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Excess Mortality During 2020 in Spain: The Most Affected Population, Age, and Educational Group by the COVID-19 Pandemic

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Original Research

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Abstract

Objective: The objective of this work was to study mortality increase in Spain during the first and second academic semesters of 2020, coinciding with the first 2 waves of the Covid-19 pandemic; by sex, age, and education.

Methods: An observational study was carried out, using linked populations and deaths' data from 2017 to 2020. The mortality rates from all causes and leading causes other than Covid-19 during each semester of 2020, compared to the 2017–2019 averages for the same semester, was also estimated. Mortality rate ratios (MRR) and differences were used for comparison.

Results: All-cause mortality rates increased in 2020 compared to pre-covid, except among working-age, (25–64 years) highly-educated women. Such increases were larger in lower-educated people between the working age range, in both 2020 semesters, but not at other ages. In the elderly, the MMR in the first semester in women and men were respectively, 1.14, and 1.25 among lower-educated people, and 1.28 and 1.23 among highly-educated people. In the second semester, the MMR were 1.12 in both sexes among lower-educated people and 1.13 in women and 1.16 in men among highly-educated people.

Conclusion: Lower-educated people within working age and highly-educated people at older ages showed the greatest increase in all-cause mortality in 2020, compared to the pre-pandemic period.

Background

The COVID-19 pandemic has been a threat to the health of the world's population. The advent of the pandemic brought on an additional burden due to exacerbations of chronic underlying conditions such as diabetes and hypertension, that can lead to death.[1,2] Also, COVID-19 may have increased mortality from other causes of death. Access to the healthcare system for non-COVID-19 patients was reduced, and there were delays in seeking medical help due to the public's fear of becoming infected, which could have increased deaths from heart disease, and some cancers.[3–5] Likewise, lockdown and social distancing may have decreased mortality from other infectious diseases, but triggered mental problems, and increased anxiety and despair in many people, which potentially increased the risk of suicide, alcohol-, or drug-related mortality.[6–9] A decrease in economic activity and travels may also have reduced mortality from work-related and traffic accidents.[10–13]

After the COVID-19 pandemic, many authors predicted a higher potential health impact in low socio-economic groups and a greater number of excess deaths in them when compared to high socioeconomic groups.[14–16] They based their prediction on socially unequal exposure to the SARS-CoV-2 coronavirus (the causative agent), and factors such as cramped living conditions, mutigenerational living, and occupational exposure, along with social disparity in COVID-19 prognosis related to concurrent chronic disease, whose prevalence shows an inverse relationship with socio-economic status.[17–19]

Existing research reflects higher COVID-19 mortality in low socio-economic people and those living in the most disadvantaged areas.[20–24] However, when the relationship between Human Development Index (HDI) (an indicator of the socio-economic status of countries), and

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Table 1. Total death during the first and second semesters of 2017-2019 and 2020 and excess deaths in 2020 compared to 2017-2019 annual average, by sex and age

	First semester			Second semester		
Sex and age	2017–2019	2020	Excess deaths in 2020	2017–2019	2020	Excess deaths in 2020
Women						
Total	325 514	129 412	20 907	288 291	110 019	13 922
25–64 yr	27 094	10 190	1 159	26 556	9 694	842
65–74 yr	28 194	11 202	1 804	26 951	10 397	1 413
≥75 yr	270 226	108 020	17 945	234 784	89 928	11 667
Men						
Total	325 755	129 473	20 888	296 203	113 643	14 909
25–64 yr	54 246	19829	1 747	52 513	19 269	1 765
65–74 yr	57 663	22 775	3 554	54 445	20 417	2 269
≥75 yr	213 846	86 869	15 587	189 245	73 957	10 875

COVID-19 pandemic was examined, the findings were unexpected. During the early months of the pandemic, countries with the highest HDI reported more cases per million of population, and registered higher death rates than countries low on the HDI scale.[25–28] The analyses carried out at the regional or municipal levels offer heterogeneous results, especially in low HDI countries.[29–33] In any case, these are ecological studies that have not considered confounding factors, such as the socio-economic characteristics of the residents. Therefore, the observed findings cannot be inferred at the individual level. In addition, this evidence does not clarify whether the change in mortality, compared to the pre-pandemic period, was greater in low socio-economic groups.

