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The growth in deaths in Italy in time of Covid-19

An analysis of 1.084 Municipalities

BY

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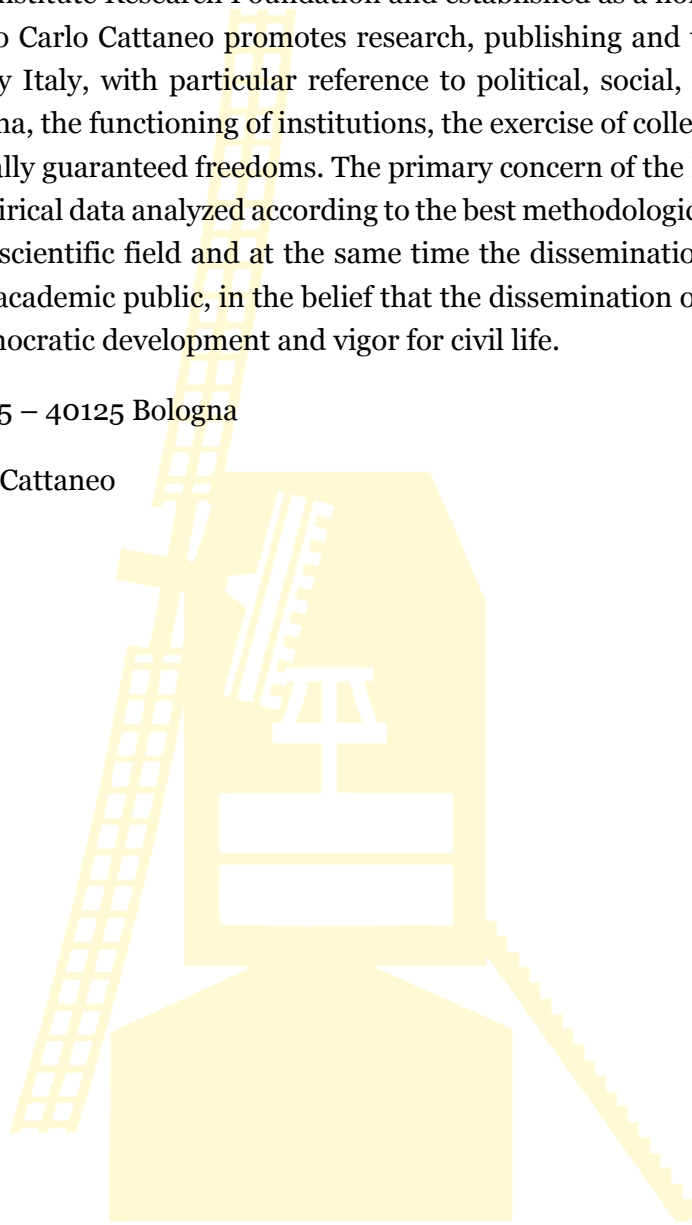
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The growth in deaths in Italy in time of Covid-19

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The impact of Covid-19 on the lives of Italian citizens has been very heavy and the threat that the virus is bringing to the health of the population is considered by some to be the most serious since the 1918¹ H1N1 flu pandemic. At the time of writing (April 1st) the cases ascertained in the world exceeded 870 thousand, and the deaths over 43 thousand, with Italy leading this sad ranking with 12,428 cases. There are now 180 (out of 206, therefore 87%) countries in the world that have declared the presence of Covid-19 cases within their territory².

Among the numerous problems that scholars and authorities are facing, the one relating to the precise assessment of the size of the emergency is certainly one of the main. The precise knowledge of the phenomenon, its dimensions, its outlines and its distribution are crucial for those who want to pursue the intervention, reduction and containment of the virus. There are many indicators available: established cases, patients with symptoms, patients admitted to intensive care and deaths. However, each of these indicators presents critical issues. So far, the analysis of deaths for Covid-19 has been conducted using the number of patients who died positive for Covid-19, a figure provided on a daily basis by the Civil Protection. It is an indicator influenced not only by the methods of classification of the causes of death, but also by the presence of a test of positivity to the virus and by the place where the death occurs, given that the probability that the test is carried out decreases passing from the hospital at home.

