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The health impacts of poor housing conditions and thermal discomfort

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Abstract

On summer and winter months, cardiovascular morbidity and mortality rates vary throughout Europe. For example, areas with mild winters seem to be the ones with higher number of seasonal mortality. In fact, Portugal is one of the southern countries together with Ireland that have higher mortality in winter. However, the number of studies relating cold weather with morbidity/mortality is still very rare. These occurrences are suspected to be associated with housing quality especially thermal insulation. In order to assess the relation between the incidence of coronary events and housing conditions in Portugal, a survey on inpatients with any form of acute coronary syndromes was undertaken during winter months, in order to get some data about houseability and residents behavior attitudes against cold exposure. It remained clear that poor housing conditions and/or lack of protective measures against cold exposure are common in Portugal. A better knowledge about the impact of weather and climate on health may be applied to built up a set of regulations for housing design (for new but also for old dwellings restoration); but also it is essential for the establishment of adaptation and mitigation policies and strategies, as well as on health planning and on the development of early warning systems..

Keywords: Excess winter morbidity; acute myocardial infarction; temperature; housing conditions; Portugal

1. Introduction

Most regions of Europe have observed a seasonal pattern of mortality with peaks during the winter months described as excess winter mortality (EWM)[1]. Surprisingly, the EWM is more intense in mild winters regions [1, 2] and places with harsh winters, such as Sweden or Russia, seem to have a smaller variation in mortality. In fact, the excess mortality during the colder months seems inexistent in some extremely cold regions of the globe [3].

In Europe, it is estimated that there are 250,000 excess deaths during winter every year: 70% of these are

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associated to heart disease and 15% to respiratory diseases [4, 5]. Only in the UK, estimates mention an average of 30,000 excess deaths every winter [6].

This phenomenon has been declining gradually in recent decades [7, 8]. However, it still remains much higher in countries such as Portugal, Spain, Ireland, England and Wales than in other European countries with similar climate. This intensification of mortality during winter has been assumed as a major concern for public health authorities in some of these countries [1, 9].

The fact that the EWM is higher in mild climates than in cold regions suggests that this might be indirectly associated with factors other than temperature such as behavioral aspects [4, 10, 11] but also with poor housing quality [1, 12-14].

Although some studies have been contributing to highlight this pattern in mortality, the impact of a continuous exposure to cold in Portugal is almost neglected and still needs much further research.

The study by Healy [1] was probably the work most alarming to Portugal, as he identified Portugal as the European country with the highest percentage of variation in mortality (28% excess deaths in winter), followed by Spain and Ireland. This might indicate that the probable cause of this value, in the case of Portugal, should be the poor housing conditions and high health inequity comparing to the rest of Europe. The study greatly contributed to highlight that mild climate countries may mask episodes of cold weather which may have a great impact on mortality.

The present paper aims to present the first results on a research about housing quality and health in Portugal, namely the variation of the disease throughout the year, the relation with temperature and the housing aspects of inpatients in several hospitals. We have evaluated the variation of daily hospital admissions for myocardial infarction, from 2003 to 2007, provided by the Portuguese High Commissariat for Health and a survey that was conducted on housing conditions of the inpatients with acute coronary syndromes.

2. Excess winter morbidity in Portugal

For an accurate assessment of the monthly admissions for myocardial infarction over the years we have chosen to transform these data into units of equal time - 30 days. Thus, it was assigned a weight to compensate the months with 28, 29 and 31 days. So, months with 31 days were multiplied by 0.96, those with 29 days by 1.03 and those with 28 days by 1.07.

Based on these periods of equal time, we subtracted the number of admissions in each month from the monthly average for the studied period. The concentration of admissions for myocardial infarction was evident in the coldest months of the year which was the case of January, February, March, November and December here called as "winter months". Similarly, the other months of the year are called "rest of the year" (Figure 1).

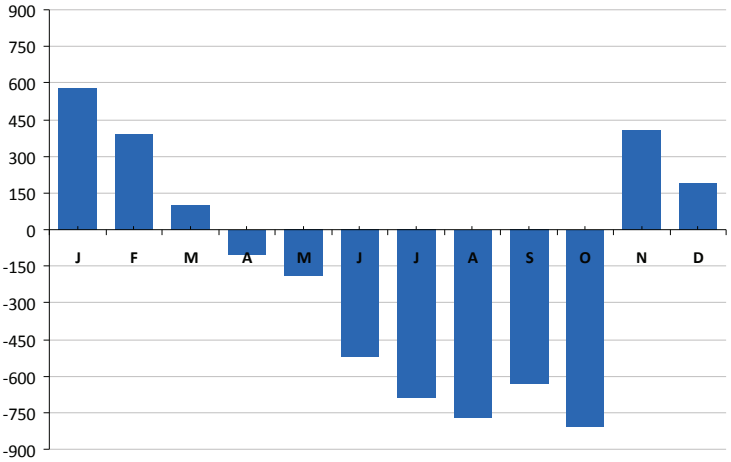

Figure 1 - Absolute deviations of the average monthly number of admissions (men and women) for myocardial infarction in Portugal mainland (2003-2007) after adjustment for periods of 30 days.

