Title

Proportion of deaths in hospital in European countries: Trends and associations from panel data (2005-2017)

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Abstract

Background: End-of-life care attracts major policy interest. Place of death is an important metric of individual experience and health system performance. Most people prefer to die at home, but hospital is the most common place of death in high-income countries. Little is known about international trends in place of death over time.

Methods: We aimed to collate population-level data on place of death in Europe from 2005-2017, and to evaluate association with national characteristics and policy choices. We sought data on hospital as the place of death from the 32 European Economic Area countries. We identified national economic, societal, demographic and health system predictors from Eurostat, OECD and the WHO. We analysed these cross-national panel data using linear regression with panel-corrected standard errors.

Results: Our analytic dataset included 30 countries accounting for over 95% of Europe's population. Average national proportion of deaths occurring in hospital in the study period ranged from 26% to 68%, with a median of 52%. Trends vary markedly by region and wealth, with low and decreasing rate in the North-West, and high and increasing prevalence in the South and East. Controlling for demographic and economic factors, strong palliative care provision and generous government finance of long-term care were associated with fewer hospital deaths.

Conclusions: We found modifiable policy choices associated with hospital mortality, as well as wider structural economic and societal factors. Policymakers can act to reduce the proportion of dying in hospital.

Keywords: public health, hospital mortality, place of death, end-of-life, healthcare policy, Europe.

Introduction

Health care provision for people at end of life has attracted major policy interest in developed countries over the last three decades (1). Health care utilization nearing death accounts disproportionately for costs, yet this expenditure yields poor value including unmanaged pain and other symptoms, unmet preferences, and poor quality of life (2, 3).

Place of death is an important metric for measuring end-of-life experience (4). There is a widespread preference for dying at home provided people can access adequate supports, yet hospital is the most common place of death in most countries(4-6). The burden of poor experience falls more heavily on those with low socioeconomic status(7), and equity gaps are growing over time(8).

Demographic ageing compounds the need to tackle poor health system performance and low-value care for people near end of life (9). There will be 427.5 million deaths in the EU-27 between 2020 and 2100, peaking in the middle of the century(10). Given the high prevalence of serious disease among older people, and the strong association between proximity to death and costs(11), these trends threaten the long-term sustainability of health systems(12).

Rationale and aim

There have been few international studies of population-level data on place of death(4), and none to our knowledge that surveys European countries comprehensively or over time. We aimed to address this knowledge gap and analyse for the first time those factors associated with the proportion of deaths that occurred in hospital.

Due to inconsistency in recording and reporting of place of death between countries, our outcome of interest was restricted to proportion of deaths in hospital. Since hospital is the most common place of

death in high-income countries, and an established metric of health system performance and end-of-life care, we considered this a good subject of enquiry. Our research questions (RQ) therefore were:

1 What proportions of deaths occur in hospital in European countries?

2 How are the proportions of deaths occurring in hospital changing over time?

3 What national characteristics and policy choices are associated with the proportion of deaths occurring in hospital?

Methods

Study design and eligible countries

We conducted a cross-national study using publicly available data for the years 2005 to 2017 inclusive. We sought data from the 32 countries that made up the European Economic Area (EEA). The EEA comprised the 28[1] member states of the European Union (EU) and four high-income countries (Switzerland, Norway, Iceland, and Liechtenstein) with whom the EU had an agreement on free trade and free movement of people. The EEA accounted for more than 95% of people and economic activity in Europe in the study period. Membership of the EU and high-income country status maximized likelihood of accessing reliable and comparable data, as well as providing near-full coverage of the continent's population.

