FACT SHEET: HOSPITAL ADMISSIONS AND MORTALITY RATIO: A COMPOSITE HEALTH INDICATOR FOR MONITORING NON-COMMUNICABLE DISEASES

WP9 "Innovation in health information for public health policy development"

Case study: Development of composite indicators to monitor the burden of disease and health system performance at population level

Key outputs

1. Morbidity and mortality rates are the most used epidemiological indicators to describe the health status of a population. Although these indicators are often correlated, there are also some differences between them that should be considered in the epidemiological analysis.
2. Combined morbidity and mortality analyses could provide complementary information on disease patterns that might not arise from the independent analysis of each indicator.
3. The usefulness of a composite indicator (defined as the ratio of hospital morbidity to mortality rates in monitoring non-communicable diseases) is explored.

Background and Rationale

Worldwide, Non Communicable Diseases (NCD) are one of the major health challenges of the 21st century. Indeed, the World Health Organization (WHO) has set as a goal a reduction of 25% in global mortality associated with cardiovascular diseases, cancer, diabetes and chronic obstructive respiratory diseases by the year 2030.

In the assessment of the health status of any population, the burden of disease is usually estimated from the analysis of morbidity and mortality rates, which are the basic epidemiological indicators in public health surveillance. Although morbidity is usually correlated with mortality, there are also some discrepancies between these indicators that have been described in cardiovascular diseases and in some types of cancer. This discordance could be related to local and regional differences in population´s wealth, the degree of prevention and control of risk factors, or the availability of health resources.

Therefore, the analysis of the epidemiological patterns of NCD should include an integrated study of morbidity and mortality, describing their geographic variability and, if detected, examining their causes. This indicator would provide complementary information in the analysis of the population´s health status, using sources of information and procedures already implemented in public health surveillance systems.

Proposal

This study analyses the ratio of age-adjusted hospital morbidity and mortality rates for the following NCDs: ischemic heart disease (IHD), cerebrovascular disease (CVD), chronic obstructive pulmonary disease (COPD), and prostate, breast and lung cancer. This composite indicator has been developed from the Hospital Morbidity Survey and the Death Statistics in all

of Spain and its provinces, information which is provided by the National Statistics Institute (INE, Spanish acronym). The minimum data necessary for its construction were:

a. Hospital morbidity occurred in 2016: number of hospital admissions according to sex, age, main diagnosis, type of hospital admission, and province of residence.
b. Deaths occurred in 2016: number of deaths according to sex, age, main cause of death and province of residence.

With such information for each disease, the morbidity and mortality rates were calculated in men and women for each province per 100,000 inhabitants, adjusted by age (European standard population of 2013). Subsequently, the ratio of the morbidity and mortality rate (hereinafter HMR), and the HMR male/female ratio were calculated. In the case of IHD, CVD and COPD, these analyses were repeated by selecting only emergency admissions. For the geographical representation of the 50 provinces and 2 autonomous cities, quintiles of the three indicators (morbidity, mortality and HMR) were estimated. All analyses were performed with Stata® v.15, using the spmap module for spatial data representation.

Summary of results

Figure 1 shows the variability of HMR in men and women for the health problems studied. In cardiorespiratory diseases, COPD stood out, with an average of 7 admissions per year in men and 9 to 10 in women for each deceased, with great variability between provinces. IHD and CVD showed more homogeneous HMR, but unlike COPD men had higher values than women. Regarding to cancer, lung cancer was the most homogeneous in both sexes, while breast cancer showed the highest values and the greatest variability.

Geographical patterns are observed, depending on the diseases involved. Using CVDs as a case study, the distribution of HMR by province and sex is shown in figures 2 and 3. The southern provinces of the peninsula (the region of Andalusia) concentrated the lowest values so that reported higher proportional mortality (figure 2). In addition, large Pearson's correlation coefficients, $r= -0.69$ ($p<0.001$) and -0.71 ($p<0.001$) were observed in both men and women (Figure 3). This association was also observed for IHD in both sexes, COPD in men and breast and lung cancer in women, albeit their slopes were less steep than CVD.

Recommendations for sustainability

The analysis of this indicator showed important geographic variability that should be further explored to identify potential associated factors. There is also a need of examining specific case-management approach at hospital level that could explain the trends observed in the HMR and mortality in Spain. This information might increase the knowledge of the epidemiological distribution of these diseases, providing additional information to the separated analysis of morbidity and mortality.

The HMR is a tool that uses standardized methods and is based on routine data sources and traditional analytical procedures in public health surveillance systems. This indicator would allow a better understanding of regional variability between and within countries, and can also be useful for health planning and prevention.

Annex

Figure 1. Distribution and variability of hospital morbidity and mortality ratio (HMR) values according to selected diseases.

