

# Methods and Their Application in the Analysis of Multiple Causes of Death Data: Application of Network Analysis to Japanese Data

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In this study, we review the methods of analysis for multiple causes of death (MCOD) data, which have become increasingly available in Japan in recent years. We use the method by Egidi et al. (2018), which applies network analysis to the Japanese MCODE data, and investigates its applicability.

There is a large number of studies on the MCODE data outside Japan, especially by researchers in the "MultiCause network," an international research network for MCODE. The studies are classified into the following groups: [1] Analysis of multiple causes as well as underlying causes; [2] Comparing multiple causes with underlying causes; [3] Analyzing the number of multiple causes per death; [4] Analyzing the relationship between multiple causes; [5] Application to life table analysis such as competing risk model and cause-deleted life tables; and [6] Validation of the coding of causes. In recent years, some studies in group [4] have been applying network analysis on MCODE. Amongst them, the study of Egidi et al. (2018) is a seminal one that applies network analysis to explore relationships between the causes of death; we used the same method for the Japanese data. We extract some causes that have a strong relationship with other causes, using centrality measures. Moreover, we apply community detection methods used in network analysis, for better understanding of the complex relationship between causes of death, which is not examined in Egidi et al. (2018).

We established various possibilities in MCODE data through a comprehensive review of the methodologies. From the results of this study, we can also confirm that network analysis is effective for analyzing the relationship between the multiple causes of death in Japan.

keywords: multiple causes of death, network analysis, mortality