemiological data can fully contribute to the quantitative evaluation of human health risks and to build confidence in a dependable decision-making process that utilizes the entirety of scientific evidence, we investigated and integrated these themes into a roadmap. Because epidemiological evidence is frequently a fundamental component of regulatory risk assessment, it is necessary to take into consideration the most effective method for evaluating the report quality of epidemiological studies. A number of frameworks intended to address this issue could be considered the precursors of the London Principles, which were published in the middle of the 1990s. STROBE (Strengthening the Reporting of Observational Studies in Epidemiology), GRADE (Grading of Recommendations, Assessment, Development, and Evaluations), HONEES (Harmonization of Neurodevelopmental Environmental Epidemiology Studies), and BEES-C (Biomonitoring, Environmental Epidemiology, and Short-Lived Chemicals) are examples of these frameworks. These frameworks list various criteria that characterize the quality of epidemiological studies and good research. The reporting of epidemiological data is guided by similar frameworks like COHERE (Checklist for One Health Epidemiological Reporting of Evidence) and STREGA (Strengthening the REporting of Genetic Association Studies). Although some of these frameworks have gained widespread acceptance in some areas of research, such as clinical epidemiology, the use of these instruments to improve the usability of human data from environmental epidemiology for quantitative risk assessment is still up for debate. A number of guidance and best practices documents have also been published to improve the integrity, value, and transparency of epidemiological research, increase researchers' accountability, and conserve research resources without being overly prescriptive. This demonstrates the desire to see environmental epidemiology used more extensively to

guide evidence-based public health policies.

Toxicology is still the most important part of environmental risk regulation and public health advice today. However, there is growing concern regarding the capacity of laboratory animals, specifically rodents, to accurately predict outcomes for humans. Epidemiological research methods have generally improved as a result of rapid advancements in various fields of science and technology. Biomarkers of exposure and effect, for instance, could make epidemiology studies more useful in quantitative risk assessment and help them better characterize exposure-response relationships at doses that are appropriate for the environment [1-5].

Discussion

The Environmental Epidemiology for Risk Assessment Committee was established by the Health and Environmental Sciences Institute (HESI) in 2017. The "committee," as it will be referred to in the following, with the goal of comprehending 1) how epidemiology is utilized for public health guidance and regulation, 2) how to more fully utilize and leverage environmental epidemiology in quantitative human health risk assessment, and 3) how to encourage epidemiologists to have a better understanding of the policy process and the data it requires.

In this section, we provide a synopsis of the most important information that was gleaned from a few of the committee's activities as well as our suggestions for enhancing the way quantitative health risk assessment and decision-making are aided by human data. The committee asked participants to respond to a set of questions before each meeting to get the conversation started (Supplemental Material S1). Questions were designed to gauge participants' expectations

***Corresponding author:** Charles Langelier, Department of Infectious Diseases, Department of Medicine, University of California, San Francisco, E-mail: Charleslan@gmail.com

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of colleagues from other disciplines, the level of interdisciplinary collaboration, and how much they knew about others' fields of expertise (for example, how much epidemiologists knew about risk assessment and how risk assessors perceived the work of epidemiologists). The fundamental aspects of successful proposals, the selection and prioritization of funded research topics, and the evaluation and improvement of funding impact were the subjects of pre-workshop questions with funding agencies for the fifth meeting (Supplemental Material S2). The first portion of each workshop was used to talk about and exchange ideas about these subjects.

Participants were required to complete a case study based on three distinct epidemiological studies of a chemical, the name of which was withheld, during the second portion of each workshop; A case-control study, a case-control study nested within a cohort study, and a cohort study were selected (Supplemental Materials S3 and S4). In addition to reflecting on the study designs and outcomes, participants were asked to elaborate on how confident they would be in each study's individual and combined findings. In addition, participants were asked to suggest ways to improve the reporting of the results and the design of each study. This exercise was intended to elicit a discussion that would improve comprehension of which aspects of study design, data analysis, and data reporting were valued or not.

The third portion of each meeting consisted of an open discussion about the obstacles that stand in the way of a better integration of epidemiology into the risk assessment of human health, how to move forward in this area, what kinds of incentives might be available, and how to create a path that leads to the full use of human data in quantitative risk assessment. Each discussion's themes and ideas were recorded. Only the pre-workshop questions were used to record direct quotations. The committee's discussions led to the identification of five major requirements that have the potential to enhance the relevance and utility of risk assessments and the influence that epidemiological studies have on quantitative risk assessment. The long-standing issue of how little epidemiology is used in regulatory risk assessments and, consequently, policymaking could be addressed with increased transparency, open communication with funders, improved data sharing, the establishment of new funding channels, and more cross-disciplinary collaboration and cross-training [6-10].

Conclusion

Increased collaboration among epidemiology and risk assessment researchers from all fields would benefit some of the proposed measures. Organizations like HESI are in a good position to bring together professionals from a variety of industries and fields who rarely interact with one another and provide a neutral forum for them to discuss common concerns. The Environmental Epidemiology for Risk Assessment Committee at HESI, for instance, has the potential to facilitate discussions between funding agencies and regulators as well as the creation of short courses on how to carry out epidemiology studies that are more relevant to risk assessment and decision-making.

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