The results of the analysis we present provide an empirical basis for the hypothesis that the number of deaths due to Covid-19 is different from that established on the basis of the indicator used so far, or the number of patients who died positive in Covid - 19. The detection of the number of deaths in excess of the average of the previous five years allows not only to

overcome the distinction between deaths "caused by" and deaths "with" Coronavirus, but also to estimate the size of the "dark number" of mortality attributed to Covid-19. The number of deaths is typically quite stable over time, and its variations, under normal conditions, can only depend on the aging of the population. We will then compare the

number of deaths that occurred from February 21st to March 21st, 2020, the date of the first ascertained death for Covid-19 in Italy, with the average number of deaths that occurred in the same interval of days in the five-year period 2015-2019.

In this intervention we publish the results of a research conducted on 1080 Italian municipalities. The calculations will be presented by region or area of the country and for some municipalities. The values presented for the regions and areas of the country must always be understood as relating only to the municipalities belonging to that territory for which the data were available. For this reason, when in the text we will briefly speak of "Liguria" we will mean the set of Ligurian municipalities for which data were available.

The aim of the research is to evaluate the effects of the impact of the spread of Coronavirus on the growth of mortality, taking into account the increases that occurred in the current period of particular virulence of the infection. In fact, the data relating to mortality tend to be stable over time. Even with due caution, therefore, the deviations in mortality from the values it has assumed in the past can be interpreted as additional deaths due to the action of the virus.

The analysis conducted showed that an increase in the number of deaths occurred in the period considered, which can only be attributed to the intervention of an external cause, specifically Covid-19. The growth is very consistent and appears to be higher than what is detectable by the data disclosed so far by the Civil Protection. In fact, at 21st March 2020 in Italy there were 4,825 deceased positive patients at Covid-19, but the difference, detected by our analysis, between deaths in 2020 and the average deaths in the period 2015-2019, for the period from 21st February to March 21st, it was already 8,740. And this value refers to a sample that includes only one thousand of the over 8 thousand Italian municipalities, equivalent to 12.3 million inhabitants out of a total of 60.4 million. Even under a very cautious assumption, according to which in the remaining 7 thousand municipalities there should be no deviations from the average mortality of the previous years, the number of

deaths attributable to Coronavirus in Italy is still double the number calculated on the basis of the patients who died positive for the Covid-19 test, communicated by the Civil Protection. It is plausible, therefore, that the additional deaths not attributed to Covid-19 concern people who died at home, and on whom the positivity test was not performed.

The analysis presented in this report also reveals that the impact of Coronavirus has spread widely across the Italian population. It grows, as has already been observed, passing from women to men and with age, and is higher in Lombardy and Emilia-Romagna.

However, substantial increases in mortality are also visible in areas other than those traditionally indicated as Coronavirus hotspots. Looking at the data relating to the available municipalities, unlike what is thought so far, the South of Italy does not appear to be foreign to the spread of Coronavirus. Indeed, the over-mortality in this area of the country is fully aligned with that which was recorded in Veneto, and higher than that which can be observed in Liguria (Northern Italy).

How many more deaths can be attributed to Covid-19 in Italy?

We compare the deaths that occurred in the period between February 21st and March 21st of this year to the average of the same period for the previous five-year period 2015-2019. The simple comparison of these two values reveals the dimensions of mortality growth and the variability territorial growth. The demographic balance shows that in some areas of the country the total deaths in the period between February 21st and March 21st, the last day for which the data was made available, was far higher than the average recorded in previous five years. The trends highlighted by the data are as follows.

The first observed trend, shown in Table 1, is that the variation in mortality between the average for the five-year period 2015-2019 and 2020 grows from the Southern to the

Northern regions. In Lombardy the number of deaths in the period considered was more than double compared to the same period in the previous five years. In Emilia-Romagna, growth was over 75%, while in Trentino-Alto Adige and Piedmont it was still over 50%. However, even the regions of the South and Islands show variations which are far from negligible. The percentage change in the number of deaths compared to the same period of the previous five years in the South and Islands was 40.2%, a value equal to that of Veneto (North), and greater than 35% recorded by Liguria (North).

The second observed trend is that the variation in mortality between the average for the five-year period 2015-2019 and 2020 grows from women to men. This is a very relevant fact, because in addition to revealing a known fact, namely the greater vulnerability of men to the Coronavirus, it is consistent with the hypothesis that the over-mortality is due to an external factor, in the absence of which a possible growth of deaths should be the same size regardless of gender.