In order to verify whether or not the changes in all-cause mortality and in mortality from the leading causes of death were of the same magnitude in individuals according to socio-economic status, this study verifies this issue in Spain, 1 of the countries most affected by the pandemic. Spain is the OECD country, along with the United States, that showed the greatest reduction in life expectancy in 2020.[34] The objective is to show mortality rates from COVID-19 during the first year of the pandemic and assess the changes in all-cause and cause-specific mortality during that year, compared to pre-pandemic period, by sex, age, and educational level.

Methods

Data Sources

This is an observational study of linked data. To calculate excess mortality in 2020, we used the years 2017 to 2019 as reference. Data on population and deaths in Spain during 2017 -2020 by sex, age, the highest educational level attained, and calendar time were provided to the researchers by the National Statistics Institute. The population file contained residents' data on January 1 and July 1 of each year, and it was filled from several information sources such as population censuses, municipal population registers, and other administrative information systems. Death files also contained data on underlying cause, setting of occurrence (hospital, care home, family home, and other), and month of death. All variables of the death file were collected on the medical death certificate, except educational level which was assigned by National Statistics Institute to each deceased aged 25 years or over from the population file. The underlying cause of death was coded according to the International Classification of Diseases, 10th revision. About 2% of deaths in each calendar year were excluded from the analysis because information on educational level was missing.

Statistical Analysis

All results were stratified by sex, age, and education level. Most excess deaths in 2020 compared to pre-pandemic period were observed among elderly people (75 years old and older), and because at working age (25 to 64 years), some employment relationships can lead to greater exposure to SARS-CoV-2, the age categories for the analyses have been 25–64, 65–74 and ≥ 75 years. Educational level was categorized as low (primary education or less, up to 6 years of education), medium (secondary education, up to 12 years) and high (bachelor´s degree or higher).

We estimated age-standardized mortality rate from COVID-19 per 100 000 person-years during the first and second semesters of 2020, coinciding with the first and second COVID-19 epidemic waves, as well as the relative variation in mortality during the second semester compared to the first. Standardization weights came from the 2013 European Standard Population. We also estimated age-standardized mortality rate from all-causes and the leading causes of death other than COVID-19, during the first and second semester of the combined 3 years of 2017 to 2019 and 2020. In each subgroup, we estimated the relative increase in all-cause mortality in each semester of 2020 compared to the same semester of pre-pandemic period, by calculating the mortality rate ratio using Poisson regression. We also presented the contribution of mortality from the leading causes other than COVID-19 to increase all-cause mortality, by calculating the mortality rate difference per 100 000 person-years.

Finally, given that excess deaths during 2020 were reported in care homes where a high percentage of the vulnerable population lives,[34,35] we calculated the proportion of the total deaths in care homes in the population sub-groups analyzed, and the proportions' difference in each semester of 2020 compared to the same semester of pre-pandemic period.

Results

During the first semester of 2020, there was an excess of 20 907 deaths among women and 20 888 deaths among men, compared to the average of the first semester of the 2017–2019 3-year period. During the second semester, excess deaths were 13 922 and 14 909, respectively (Table 1). Most of the excess deaths (around 85% in women and 74% in men) occurred among elderly people.

The mortality rate from COVID-19 in 2020 showed an inverse educational gradient, except among the elderly during the first semester where the highest mortality was observed in

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Table 2. Age-standardized mortality rate from COVID-19,[¥] according to educational level by sex and age in both semesters of 2020 and percentage change in the mortality rate between semesters

	Mortality rate per 100 000 person-years						Percent change in mortality rate (2nd vs. 1st semester)[ǂ]		
	First semester			Second semester					
Educational level	Low	Medium	High	Low	Medium	High	Low	Medium	High
Sex and age									
Women									
25–64	35	12	7	27	8	5	−22.9	−32.0	−33.8
65–74	164	128	118	107	74	44	−34.8	−42.4	−62.9
≥75 yr	1 194	1 219	1 269	713	662	628	−40.3	−45.7	−50.5
Men									
25–64	58	30	28	44	22	14	−24.9	−27.5	−50.1
65–74	373	348	333	255	222	159	−31.7	−36.3	−52.3
≥75 yr	1 825	1 938	2 000	1 188	1 176	1 106	−34.9	−39.3	−44.7

[¥]Corresponds to codes U07.1 (COVID-19, virus identified) and U07.2 (COVID-19, virus not identified) of the International Classification of Diseases, 10th revision.
[ǂ]Percentage change in mortality rate: ([mortality rate in the second semester-mortality rate in the first semester]/mortality rate in the first semester)*100.

