

Let's discuss the Criteria of Bradford Hill (1965)

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On 10th October 2020, the German Federal Ministry for the Environment had responded to an inquiry concerning causality, as follows: The nine criteria of Hill [1] are a “central pillar for the determination of causality in epidemiology.” The reason of the inquiry was the dramatic press release: “Air pollution is responsible for more than 400,000 premature deaths/year in Europe.” Among others, the “central pillar” agrees e. g. with reference [2]. Applying to expert discussions, a colleague had commented on this matter: “All our environmental epidemiologists refer to the Bradford Hill criteria”. Is this also the case in publications?

Whilst reading through numerous epidemiological publications on sport & health respectively environment & health, the author had never come across these criteria – the reason for this letter to the editor.

In 1965, HILL had given detailed considerations to the conditions that would have to be fulfilled in the case of epidemiological associations found before they could be used as a reason to “cry causation”.

Extensive annually published reports of the EEA (European Environment Agency) deal with air pollution and human health. In 2019 as key message ([3] p. 63): “Air pollution is the single largest environmental health risk in Europe, with around 400 000 premature deaths attributed to air pollution¹ in 2018” ([3] p. 63) and again in 2020: “Air pollution is a major cause of premature death ¹/₄, responsible for around 400 000 premature deaths per year” ([4] p. 10).

The corresponding EEA studies are based on epidemiological surveys, collected in the categories urban – suburban – rural ([4] p. 11). The results, often calculated using the DPSEEA

Model ([5] to Healthcare Waste Management), are correctly described from a statistical point of view as: “Deaths attributed to” ([2] p. 63), “associated with” ([1] p. 10), “relationship (between exposure to ambient pollutant concentrations and health outcome” [1] p. 106), “Estimates are produced” or: “the impacts attributable to exposure” ([4] p. 106). But then there is a mind jump to causality by complaining: “Air pollution is a major cause of premature death” ([4] p.10) and implicate with “air pollution is currently the most important environmental risk to human health” ([4] p.9): A typical case of “cry causation”, but without prior examination of the Bradford-Hill-criteria. These are neither mentioned in the text nor in the reference list, nor are alternative criteria (e.g. [6]).

However, the published conclusions claiming causality led to serious environmental policy consequences. Yet the question of causality should be decisive for avoiding a so-called stork statistic.

Therefore: Let's discuss the Bradford-Hill-criteria! I am interested to find environmental epidemiological studies in which all of the 9 criteria have been thoroughly discussed rather than having to endure serious environmental policy consequences triggered as “cry causation”.

An orienting PubMed analysis did not reveal any reference to environmental epidemiology among 79 hits, but in other research fields associations were often evaluated using all 9 Bradford-Hill-criteria, in two cases even resulting in the rejection of a hypothesis.

Therefore, if anyone knows of an environmental health epidemiological study in which the 9 Bradford-Hill criteria were discussed individually prior to “cry causation”: Please provide the author with the bibliographical details: ulmer@uni-mainz.de.

The Editor in Chief has agreed to publish a corresponding list of entries in issue 3/2021.

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