Citations
Kowall, B., Stang, A.: „Uncertain knowledge: Example of supermortality“, in „Monitor Versorgungsforschung“ (05/23), p. 35.
http://doi.org/10.24945/MVF.05.23.1866-0533.2543



**Prof. Dr. rer. nat. Dr. rer. san. Bernd Kowall / Prof. Dr. med. Andreas Stang MPH**
**Institute for Medical Informatics, Biometry and Epidemiology, Essen University Hospital**

# Uncertain knowledge: Example of supermortality

>> Die The Covid 19 pandemic confronted German society with a situation characterised by strong uncertainties, especially in the initial phase, which was unique in the post-war period. Science was assigned a central role in getting the uncertainties under control, especially with regard to the health consequences of the pandemic - there was much less talk of other consequences, such as psychological or economic ones.

According to the slogan „Follow the Science“ often heard during the pandemic, science was to serve as the guiding star. This is based on the naïve idea that science, if only done carefully enough, would provide reliable knowledge on which politicians could base their decisions. This idea is naïve in two respects. Firstly, policy conclusions are not automatically derived, even when there is certain knowledge. To give an example: Even if it had been clearly shown that children are just as infectious as adults, school closures would not have been the automatic consequence, since a multitude of other aspects, including the psychological well-being of children, would have had to be taken into account. Secondly, science can rarely fully live up to the expectation of producing assured knowledge - this thesis will be substantiated in the following as an example using the question of whether there was excess mortality during the pandemic.

Excess mortality takes into account deaths from any cause. The advantage of this is that it avoids problems arising from the considerable variation in definitions of what constitutes a Covid 19 death between different countries. In order to estimate the level of excess mortality, one only needs a few variables that can usually be reliably collected: These are the age structure of the population and the age-specific mortality during and before the pandemic. What may come as a surprise to many is that when estimating excess mortality, a number of subjective decisions have to be made, which can legitimately be taken in different ways and which have a considerable influence on the result. Thus, it is explicitly not a matter of error.

The exact calculation procedure for excess mortality can only be briefly outlined here; more detailed information can be found in the literature [1, 2]. The central idea is to compare the actual number of deaths observed during the pandemic with the number of deaths that would have been expected during the pandemic if mortality during the pandemic had been the same as in the pre-pandemic period. In the following, we would like to name four factors that can be determined differently for well-founded reasons and that clearly influence the result:

- The choice of the comparison period has a great influence on the result. If, for example, only the year 2019 is chosen as the comparison period, in which there were only few influenza deaths and in which mortality was therefore comparatively low, the result is a higher excess mortality than if the years 2016-2019 are chosen as the comparison period. However, the choice of the comparison period is a subjective decision for which there are many possibilities beyond the two mentioned.
- The choice of the period for which one calculates excess mortality can also have a significant influence on the result. Let us illustrate this with an example: a highly vulnerable man who would have died in February 2021 without the pandemic but died in the pandemic in May 2020 is an excess death if one calculates excess mortality for the year 2020, but not if one calculates it for the years 2020 and 2021.
- Scientists also have leeway when calculating mortality rates during the pre-pandemic phase. Reasons can be given for choosing the mean value of the mortality rates of the pre-pandemic years, but it can also be justified to continue the usually falling trend in the pre-pandemic years instead of the mean value. The second approach yields significantly higher excess mortalities than the first approach.
- There is no standard whether irregularly occurring causes of death - such as heat waves or influenza - should be excluded from the evaluation or not. For example, excess mortality is higher if heat deaths during the reference period are excluded. Epidemiological evaluations in general and calculations of excess mortality in particular are not comparable to mathematical problems in school for which there is a clear solution. An individual evaluation is usually based on subjective determinations that could also have been made differently. Incidentally, in a study on excess mortality, Nobel Prize winner Michael Levitt and Stanford epidemiologist John Ioannidis chose 66 comparison periods instead of just one subjectively chosen comparison period, and reported an interval of -4.3% to +4.6% for excess mortality in Germany in 2020 and 2021. This may contradict the expectation of a broad public, which expects clear statements from scientists. However, science must often reject this claim to unambiguity for reasons of probity. The public, in turn, must put up with this lack of unambiguity instead of, for example, accusing researchers who report no or lower excess mortality than others of downplaying the pandemic.

So as not to be misunderstood: There were mistakes, too. For example, many publications on excess mortality did not include the ageing of the population. Such an approach is unacceptable because the German population is ageing continuously and more deaths were to be expected in 2020 than in previous years simply because of the significant increase in the number of people over 80. <<

Literature
1: Kowall B, Stang A. Estimates of excess mortality during the COVID-19 pandemic strongly depend on subjective methodological choices. Herz 2023; 48: 180-183.
2. Levitt M, Zonta F, Ioannidis JPA. Excess deaths estimates from multiverse analysis in 2009 – 2021. Eur J Epidemiol 2023; doi: 10.1007/s10654-023-00998-2. Online ahead of print.