Excess winter morbidity was calculated from the excess admissions for myocardial infarction in Portugal during winter (EWmorb). This concept was adapted from the methodology applied in UK [15]. EWmorb was calculated by subtracting the number of admissions during the "winter months" from the mean number of hospitalizations during the previous autumn (August to October) and the summer of the following year (April to July).

In Portugal mainland, during the studied period, there were 18 388 admissions during the winter which represents an average excess of 4,597 per year (Table 1).

Table 1 - Excess winter morbidity due to acute myocardial infarction Portugal mainland (2003-2007).

Counties	03/04	04/05	05/06	06/07	Average
Aveiro	266	290	294	279	282
Beja	121	98	101	108	107
Braga	295	287	296	310	297
Bragança	103	80	63	88	83
Castelo Branco	114	105	88	132	110
Coimbra	202	222	207	227	214
Évora	135	125	132	97	122
Faro	177	208	223	204	203
Guarda	83	76	88	102	87
Leiria	164	174	182	105	156
Lisboa	1191	1214	1026	1006	1109
Portalegre	92	62	63	98	79
Porto	834	847	753	806	810
Santarém	183	143	121	200	162
Setúbal	389	478	459	488	454
Viana do Castelo	113	124	97	113	112
Vila Real	76	84	87	52	75
Viseu	161	114	124	139	135

The rate of EWmorb was calculated by adding the weight of the resident population in order to better understand the geographical pattern of this event in Portugal, according to the formula (1).

$$\text{EWmorb rate} = \text{EWmorb} / \text{Popc} \times 1000 \quad (1)$$

Where:
EWmorb: Excess admissions to hospital during the winter;
Popc: Resident population in the counties, according to the 2001 Census (INE)

By weighting the EWmorb on the basis of the population, the 18 counties of Portugal mainland were compared (Figure 2). A variation of this indicator on a northwest – southeast trend was observed. The Alentejo region (Portalegre, Évora and Beja counties) showed the highest rate of excess hospitalizations during winter while the counties of Braga, Vila Real, Leiria and Santarém were those with the lowest EWmorb rate.

Exploring the yearly variation of the hospital admissions and the main geographical patterns can be an important step in understanding the mechanisms behind the exposure to some risk factors for myocardial infarction in Portugal.

Unlike in many other countries where EWM has been considered a serious public health problem, in Portugal it is still largely unknown and ignored. In some cases, it is well known to the hospital services though it has been underestimated and it has not been taken as important enough to implement any action in order to mitigate it or even

to be quantified.

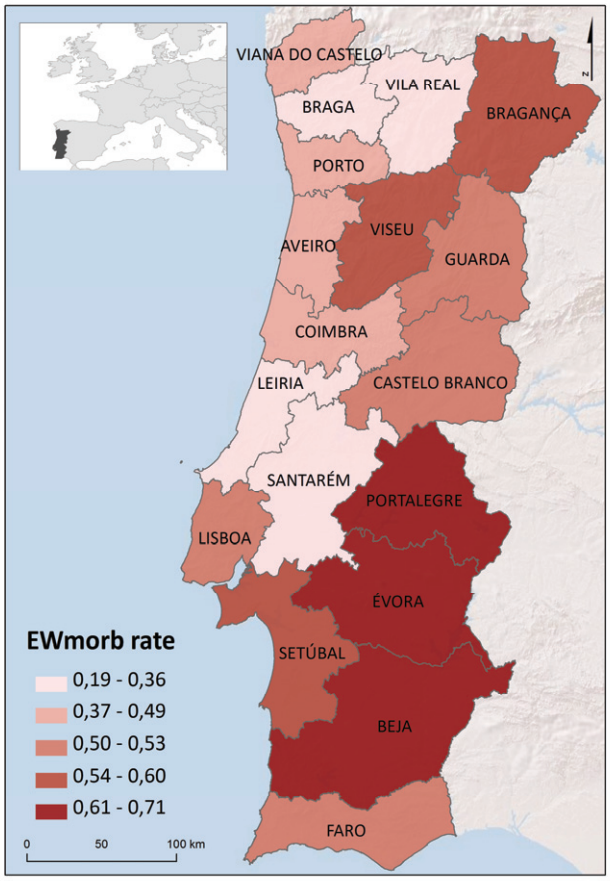

Figure 2 - Excess winter morbidity rate due to acute myocardial infarction in Portugal mainland (2003-2007).

