

The Income Gradient in Mortality during the Covid-19 Crisis: Evidence from Belgium

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- **Health Inequality:**

- Focus in economics on documenting and understanding inequalities
- Persistence in health inequalities is major challenge (*failure*) for modern welfare state

- **New Data Opportunities:**

- De-identified population-wide administrative registers (tax, social security, health, education, etc.) linked at the individual level
- Powerful (*under-used*) tool to generate evidence-base to inform and evaluate policy

- Strong socio-economic gradient in (economic & health) impact of the Covid pandemic...
- ...but inequalities were already high before the pandemic
- **Question:** Has Covid worsened the inequalities?

Our Approach

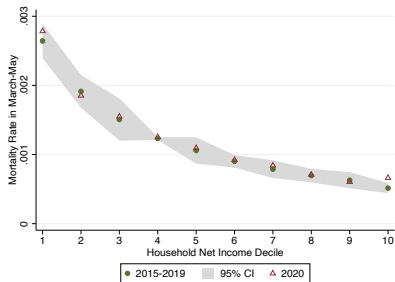
- Link individual-level data on socio-economic status (income, education, sector, migration) to mortality records (in July 2020) through Statbel
- Focus on excess mortality rather than Covid-related mortality – *causal impact of Covid pandemic*
- Compare analysis at the individual level and geographic level – *shed light on different mechanisms*

Major Findings

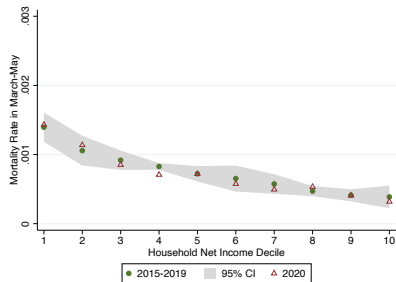
- 1 Strong negative income gradient in excess deaths...
- 2 ... but the income gradient in overall mortality was comparable to normal times (when expressed in relative terms)
- 3 Income gradient is substantially steeper at municipality-level than at individual-level

Income Gradient in Mortality

Men 40-64



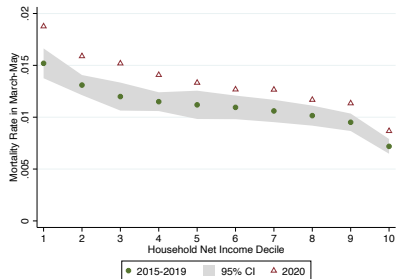
Women 40-64



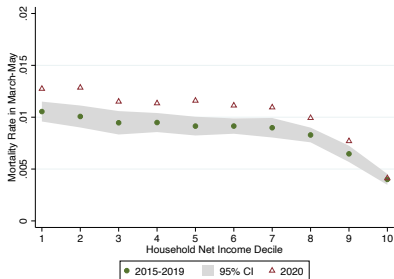
Notes: These figures show the average mortality rate by income decile in March-May of 2015-2019, with a 95% confidence interval, and in March-May of 2020. They show mortality rates for all Belgian individuals aged 40-64, excluding people living in collective households or households with more than 10 individuals.

Income Gradient in Mortality

Men 65+



Women 65+

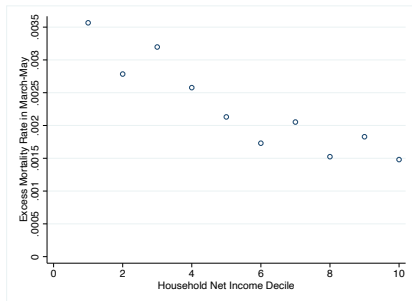


Notes: These figures show the average mortality rate by income decile in March-May of 2015-2019, with a 95% confidence interval, and in March-May of 2020. They show mortality rates for all Belgian individuals aged 65+, excluding people living in collective households or households with more than 10 individuals.

