

Multimorbidity Profile of COVID-19 Deaths in Portugal during 2020

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Supplementary Material

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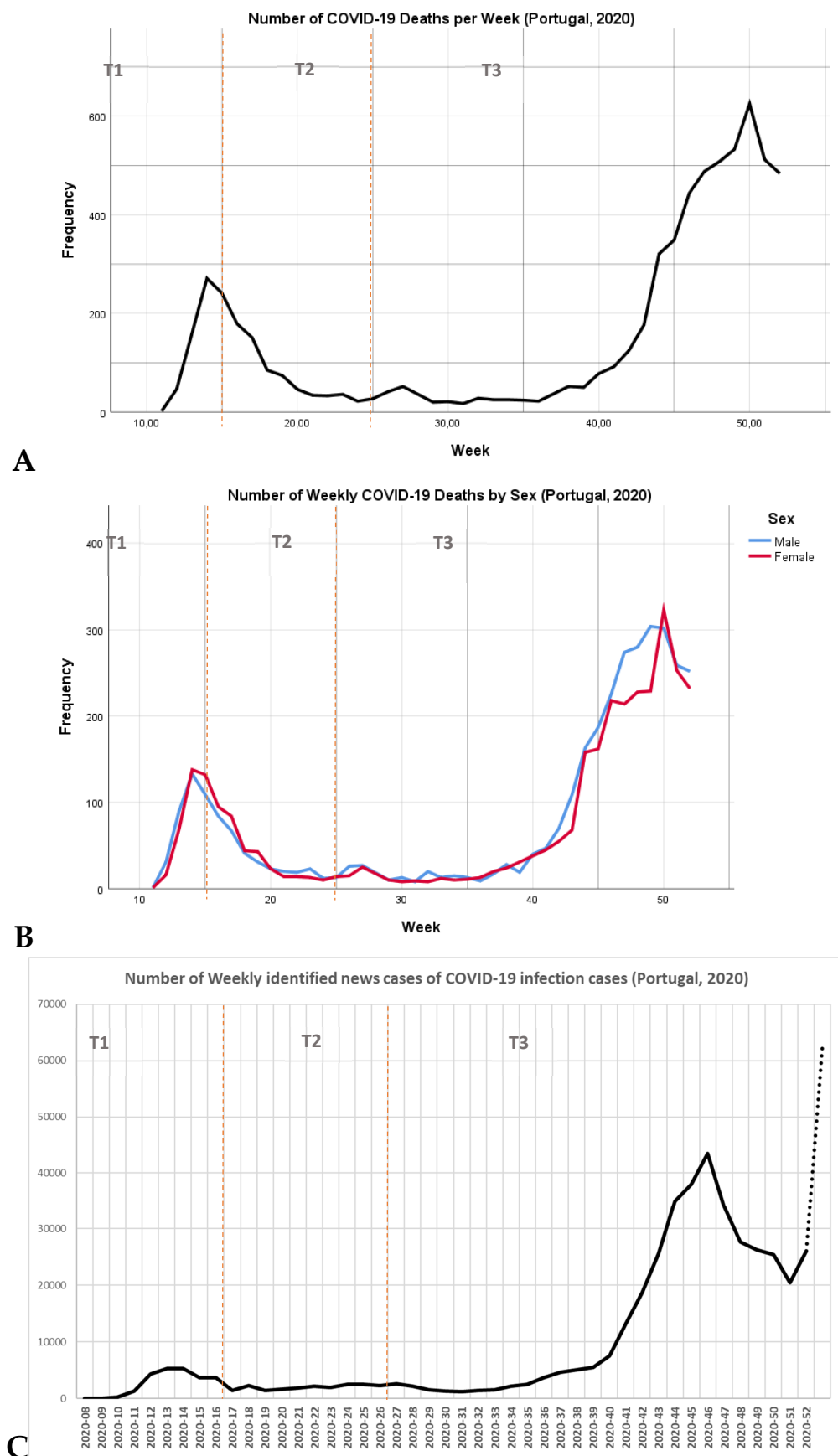
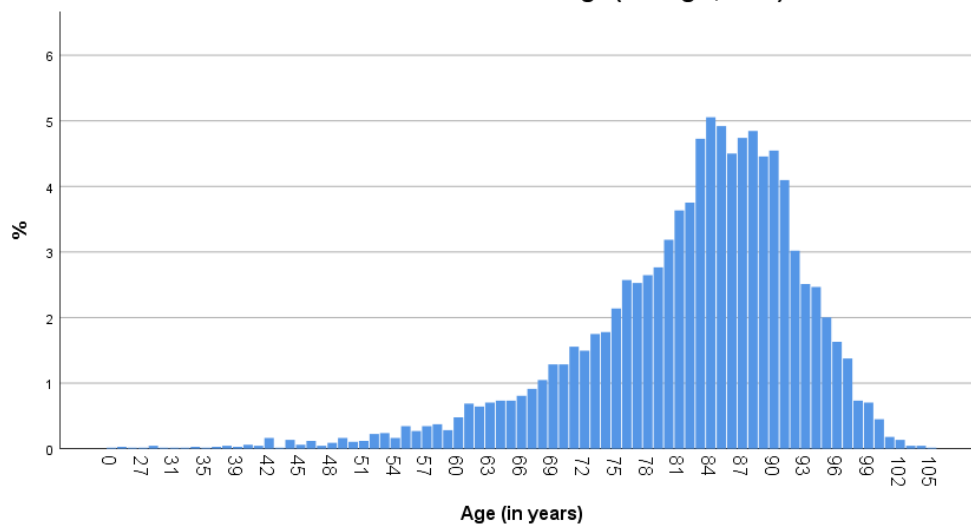