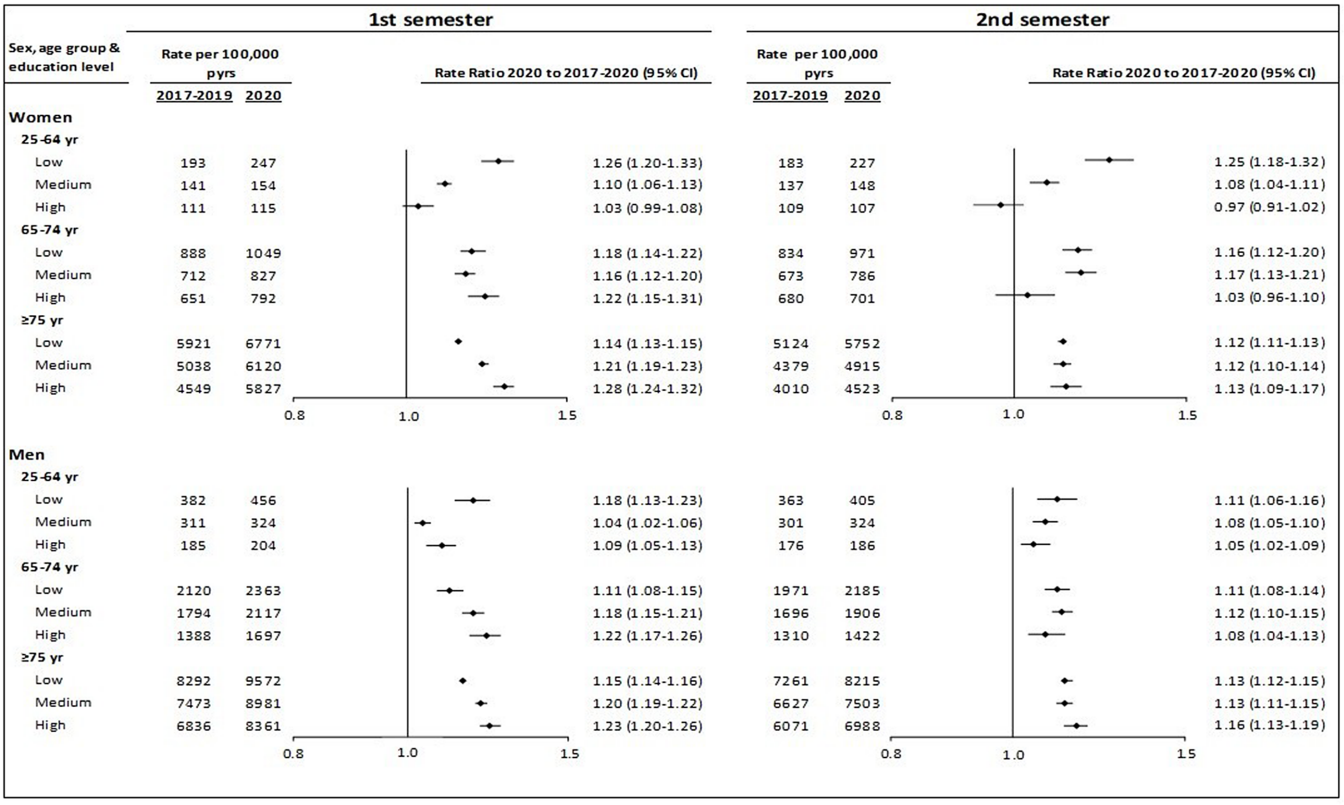

Figure 1. Comparison of the six-monthly all-cause mortality rate between 2020 and the period 2017–2019 by sex, age group and educational level. The mortality rate ratio represents the relative excess mortality in each semester of 2020 with respect to the same semester of combined three-year 2017–2019. pyrs: person-years at risk.

highly-educated people. COVID-19's mortality rate decreased considerably in the second semester compared to the first. A larger relative reduction among highly-educated people (compared to lower-educated people) was observed, which led to an increase in the COVID-19 mortality advantage among well-educated people under 75 years old, and to a disappearance or reversal of the COVID-19 mortality advantage among lower-educated elderly people in second half of 2020 (Table 2).