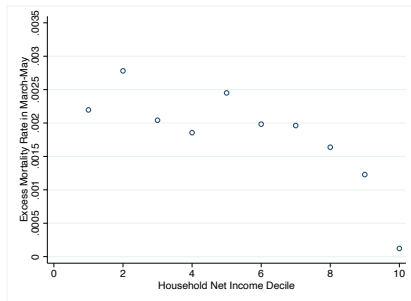
► Individuals in Nursing Homes

Income Gradient in Absolute Excess Mortality

Men 65+



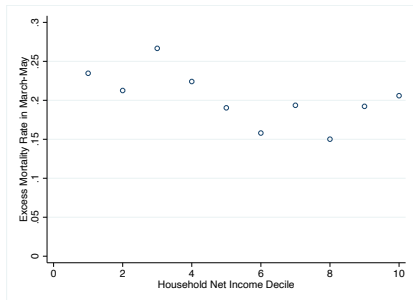
Women 65+



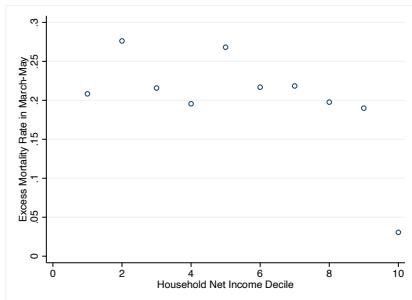
Notes: These figures plot the excess mortality rate by income decile in March-May 2020 for individuals aged 65 or older, excluding people living in collective households, or households with more than 10 individuals.

Income Gradient in Relative Excess Mortality

Men 65+



Women 65+



Notes: These figures plot the excess mortality rate by income decile in March-May 2020 for individuals aged 65 or older, excluding people living in collective households, or households with more than 10 individuals. The P-Score is defined as excess mortality in 2020 divided by average mortality in 2015-2019 within the associated group.

Major Findings

- 1 Strong negative income gradient in excess deaths...
- 2 ... but the income gradient in overall mortality during 1st wave has been comparable to normal times (when expressed in relative terms)
- 3 Income gradient is substantially steeper at municipality-level than at individual-level
 - Individual-income differences in excess-mortality are partly explained by where individuals live
 - Municipal-income differences in excess-mortality are fully explained by number of Covid infections

Individual vs. Municipal-Level Income

	<i>Dependent Variable:</i>						Municip. Mortality Rate in March-May (7)
	Indiv. Mortality in March-May (0/1)						
	(1)	(2)	(3)	(4)	(5)	(6)	
Log Household Income	-0.00419*** (0.00006)	-0.00101*** (0.00006)	-0.00097*** (0.00006)	-0.00092*** (0.00006)	-0.00094*** (0.00006)	-0.00094*** (0.00006)	
Year 2020 X Log Household Income	-0.00173*** (0.00015)	-0.00041*** (0.00015)	-0.00025 (0.00015)	-0.00019 (0.00015)	-0.00021 (0.00015)	-0.00023 (0.00015)	
Log Per Capita Municipality Income				-0.00355*** (0.00020)	-0.00406*** (0.00030)	-0.00397*** (0.00031)	-0.00419*** (0.00027)
Year 2020 X Log Per Capita Municipality Income				-0.00446*** (0.00054)	-0.00221*** (0.00078)	-0.00006 (0.00081)	-0.00395*** (0.00082)
Constant	0.05270*** (0.00058)	0.02124*** (0.00054)	0.02055*** (0.00055)	0.06243*** (0.00187)	0.07031*** (0.00266)	0.06580*** (0.00276)	0.05099*** (0.00266)
Age-Time FE	NO	YES	YES	YES	YES	YES	NO
Municipality-Time FE	NO	NO	YES	NO	NO	NO	NO
Municipality Controls	NO	NO	NO	NO	YES	YES	NO
Number of Cases Control	NO	NO	NO	NO	NO	YES	NO
Observations	12,156,397	12,156,396	11,619,380	11,613,489	11,613,489	11,608,535	3,372
Adjusted R-squared	0.00069	0.01202	0.01219	0.01207	0.01210	0.01211	0.24614

