



CST

Centro studi sul territorio
DiathesisLab

UNIVERSITÀ DEGLI STUDI
DI BERGAMO

REFLEXIVE MAPPING ON THE CORONAVIRUS CONTACT

From the geolocation of the phenomenon to the importance of its territorial dimension

Why Bergamo? To understand why the spread of pandemic influenza has assumed the current proportions in this territory – a question that the whole world is asking – a group of researchers from the University of Bergamo undertook a research that investigates the fueling of the Covid-19 pandemic in Lombardy, and particularly in the province of Bergamo, by both using reflexive mapping and analyzing the social and environmental characteristics of this territory (such as **population, mobility, work, pollution**) on a national scale.

In accordance to the recent scientific perspectives on the central role of spatiality and mapping in the study of social phenomena, the principal aims of the research are: *a)* to **analyze the Covid-19 pandemic in relation to the socio-territorial peculiarities of the places where it has become more virulent**; *b)* to **create reflective maps that contribute to understand the complexity of the phenomenon**, and contrast the alarmist messages issued by the massive amount of maps produced at both institutional and non-institutional levels.

Concerning point *a)*, it is by far well known that, in order to understand and interpret many different types of social phenomena in present times, *spatiality* is of crucial importance: understand *where* things happen is crucial in order to comprehend *how* and *why* they happen. It is important to analyze how territories are inhabited; the fueling of the Covid-19 pandemic and its initial reticular diffusion are clearly related to the *mobility* and *urbanization* of our contemporary world. Mobile ways of living imply that it is the connection between places that causes the onset of contagion, which will spread due to proximity only afterwards; urbanized living fuels the contagion because of the inevitable gatherings; the peripheral villages of the Po Valley (Codogno, Vo' Euganeo, Alzano Lombardo-Nembro), which were the first hotbeds of contagion, belong to the extensive Po polycentric conurbation.

Point *b)* is about the need to counteract the trivialization of cartography and its devastating mediatic power to create social alarm by creating maps in an unreflective way. Indeed, GIS (Geographic Information System) tools, if well used, are not only able to geolocate the phenomenon, but also to **create new knowledge by intertwining the pandemic influenza data with specific socio-territorial data**. The cartographic information circulating in these days hides the digital cartographic systems potentiality because computer scientists usually let the “machine” choose the information, and, since they are neither mapping analysts nor territory analysts, they cannot make it intelligible.

Context: Over the years the *Center for Territorial Studies* of the University of Bergamo has experimented with new forms of cybercartography in the context of territorial diagnostics research in local, national and international contexts aimed at territorial and landscape design, urban and environmental governance; the *Center* applies innovative theoretical approaches (Casti, 1998; Id. 2013) and methodologies, which analyze land data (Casti, 2006) and come from multiple sources (statistics, archives, social media, big data); it also works with digital platforms for the collection, elaboration, interpretation and circulation of data (www.unibg.it/diathesis). In particular, the interdisciplinary research group of the *Center for Territorial Studies* has carried out research in the Bergamo area, i.e. the socio-territorial study on the phenomena of school placement, commuting and employment in the Seriana valley; moreover, as a member of the *Urban Nexus* Excellence Initiative Project – a multi-year research project on dynamic methods and mappings for the management of big

