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Education and place of death. Inequalities in the prevalence of deaths at home of patients with cancer

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http://invesfeps.ulpgc.es/en

Health Economists *obsessed* with the quality of life (QALYs), but **what about the quality of death**?

Crónica de una muerte anunciada

Generally, death by **cancer** is **foreseeable**

Many patients (Portugal 50%-Netherlands, 83%) with cancer and their families would prefer death at home with appropriate palliative supporting care (in Spain, 66%)(1)

Home deaths are associated with better symptom control, death preparation, and overall quality of death(2)

But most of persons with cancer die in hospital (76% in Spain)

Why?

(1) Gomes, B., et al., *Preferences for place of death if faced with advanced cancer: a population survey in England, Flanders, Germany, Italy, the Netherlands, Portugal and Spain.* Annals of Oncology, 2012: p. mdr602.
(2) Hales, S., et al., The quality of dying and death in cancer and its relationship to palliative care and place of death. Journal of pain and symptom management, 2014. 48(5): p. 839-851.

Why? (hypothesis and evidence from other studies)

England: death at home (1985-1994) small significative association with **social deprivation** indexes in electoral wards (24% in high deprivation vs 30% in low deprivation)(1)

US: The use of **chemotherapy** in **terminally ill cancer patients** in the last months of life was associated with an increased risk of undergoing cardiopulmonary resuscitation, mechanical ventilation or both and of dying in an intensive care unit(2)

6 EUR countries: Better chances of dying at home are associated with **solid cancers**, being **married**, higher **educational** attainment (in Belgium, Italy, and Norway), living in less **urbanized areas** (except in England).(3)

(1) Higginson, I.J., et al., Do social factors affect where patients die: an analysis of 10 years of cancer deaths in England. Journal of Public Health, 1999. 21(1): p. 22-28
(2) Wright, A.A., et al., Associations between palliative chemotherapy and adult cancer patients' end of life care and place of death: prospective cohort study. 2014
(3) Cohen, J., et al., Which patients with cancer die at home? A study of six European countries using death certificate data. Journal of Clinical Oncology, 2010. 28(13): p. 2267-2273.

Objectives

1) to estimate the inequalities in the probability of dying of cancer at home by **education** level
2) to analyze the **municipal inequalities** in the probability of dying of cancer at home, and to explore the possible causes of this variability, in particular the **quality of palliative home care**

Databases

Main database

Raw micro data of the mortality **registry** of Spain (National Institute of Statistics) for 2014, based in death certificates.
Population:**110,278 deaths** with cancer as cause of death (CIE10).
The database has information on municipality of residence for the **774 municipalities** with more than 10.000 population, (**n=83,523**)

Complementary matched databases (municipal level)

Official sources containing economic and healthcare indicators at municipal level

- Income tax database (anonimized microdata)
- Municipal budgets
- Social Security database
- Registry of the Palliative resources in Spain

Variables

Individual characteristics

- age
- education
- nationality
- detailed cause of death (CIE10)
- place of death
- date of death

Municipal

A long list of economic measures (incomes, taxes, occupation by economic sectors) and demographic indicators (population size, age-sex distribution)

Access to home palliative care provided by a specialized unit accredited by the scientific society of Palliative Care of Spain (google maps+R software)

Listado de recursos que han cumplido los requisitos para ser clasificados con los criterios definidos por el Directorio SECPAL 2015:

CC.AA	PROVINCIA	NOMBRE RECURSO	TIPO DE RECURSO	ÁMBITO			DOTACIÓN PROFESIONALES				
				H	D	CSS	M	E	P	TS	O
Islas Canarias	LAS PALMAS	UNIDAD DE CUIDADOS PALIATIVOS DEL HOSPITAL INSULAR DE LANZAROTE	EBCP				6	11	1	2	9
Islas Canarias	LAS PALMAS	UNIDAD DE CUIDADOS PALIATIVOS. HOSPITAL GENERAL DE FUERTEVENTURA	EBCP				2	1	-	-	-
Islas Canarias	LAS PALMAS	UNIDAD DE CUIDADOS PALIATIVOS COMPLEJO HOSPITALARIO INSULAR DE GRAN CANARIA	UCCP				6	22	2	2	25
Islas Canarias	LAS PALMAS	UNIDAD DE MEDICINA PALIATIVA DEL HOSPITAL UNIVERSITARIO DE GRAN CANARIA DOCTOR NEGRÍN	UCCP				8	12	3	2	12
Islas Canarias	SANTA CRUZ DE TENERIFE	UNIDAD DE CUIDADOS PALIATIVOS DEL HOSPITAL UNIVERSITARIO NS LA CANDELARIA	UBCP				7	8	-	1	7

Directorio Recursos Asistenciales CP en las Islas Canarias

LAS PALMAS

EQUIPOS BÁSICOS DE CUIDADOS PALIATIVOS

UNIDAD DE CUIDADOS PALIATIVOS DEL HOSPITAL INSULAR DE LANZAROTE
URBANIZACIÓN JUAN DE QUESADA S/N
ARRECIFE CP: 35500

PERSONA DE CONTACTO: DOMINGO DE GUZMÁN PÉREZ HERNÁNDEZ / **PROFESIONAL:** MÉDICO

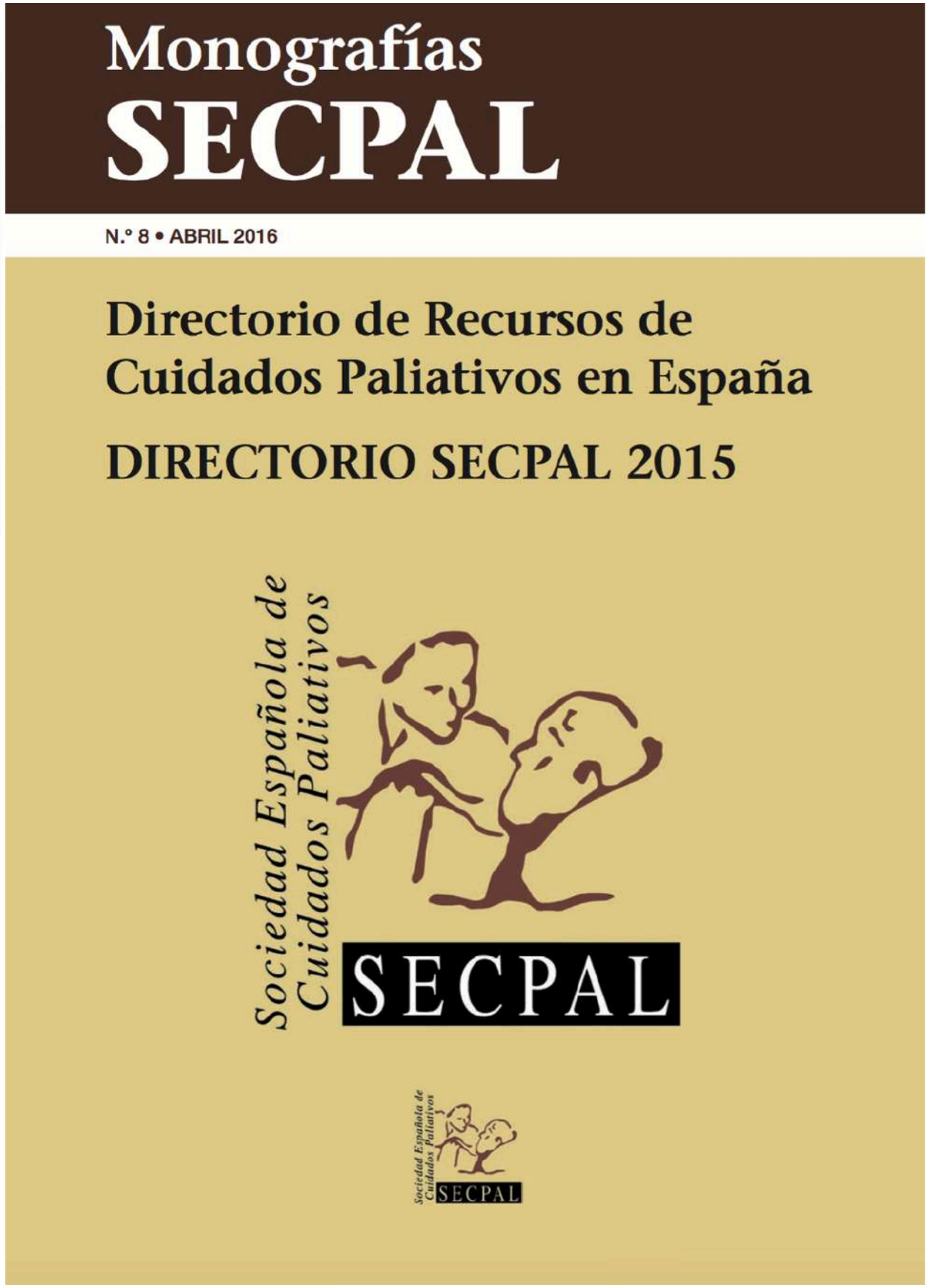
TELÉFONO: 928810000
EMAIL: domingodeguzman@cabildodelanzarote.com
PÁGINA WEB:
HORARIO DE ATENCIÓN:

NÚMERO DE PROFESIONALES
6 Médicos (Entre todos Dedicación 100%)
11 Enfermeras (Entre todas Dedicación 100%)
1 Psicólogo (Dedicación <50%)
2 Trabajadores Sociales (Dedicación <50%)
1 Capellán/Guía Espiritual
1 Fisioterapeuta
7 Auxiliares Enfermería

ÁMBITO DE ATENCIÓN
HOSPITALARIO, DOMICILIARIO, CENTRO SOCIOSANITARIO

SERVICIOS
Visita, Soporte, Interconsulta, Consulta Telefónica, Coordinación, Investigación

El 85% del equipo supera las horas de formación específicas definidas por la SECPAL



Population of the study and % of home deaths

[Spain, 2014]

395,830 deaths

110,278 cancer deaths (27.86%)

26,755 cancer deaths unknown municipality of residence (<10,000 population)

83,523 cancer deaths with identified municipality of residence

18,271 die at home (68.3%)

8,484 die at home (31.7%)

62,803 die at home (75.2%)

20,720 die at home (24.8%)

Two steps

1. Multilevel Linear Probability Model for the probability to die at home

Level 1: person

Level 2: municipality

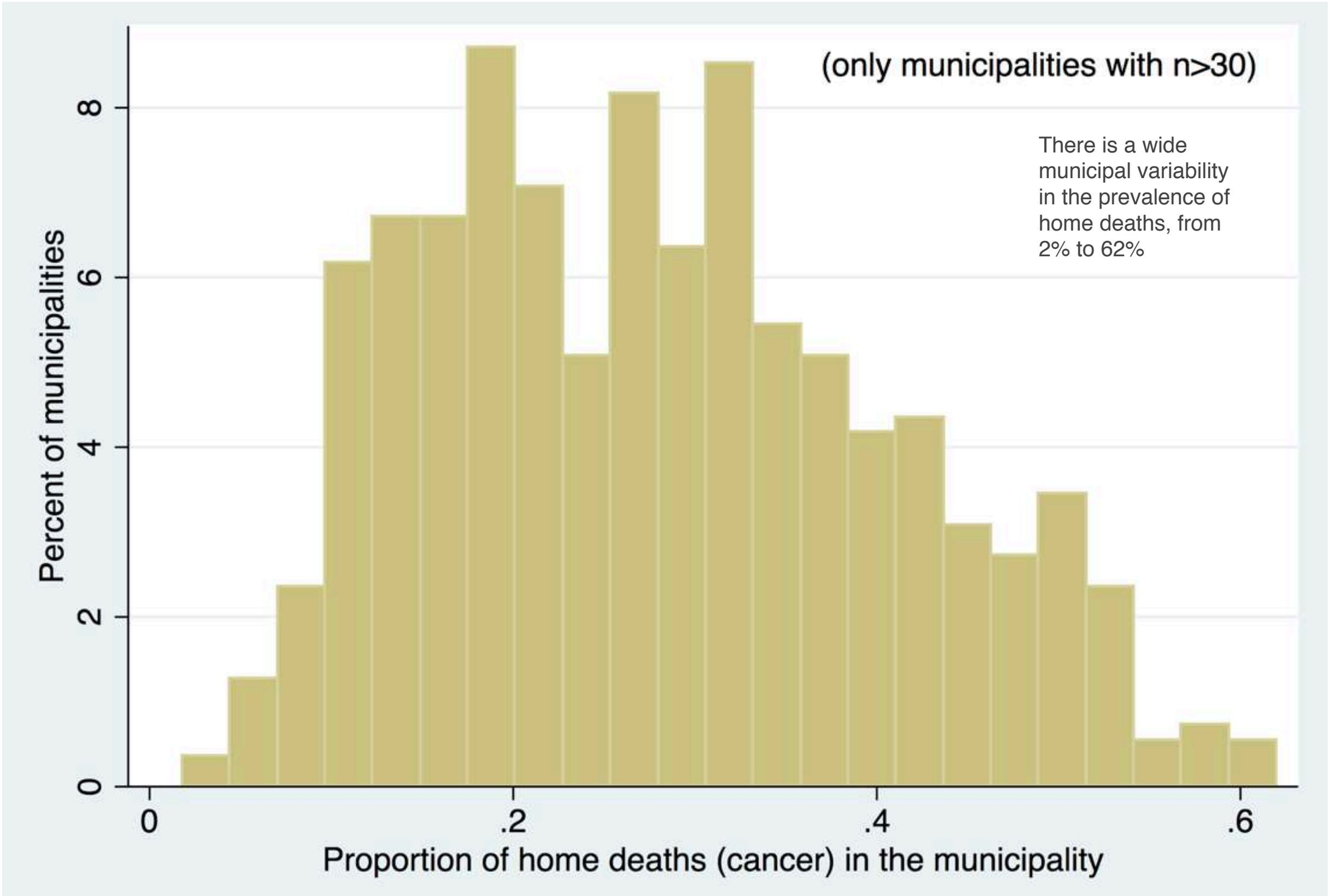
Variable of interest: education

[Keep fixed effects for the 770 municipalities]

2. Linear regressions and statistical tests on the fixed effects obtained in step 1

Focus on access to home specialized palliative care.

Control for demographic and economic indicators


(only municipalities with n>30)