The cause of this increased vulnerability in winter may be associated with a set of risk factors that also follows a seasonal pattern, such as diet, alcohol consumption and physical exercise. Apart from these, one major factor that may be linked to seasonal variation of the disease is the exposure to cold environment.

3. Housing conditions in Portugal

It is obvious that morbidity and mortality have many causes and one of them is the thermal discomfort in our homes where, as a sedentary being, we spend most of our daily life. A continuous exposure to cold surely debilitates our health and may lead to cardiovascular diseases [16].

Most Portuguese dwellings show a poor building quality, in particular about thermal insulation; dwellings are cold and humid in winter and hot in summer, although, in recent years, there were some improvements in the building industry. As a corrective measure, Portuguese people are investing on climatization facilities to attain the thermal human comfort. But this represents an important financial burden on the family budgets that only some are fortunate to afford. The exposure to cold and its consequences upon people, though less studied in Portugal, may seriously reduce the quality of life and health of a large amount of population [17, 18]. Improvement on housing quality is mandatory to reduce thermal discomfort and thus the exposure to cold and thus for a better health.

3.1. Survey on housing conditions – methods

In the winter of 2009/2010 (from November to March), a survey on inpatients that have suffered any form of acute coronary syndrome was carried out in four hospitals located in different counties (Vila Real, Leiria, Lisboa and Faro). 115 patients answered the survey, which is more than 2% of the patient average during winter. All patients were fully informed about the research and accepted the study when a written consent was signed. A full anonymity was guaranteed by the researches. Patients were asked about their symptomatology, usual protective attitudes against cold and housing conditions.

3.2. Survey on housing conditions – main results

The respondents were mostly male (80%) and caucasian (97%) living in Portugal (91% residents in the country for more than 1 year – data not showed) and unemployed or retired (60%). The individuals interviewed were between 33 and 91 years, but 50% were under 64 (Table 2).

Table 2 – Patient characteristics.

Patient characteristics		TOTAL	
		#	%
Gender	Male	92	80,0
	Female	23	20,0
Ethnic group	Caucasian	109	97,3
	African	1	0,9
	Asiatic	0	0,0
	Other	2	1,8
Age	Average	64	-
	Median	64	-
	Minimum	33	-
	Maximum	91	-
Employment	Unemployed/retired	69	60,0
	Employed	46	40,0
Family average income	Less than 750€	70	63,1
	750€ - 1500€	29	26,1
	1500€ - 3000€	5	4,5
	Higher than 3000€	7	6,3
Education	No education	38	33,3
	4 years	46	40,4
	9 years	15	13,2
	12 years	9	7,9
	Graduation	6	5,3
	Post-graduation	0	0,0

About 76% reported that they were in a closed space (in a building, a car, or in other space-conditioning), while only 24% of the patients were outdoors at the moment when the first acute myocardial infarction symptoms were felt. Of those subjects who experienced symptoms indoors, only half reported to have some sort of air heating device. 26% of these assumed that the only heating device was an electric radiator. Curiously, from those that had a heating device at home, only 54% used it last winter.

Based on the information recorded, it is possible to point out that the way we use to heat our home is not efficient

and desirable; since the majority of patients only use an electric radiator and 60% of them have stated that only some rooms are usually heated.

These results might have two readings: first, a predominance of comfortable and efficient homes may be suggested, which justifies that heating is unnecessary; on the other hand, these data may reflect a passive attitude in seeking a suitable thermal environment indoors; in this last case, it might show carelessness in keeping the house properly heated or simply ignorance of the need to keep the air temperature within comfortable and healthy conditions; but, in a more serious situation, it might suggest deprivation.

In order to verify these possibilities the inpatients were also questioned about a subjective assessment of their own homes. 54% of the respondents identified their home as a comfortable place, while 42% considered it to be cold and only 4% stated that it is warm.

In parallel, patients were also asked about the insulation, the conservation level and the solar exposition of their homes. Almost one third of the persons pointed out that they could feel the air through the windows and almost 11% revealed that their homes have no sun exposure during the winter.

Forty percent of inpatients who claimed to have heating facilities and though they have not used them during the winter, also reported that their homes are cold. This information is even more important if we consider that 26% of respondents that did not use any kind of heating during winter remember being cold just a few days before they had heart failure which caused their hospital admission.

4. Conclusions

These results reinforce the winter vulnerability of southern European regions and highlight the need to assess thermal housing conditions and to establish protective measures in those areas.

It is believed that part of the influence of cold on mortality may be avoidable, and as well we can save human and physical resources, by adopting correct mitigation policies. Some of these policies may be directed to

i) the implementation of educational programs -for the adoption of e.g. adequate clothing, time spent outdoors, heating facilities, early warnings;
ii) a social funding for those with low income to whom heating represents a heavy burden;
iii) changes in architecture and urban planning (e.g. better housing insulation, adequate street shelters, adjustments on the existent building regulation which should be applied to both new buildings as well as to those to be rehab).

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