Monitoring Mortality Inequalities in Italy: A New Indicator System Is Now Available for 2019 and for the First Year of the Covid-19 Pandemic

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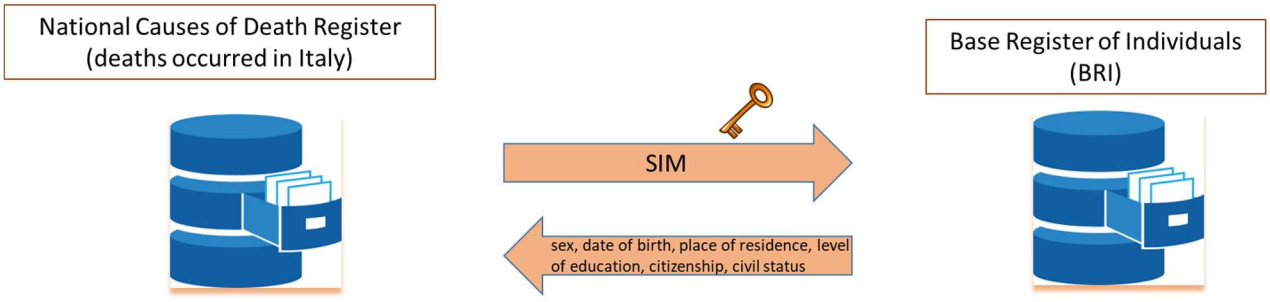
Socioeconomic inequalities in health can be defined as systematic differences in mortality rates between people of higher and lower socioeconomic status.

Reducing socioeconomic inequalities in mortality is a public health challenge. The economic crisis and the most recent Covid-19 pandemic exacerbated inequalities in Italy and the gap between European countries. In addition, the importance of studies on the impact of socioeconomic inequalities on health has increased over the years. All this considered, it is relevant to have robust health inequality monitoring systems to collect relevant and essential data to produce the evidence and engage policymakers to develop effective and appropriate responses and evaluate progress.

Since 2016 the Italian National Institute of Statistics (Istat) developed a longitudinal observation system of social inequalities in mortality (Census based). However, we needed a cross-sectional indicator system to monitor the changes in social inequalities in mortality by cause over time. Therefore in 2023, Istat carried out a new project to develop cross-sectional indicators of mortality by socioeconomic conditions and has already made them available for the year 2019, with the release for the year 2020 currently in progress. The level of education is generally considered as one of the best proxy of the socioeconomic status for several reasons: a lower level of education is usually associated to a worse employment status and a lower income; it is available at the individual level; it remains stable over time once a certain age is reached; and it is associated with the possible determinants of health conditions: lifestyle risk factors; propensity and ability to access preventive measures and care.

Data and methods

To measure social inequalities in health, countries should have coherent and integrated information systems of the population's socioeconomic status and health events. At this aim we integrated the National Register of Causes of Death (CoD), referring to all deaths occurred in Italy in 2019 and in 2020, with the information available (such as level of education and place of residence) in the National Base Register of Individuals (BRI) for the corresponding years. The linkage performance was extremely successful and of about 98,5%.



SIM code is a non-identifiable individual identification code derived from the Integrated System of Microdata developed by the Istat

In this study, we selected deaths and the population over 30 years, as the level of education remains reasonably stable from this age onwards.

The standardized mortality rate (STD) x 10.000 (Population European Eurostat Standard, 2013) and the rate ratio (RR) between two STDs were calculated. The RR considering the educational level (reference: university or upper), or the reference year (reference 2019), was calculated by sex, age class and cause of death. The RR measures the excess (>1) or reduction (<1) in mortality in decedents with a specific characteristic (lower education or died in 2020) compared with those with the reference characteristic (higher education or died in 2019).

Main results

From 2019 to 2020, the number of deaths increased by 104.314 (Table 1), and the standardized mortality rate in 2020 experienced a 15 percent increase compared to 2019 (Table 2). However, the increase was not the same in all areas of the country. In the Northwest area, the excess in the mortality rate was 29 percent, while in the South and in the Islands, it was 7 and 5 percent, respectively.