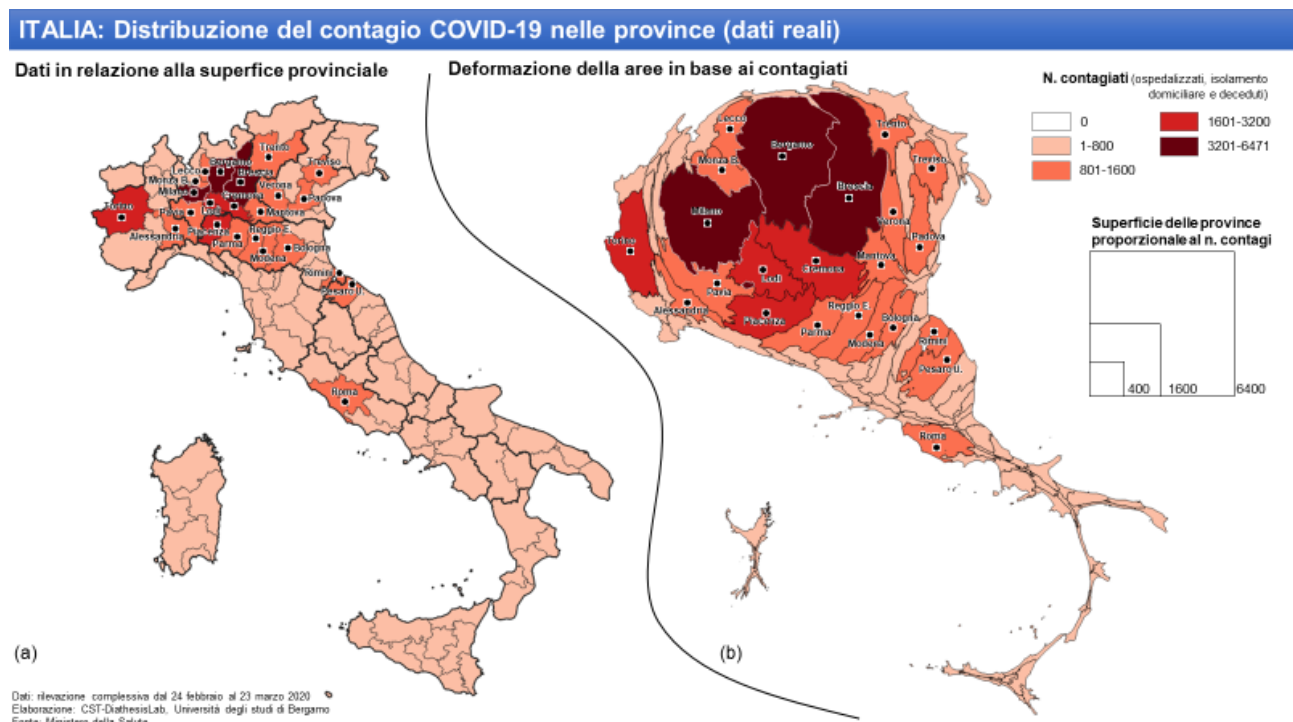
data – it created a mapping of the “urban rhythm” with data collected in the hotspots of the Municipality of Bergamo.

The research on the Covid-19 pandemic – undertaken voluntarily by some researchers and external collaborators of the University of Bergamo and coordinated by the director of the *Center for Territorial Studies*, Prof. Emanuela Casti, and by prof. Fulvio Adobati – will adopt to a scientific (and not alarmist) approach to the contagion in order to better understand the phenomenon. It will make **use of the databases** developed by the *Center* and the DiathesisLab – concerning the composition of the population of the Province of Bergamo by age groups, its distribution on the area, the various forms of mobility, the spatial organization of the territory and its pollution –, and it **will cross-reference the collected data with those of the Italian “Ministero della Salute” and “Istituto Superiore di Sanità”**.

First results

The first maps highlight new findings: **different age groups affected by the infection** according to the Region; **different quantifications based on the type of data** (real or percentage); **socio-territorial considerations** if the **percentage of the infection is related to the number of total inhabitants**), to be offered as first elaborations to the scientific environment that is working on the knowledge of the virus both nationally and internationally. Subsequently, the results obtained by the University of Bergamo will be put on the open source network to help consider the socio-territorial characteristics in the spread of the infection. Progressive communication is expected on the basis of monitoring the progress of the infection on the CST website of the University of Bergamo (www.unibg.it/cst) and on the A.Ge.I. (Association of Italian Geographers) website (www.ageiweb.it) and through social media.