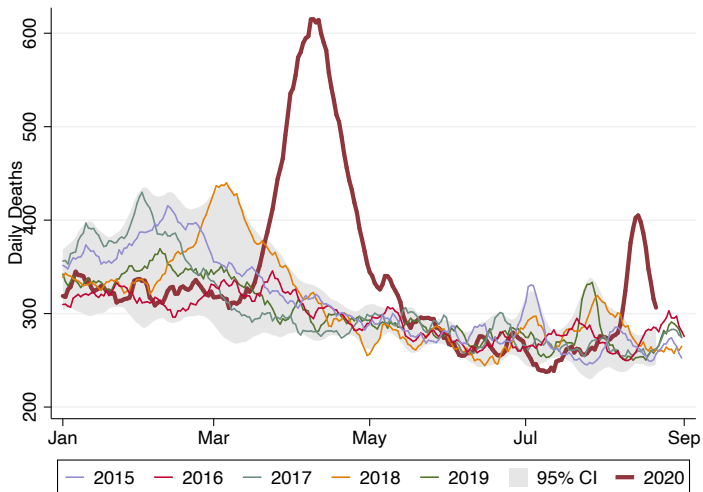
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

BACK-UP SLIDES

- Individual-level administrative data on all-cause mortality from the national register. Available up to a couple of weeks ago.
- Linked to income from tax records and to economic sector and educational level obtained from the 2011 census.
- We can construct households and have a separate indicator for being a nursing home resident.

Mortality Rate Time Series

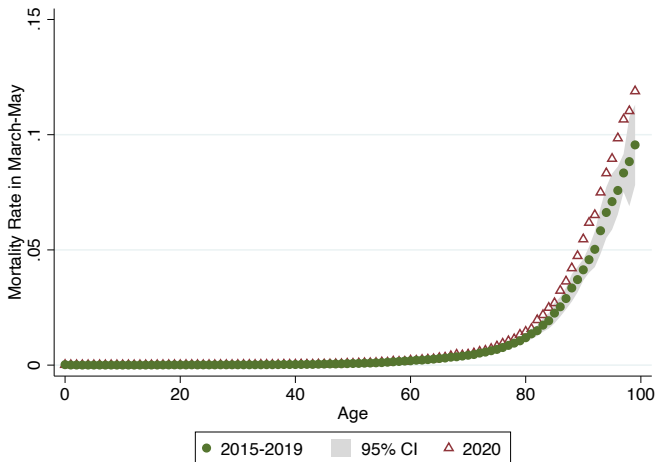


Notes: This plot shows the daily 7-day moving averages of the number of deaths recorded in Belgium. Also plotted are the daily 7-day moving averages of mortality in the 5 previous years, together with 95% confidence intervals.

Excess Mortality by Age

Excess Mortality by Age

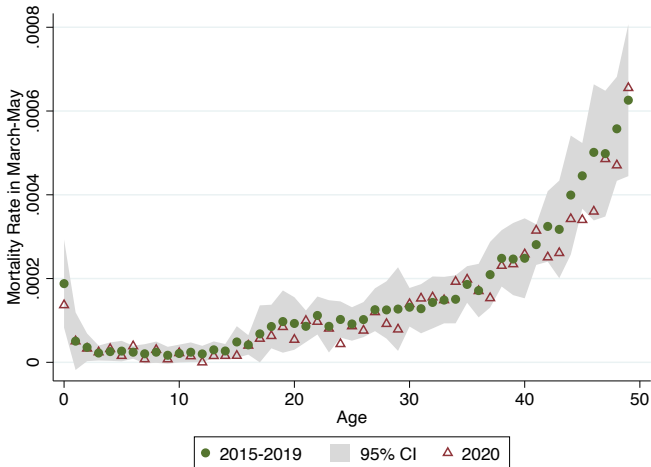
All Ages



Notes: This figure shows the average mortality rate by age in March-May of 2015-2019, with a 95% confidence interval, and in March-May of 2020 for all Belgian inhabitants, excluding people living in collective households, or households with more than 10 individuals.

