

Abstract

The aim of the thesis is the application of network analysis methods in the study of relationships between multiple causes of death. As a result of increasing life expectancy and of the growing proportion of people dying from chronic diseases in developed countries, the analysis of multiple causes of death may be a relevant topic, as this approach makes it possible to analyse the circumstances of dying, not just the single cause initiating the entire disease chain leading to death. The purpose of this work is to construct the system of causes of death, in which the complexity of the relationships between the causes of death reported on the death certificate would be captured. First network is created from the first part of the death certificate, and we distinguish between the “causing” condition and the consequent one in a pair of multiple causes of death. The second network is designed for the second part of the death certificate, and in this network, we do not differentiate the direction of the link. Networks are then analysed with various centrality measures and community detection, and we also examine neighbours of selected diseases. Essential part of the thesis is the explanatory analysis of multiple causes of death, because it determines methods later used in network analysis.

It was found that diseases of the circulatory, digestive, respiratory tracts as well as some neoplasms are more closely linked to diseases from the same categories. Conversely, metabolic, and behavioural disorders and the nervous system diseases are more often linked to diseases from distinct chapters of International Classification of Diseases. Another finding was that more communities were detected in networks for females than in network for males, which was also characterised by higher local centrality of the diseases. More than 70 % of links are same in networks for women and men, the differences between them lay mainly in external causes of death, neoplasms, blood and hematopoietic, gallbladder and musculoskeletal diseases and some diseases of the nervous system. The most important nodes in directed networks mostly coincided with those that occurred most frequently on death certificates, but it depended on which metric was used to determine the “importance” of the node in the system.

The networks from second part of death certificate for females were denser than those for males. In these networks diseases with “specific” neighbours were spotted. Diseases, which are not the most frequent ones, but are very alike in terms of links they have, were detected too.