Figure S1. Weekly evolution of the Number of COVID-19 deaths, total (A) and by sex (B), and of new infected cases (C) in Portugal during 2020.

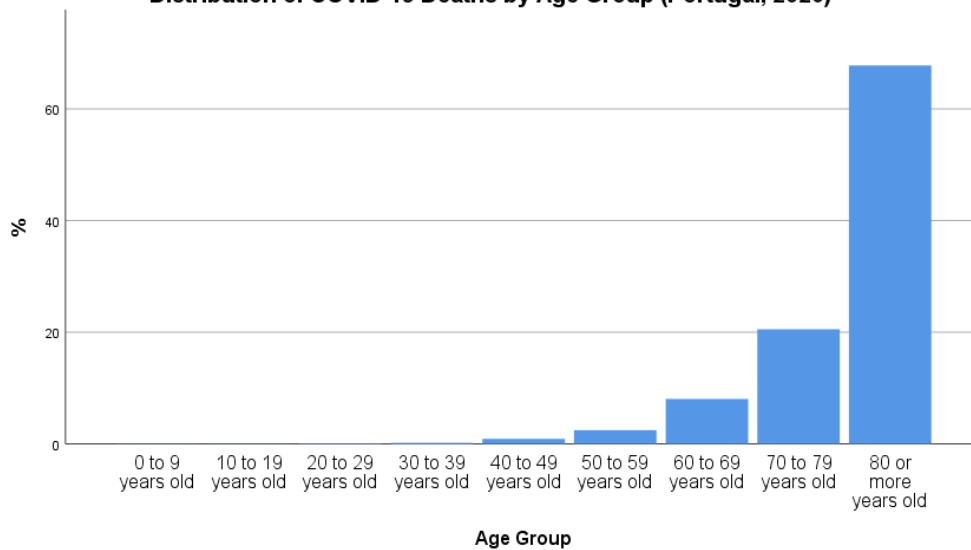
Notes: ISO Weeks numbers of 2020 are presented – week 53 is omitted because having only four days. **Abbreviations:** (T1) March 2 - June 2; (T2) June 3 - August 11; (T3) August 12 - December 31. Data source for (C): <https://github.com/CSSEGISandData>.

Distribution of COVID-19 Deaths' Age (Portugal, 2020)