The observation of the differences in the growth of deaths between men and women also reveals, however, the existence of significant territorial differences. These are very consistent in the Northern regions (they are more than double in Trentino-Alto Adige),

weaker where growth has been relatively more contained, as in Central Italy, zero in the South.

The deviation of mortality from the previous trend to the period in which the emergency began is well highlighted in the following graphs (Figs. 2-7). The time series on a daily basis

clearly shows the growth in deaths that occurred between the end of February and the first days of March. The death toll quickly rises well beyond the previous values. Deaths in Lombardy begin to grow at the end of February, followed by Emilia-Romagna in early March. Growth appears slower in Piedmont, Veneto and Central Italy.

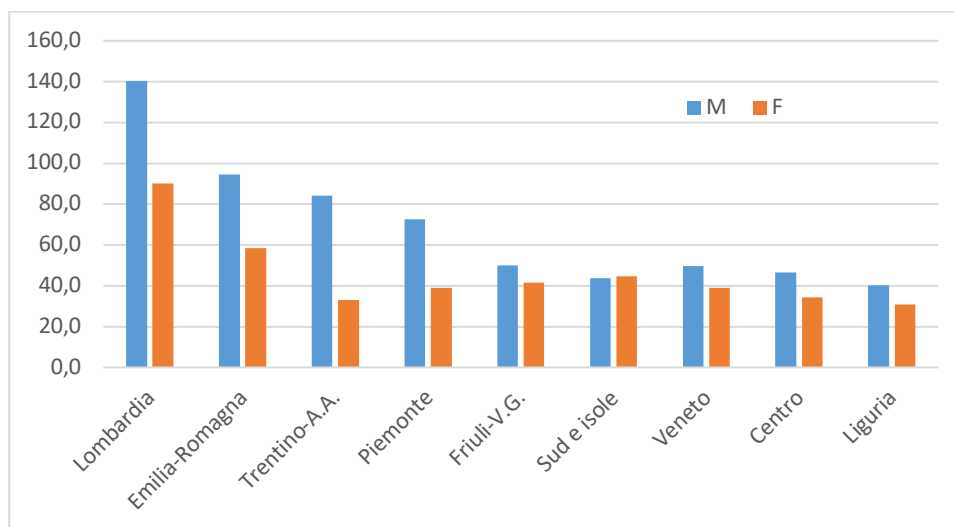
The Southern case deserves some separate consideration. The data confirm that even in the South and Islands, albeit with smaller dimensions, already from the beginning of March, there had been a deviation from the pre-crisis trend, and that another started after the end of the second week, and it would still be going on.

Tab. 1. Difference between deaths in 2020 and in the average of five-year period 2015-2019, by region and area of the country and by gender, period considered: February 21st March 21st, percentage changes and in Annual Variation.

	Var %			Diff 2020-average 15-19		
	Males	Females	Total	Males	Females	Total
Piemonte e VdA	72,7	39,0	54,4	293	186	480
Lombardia	140,2	90,0	113,2	3.091	2.306	5.397
Trentino-A.A.	84,2	33,0	56,0	32	15	47
Veneto	49,6	39,1	44,0	191	177	369
Friuli-V.G.	50,0	41,4	45,4	17	16	33
Liguria	40,1	30,8	35,0	61	57	118
Emilia-Romagna	94,5	58,5	75,1	737	530	1.267
<i>Centro</i>	46,4	34,4	40,1	317	260	576
<i>Sud e isole</i>	43,7	44,7	44,2	225	227	452

N (Municipalities): 1.084; N (Population): 12,3 mln.

Fig. 1. *Difference between deaths in 2020 and in the five-year period 2015-2019, by region and area of the country and by gender; period considered: 21st February-21st March, percentage changes*



N (Municipalities): 1.084; N (Population): 12,3 mln.