National Territory

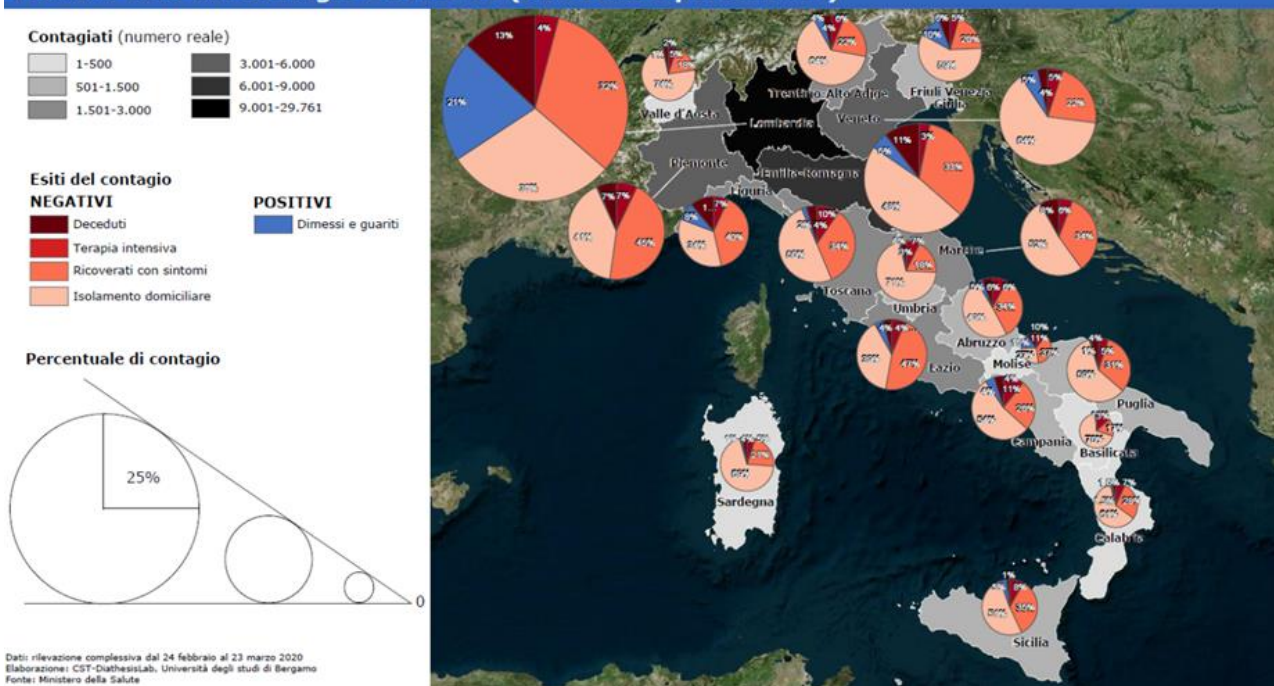


The paper does not show the progression of the infection, but photographs the situation as of March 23rd. The same number of infected people is shown in the map (a) in relation to the extent of the Provinces and in the map (b), where the surface has been deformed proportionally to the infections. Both show the contagion with chromatic gradations: if the map (a)

uniforms the differences between the Provinces, the map (b) allows to show the profound difference of northern Italy and in part central to the rest of the Nation.

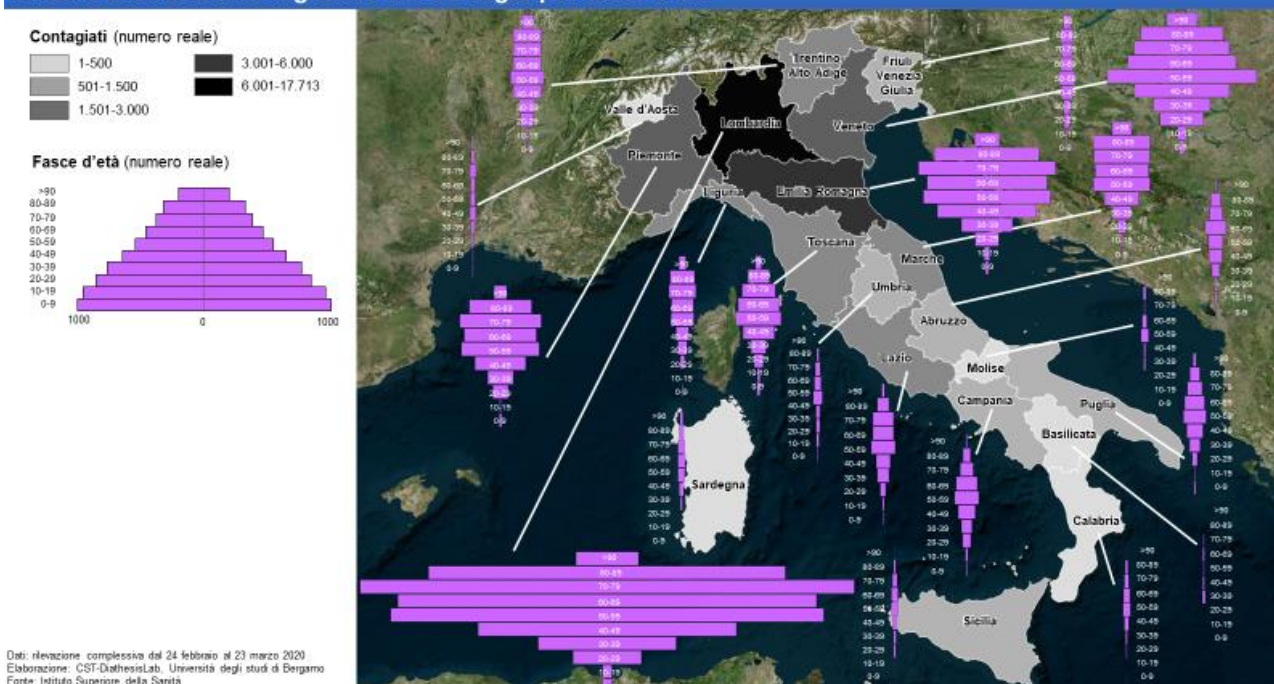
The infection is high in the three Lombard provinces of Milan, Bergamo and Brescia, followed by Lodi, Cremona, Piacenza and Turin and the rest of the northern provinces identified with intense pink, to which Rimini, Pesaro-Urbino and Rome also belong.