Figure 1 shows the 6-month all-cause mortality rates in 2020 and the combined 3-years mortality rates in 2017-2019, as well as the average semester mortality rate ratios of 2020 to 2017–2019. There were increases in all-cause mortality rates in 2020, with mortality rate ratios greater than 1, among all subgroups, except highly-educated women in the second semester. Such increases were generally larger in the first than the second semester, especially among highly-educated people. Among working-age people, the increases were larger in lower- than highly-educated people in both semesters. At other ages, the educational patterns of increased mortality rates were heterogeneous by semester. Thus, in the first semester, the mortality rate ratio was larger in

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Table 3. Differences in mortality rates from all causes and from leading causes of death (except Covid-19) per 100 000 person-years in each semester of 2020 compared to the same semester of 2017-2019 by sex, age and educational level

	Semester of the year											
Sex Education level	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
*Age group and cause of death**												
25–64 yr												
All causes	53	13	4	75	13	19	44	11	−2	42	23	10
All causes other than Covid-19	18	1	−3	16	−17	−8	17	2	−7	−2	1	−3
Cancer	3	0	−3	−5	−11	−8	7	−2	−9	−17	−8	−6
Cardiovascular diseases	5	0	0	2	−1	2	1	1	2	8	9	3
Respiratory diseases	1	0	0	3	−2	1	0	0	0	1	−1	0
Digestive diseases	2	0	0	0	−1	0	3	2	0	0	1	0
External causes	0	1	0	10	2	−1	0	1	1	8	3	2
Rest of the causes	8	0	1	8	−3	−1	6	0	−1	−3	−3	−2
65–74 yr												
All causes	162	114	142	244	323	309	137	113	21	215	210	112
All causes other than Covid-19	−3	−14	24	−130	−25	−24	30	39	−23	−40	−11	−46
Cancer	−7	−8	15	−87	−20	−6	20	10	−5	−82	−10	−35
Cardiovascular diseases	−6	−7	3	−19	−11	−13	11	12	−8	33	25	1
Respiratory diseases	5	−3	2	−15	−16	−11	0	−1	−10	−32	−26	−7
Digestive diseases	1	−1	8	−17	11	−2	4	3	1	5	6	−3
External causes	−4	−6	−4	4	3	6	−1	2	−7	3	0	−6
Rest of the causes	8	11	−1	5	8	2	−4	12	7	32	−8	5
≥75 yr												
All causes	850	1 082	1278	1279	1 509	1524	628	537	513	954	876	917
All causes other than Covid-19	−344	−137	9	−546	−429	−475	−85	−125	−115	−233	−300	−189
Cancer	−18	−10	7	−52	−53	−98	-17	−7	36	−78	−67	−40
Cardiovascular diseases	−157	−80	−4	−134	−135	−132	5	−32	−72	6	−23	−86
Respiratory diseases	−173	−129	−59	−285	−238	−204	−141	−102	−109	−204	−152	−98
Digestive diseases	−13	−1	20	−27	−21	−39	−2	−9	28	0	−2	33
External causes	−3	−17	−14	−13	−15	−2	−5	−10	15	2	−16	−21
Rest of the causes	20	98	60	−34	34	0	76	36	−13	40	−40	22

*Codes of International Classification of Diseases, 10th revision (ICD-10): cancer (C00-C97), cardiovascular diseases (I00-I99), respiratory diseases (J00-J99), digestive diseases (K00-K93), external causes (V01-Y98).

highly-educated than lower-educated, and people aged 65 to 74 years, as well as the elderly, whereas in the second semester such a pattern was only observed among the elderly. The mortality rate ratio (95% confidence interval) in lower-versus highly-educated elderly people was 1.28 (1.24–1.32) vs. 1.14 (1.13–1.15) in women and 1.23 (1.20–1.26) vs. 1.15 (1.14–1.16) in men in the first semester, and 1.13 (1.09–1.17) vs. 1.12 (1.11–1.13) in women and 1.16 (1.13–1.19) vs. 1.12 (1.12–1.15) in men in the second semester.