Covid-19 and mortality in 20 Italian provincial capitals

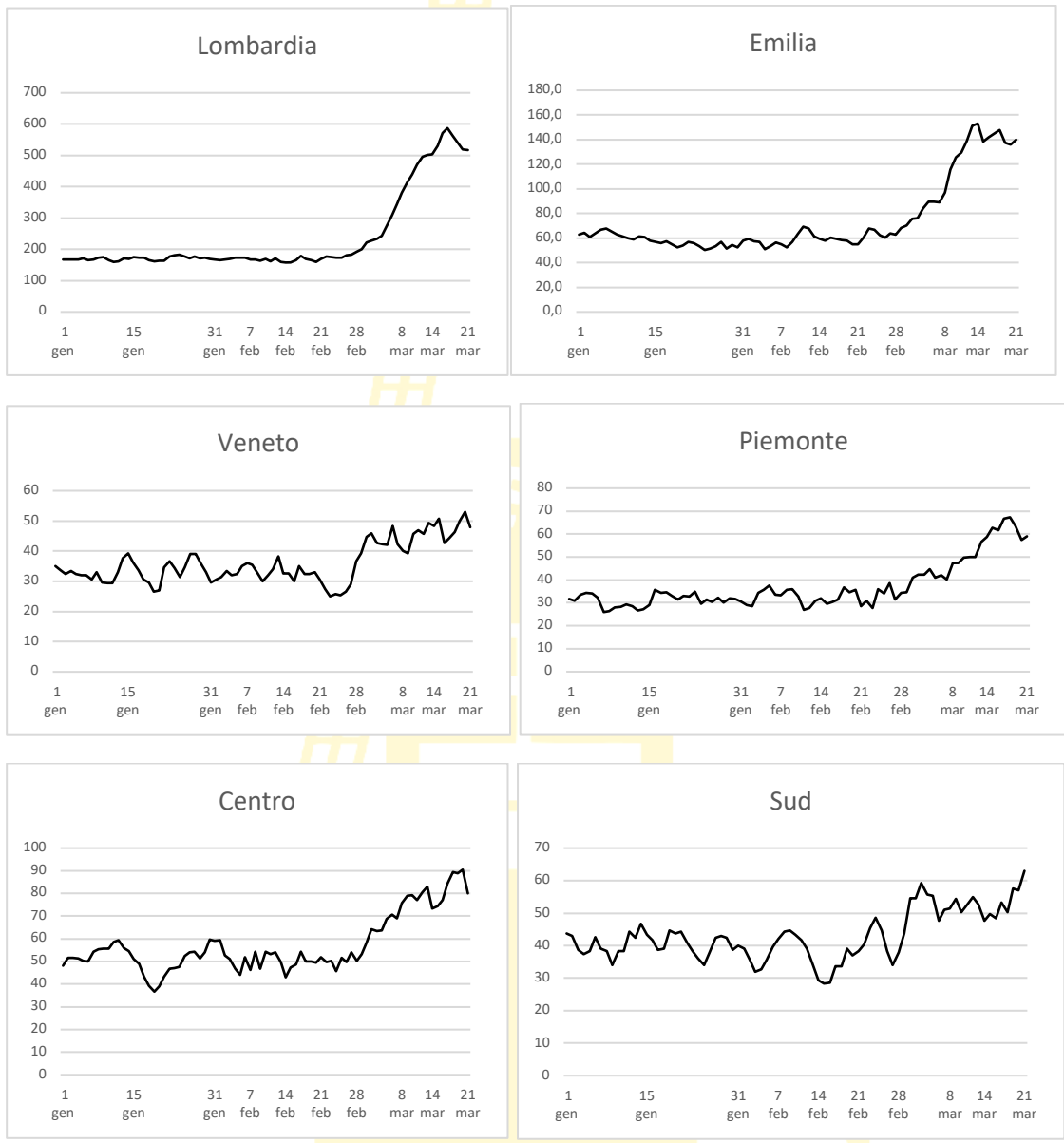
A closer look at some common capitals for which data are already available confirms the two main trends, but also reveals a third.

The first is that the increase in mortality grows from women to men. The second, which is also well known, is that the growth in mortality in some cities was more than double that of the average of previous years.

The third observation emerges from the inspection of the values in the table relating to the head of the municipalities sorted in descending order by size of the percentage increase in deaths compared to the average of previous years. Some municipalities in the top places, such as Bergamo, Piacenza, Parma or Brescia, have long been at the centre of the interest of observers based on daily published data on the deaths attributed to Covid-19. Others, however, such as Pesaro, Cremona, Biella, have so far been far from the spotlight. Data presented in the table, therefore, show that the growth in mortality has been higher also in other areas, far from those considered to be outbreaks of contagion, and

that probably these deaths occurred within the domestic walls and without the test being conducted to detect the presence of the virus.