We classified the European countries into four groups. We hypothesised that important geographical and cultural patterns would be important across the continent. At the start of our observation period in 2005, Eastern nations had operated democratic capitalist systems for little more than a decade and

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[1] The United Kingdom left the EEA following completion of 'Brexit' negotiations in 2020-2021, but was an EEA member for the duration of the study period.

were inevitably at different stages of health system development than the rest of Europe. Additionally, there are well-known cultural differences between the South - where multi-generational homes are common and older family members often cared for in the home by unpaid, predominantly female relatives – and the North – where female workforce participation is higher and it is much more common for older people to live in long-term residential care facilities (13, 14). Finally, there were potentially important differences between (North-)western nations since some(13), such as the Scandinavian countries, have long-established high achievement in standards of living, and others, such as Ireland and Portugal, have experienced very substantial economic growth in the years prior to and during our study. Since individual country-level dummy variables were not feasible, we created a four-tier variable distinguishing Southern, Eastern, (North)western with high HDI, and other (North)western nations and included this in our list of potential predictors.

Variables

Outcome variable

The main outcome of interest was the proportion of deaths in each country occurring in hospital annually from 2005 to 2017. We first collected the data on location of death including hospitals, home, work places, in transit, nursing home, and other institutions in each country, then generated the percentage of deaths that occurred in hospital by dividing total number of hospital deaths by total number of deaths in all places. We chose this outcome because it is an established indicator of health system performance and end-of-life experience at the population level (5, 6, 15). We considered alternatives, e.g. a four-level outcome variable [died at home, died in hospital, died in residential care, died in another place], but inconsistency of data reporting by different countries precluded this approach.

Explanatory variables

  We searched databases of national-level characteristics and data, and identified predictors that we hypothesized as potentially associated with the proportion of deaths occurred in hospital. We grouped these into five domains: economy, demography, society, healthcare system and policy choices. The national economy domain included Human Development Index (HDI) in 2010 which is defined as measures of the average achievements in a country in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living (16), and inequality-adjusted HDI 2010 where inequalities were applied to HDI values (17). Variables categorized into the national demography domain included the percentage of Christian population reside in a nation in 2010 (18), the percentage of population live in the urban areas from 2005 to 2017(19, 20), life expectancy at birth in the years of 2005-2017 (21, 22), percentage of population deaths due to cancer from 2011 to 2017 (23, 24). The society domain included percentage of population who perceived that they received strong social support in 2014 (25) and proportion of population provided informal care or assistant at least once a week in 2014(26-28). Health care system variables were those related to health care but with no simple short-term solution through policy: the number of hospital beds per 100,000 population from 2005 to 2017 (29-31), the total number of full-time health personnel employed in hospital from 2005 to 2017 (32), mean length of stay for inpatient care between 2005 and 2017 (33), and percentage of population with unmet needs for specific health care-related services due to financial reasons in 2014 (34-37). Policy variables were those we considered could be addressed in the short term through changes in policy and financing: percentage of avoidable death[2] from 2005 to 2017 - avoidable mortality covers both preventable and treatable causes of mortality. Preventable mortality refers to mortality that

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[2] The total avoidable mortality includes a number of infectious diseases, several types of cancers, endocrine and metabolic diseases, as well as some diseases of the nervous, circulatory, respiratory, digestive, genitourinary systems, some diseases related to pregnancy, childbirth and the perinatal period, a number of congenital malformations, adverse effects of medical and surgical care, a list of injuries and alcohol and drug related disorders. Due to data insufficiency, percentage of avoidable death was calculated as the number of preventable and treatable mortality under 75 years divided by the number of total deaths in a country in a year.

can mainly be avoided through effective public health and primary prevention interventions (i.e. before the onset of diseases/injuries, to reduce incidence). Treatable mortality can mainly be avoided through timely and effective health care interventions, including secondary prevention and treatment (after the onset of diseases to reduce case-fatality) (38-41), proportion of healthcare spending on ambulatory care(42) that refers to healthcare services directly to outpatients who do not require inpatient services, including both offices of general medical practitioners and medical specialists and establishments for services of day-cases and home care from 2008 to 2017(43), proportion of healthcare expenditure on hospitals spanning the years of 2008-2017 (44), percentage of healthcare spending covered either by government or compulsory insurance from 2005 to 2017 (45), percentage of long-term care spending covered by government or compulsory insurance from 2008 to 2017 (46), percentage of population received home care services in 2011 (47-49), total healthcare expenditure per capita from 2005 to 2017(50), percentage of total health care spending on long term care from 2008-2017(51), prevalence of lack of assistance for people who need for help with personal care activities in 2014(52), and provision of palliative care services (53-55).