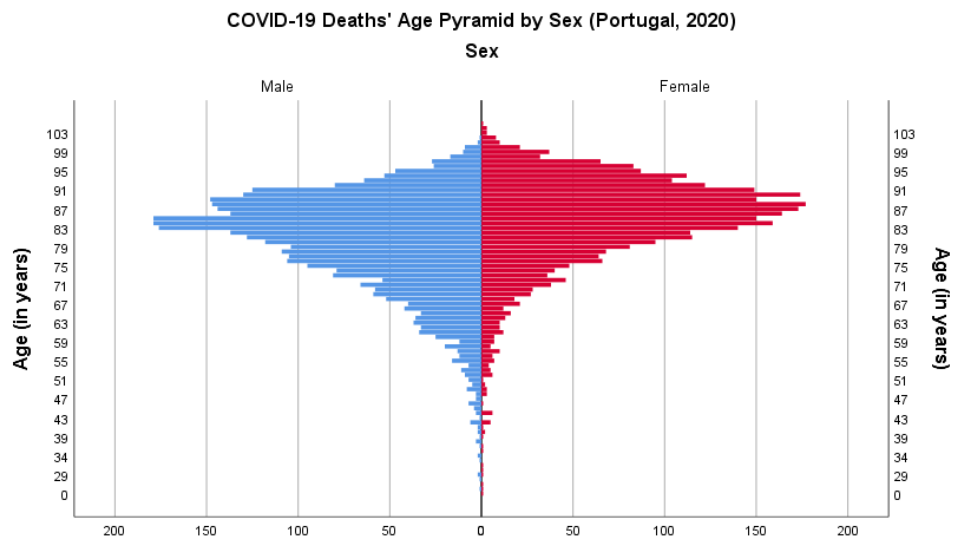


A

Distribution of COVID-19 Deaths by Age Group (Portugal, 2020)



B



C

Figure S2. Age distribution of COVID-19 deaths in Portugal during 2020.

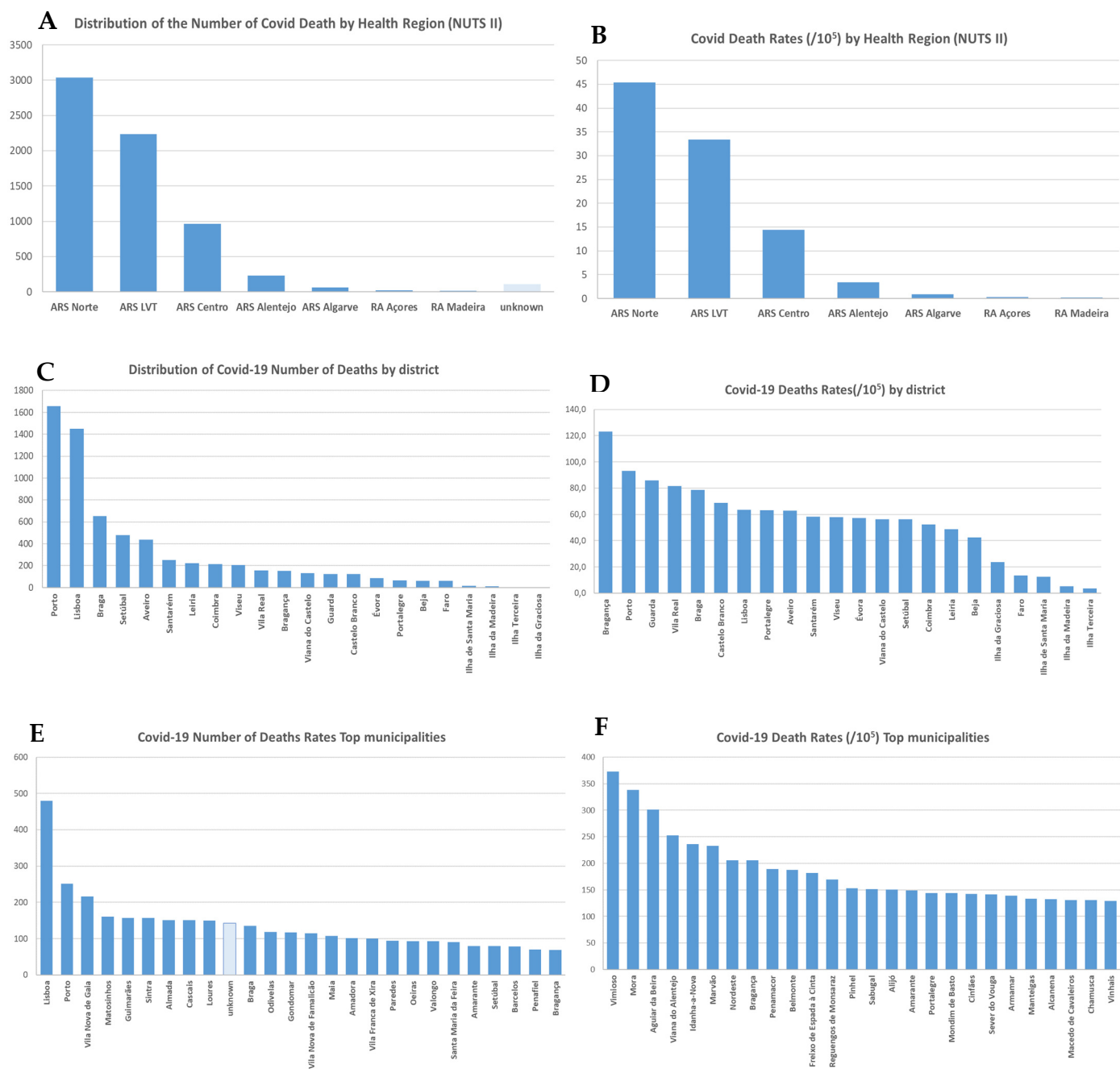
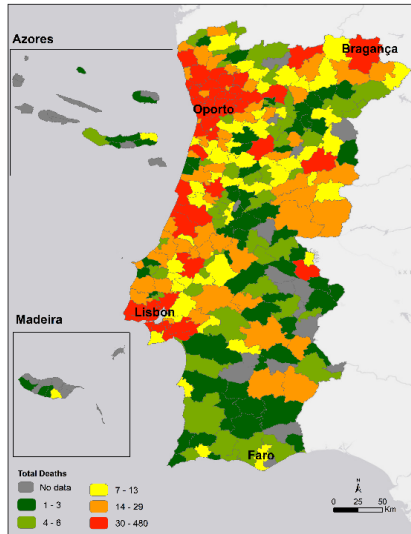
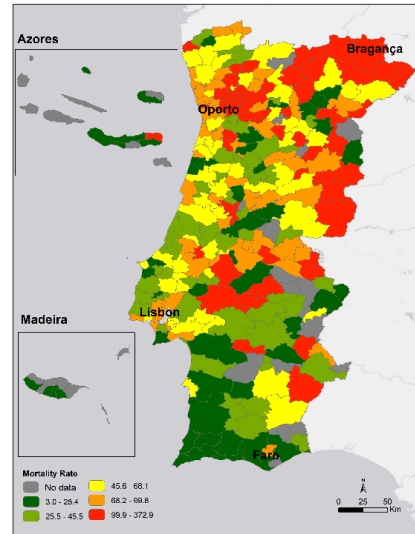


