Winter Deaths in Hungary and Portugal, 1980-2017

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Introduction

The close relationship between exposure to extremely low indoor temperatures for long periods and excess winter mortality has been stated since long (Liddell et al. 2015). Up to 70% of excess winter deaths are attributed to cardiovascular diseases (ischaemic heart and cerebrovascular diseases), while approximately 15% to respiratory diseases, many resulting from respiratory diseases (Mercer 2003). Age is the most important risk factor for cold-related deaths (Laake and Sverre, 1996). Although the reasons are not fully known (Mercer 2003), some factors may contribute to this compression of cold-related deaths. Older people tend to spend long periods indoors, to move less and are more likely to suffer from thermo-regulatory system impairment (Rudge, 2011). Older people are also more vulnerable to cold housing and fuel poverty (Marmot Review Team 2011). In addition, thermal neutral temperature and optimal thermal condition differ across age, older people prefer higher temperature compared to young people (Schellen et al. 2010).

Extremely low indoor temperatures, and consequently excess winter mortality, result greatly from the combination of two factors: energy inefficiency of the housing stock (poor insulation and/or inefficient heating systems) and financial inability to keep home adequately warm (low household income and/or high energy prices) (Rudge, 2011). Housing conditions have also been called to explain the paradox behind higher winter mortality trends in warmer countries (Eurowinter Group 1997, Healy 2003).

In the literature, cold-related deaths have been measured using the Excess Winter Death Index (EWDI), which is computed as the ratio between the number of excess and expected deaths during the four winter months (December-March) (Healy 2003; Fowler et al. 2014). In 2015, Liddell and his colleagues questioned this approach demonstrating that the EWDI is inaccurate in estimating cold-related deaths in the large majority of the European countries which can be attributed to the fact that the EWDI misses the number of days of cold that actually occurred during the four winter months. As an alternative, Liddell et al. (2015) suggest an approach based on the Heating Degree Days (HDD), a continuous metric that considers the outdoor temperature and the average room temperature, i.e., the need for heating indoor spaces. Available for all Member States at the NUTS2 level since 1975, the HDD is a promising approach to monitor cold-related deaths over time and better inform public policy on energetic efficiency and poverty, and housing conditions; and to perform comparative analysis across and within European countries to define goals and ways of improvement.

Data and Methods

To test our hypothesis, we performed an exploratory analysis using data on mortality and heating degree days index in Hungary and Portugal. At this stage, the choice of the countries followed three criteria: a) to consider representative regions of cold (Hungary) and warm (Portugal) winters; b) to compare countries that rank differently in the excess winter deaths index (Fowler et al. 2014); and c) to compare countries that rank similarly in the heating degree days index. As in Liddell et al. (2015), an index was derived from HDD as:

$$IDHH = \frac{\%HDD_{wintermonths}}{0.5 * \%HDD_{non-wintermonths}}$$

to compute winter deaths. Table 1 shows the difference between the two countries. Regions of Hungary have fairly similar values but Portugal show higher variation in 2017.

Data on mortality was provided by the Statistical National Offices. As in previous studies, we assume that excess winter mortality is cause, sex, age and region sensitive. Therefore, we use deaths per month from all causes in the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10), ischaemic heart diseases (ICD-10 I20-I25), cerebrovascular diseases (ICD-10 I60-I69), diseases of the respiratory system (ICD-10 J00-J98), and influenza (ICD10 J10-J11) from 1980 to 2017 grouped by sex into five-year age groups on NUTS2 level. Monthly heating degree days (HDD) by NUTS2 was accessed on the Eurostat website for the same period. As in Liddell et al. (2015), an index was derived from HDD as: Therefore, in this study, we compute the IHDD as suggested by Liddell et al. (2015) with further refinements. First, we focus on the causes of death known from the literature as related to excess winter mortality: cardiovascular and respiratory diseases. Secondly, we look at sex and age patterns. Third, we explore regional heterogeneity at the NUTS2 level.

Unit	IHDD
Hungary	0.153
Közép-Magyarország	0.156
Közép-Dunántúl	0.147
Nyugat-Dunántúl	0.144
Dél-Dunántúl	0.154
Észak-Magyarország	0.152
Észak-Alföld	0.157
Dél-Alföld	0.159
Portugal, Mainland	0.286
Northern	0.188
Algarve	0.733
Central	0.280
Lisbon	0.513
Alentejo	0.498