Data sources

We sought place of death data from the national statistics office of the 32 EU-EEA countries, searching first online and then contacting offices directly via email or telephone. All the data on hospital as the place of death are provided as part of our supplementary materials. Predictors were collected from Eurostat, Organization for Economic Co-operation and Development (OECD) and World Health Organization (WHO). Data on palliative care availability by country were collected from the three European Association for Palliative Care (EAPC) Atlases.

Missing data imputation

   We adopted different methods to impute missing data based on the degree of missingness in each

variable. For predictors, two methods were adopted: for all time-invariant variables and a few time-

variant variables where missingness was very low, we identified relevant data from literature or relevant

public data sites; for other time-variant variables, we imputed data where the values were missing at

the start of the sequence by using the mean absolute change in observed years, and filled with the

mean if the missing data were in a sequence. For the outcome variable, if the country reported

outcomes for an unbroken sequence of years that did not cover our entire time period (e.g. for 2005-

2009, or for 2015-2017) then we used the data in the sequence and omitted the nation for all other

years. If a country reported outcomes with a broken sequence (e.g. had data for both 2005-2010 and

2012-2017) then we estimated a smoothed average for the missing year(s) and tested sensitivity of

results to this practice. For predictors, we matched outcome and predictor on year where possible.

Where predictor data were available for fewer years than outcome data, we assumed linear trends for

the missing values. Where only one year's data was available for a given predictor, we assumed this to

be constant across the time period of observation.

Statistical analysis

   Stata version 15 was used to conduct all statistical computation. Prior to estimating results, simple

linear regressions were performed to choose independent variables for inclusion in final panel data

analysis. We first regressed each predictor against the outcome in bivariate regressions, retaining those

with p<0.25. Subsequently, we regressed five variable groups separately on the outcome in multivariate

regressions, retaining individual predictors where p<0.25. Finally, we regressed all retained predictors

on the outcome, retaining individual predictors where p<0.10. To promote model parsimony at all

stages of the process, we binarized or categorized the variables if this did not adversely impact R^2.

After identifying predictors, we conducted a linear regression with panel corrected standard errors (STATA program –xtpcse-) specified with pairwise correlation (56), to assess association between the proportion of deaths occurred in hospital, palliative care availability and other factors. Collinearity was diagnosed by adopting mean variance inflation factor (VIF) and eigenvalues condition numbers where mean VIF >6 and condition number > 15 were considered high collinearity. We took $p < 0.05$ to represent statistical significance.

We performed scenario sensitivity analyses to check robustness to imputed data and the results of regression model, reported in the Appendix.

Scenario 1: We tested the model without data of Denmark and Finland because these two countries reported nursing home deaths and hospice deaths grouped with hospital deaths.

Scenario 2: We examined the model without palliative care data of Netherlands from 2011-2017 due to missing data for some years.

Scenario 3: We assessed the model by replacing with a new variable categorizing palliative care availability into two groups at a threshold of 1.25 services per 15000 population aged over 65.

Scenario 4: We assessed the model by replacing with a new variable categorizing palliative care availability into two groups at a threshold of 1.75 services per 15000 population aged over 65.

Results

Data on hospital as place of death

Our final dataset included 30 countries, excluding Greece, which did not provide data on hospital deaths despite repeated requests, and Liechtenstein, which has one hospital and citizens routinely access care in neighbouring Austria and Switzerland. For 30 countries 2005-2017 inclusive there are 390 potential observations; data on the proportion of deaths occurred in hospital were available for 330

(85%). All place of death data provided by national statistics offices are available in Supplementary

Materials.

Research question 1: What proportions of deaths occur in hospital in European countries?