ITALIA: Esiti del contagio COVID-19 (dati reali e percentuali)



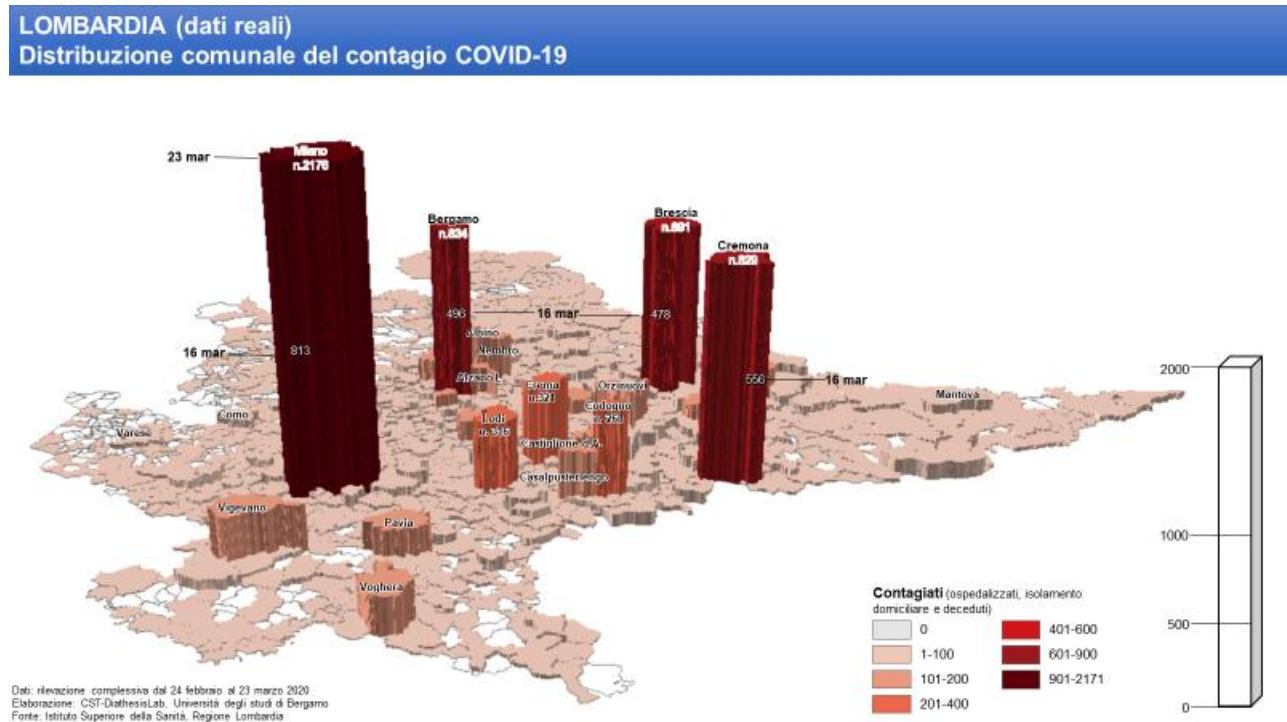
In addition to the distribution of the infected COVID-19 in the different regions identified with the basic chromatism, the paper shows the outcomes of the contagion distinguishing the negative one (i.e. deceased, people in intensive care, hospitalized with symptoms and individuals in home isolation) from that positive (i.e. discharged and healed). It is possible to note that in most regions the number of those infected in home isolation is greater than those hospitalized with symptoms: in fact, the regions with the highest number of hospitalized are Lombardy, Piedmont, Liguria, Lazio and Molise. The highest percentage of deaths is found in Lombardy region (13%), Emilia-Romagna, Liguria (11%), and Marche (8%). As for the positive outcomes of the infection, it is noted that in Lombardy 21% of those infected were discharged or cured of the COVID-19 disease, followed - remotely - by Molise and Friuli Venezia Giulia.