Figure S3. Distribution of COVID-19 number of deaths and COVID-19 death rates by health administrative region (A,B), district (C,D) and municipality of residence (E,F).

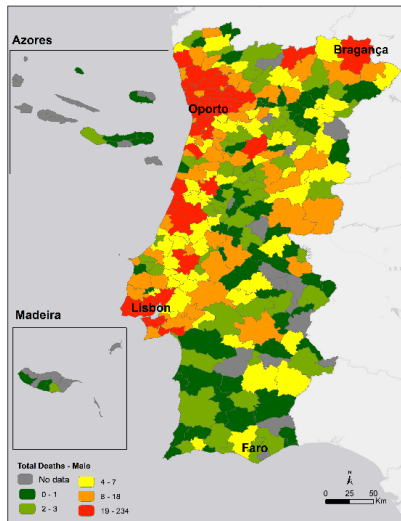
(A) Number of deaths by municipality



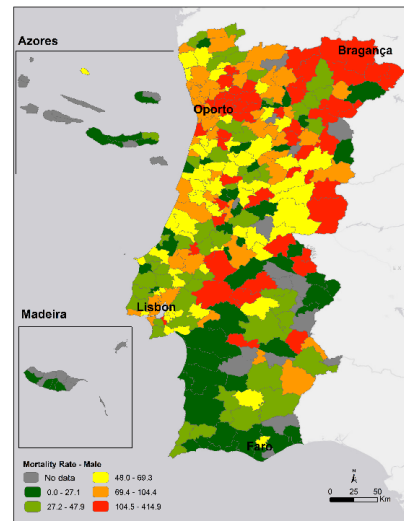
(B) CMR/100,000 inhab. by municipality



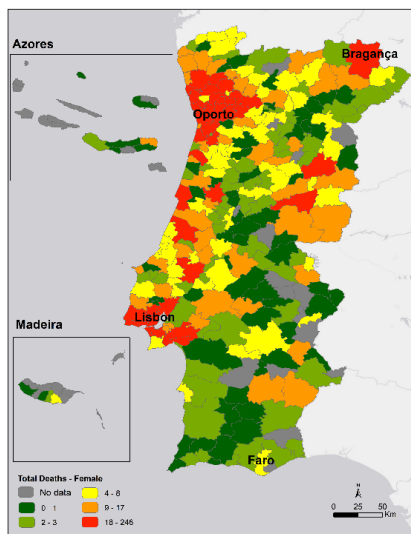
(C) Number of deaths by municipality - men