   Mean data on hospital as the place of death are presented in Figure 1. There was a wide variation in

mean proportion of deaths occurred in hospital, from 26% in Romania to 68% in Malta. Low rates are

observed among both those countries with high incomes and HDI scores (Norway, Netherlands, Sweden)

and lower incomes and HDI scores (Romania, Bulgaria, Latvia). Nevertheless, regional differences are

clearly observable: these outcomes are lowest in the wealthier (North)western nations and highest in

Eastern Europe.

[Insert Figure 1 here]

Research question 2: How are the proportions of deaths occurred in hospital changing over

time?

   Data on the proportions of deaths occurred in hospital over time are presented in Figure 2. Important

regional differences persist: these outcome rose in Eastern Europe, were fairly steady in Southern

Europe, and fell in (North)western countries.

[Insert Figure 2 here]

Research question 3: What national characteristics and policy choices are associated with the proportion of deaths occurred in hospital?

Descriptive data

  Descriptive statistics for those predictors retained in the final model are presented in Table 1. Variables were retained as important in their relationship with the proportion of deaths that occurred in hospital. In the context of 330 observations for our outcome variable, there were 325 observations for palliative care availability and no more than 21 (6%) missing observations for any other predictor. Further details in the Appendix.

[Insert Table 1 here]

Main results

  Our regression results are presented in Table 2. All retained predictors were statistically significantly associated with the dependent variable, collinearity requirements were satisfied and R^2=0.90.

[Insert Table 2 here]

  The largest and most significant associations were by region. Compared to (North)western nations with high HDI, all other regions had higher proportions of deaths occurred in hospital and in each case this is statistically significant: Southern nations had 19.9% higher proportions of deaths occurred in hospital (95% CI: 16.9 to 23.0), (North)western nations not with high HDI had a 15.8% higher rate (95% CI: 13.7 to 17.9) and Eastern nations had a 8.9% higher rate (95% CI: 5.8 to 12.0).

With respect to societal factors, perceived strong social support was linked with a 2.5% higher proportion of deaths occurred in hospital (95% CI: 0.4% to 4.7%). High prevalence of lack of assistance with a functional issue was associated with 13.8% lower proportion of deaths occurred in hospital (95% CI: -15.8% to -11.8%).

High hospital capacity had an association with 1.6% increase in the proportion of mortality occurred in hospital (95% CI: 0.1% to 3%). Mean hospital length of stay was positively associated with the proportion of deaths occurred in hospital, with observations at the higher quartiles showing higher incidence of in-hospital deaths and in each case this is statistically significant. High prevalence of unmet need due to a financial reason was identified with 6.1% decreased proportion of deaths occurred in hospital (95% CI: -7.7% to -4.5%).

High spending on ambulatory care was associated with 2.9% increase in the outcome (95% CI: 1.5% to 4.4%). High home care provision had positive association with the proportion of deaths occurred in hospital, showing an increase of 9.1% (95% CI: 6.5% to 11.7%). Palliative care provision in line with EAPC recommendations was associated with 4.3% lower proportion of people dying in hospital (95% CI: - 6.9% to -1.7%). High long-term care expenditure covered by government or compulsory insurance was negatively linked with the outcome, displaying a 1.2% reduction (95% CI: -2.3 % to -0.1%). High prevalence of avoidable death was associated with 1.6% higher proportion of deaths occurred in hospital (95% CI: 0.1% to 3.1%).

Sensitivity analysis

Full output is provided in the Appendix. Our central conclusions are substantively supported in each case.

Discussion

Main findings

This study provides the first investigation of place of death across Europe and changing trends over time, as well as an analysis of factors that determine proportion of deaths in hospital. In our descriptive analyses (RQ1 and RQ2), we identify systematic differences in place of death by region and wealth. There has been low and decreasing proportions of hospital deaths in nations in the North-West, and high and levelling prevalence in nations in the South and East.