Table 1. Deaths and population by sex. Italy, 2019 and 2020

	2019		2020	
	deaths	population	deaths	population
males	328.752	22.523.750	354.700	20.389.575
females	299.659	20.422.101	378.025	22.459.542
total	628.411	42.945.850	732.725	42.849.116

Table 2. Standardized overall mortality rate by sex and area of residence (per 10.000 residents). Italy, 2019 and 2020

Area of residence	2019			2020			2020/2019		
	M	F	total	M	F	total	M	F	total
Northwest	150,36	97,86	119,15	196,89	124,15	154,26	1,31	1,27	1,29
Northest	143,16	94,57	114,59	167,45	108,89	133,43	1,17	1,15	1,16
Centre	147,62	98,76	118,95	160,73	105,79	128,64	1,09	1,07	1,08
South	161,17	110,28	131,99	174,64	116,00	141,25	1,08	1,05	1,07
Islands	163,08	111,84	133,46	172,77	116,74	140,67	1,06	1,04	1,05
Italy	151,95	101,35	122,34	176,32	114,99	140,81	1,16	1,13	1,15

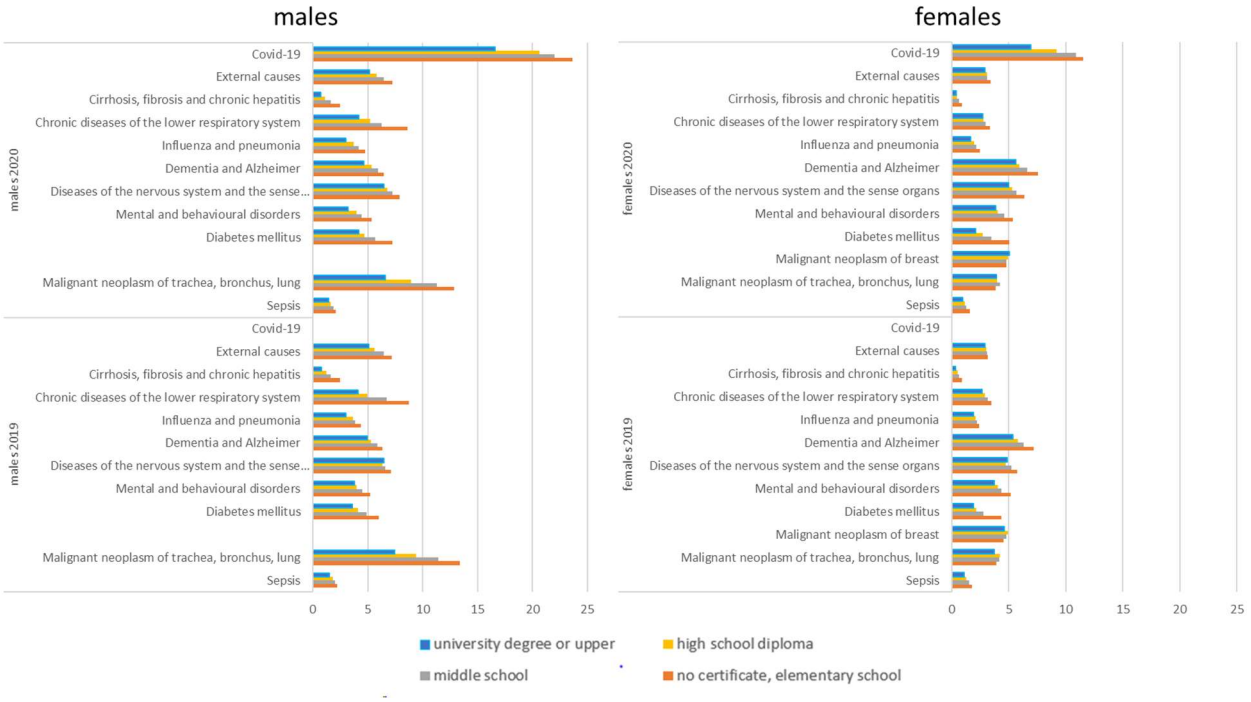
As it is well known, in 2020 Italy has been hard hit by the Covid-19 pandemic, first of all in the first wave in early 2020: the mortality due to Covid-19 was 10,65% of the overall mortality, with a relevant difference between women and men, for whom the percentage was 8,98 and 12,05, respectively (Table 3). In addition, people with a lower level of education showed a Covid-19 standardized mortality rate that is of 42 percent, for males, and 66 percent, for females, higher than that of people with a higher education.