Figg. 2-7. Deaths from 1st January to 21st March 2020 per day in four regions and two areas of the country; Annual Variation, a three-day moving average. In order: Lombardia, Emilia, Veneto, Piemonte, Centro (of Italy), South (of Italy).



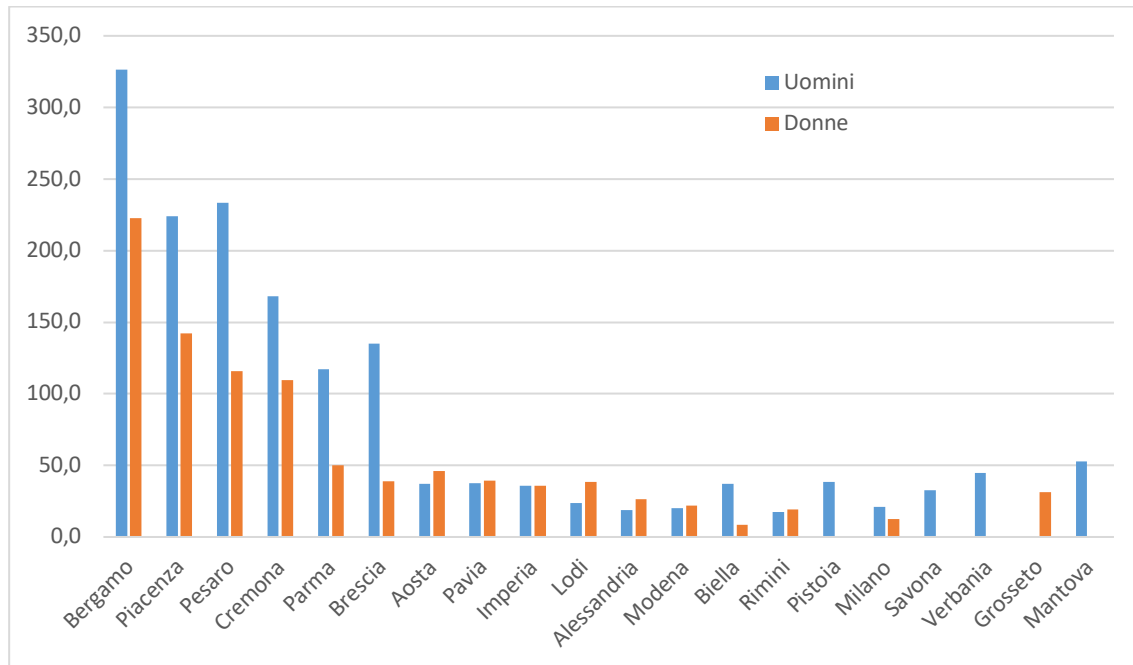
N (Municipalities): 1.084; N (Population): 12,3 mln.

Tab. 2. *Variation in deaths in 2020 compared to the five-year period 2015-2019 in some municipalities capitals by gender; February 21-March 21, percentage changes and Annual Variation*

	Var %			Diff 2020-average 15-19		
	Males	Females	Total	Males	Females	Total
Piemonte						
Alessandria	18,6	26,4	22,7	9	14	23
Biella	37,1	8,3	21,0	9	3	12
Verbania	44,6	-10,4	13,8	7	-2	5
Valle d'Aosta						
Aosta	36,9	46,1	41,6	6	8	14
Lombardia						
Bergamo	326,4	222,9	266,8	168	156	324
Brescia	135,1	38,8	78,7	104	42	146
Cremona	168,0	109,8	134,6	51	45	96
Lodi	23,8	38,7	31,8	5	9	14
Mantova	52,5	-17,2	12,1	12	-6	7
Milano	21,1	12,3	16,3	113	80	193
Pavia	37,7	39,2	38,5	13	15	28
Liguria						
Imperia	35,9	36,0	35,9	7	8	15
Savona	32,7	-0,5	14,1	11	0	10
Emilia-Romagna						
Modena	20,0	22,1	21,2	16	23	39
Parma	117,0	50,0	80,9	92	46	138
Piacenza	224,0	142,1	178,3	112	90	202
Rimini	17,4	19,2	18,3	11	12	23
Toscana						
Grosseto	-5,4	31,2	13,7	-2	13	11
Pistoia	38,6	-2,0	17,0	17	-1	16
Marche						
Pesaro	233,3	115,8	167,9	90	56	145

N (Municipalities): 1.084; N (Population): 12,3 mln.