The importance of regional differences was affirmed in our regression analysis (RQ3), which found that the most important determinant of a low proportion of deaths occurring in hospital was to be a (North)western nation with high HDI. All other countries had significantly higher proportion of mortality occurring in hospital. This difference was largest in Southern countries, which is consistent with a higher reliance on unpaid family carers who provide supports at home until the end-of-life period when the dying person moves to hospital. (North)western countries with lower HDI also had a much higher proportion of mortality occurred in hospital than their neighbours with high HDI, showing that macro-structural factors (e.g. life expectancy, education, per capita income) substantively impact patterns of dying. The difference between high-HDI (North)western nations and Eastern Europe was smaller. As these nations continue to transition from post-Soviet economies, increases in hospital mortality may in some circumstances be a positive development reflecting growing capacity.

After controlling for these structural regional economic issues, we identified modifiable policy choices that are also associated with outcome. Strong palliative care availability was associated with lower incidence of death in hospital. This finding is also consistent with previous individual-level studies (57, 58). High coverage of long-term care by government or compulsory insurance linking with less hospital

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death shows that people may choose long-term care in other institutions (i.e. nursing home, hospice) instead of hospital at end of life, which indirectly reduced the number of deaths in hospital.

High number of hospital beds and long mean hospital length of stay showing positive association with the proportion of deaths occurred in hospital is anticipated, reflecting high system reliance on acute institutions. On the other hand, large proportion of unmet need due to financial reasons relating to fewer hospital deaths can be regarded as a marker of low healthcare capacity and disengagement with some parts of the population in a country. In terms of the society factors, strong social support and high home care provision associating with more hospital deaths implies the greater investment in a nation's healthcare provision, contributing to hospital development and social support expansion concurrently. With respect to policy choices, high spending on ambulatory care linking with high proportion of deaths happened in hospital may concurrently expand the diagnosis capacity of sever diseases that need inpatient treatment while providing ambulatory care services (i.e. medical specialists, day care or home care), which thereby can lead to increase in hospital admission and unplanned hospital death (59).

The proportion of deaths occurred in hospital rising with high prevalence of avoidable death may be driven by those patients with life threatening diseases (i.e. cancer, severe respiratory disease) who need high level of in-patient care provided in the hospital at the end of life(41). Further exploration on this factor is needed. High unmet need for assistance with function issues in population is identified with lower hospital mortality, implying potential policy neglect of the availability and accessibility of social support and inpatient care for that part of population.

Limitations and further research

Our main limitation for research questions 1 and 2 is data availability. All places of death have potentially important implications at the population level, for policymakers and health system

evaluation, and at the individual level, since people should receive end-of-life care consistent with their preferences. We report only proportion of deaths in hospital due to data limitations, of which the unavailability of data on the age distribution of hospital deaths limited our analysis on adjustment for age. Lack of data on deaths in hospice constrained a further analysis on its association with deaths in hospital and evaluation of places of death outside hospital. We provide all available data in the Supplementary Materials. Our main additional limitation for research question 3 is observational data. It is possible that a third unobserved factor associated with policy choices and hospital as place of death at population-level , such as other health system reforms, is driving results. Our use of panel data to take account of time-variance in predictors and in outcome reduces but does not eliminate this risk. Another limitation was the availability and consistency of data. Definition of 'hospital' death varies by country, though where countries explicitly grouped this site with other sites we tested robustness of our findings. The use of predictors for which only one year's data were available risks bias if these factors were changing at different speeds and directions across countries in the unobserved years. Furthermore, there could be a supply side effect, for example, increasing hospital capacity may contribute to more in-hospital deaths as well as more institutional deaths.

The main strength of our analysis is that we compile the most substantial international dataset of place of death that we are aware of. We leverage panel data on a variety of national characteristics over time to isolate modifiable policy choices that are strongly associated with an important outcome for health systems and for populations.