There is a wide municipal variability in the prevalence of home deaths, from 2% to 62%
Percent of municipalities
0
2
4
6
8
0
.2
.4
.6
Proportion of home deaths (cancer) in the municipality

Step 1

```
Mixed-effects ML regression                     Number of obs      =     83523
Group variable: mun_re                          Number of groups   =       752

                                                Obs per group: min =         6
                                                               avg =     111.1
                                                               max =      7663

                                                Wald chi2(8)       =   1912.18
Log likelihood = -45873.324                     Prob > chi2        =    0.0000
```

muerecasa	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
edad_def	-.007249	.0007298	-9.93	0.000	-.0086793	-.0058187
edad_def2	.0000822	5.35e-06	15.38	0.000	.0000718	.0000927
1.est_sup	.0492869	.0042461	11.61	0.000	.0409647	.0576092
eciv						
2	.0526981	.0050485	10.44	0.000	.0428032	.0625929
3	.0273142	.0056961	4.80	0.000	.0161502	.0384783
4	-.001227	.0076697	-0.16	0.873	-.0162594	.0138054
6.sexo	.0246303	.0031484	7.82	0.000	.0184595	.0308011
cancer_hemat	-.0722197	.0054884	-13.16	0.000	-.0829767	-.0614627
_cons	.3112258	.0246622	12.62	0.000	.2628888	.3595629