Tables 3 and S1 show differences in mortality rates from all-causes and from leading-cause-of-death other than COVID-19 for 2020 and 2017–2019 in the first and second semester. Differences are positive or negative reflecting that mortality rate was higher or lower during 2020 than in the pre-pandemic period. In general, the mortality rate from all causes other than COVID-19 increased in lower-educated working-age people, adding to the COVID-19 mortality, and decreased in highly educated people, which buffered excess mortality from COVID-19. Among people aged 65–74 years, the differences in mortality rate from all causes other than COVID-19 per 100 000 person-years in lower- vs. highly-educated people were −3 vs. 24 in women and −130 vs. −24 in men during the first semester, and 30 vs. −23 in women and −40 vs. −46 in men during the second semester. Among elderly people, those differences were −344 vs. 9 in women and −546 vs. −475 in men during the first semester, and −85 vs. −115 in women, and −233 vs. −189 in men during the second semester.

The proportion of care home deaths in the first semester of 2020 compared to the same semester of 2017–2019 hardly changed among people under 75 years of age and even decreased in highly-educated people (Table 4). Among the elderly, the proportion went from 20.0% to 26.6% in women, and from 13.0% to 16.4% in men. Highly-educated elderly people showed the smallest increase. In the second semester of 2020, the proportion of care home deaths decreased compared to the same semester of the pre-pandemic period.

Discussion

Main Findings

In 2020, lower-educated people in Spain showed the highest COVID-19 mortality in the age groups analyzed, except in the elderly during the first semester of 2020.

The comparison of all-cause mortality during 2020, and that observed in the pre-pandemic period, showed that lower-educated people within working age and highly-educated people at older ages displayed the greatest relative increase in all-cause mortality. The exception was mortality during the second semester in people

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Table 4. Percentage of total deaths in care home during the first and second semesters of 2017 - 2019 and 2020, and percentage difference by sex, age, and educational level

Sex, age and educational level	First semester			Second semester		
	2017–2019	2020	Difference	2017–2019	2020	Difference
Women						
25–64 yrs						
Total	3.0	3.2	0.2	2.8	2.6	−0.3
Low	5.0	6.7	1.6	5.2	4.9	−0.3
Medium	2.6	2.6	0.0	2.9	2.0	−0.9
High	2.1	2.0	−0.1	1.8	2.2	0.3
65–74 yrs						
Total	6.6	7.5	0.9	6.6	5.4	−1.2
Low	7.4	9.0	1.6	7.2	6.4	−0.8
Medium	5.7	6.4	0.8	6.0	5.0	−1.0
High	6.6	6.5	−0.1	6.0	3.8	−2.3
≥75 yrs						
Total	20.0	26.6	6.6	19.9	18.0	−1.9
Low	19.9	26.5	6.5	19.9	18.3	−1.6
Medium	20.2	27.2	7.0	20.3	17.3	−2.9
High	19.7	25.6	5.8	18.7	17.3	−1.4
Men						
25–64 yrs						
Total	2.7	2.8	0.1	2.5	2.2	−0.4
Low	4.7	6.2	1.5	4.3	4.4	0.2
Medium	2.3	2.3	0.0	2.2	1.9	−0.3
High	2.1	1.8	−0.3	1.8	1.3	−0.5
65–74 yrs						
Total	5.5	6.0	0.5	5.3	4.2	−1.0
Low	6.5	7.5	1.0	6.0	5.5	−0.5
Medium	4.9	5.5	0.5	4.9	3.8	−1.1
High	4.6	5.0	0.4	4.6	3.5	−1.1
≥75 yrs						
Total	13.0	16.4	3.4	13.0	10.3	−2.7
Low	13.6	17.4	3.9	13.6	11.2	−2.5
Medium	12.2	15.1	2.9	12.1	9.3	−2.8
High	10.9	13.7	2.8	11.0	7.8	−3.1

aged 65 to 74 years, since the greatest relative increase occurred among averagely-educated people.

