# It is logically impossible to count the number of indirect deaths

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### Abstract

**Background**: Individuals wanting to popularize certain positions typically looks for arguments to support their convictions. Claims that evoke emotions in recipients and are presented as indisputable facts by renowned experts are particularly popular as advocacy tools. Several years ago, at another ESSD conference, I pointed out that the enumeration of economic costs of substance use is logically flawed and induces highly misleading conclusions. Today I focus on another popular statistic, the number of individuals who died prematurely due to an exposure, like substance use.

**Methods**: Enumerations of premature deaths are largely built on observational data, on more or less plausible assumptions, and on simple mathematical calculations. Organizing randomized controlled trials (RCT), as a gold standard, to demonstrate that a certain detrimental exposure induce premature death in humans is of course not feasible due to ethical and pragmatical limitations. Therefore, almost all considerations in this field are based on observational data. This paper is neither concerned with the trustworthiness of the existing empirical data basis nor with inherent basic assumptions but focuses exclusively on the logical structure of basic calculation and their interpretation.

**Results**: Even if we had a perfect data situation, that is if a perfect randomized controlled trial (RCT) could be conducted to evaluate the effects of harmful exposure on humans – a trial running until all the included individuals have died –, it would be logical impossible to determine the percentage of exposed individuals who until within a longer-term perspective died earlier than they would otherwise have died (**indirect fatalities**). To be understood correctly: to claim that assessing the number of indirect deaths in the longer run is logically impossible, does not mean that it is impossible to quantify the number of **direct fatalities**; i.e. individuals dying immediately or shortly after an exposure. Direct fatalities can be assessed quite reliably provided the causal relationship between exposure and death is solidly established and if there is a reliable assessment procedure implemented to document these cases precisely (e.g. deaths caused by drug overdose in Austria).

More specifically, if such an RCT could be performed, we could perfectly calculate the average number of years of life lost (YLL) per individual caused by exposure, but we could not possibly determine the number or the percentage of individuals who died earlier than they would otherwise have died. But since RCTs are not available and since research in this field depends primarily on observational data, statistics on YLL due to a specific exposure need to be analysed critically as well. When using observational data we are confronted with uncontrolled confounders, problematic measurement issues and problems to determine the direction of causal relationships – but this latter problem is not a focus of my presentation.

**Conclusions**: All popular scientific statistics presented to demand certain policy measures need to be systematically scrutinized even if renowned experts ubiquitously present them as dogmas of common sense and if questioning these statistics is perceived as heresy. Serious scientific research should mean to critically scrutinise all assumptions and conclusions even if results seem to be established beyond doubt. Science can only advance if heretics routinely question all conclusions in order to identify weak spots that were overlooked.

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**Biography:** Psychologist in Addiction Research since 1977. Deputy head of the Addiction Competence Centre of the Austrian Public Health Institute, Lecturer in quantitative Research Methodology as well as deputy head of the international PhD Programme of the Sigmund Freud Private University. Current research focus: epidemiology, prevention, evaluation, research methodology.

**Technical Equipment Required**

Computer and beamer for PowerPoint presentation. The PowerPoint file will be mailed beforehand and additionally brought via USB-Stick.