Future research on population place-of-death trends will benefit from the emerging age of big data, which will provide more detail on both hospital as place of death and determinants. One important area is improved detail and consistency of outcome measurement across countries, so that policymakers and researchers can compare places of death outside the hospital setting. The trends in Southern Europe

illustrated in Figure 2 are concerning in the context of population ageing – these countries are experience fast-growing numbers of deaths annually. If these deaths occur in hospital at the fast and growing rates illustrated by our data then this poses a major challenge for health system capacity and workforce. It is essential that research evaluates policy choices that can mitigate these trends, optimally involving a move to quasi-experimental research designs that deliver causal estimates of observed changes.

Conclusion

  The proportions of deaths occurring in hospital varied markedly among 30 European countries and were changing in different directions over time. This study provides insightful and comparative evidence for policymakers to plan future policies with aging populations and accelerate development of end-of-life care services, as well as establishing that non-modifiable structural factors are also key determinants of outcome.

Conflicts of interest

None declared.

Funding

Key points

- A large majority of people prefer not to die in hospital, yet hospital is the place of death for most people in Europe.

- Trends in hospital death vary markedly by region and wealth, with low and decreasing incidence in the North-West, and high and increasing proportions in the South and East.

- Important factors in hospital deaths included large structural issues, like national wealth, but also modifiable policy choices.

- Palliative care provision in line with EAPC recommendations and government funding of long-term care were both associated with a lower rate of mortality occurred in hospital.

- Expanding access to palliative care and increasing long-term care financing may reduce incidence of in-hospital mortality, which is a marker indicating room for improvement in healthcare systems and increase values of health care services.

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Figures

Figure 1. Average proportions of deaths occurred in hospital in 30 European countries: Northwest with HDI at top quartile, Northwest with HDI at lower quartiles, East, and South, 2005-2017

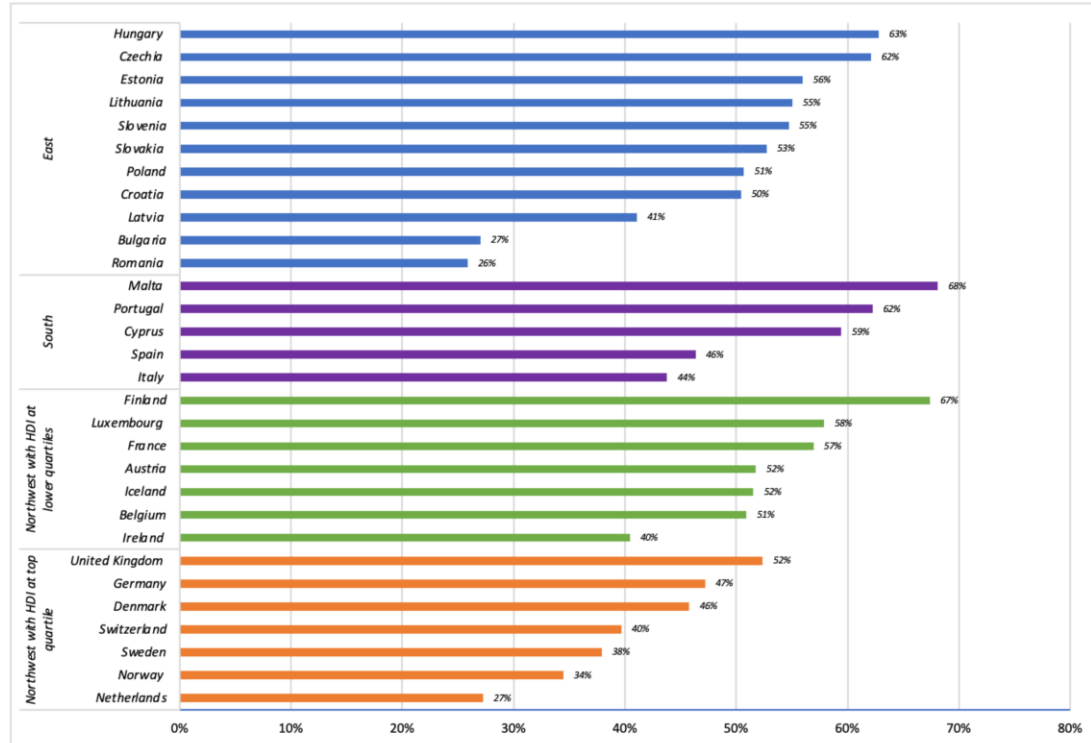| Region	Country	Value
East	Hungary	63%
	Czechia	62%
	Estonia	56%
	Lithuania	55%
	Slovenia	55%
	Slovakia	53%
	Poland	51%
	Croatia	50%
	Latvia	41%
	Bulgaria	27%
	Romania	26%
South	Malta	68%
	Portugal	62%
	Cyprus	59%
	Spain	46%
	Italy	44%
Northwest with HDI at lower quartiles	Finland	67%
	Luxembourg	58%
	France	57%
	Austria	52%
	Iceland	52%
	Belgium	51%
	Ireland	40%
Northwest with HDI at top quartile	United Kingdom	52%
	Germany	47%
	Denmark	46%
	Switzerland	40%
	Sweden	38%
	Norway	34%
	Netherlands	27%