Table 3. Standardized mortality rates by Covid-19, sex and education (per 10.000 residents). Italy, 2020

Education	2020			% out of total mortality		
	M	F	total	M	F	total
no certificate, elementary school	23,63	11,50	15,91	11,44	9,01	10,16
middle school	22,04	10,87	16,32	12,40	9,67	11,33
high school diploma	20,64	9,22	14,71	12,96	9,03	11,38
university degree or upper	16,58	6,93	12,15	12,08	7,56	10,45
all	21,25	10,33	14,99	12,05	8,98	10,65

Analysing the differences in mortality by the level of education, a clear gradient was also found for almost all others causes of death. Less educated people had a higher level of mortality than those with higher education, showing a negative effect of disadvantaged socioeconomic status on health (figure 1). This result is particularly relevant for some causes whose risk factors are strongly related to lifestyles (diet, alcohol abuse) and individual behaviors (propensity to care, prevention, early diagnosis), which in turn are conditioned by level of education. For example, the cirrhosis, fibrosis and chronic hepatitis, the diabetes mellitus, the malignant neoplasm of trachea, bronchus, lung.

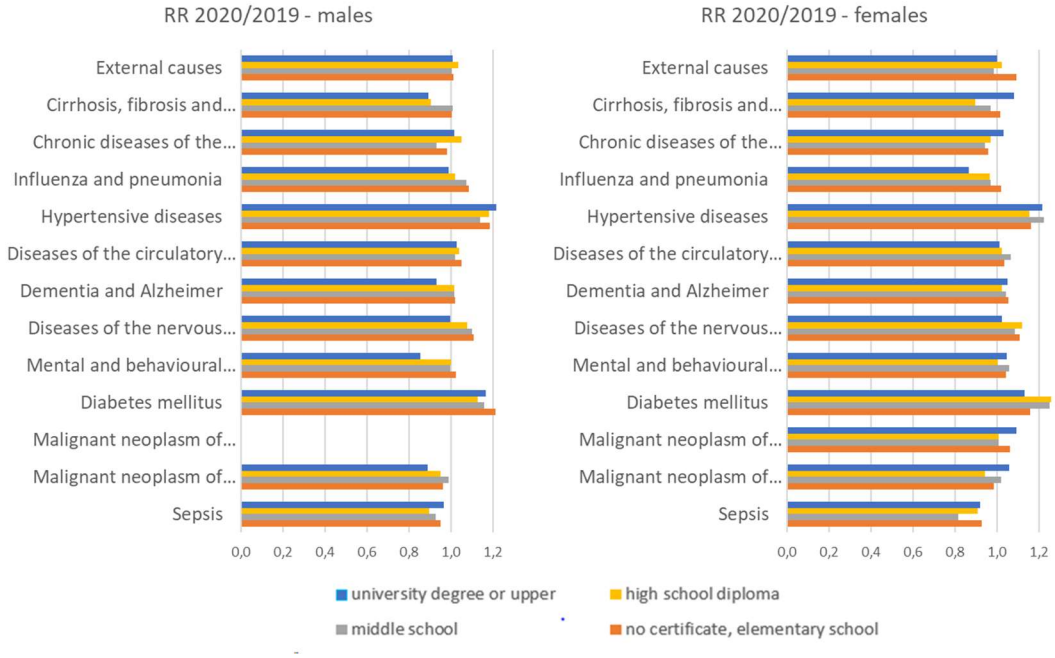
Figure 1. Standardized death rates by causes, sex and education (per 10.000 residents). Italy, 2019 and 2020.



However, there are some causes for which we observe a “reverse” pattern (high/low), and the mortality for people with a higher level of education is higher than that for people with a lower level of education, such as in the case of breast cancer or malignant neoplasms of the trachea, bronchi, and lungs in women. Comparing mortality rates in 2019 and 2020, we found an increase in several causes. Indeed, the excess mortality in 2020 was not only due to Covid-19 (figure 2). Mortality from hypertensive diseases, diabetes mellitus, influenza and pneumonia, and diseases of the nervous system has also increased. The analysis of RR by education shows that, for some causes, the increase affects only the less educated (influenza and pneumonia) or, conversely, only people with higher education level (chronic diseases of the lower respiratory

system). This result suggests that inequalities for some specific diseases have increased during the first year of the pandemic in Italy.

Figure 2. Rate ratios between the STD's of 2020 vs 2019, by causes, sex and education. Italy



The preliminary results suggest that a more in-depth analysis that considers three different age groups (30-69 years, 70-84 years, and over 85 years), a more detailed geographic reference (regional areas), and other causes of death, could better explain inequalities in mortality variations over the course of the pandemic. Since health policies in Italy are managed at the regional level, we can hypothesise that regional differences in the availability or access to healthcare may exacerbate or mitigate health inequalities. In order to analyse the large amount of data taking into account sociodemographic and territorial variables, we will apply also multivariate data analysis techniques.

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