Time-series analysis of undetermined death rates compared to suicide death rates in Germany: Considerations for evaluating anti-suicide interventions

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Introduction

Evaluation of suicide prevention campaigns can reveal their effectiveness. A common outcome for assessing anti-suicide activities is the rate of completed suicides. However, suicide deaths are often misclassified as deaths of undetermined cause, masking the effects of anti-suicide interventions. Our aim was to compare the rates of suicide deaths (SD) to undetermined deaths (UD) in Germany to understand how they are related.

Methodology

Sample: Death registration data for German inhabitants, aged 15 years and older, were obtained from the Federal Health Monitoring website for the period of 1991 to 2020.

Analyses: Age-standardized rates (SDR, per 100,000) were calculated for SDs and UD. Rate ratios were found by dividing the SD rate by the UD rate. A time-series analysis was then applied to detect structural changes utilizing the methodology described by Gusmão et al. (2021). Analyses were completed using RStudio software (Version 1.4.1106).

Results

Figure 1. Ratio of undetermined death (UD) rate to suicide death (SD) rate for both sexes (F = 9.2742, p-value = 0.039). Breakpoints = 1997, 2010, 2016.

Figure 2. Suicide death (SD) rates for both sexes (F = 84.181, p-value < 2.2e-16). Breakpoints = 1994, 1998, 2004, 2016.

Table 1. Mean rate ratio for each time window between breakpoints (by sex).

Discussion

• The 1997 breakpoint aligns with the 1998 adoption of the International Classification of Diseases (Tenth Revision), which impacted death registration procedures.

• Decline in the rate ratio observed in 2010 (Figure 1) corresponds to changes in the SD rate (Figure 2) and UD rate (Figure 3). The decrease in rate ratio suggests fewer SDs were “masked”.

• The 2010 breakpoint corresponds to the 2009 suicide of a famous German footballer. The publicity surrounding his death may have led to reduced stigma and increased recognition of SDs.

• Similar results were found when rate ratios for males and females were separated (Table 1).

Conclusion

• Due to the common misclassification of SDs as UD, calculating the rate ratio of the two measures will provide a more accurate picture of suicide statistics.

• Researchers should consider using this measure when evaluating suicide prevention activities.