(D) CMR/100,000 men by municipality



(E) Number of deaths by municipality - women



(F) CMR/100,000 women by municipality

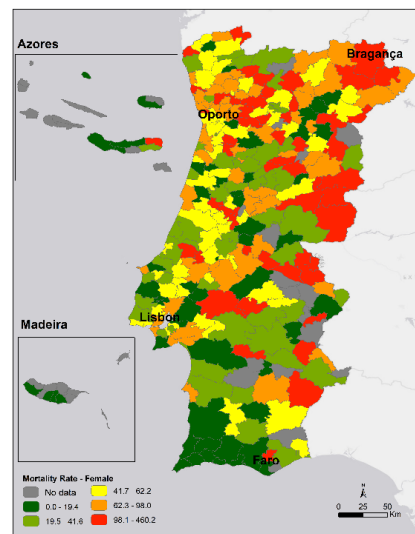


Figure S4. Geographical distribution of COVID-19 deaths by municipalities in absolute number and Crude Mortality Rates for total population (A,B), men (C,D), and women (E,F), Portugal, 2020.

Table S1. Age distribution and comparison by characteristics.

Age Distribution by Sex								
Sex	Median	Mean	Standard Deviation	Min - Max	1st - 3rd Quartiles	n	Missing	p-Value
Female	86	84.3	9.9	0 - 105	80 - 91	3192	7	<0.001
Male	82	79.9	10.7	19 - 102	74 - 88	3495	7	
Age distribution by age group								
Age groups	Median	Mean	Standard deviation	Min - Max	1st - 3rd quartiles	n	Missing	p-value
0 to 9 years	0	0	-	0 - 0	0 - 0	1	0	<0.001
10 to 19 years	19	19	0	19 – 19	19 – 19	2	0	
20 to 29 years	29	28	1.4	26 – 29	27 – 29	5	0	
30 to 39 years	37	35.5	3.1	30 - 39	34 – 38	13	0	
40 to 49 years	45	45	2.9	40 – 49	42 – 48	60	0	
50 to 59 years	56	55.4	2.6	50 – 59	53 – 58	165	0	
60 to 69 years	66	65.2	2.9	60 – 69	63 – 68	537	0	
70 to 79 years	76	75.2	2.8	70 – 79	73 – 78	1372	0	
> 80 years	87	87.8	4.9	80 – 105	84 – 91	4532	0	
Age distribution per district								
Districts	Median	Mean	Standard deviation	Min - Max	1st - 3rd quartiles	n	Missing	p-value
Aveiro	84	81	11.3	29 – 102	75 – 89	439	142	<0.001
Beja	87	85.2	9.7	45 – 99	81 – 92.2	60	142	
Braga	84	81.8	10.5	42 – 104	76 – 89	651	143	
Bragança	86	85.7	8.2	53 – 102	81 – 91	153	142	
Castelo Branco	87	85.7	9.1	49 – 105	81 – 92	122	142	
Coimbra	84.5	82.4	10.4	42 – 102	77 – 90	212	142	
Évora	86.5	84	9.8	42 – 98	81.2 – 90	86	143	
Faro	84	81	12.7	37 – 99	76.5 – 90	59	142	
Guarda	87	86	8.3	41 – 104	82 – 91	123	142	
Leiria	84	82.5	9.9	44 – 101	78 – 89	222	142	
Lisboa	84	81.6	11.3	0 – 102	76 – 89	1449	144	
Portalegre	85.5	84.4	8.6	61 – 102	80.2 – 90	66	142	
Porto	83	81	10.6	19 – 103	75 – 88	1650	151	
Santarém	84	83.6	9	46 – 104	79 – 90	250	142	
Setúbal	84	81.4	10.8	19 – 103	76 – 88	480	142	
Viana do Castelo	85	84.3	8.2	44 – 98	81 – 90	130	142	
Vila Real	84	83.2	9.3	55 – 99	77.5 – 90	155	143	
Viseu	85	83.9	10.4	31 – 100	80 – 90	205	142	
Madeira Island	87	85.6	8.9	64 – 97	80 – 91	13	142	
Santa Maria Island	84	80	13.8	48 – 99	73 – 90	17	142	
Terceira Island	80.5	80.5	12	72 – 89	76.2 – 84.8	2	142	
Graciosa Island	47	47	NA	47 – 47	47 – 47	1	142	
Age distribution by health region								
Health region	Median	Mean	Standard deviation	Min - Max	1st - 3rd quartiles	n	Missing	p-value
Unknown	83	80.7	10.1	49 - 101	75 - 88	142	0	<0.001
ARS Alentejo	87	84.7	9.3	42 - 103	81 - 90	227	1	
ARS Algarve	84	81.0	12.7	37 - 99	76.5 - 90	59	0	
ARS Centro	85	83.5	10.3	38 - 105	79 - 90	964	0	
ARS LVT	84	81.7	10.9	0 - 104	76 - 89	2234	2	