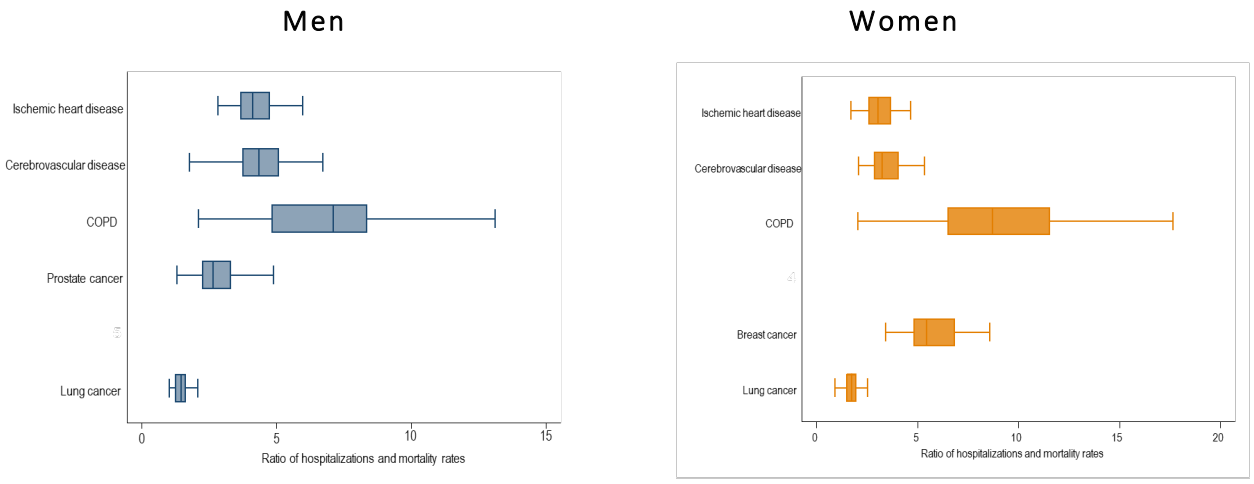


Figure 2. Geographical distribution of hospital morbidity and mortality ratio (HMR) for cerebrovascular disease by sex, 2016.

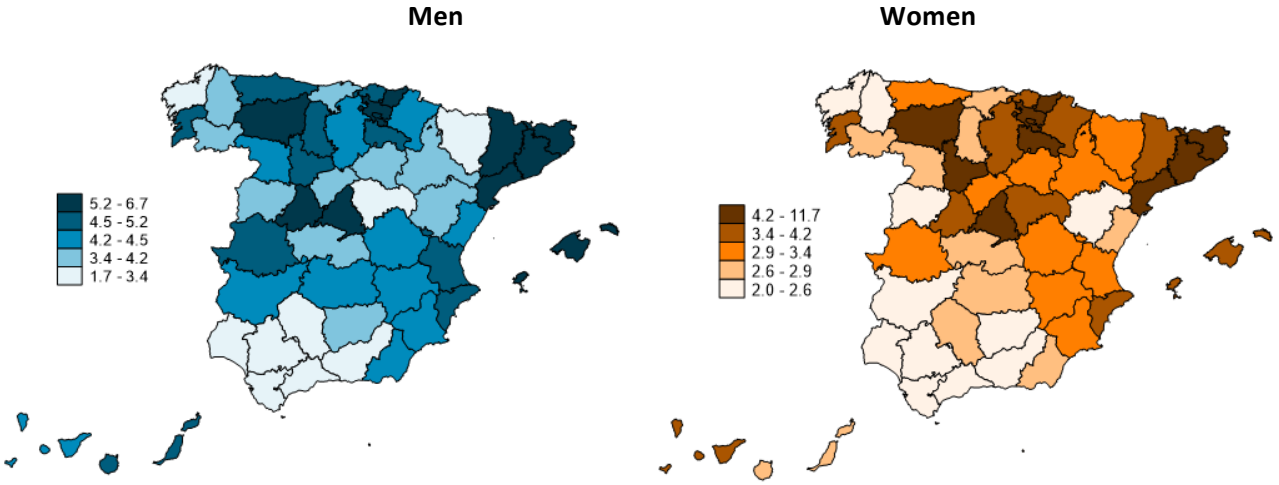
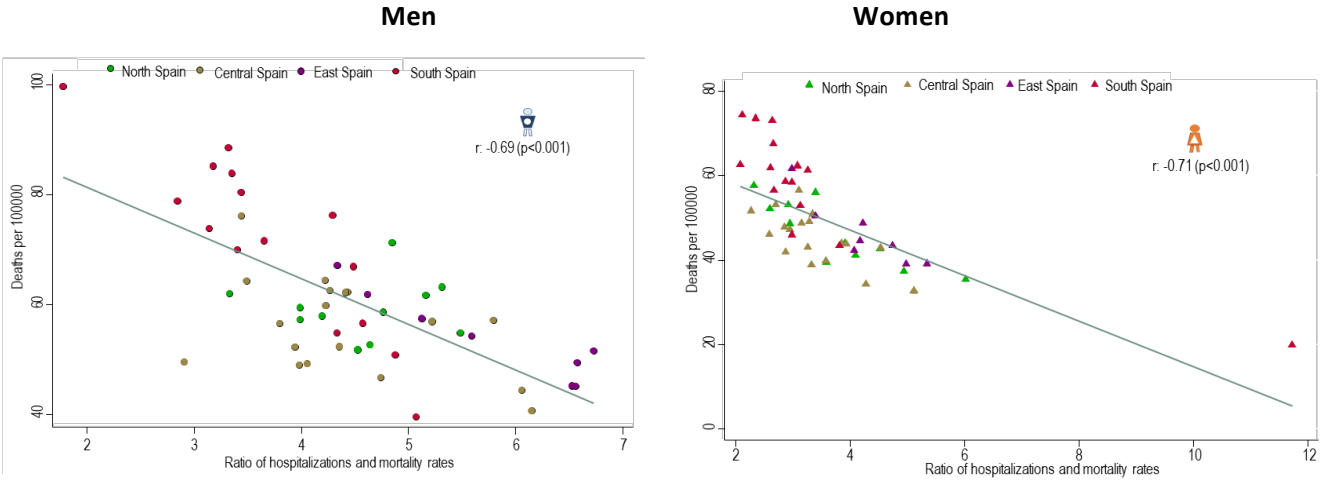


Figure 3. Correlation and linear fit between HMR and age-adjusted mortality rates for cerebrovascular diseases by sex, 2016.



This project is funded by the Health Programme of the European Union