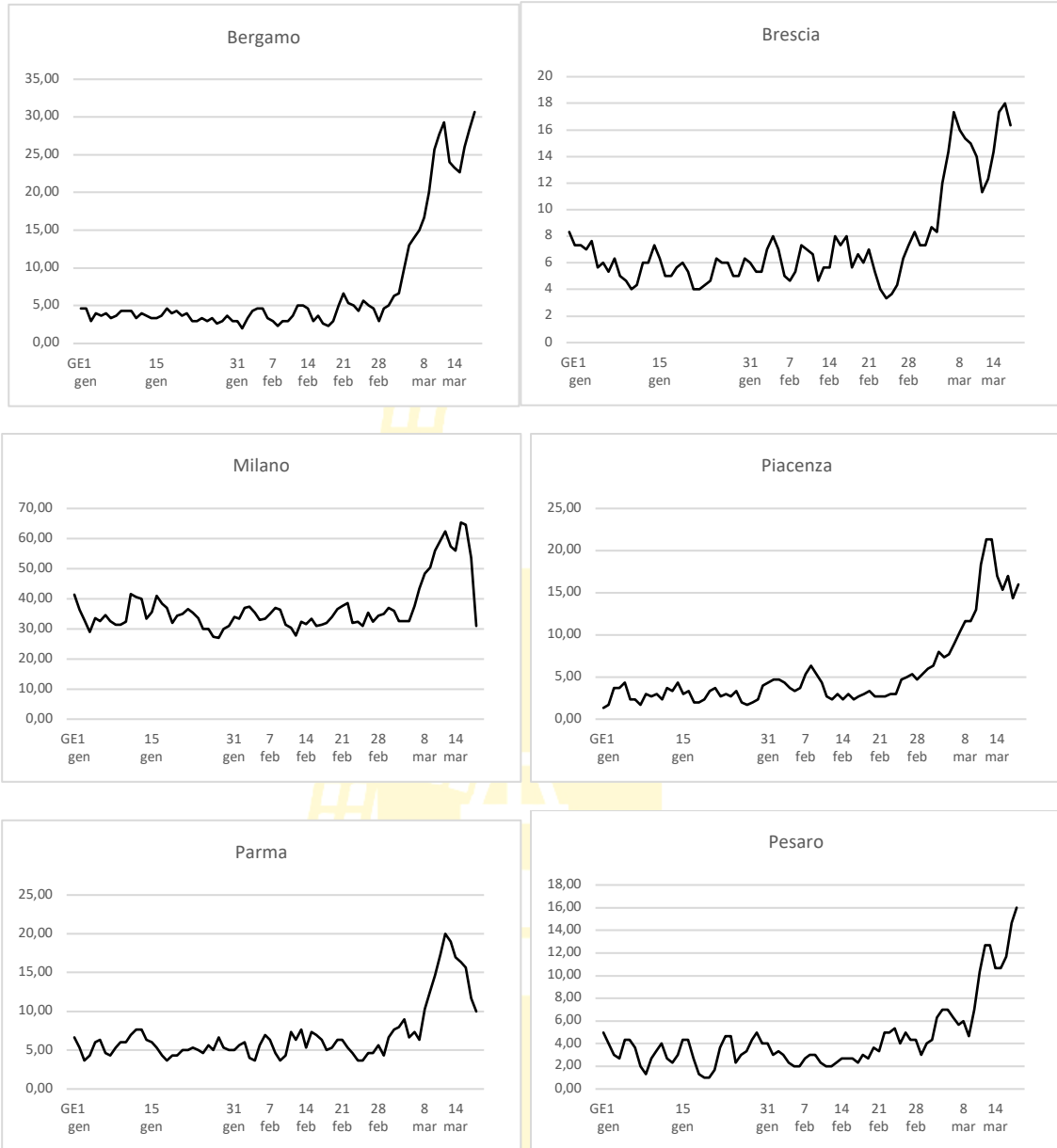
Fig. 8. *Difference between deaths in 2020 and in the five-year period 2015-2019, for some municipalities and by gender; period considered: February 21-March 21, percentage changes*



N (Municipalities): 1.084; N (Population): 12,3 mln.