ARS North	84	81.7	10.9	19 - 104	76 - 89	3028	11	
ARA Açores	83	78.4	14.9	47 - 99	71.5 - 89.2	20	0	
ARA Madeira	87	85.6	8.9	64 - 97	80 - 91	13	0	
Age distribution by Death Place								
Death Place	Median	Mean	Standard deviation	Min - Max	1st - 3rd quartiles	n	Missing	p-value
Health Institution	84	81.8	10.5	0 - 104	76 - 89	6079	4	
At home	85	82.6	12	37 - 101	79 - 90	277	9	
Nursing home	89	87.1	8.7	60 - 105	83 - 93	280	0	
Private Health Institution	80	80.6	6	70 - 90	77 - 84.5	11	0	<0.001
<i>Unknown</i>	87.5	84.2	12.8	50 - 101	80.8 - 93	40	1	
Age distribution by Basic Cause of deaths								
Pandemic period	Median	Mean	Standard deviation	Min - Max	1st - 3rd quartiles	n	Missing	p-value
T1	84	82.0	10.8	26 - 104	77 - 89	1320	71	0.481
T2	83	81.0	11.6	38 - 101	75 - 89	262	71	
T3	84	82.2	10.5	0 - 105	77 - 89	5046	69	
Age distribution by Basic Cause of deaths								
Basic Cause	Median	Mean	Standard deviation	Min - Max	1st - 3rd quartiles	n	Missing	p-value
U071 (laboratory confirmed)	84	82.0	10.6	0 - 105	77 - 89	6598	12	
U072 (laboratory unconfirmed)	85	81.2	11.8	38 - 99	79 - 88	89	2	0.803

Notes: significant results are presented in bold font. **Abbreviations:** ARS, administrative region of health; RA, autonomous region. Periods: T1) March 2 - June 2; T2) June 3 - August 11; T3) August 12 - December 31.

Table S2. Percentual presence of comorbidities (according to the Elixhauser Comorbidity Index) by Health Region of residence and by time-periods.