Excess Mortality by Age

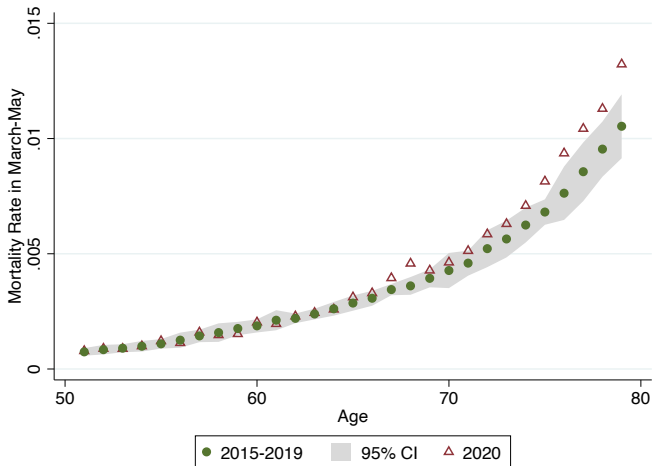
0-50 Years



Notes: This figure shows the average mortality rate by age in March-May of 2015-2019, with a 95% confidence interval, and in March-May of 2020 for all Belgian inhabitants aged 0-50, excluding people living in collective households, or households with more than 10 individuals.

Excess Mortality by Age

51-80 Years



Notes: This figure shows the average mortality rate by age in March-May of 2015-2019, with a 95% confidence interval, and in March-May of 2020 for all Belgian inhabitants aged 51-80, excluding people living in collective households, or households with more than 10 individuals.

Excess Mortality by Age

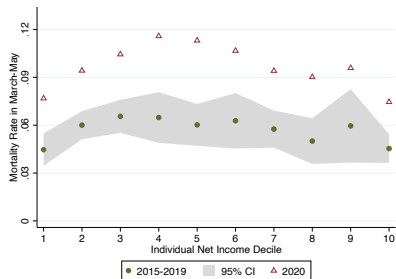
Nursing Home Residents (50+ Years)



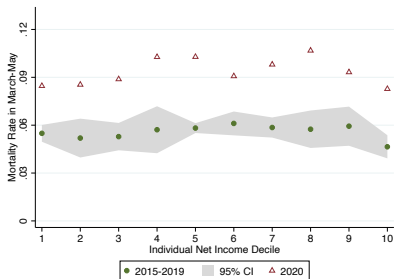
Notes: This figure shows the average mortality rate by age in March-May of 2015-2019, with a 95% confidence interval, and in March-May of 2020 for nursing home residents, according to the classification of Statbel, aged 50 and over.

Income Gradient in Mortality

Men in Nursing Homes, 65+



Women in Nursing Homes, 65+



Notes: These figures show the average mortality rate by income decile in March-May of 2015-2019, with a 95% confidence interval, and in March-May of 2020. They show mortality rates for Belgians inhabitants aged 65 or older and living in nursing homes. To control for differential selection into nursing homes depending on age, the results are residualized on age.

▶ Back

Literature on SES-Mortality Relationship during Pandemic

	Covid-19 Mortality	Excess Mortality
Individual-level measure of SES	Drefahl et al. (2020) <i>Negative association - Sweden</i>	
Aggregate measure of SES	<p>Abedi et al. (2020) <i>Negative association - US</i></p> <p>Ashraf (2020) <i>Negative association - World</i></p> <p>Chen and Krieger (2020) <i>Negative association - US</i></p> <p>Desmet and Wacziarg (2020) <i>Mixed results - US</i></p> <p>Jung et al. (2020) <i>Mostly negative association - US</i></p> <p>Kim and Bostwick (2020) <i>Negative association - US</i></p> <p>Knittel and Ozaltun (2020) <i>No/positive association - US</i></p> <p>Office for National Statistics (2020) <i>Negative association - UK</i></p> <p>Sá (2020) <i>Mixed results - UK</i></p> <p>Tubadji, Webber and Boy (2020) <i>Negative association - UK</i></p> <p>Williamson et al. (2020) <i>Negative association - UK</i></p>	<p>Brandily et al. (2020) <i>Negative association - France</i></p> <p>Calderón-Larrañaga et al. (2020) <i>Negative association - Sweden</i></p> <p>Chen, Waterman and Krieger (2020) <i>Negative association - US</i></p>

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