Figure 2. Trend of proportions of deaths occurred in hospital in 30 European countries: Northwest with HDI at top quartile, Northwest with HDI at lower quartiles, East, and South, 2005-2017
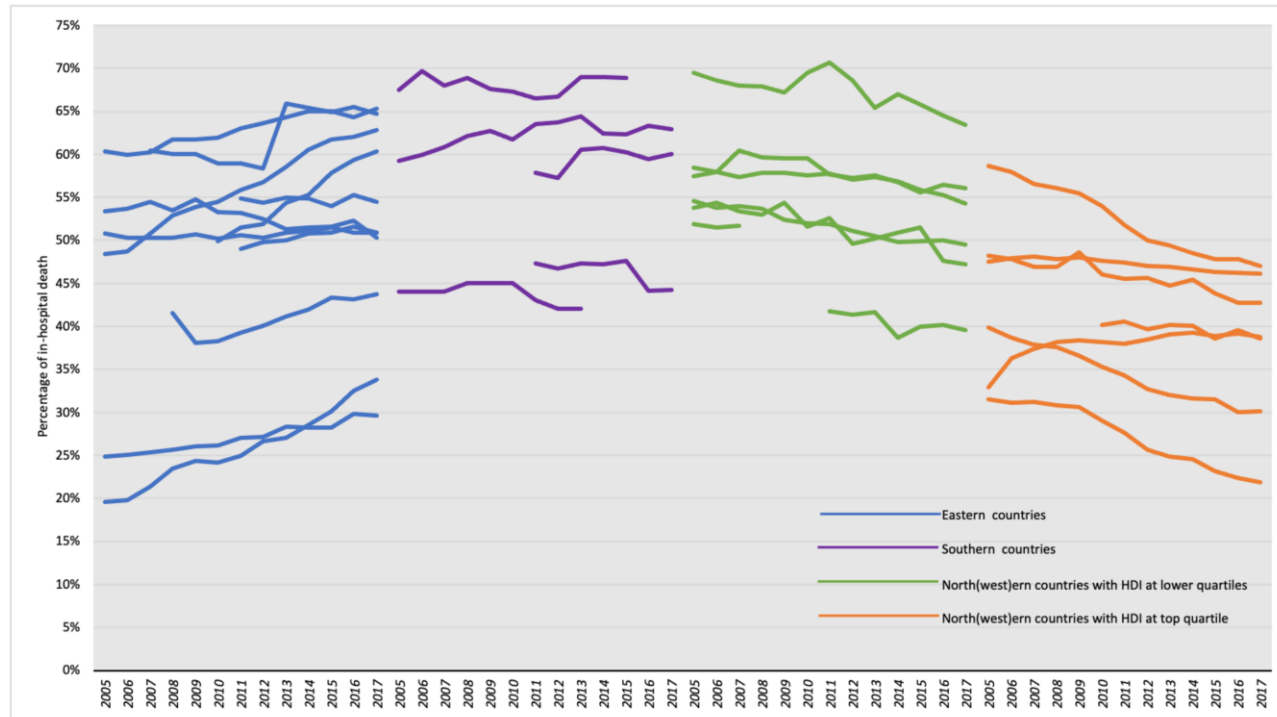
Table 1. Characteristic of 30 European countries: societal factors, health system factors, and policy choices, 2005-2017