Random-effects Parameters	Estimate	Std. Err.	[95% Conf.	Interval]
mun_re: Identity				
var(_cons)	.0128946	.0008618	.0113115	.0146992
var(Residual)	.1729943	.0008503	.1713357	.1746689

LR test vs. linear regression: chibar2(01) = **3341.68** Prob >= chibar2 = **0.0000**

Having a caregiver, being a woman and suffering from a solid tumor cancer increase the probability to die at home

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3	.0273142	.0056961	4.80	0.000	.0161502	.0384783
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LR test vs. linear regression: chibar2(01) = 3341.68 Prob >= chibar2 = 0.0000

Having a caregiver, being a woman and suffering from a solid tumor cancer increase the probability to die at home

Step 1

Mixed-effects ML regression
Group variable: **mun_re**

Number of obs	=	**83523**	
Number of groups	=	**752**	
Obs per group: min	=	**6**	
avg	=	**111.1**	
max	=	**7663**	
Wald chi2(**8**)	=	**1912.18**	
Prob > chi2	=	**0.0000**	

Log likelihood = **-45873.324**

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edad_def	**-.007249**	**.0007298**	**-9.93**	**0.000**	**-.0086793**	**-.0058187**
edad_def2	**.0000822**	**5.35e-06**	**15.38**	**0.000**	**.0000718**	**.0000927**
1.est_sup	**.0492869**	**.0042461**	**11.61**	**0.000**	**.0409647**	**.0576092**
eciv						
2	**.0526981**	**.0050485**	**10.44**	**0.000**	**.0428032**	**.0625929**
3	**.0273142**	**.0056961**	**4.80**	**0.000**	**.0161502**	**.0384783**
4	**-.001227**	**.0076697**	**-0.16**	**0.873**	**-.0162594**	**.0138054**
6.sexo	**.0246303**	**.0031484**	**7.82**	**0.000**	**.0184595**	**.0308011**
cancer_hemat	**-.0722197**	**.0054884**	**-13.16**	**0.000**	**-.0829767**	**-.0614627**
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Step 1

Having a caregiver, being a woman and suffering from a solid tumor cancer increase the probability to die at home

About 7% of the residual variation is attributable to the municipality

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Significant effect of higher education (+5% prob.)

Having a caregiver, being a woman and suffering from a solid tumor cancer increase the probability to die at home

About 7% of the residual variation is attributable to the municipality

Step 2

Source	SS	df	MS
Model	3.34767234	7	.478238906
Residual	9.79318712	741	.013216177
Total	13.1408595	748	.017567994

Number of obs	749
F(7, 741)	36.19
Prob > F	0.0000
R-squared	0.2548
Adj R-squared	0.2477
Root MSE	.11496

proba_corrg	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ciudad100	-.0522621	.0160587	-3.25	0.001	-.0837881	-.0207361
no_acceso	-.0780087	.0169403	-4.60	0.000	-.1112654	-.0447519
M_Agricu	.1871721	.0346732	5.40	0.000	.1191028	.2552415
solo_hospi	-.0285454	.0295169	-0.97	0.334	-.0864921	.0294012
solo_resi	-.0487682	.0821601	-0.59	0.553	-.2100625	.1125262
madrid	-.127769	.0175106	-7.30	0.000	-.1621452	-.0933927
Barcelona	-.1421828	.0139073	-10.22	0.000	-.1694852	-.1148803
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Lacking access to home palliative care at one hour of travel time reduces the prob. to die at home

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Hospital death is an urban phenomenon. Larger cities exhibit smaller probabilities to die at home and % of agriculture affiliates to social security is positive and significant

Lacking access to home palliative care at one hour of travel time reduces the prob. to die at home

The quality of the death shows a significant social gradient in Spain as in other EUR countries (Belgium, Italy, Norway)

There is also high geographical variability

Developing specific plans for palliative care with active role of primary care teams may contribute to improve the situation