These findings confirm the observed decrease in life expectancy by educational level during 2020 compared to 2019 in Spain. Life expectancy from 25 to 64 years showed the largest decline in lower-educated people, while life expectancy at age 65 did in highly-educated people.[36]

Comparison With Other Studies and Possible Explanations for Findings

COVID-19 mortality

A study carried out in the USA showed the highest COVID-19 mortality during 2020 among people with the lowest educational attainment.[22] This study is an exception, since most studies have analyzed the relationship between the socio-economic status of the area of residence and COVID-19 mortality. Both in countries with high HDI and in countries with low HDI, the mortality was higher in areas of social disadvantage than in affluent areas.[37] However, 2 studies among the Spanish people showed higher COVID-19 mortality rates in more advantaged areas.[38,39] It must be taken into account that in some European countries with high HDI such as Italy, Germany, France, and Spain, the areas most affected by the pandemic in the early stage were the wealthy areas,[29,38–40] and among people of high socio-economic status. In fact, 2 sero-prevalence studies of anti-SARS-CoV-2 antibodies, in France and in Spain, showed the highest frequency of SARS-CoV-2 infection among people with high income or with the highest educational attainment in the first wave of the pandemic.[41,42] This would explain our findings in COVID-19 mortality according to educational level in the elderly during the first semester of 2020.

Inadequate access to health care services, as an explanation for our findings on excess COVID-19 mortality among lower-educated people, is hardly plausible due to universal coverage of the National Health Service. People with high socio-economic status additionally use private health services more frequently,[43] and they could have had greater availability of SARS-CoV-2 tests, especially in the first wave, when the testing capacity of the National Health Service was limited, and also greater access to additional health care. It is unlikely that this would have happened as highly-educated elderly people showed the highest COVID-19 mortality during the first half of 2020.

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The results suggest that COVID-19 mortality mainly reflects the socio-economic patterns in the frequency of SARS-CoV-2 infection by age in the Spanish population,[44] as well as in the transmission of SARS-CoV-2 during the second wave related to mobility and changes in social distancing behavior.[45,46] A study revealed higher frequency of infection in low-income, working-age adults, and an increase of the economic difference in such frequency during the second wave.[47] Among working-age adults, a large proportion of lower-educated people are low-paid workers with jobs that do not allow remote work and require direct contact with people, thereby increasing their risk of exposure to the virus. The decrease in COVID-19 mortality in the second semester is consistent with the decrease in the incidence of SARS-CoV-2 infection during the second wave.[48] The increase of workers who could telecommute can explain the higher reduction in COVID-19 mortality during the second half of 2020 in highly-educated people; to this we add in their advanced knowledge and ability to protect themselves from the virus exposure due to the greater digital skills that facilitate relations without physical presence.

At other ages, household size and co-residence patterns could have shaped socioeconomic disparities in the frequency of infection.[49,50] Households showed the highest transmission rates of SARS-CoV-2 in studies investigating transmission in various settings.[42,51–53] Susceptibility to infection increased sharply with age and was higher for spousal than for other family contacts.[51,52] In Spain, a high proportion of people aged 64 and over live with their partner. Among those aged 65 to 74 years, the proportion is higher in lower-educated people.[54] However, among the elderly and highly-educated, the life course inverse educational gradient in mortality reduces the risk of being widowed. Therefore, at this advanced age, SARS-CoV-2 infection of a highly-educated individual, during the first wave, could have caused more COVID-19 deaths through within-household transmission compared to infection of a lower-educated individual. As a highly-educated partner is more frequent among highly-educated people, a large proportion of these deaths would correspond to highly-educated people. During the COVID-19 second wave, the elderly showed the lowest incidence of SARS-CoV-2 infection.[48] Probably, the reactive behavior of citizens to avoid contact with older relatives contributed to it. This behavior was more frequent among people of high socio-economic status,[46] and possibly, virus penetration was lower in the homes of highly- educated elderly people, reflected in the higher reduction in COVID-19 mortality.