Table 1: IHDD values for Hungary and Portugal in 2017

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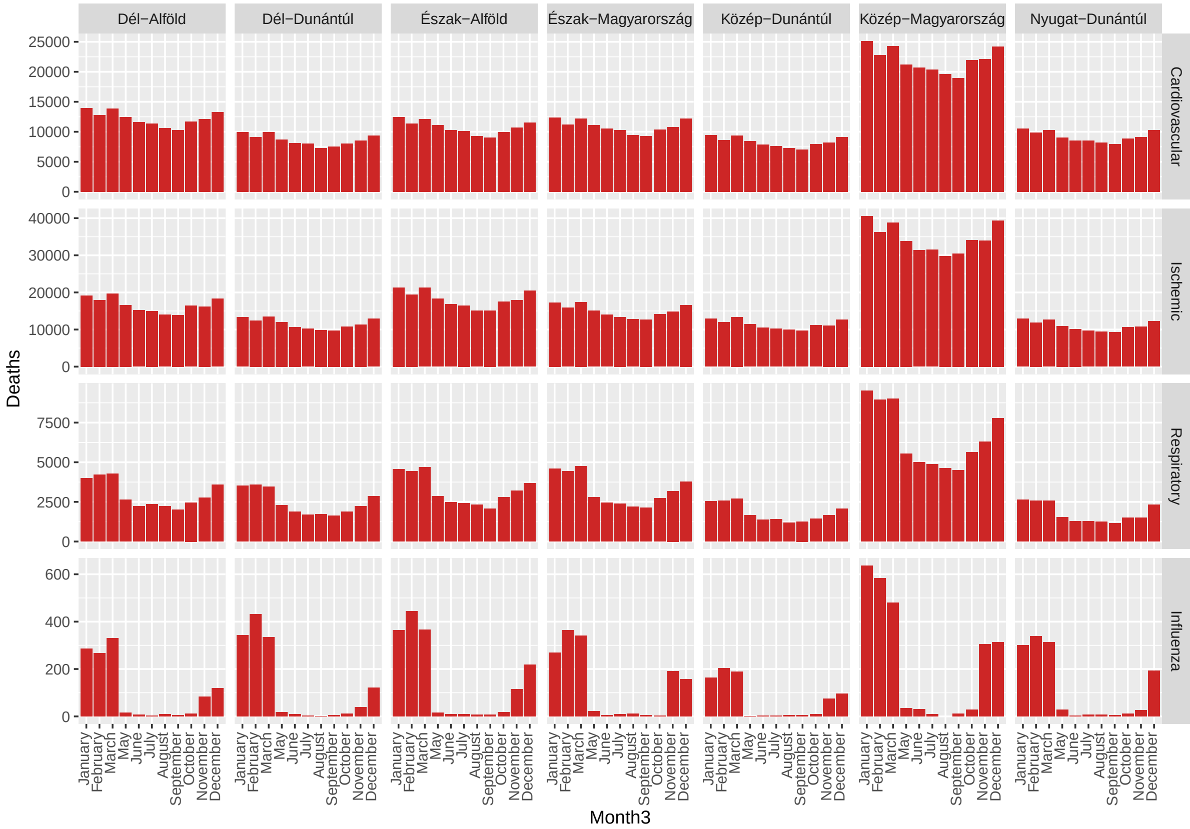

Figure 1: Cumulative deaths by months and NUTS2 regions for females in Hungary in the period of 1980-2017

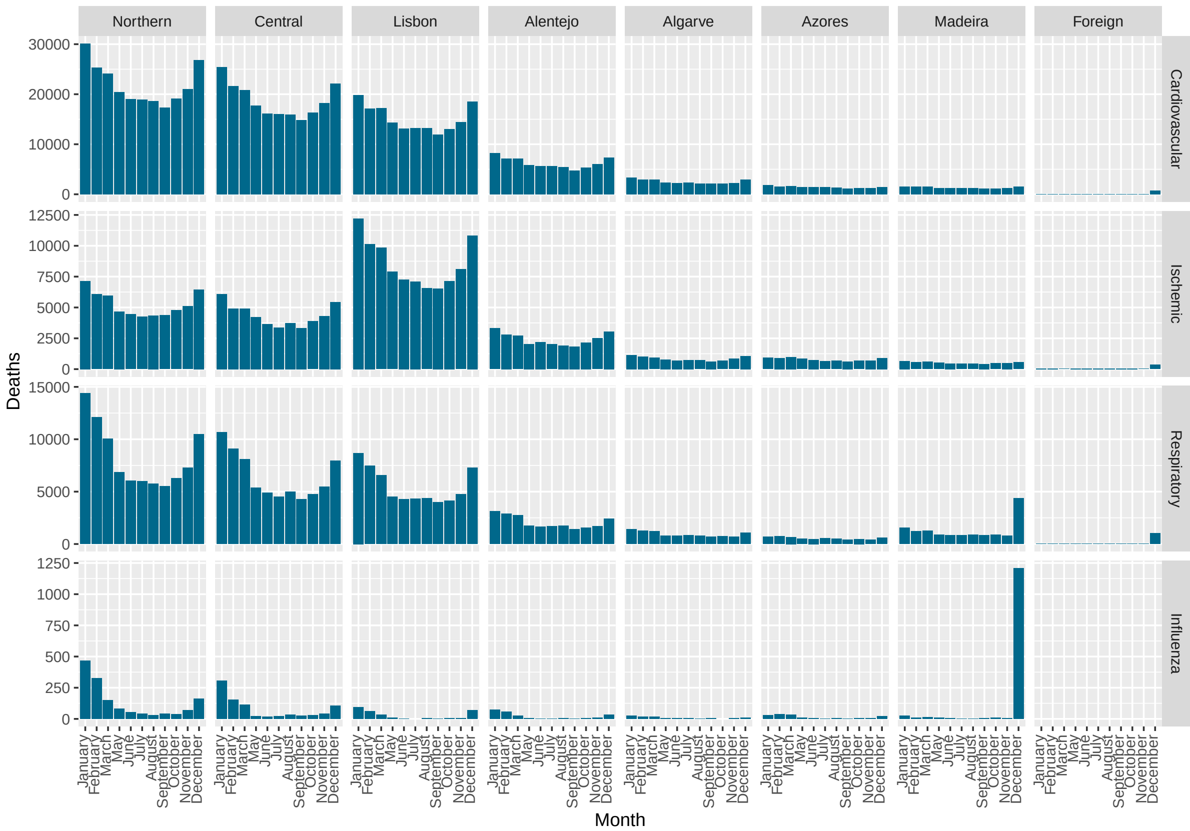

Figure 2: Cumulative deaths by months and NUTS2 regions for females in Portugal in the period of 1980-2017