Variables	Years data available	Observations	Mean (St. Dev)	Min-25th-Median-75th-Max
Societal factors				
Percentage of population who perceived they received strong social support	2014	325	0.34 (0.13)	0.16-0.26-0.32-0.41-0.60
Prevalence of lack of assistance for people who need for help with personal care activities	2014	306	0.35 (0.14)	0.07-0.26-0.33-0.41-0.69
Health system factors				
The number of hospital beds per 100,000 inhabitants	2005-2017	325	518 (170)	235-356-517-663-833
Mean length of stay for inpatient care (days)	2005-2017	325	7.60 (1.60)	4.60-6.50-7.50-8.60-12.50
Percentage of population with unmet needs for specific health care-related services due to financial reasons	2014	325	0.16 (0.08)	0.05-0.09-0.15-0.20-0.36
Policy choices				
Percent of healthcare spending on ambulatory care	2005-2017	325	0.23 (0.44)	0.13-0.20-0.23-0.26-0.31
Percentage of population received home care	2011	304	0.03 (0.02)	0.01-0.02-0.03-0.04-0.10
Number of specialist palliative care services per 15,000 people aged 65+	2005-2017	325	0.92 (0.56)	0.10-0.50-0.80-1.20-2.70
Percentage of long-term care spending covered by government or compulsory insurance	2005-2017	318	0.76 (0.15)	0.40-0.63-0.79-0.86-1.00
Percentage of avoidable death	2005-2017	325	0.25 (0.08)	0.00-0.21-0.24-0.30-0.41

Table 2. Association between national characteristics and the proportion of people dying in hospital (2005-2017)

Independent variables	Linear regression with panel-corrected standard errors		
	R-squared : 0.9028		
	Coefficient	p	95%CI
Region (base case = Northwest, high HDI)			
• *Northwest, not high HDI*	0.158	<0.001	0.137 to 0.179
• *East*	0.089	<0.001	0.058 to 0.120
• *South*	0.199	<0.001	0.169 to 0.230
Societal factors			
Strong (top 50% of observations) social support (2014)	0.025	0.019	0.004 to 0.047
High (top 25% of observations) prevalence of lack of assistance for people who need for help with personal care activities (2014)	-0.138	<0.001	-0.158 to -0.118
Health system factors			
High (top 50% of observations) number hospital beds (2005-2017)	0.016	0.036	0.001 to 0.030
Mean hospital length of stay (2005-2017)			
• *Second quartile*	0.022	0.018	0.004 to 0.040
• *Third quartile*	0.028	0.003	0.010 to 0.046

• *Fourth quartile*	0.054	<0.001	0.031 to 0.077
High (top 50% of observations) prevalence of unmet need due to financial reasons (2014)	-0.061	0.041	-0.077 to -0.045
Policy choices			
High (top 75% of observations) of healthcare spent on ambulatory care (2005-2017)	0.029	<0.001	0.015 to 0.044
High (top 75% of observations) of people received home care (2011)	0.091	<0.001	0.065 to 0.117
1.5<=Palliative care services available per 15000 population over 65 years old	-0.043	0.001	-0.069 to -0.017
High (top 50% of observations) of long-term care covered by government/compulsory insurance (2005-2017)	-0.012	<0.001	-0.023 to -0.001
High (top 25% of observations) of avoidable death (2005-2017)	0.016	0.043	0.001 to 0.031

We categorised variables to promote model parsimony, cutting according to R^2.