Even in the case of cities, the time series reveal the difference in mortality from the trend prior to the emergency. In the provincial capitals considered, the growth of deaths starts between the end of February and the first days of March and reaches a peak in the second week of March. In fact, the death toll quickly rises well beyond the previous values, first in Bergamo and Piacenza, then in Brescia, Milan and Parma and finally, after the first week of March, in Pesaro, where it does not seem the peak has been reached yet.

Figg. 9-14 Deaths from 1st January to 21st March 2020 per day in six provincial capitals, V.A, three-day moving average

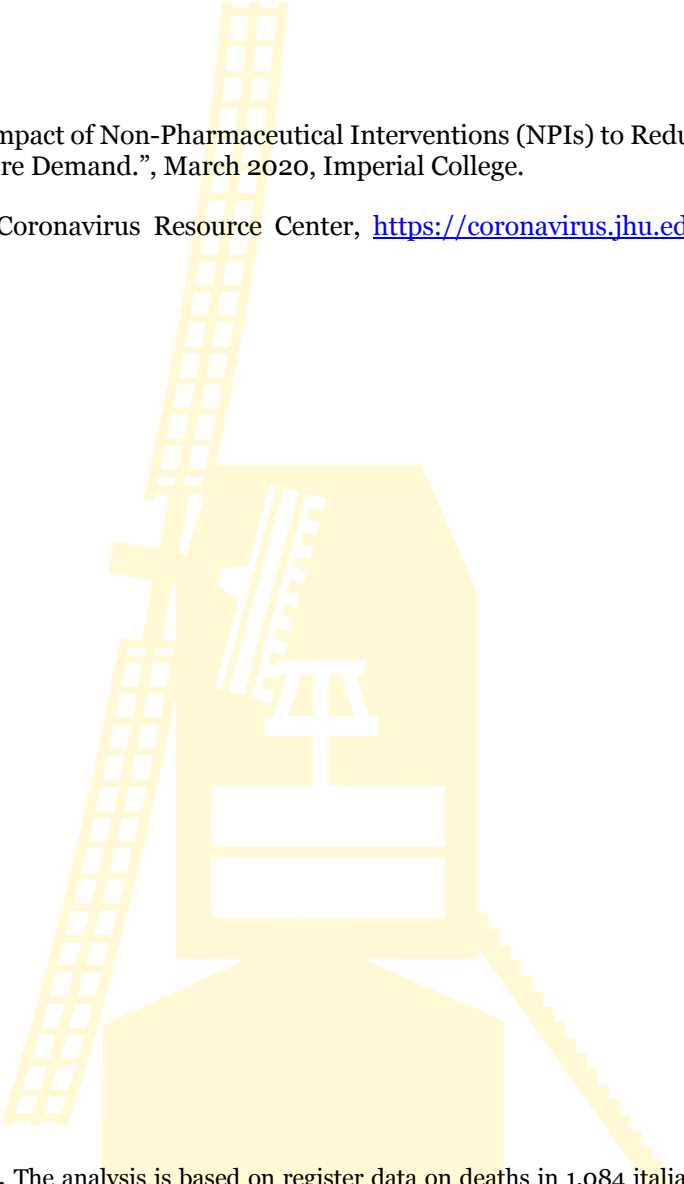


N (Municipalities): 1.084; N (Population): 12,3 mln.

NOTES

¹ Ferguson et al. “Impact of Non-Pharmaceutical Interventions (NPIs) to Reduce COVID-19 Mortality and Healthcare Demand.”, March 2020, Imperial College.

² Johns Hopkins Coronavirus Resource Center, <https://coronavirus.jhu.edu/>, consultato il 1 aprile 2020.



Methodological note. The analysis is based on register data on deaths in 1,084 Italian municipalities provided by Istat – National Institute of Statistics, available at <https://www.istat.it/it/archivio/240401> web site. Municipalities included in the Istat dataset are selected from 5,866 out of 7,914 Italian municipalities. The 1,084 selected municipalities have had a change higher than 20% in percentage of deaths in the first 21 days of March 2020 compared to the average deaths in the same days for years 2015-2019. More details are available in the *nota Istat* “L’andamento dei decessi del 2020. Dati anticipatori sulla base del sistema ANPR”. The research has been conducted by Asher Colombo e Roberto Impicciatore, members of the team “Measures and Analysis of Social Change” based on Istituto Cattaneo. The authors thank Sara Masarone, Alan Turing Institute & Queen Mary University of London, for the translation.