Conditions	ARS Alentejo	ARS Algarve	ARS Centro	ARS LVT	ARS Norte	RA Azores	RA Madeira	P ^a	T1	T2	T3	P ^a
Hypertension, uncomplicated	25.44	34.43	27.67	30.13	30.88	10,00	61.54	0.068	28.59	31.82	30.22	0.537
Diabetes, uncomplicated	18.42	21.31	15.69	16.39	17.46	0,00	7.69	0.322	15.28	18.94	17.00	0.265
Congestive heart failure	9.65	14.75	13.78	15.24	14.51	10,00	15.38	0.501	14.75	11.74	14.53	0.487
Renal failure	10.53	9.84	13.68	12.95	12.74	5,00	15.38	0.765	13.31	11.74	12.78	0.782
Cardiac arrhythmias	7.89	16.39	10.97	10.35	10.82	10,00	7.69	0.600	10.59	7.95	10.74	0.399
Chronic pulmonary disease	6.58	8.20	6.84	7.14	7.22	5,00	15.38	0.944	6.73	6.82	7.25	0.804
Solid tumor, without metastasis	7.89	8.20	6.24	7.36	7.06	5,00	0.00	0.882	6.66	9.85	6.96	0.193
Obesity	7.02	9.84	4.02	4.67	5.84	0,00	7.69	0.076	4.77	4.92	5.37	0.676
Other neurological disorders	3.51	4.92	5.53	4.93	4.72	0,00	7.69	0.766	4.01	5.68	5.03	0.266
Fluid and electrolyte disorders	3.07	4.92	4.12	3.96	3.66	0,00	15.38	0.388	2.95	6.06	3.94	0.043
Valvular disease	2.19	6.56	2.92	3.08	3.18	0,00	7.69	0.577	3.10	1.14	3.21	0.176
Peripheral vascular disorders	3.07	1.64	1.91	1.98	2.15	0,00	7.69	0.725	1.82	1.52	2.18	0.579
Pulmonary circulation disorders	1.32	3.28	1.91	2.42	1.86	0,00	7.69	0.486	1.74	2.65	2.06	0.584
Hypertension, complicated	1.75	3.28	1.61	2.47	1.83	0,00	0.00	0.584	1.44	3.41	2.10	0.086
Hypothyroidism	3.51	1.64	1.21	2.20	1.67	0,00	0.00	0.245	1.59	3.03	1.82	0.285
Metastatic cancer	2.63	1.64	2.11	2.20	1.41	5,00	0.00	0.323	1.59	3.03	1.82	0.285
Depression	2.19	0.00	1.41	1.45	1.86	0,00	15.38	0.007	1.29	2.27	1.72	0.399
Diabetes, complicated	2.19	0.00	1.51	1.59	1.41	0,00	0.00	0.890	1.13	0.38	1.64	0.128
Liver disease	2.19	1.64	1.51	1.28	1.57	0,00	0.00	0.909	1.13	1.89	1.57	0.449
Deficiency anaemia	1.32	0.00	1.61	1.15	1.28	0,00	0.00	0.869	1.21	0.00	1.37	0.155
Rheumatoid arthritis/collaged vascular disease	0.88	0.00	0.70	1.32	1.35	5,00	0.00	0.413	1.21	0.76	1.21	0.805
Lymphoma	0.44	0.00	1.71	1.10	0.96	5,00	0.00	0.209	1.06	2.65	1.05	0.055
Weight loss	0.88	0.00	0.91	1.06	0.83	0,00	0.00	0.957	0.68	3.41	0.83	<0.001
Coagulopathy	0.44	0.00	1.21	0.93	0.58	0,00	0.00	0.455	0.61	1.14	0.81	0.604
Alcohol abuse	0.00	0.00	0.91	0.79	0.80	0,00	0.00	0.832	0.76	0.76	0.77	0.998

Psychoses	0.44	0.00	0.80	0.31	0.42	0,00	0.00	0.604	0.61	0.00	0.40	0.326
AIDS/HIV	0.00	0.00	0.30	0.22	0.48	0,00	0.00	0.681	0.15	2.27	0.30	<0.001
Paralysis	0.00	0.00	0.20	0.31	0.22	0,00	0.00	0.972	0.23	0.38	0.24	0.896
Peptic ulcer disease, excluding bleeding	0.00	0.00	0.30	0.04	0.19	0,00	0.00	0.651	0.23	0.00	0.12	0.529
Drug abuse	0.00	0.00	0.00	0.04	0.13	0,00	0.00	0.869	0.00	0.00	0.10	0.456
Blood loss anaemia	0.44	0.00	0.00	0.00	0.03	0,00	0.00	0.036	0.00	0.00	0.04	0.730

Notes: ^a Homogeneity test; significant results are presented in bold font. **Abbreviations:** ARS, administrative region of health; RA, autonomous region. Periods: T1) March 2 - June 2; T2) June 3 - August 11; T3) August 12 - December 31.

Table S3. Percentage of Elixhauser multimorbidity levels and Elixhauser weighted multimorbidity indexes highest levels by time-periods.

	Periods			p
	T1	T2	T3	
Elixhauser score > 1	38.1	42	26.6	<0.001
Elixhauser score > 2	20	20.1	14.5	<0.001
Elixhauser score > 3	8.3	9.1	6.1	0.004
Elixhauser index ≥ 5	3.2	4.2	2	0.004
Elixhauser Windex AHRQ ≥ 5	32.6	40.9	21.5	<0.001
Elixhauser Windex VW ≥ 5	34.8	39	23.2	<0.001

Notes: Elixhauser score > k – individuals with at least k+1 Elixhauser comorbidities identified in the death certificate. **Abbreviations:** T1 - March 2 - June 2; T2 - June 3 - August 11; T3 - August 12 - December 31.