Mortality in 2020 Compared to the Pre-Pandemic Period

Very few studies have compared mortality during 2020 with mortality in the pre-pandemic period according to socio-economic status. Most of them have focused on the analysis of all-cause mortality. In countries with high HDI and those with low HDI, the increase in all-cause mortality was higher in areas of social disadvantage than in affluent areas.[55–58] Two studies, 1 carried out in California and the other in Korea, found the greatest increase in all-cause mortality among lower-educate people.[59,60] The authors did not estimate results by age group and education, despite the greatest increase in mortality occurring in older people, with the lowest level of education.

Our study shows heterogeneity of findings. In some population subgroups, the observed increase in all-cause mortality in 2020 compared to previous years was due to mortality from both COVID-19 and other causes of death, such as cancer and cardiovascular disease. Delay in timely diagnosis and early initiation of treatment in cancer patients could be responsible for the increased mortality from cancer among working-age lower-educated women, and some education subgroups aged 65 to 74. Regarding mortality from cardiovascular diseases, in addition to the delay in seeking medical care, the appearance of ischemic stroke, and acute myocardial infarction in patients with COVID-19 cannot be ruled out.[61,62] Among men under 75 years of various education levels, cardiovascular mortality also increased, but cancer mortality decreased. There is evidence that some cancer patients have high mortality if infected with SARS-COV-2,[63,64] and perhaps some deaths in such patients could have been certified as COVID-19. Among working age, lower-educated men, external causes of death, and COVID-19, were the causes that most contributed to the increase in all-cause mortality, in part due to drug overdose deaths.

Mortality from diabetes and hypertension increased in several subgroups aged 65 to 74 years and virtually in any subgroups of the elderly. Nevertheless, in these subgroups of population, the multiple co-morbidities contributed to the decrease in mortality from all causes of death other than COVID-19 during 2020 with respect to previous years. Many of the COVID-19 deaths occurred in people who would have died from cancer, cardiovascular, respiratory, or digestive diseases. Probably, the high prevalence of comorbidities in low-educated people led to a greater reduction in mortality from those causes, which buffered excess mortality from COVID-19. This would explain the larger increase in all-cause mortality during 2020 in highly-educated people than lower-educated people, even in the second semester among the elderly when an inverse educational gradient in COVID-19 mortality was observed.

Evidence reflects that the fast spread of SARS-CoV-2, after its introduction in care homes, resulted in high mortality during the first wave due to multiple comorbidities among residents aged 65 year and older.[35,65–68] Mortality in care homes dropped during the second wave, probably due to improved clinical management, additional equipment, and selective survival of the healthiest residents. Our results support these findings and suggest little contribution of care home deaths to excess all-cause mortality among people aged 65–74 during the first semester of 2020, compared to the same semester of previous years. Even highly-educated people showed the highest relative excess in all-cause mortality rate, while the proportion of care homes' deaths barely changed or decreased in this subgroup population. In contrast, deaths in care homes contributed to excess mortality in the elderly during the first semester of 2020, compared to the same semester of the pre-pandemic period. Alas, these deaths do not explain the change in all-cause mortality with respect to education, since highly-educated elderly people showed the lower increase in proportion of care homes' deaths but the higher relative excess in all-cause mortality rate.

Limitations of This Study

As noted, COVID-19 may not have been the underlying cause of death in some deceased yet certified as COVID-19 deaths, while in other COVID-19 related death, the certified underlying cause may have been another illness, neglected mainly at the beginning of the pandemic due to a lack of diagnostic tests. It is unknown if this misclassification varied by education level. In any case, such misclassification does not affect the findings on all-cause mortality. Likewise, the use of only 1 measure of socioeconomic position may be another weakness, since other measures could have yielded

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different results. However, some indicators of wealth or income in the Spanish population show a linear relationship with education level.[45,69]

Conclusion

Similar to other places, excess deaths in Spain during the first year of the COVID-19 pandemic were concentrated in elderly persons. Our findings reflect that lower-educated people within the working age, and highly-educated people at older ages showed the greatest increase in all-cause mortality compared to the pre-pandemic period.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/dmp.2024.17

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