ITALIA: Distribuzione regionale del contagio per fasce d'età



The paper background, with various shades of gray, provides the number of infections, while the pyramids divide them by age. On age groups, although the pyramids always show an incidence on the adult population from 40 years of age, they differ at least for the regions with the highest contagions: for Lombardy and Emilia-Romagna a high percentage can be noted for the 50-69 age groups, a peak for that from 70-79 and a progressive decrease for those over 80; for Veneto, on the other hand, the most affected age group is that from 50 to 59 years with a weaker contagion both for the upper age groups and for the 40 to 49 age group. The other regions, due to the low incidence of the phenomenon, do not show significant peaks. Piedmont presents the same projection as Lombardy and Emilia-Romagna; Marche, Lazio, Tuscany and Trentino-Alto Adige, which belong to the same range of infected people, have a homogeneous incidence of contagion, from 40 years to over 80, with a slight increase in the range from 50 to 59 years.

Lombardy region



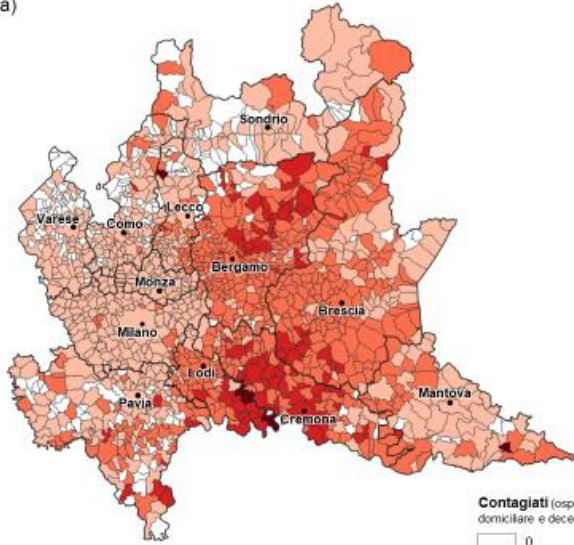
The distribution and municipal evolution between 24 February and 23 March on the number of infections show the most affected cities in the smaller centers. Milan emerges with its over 2000 infections, followed by Brescia, Bergamo, Cremona and – remotely – by Codogno and Cremona. From the map it is also possible to note the strong growth in the number of infected people in the major Lombard urban centers: in fact, the infections in Milan went from 813 recorded on March 16 to 2171 recorded at 23 of the same month. The cities of Bergamo and Brescia also see a doubling in the number of infections: as regards Bergamo, the number of people infected has gone from 496 to 834; vice versa, Brescia has a number of infections equal to 891 (almost double compared to the previous week, which saw 478). Finally, Cremona also recorded a strong increase - albeit smaller than in the three cities previously mentioned - passing from 556 to 829, as well as other smaller urban centers.

LOMBARDIA:

Distribuzione del contagio COVID-19 in rapporto alla popolazione residente (dati percentuali)

Dati in relazione alla superficie comunale

(a)

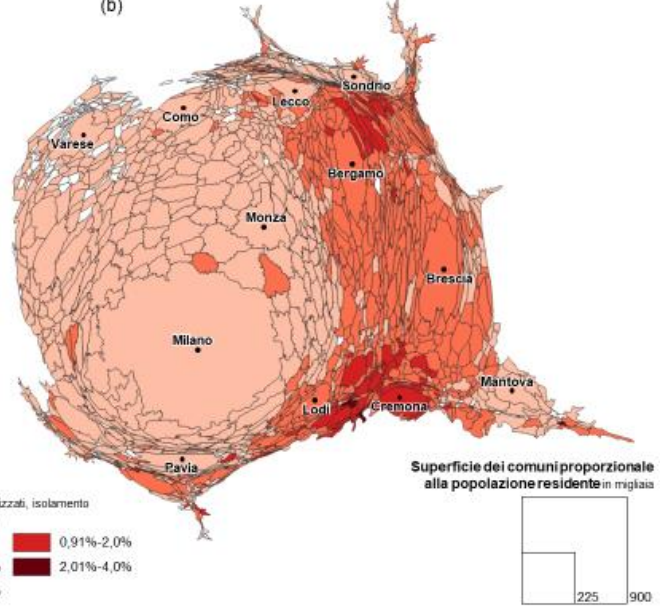


Dati: rilevazione complessiva dal 24 febbraio al 23 marzo 2020
Elaborazione: CST-DiathesisLab, Università degli studi di Bergamo
Fonte: Istituto Superiore della Sanità, Regione Lombardia



Dati in relazione al numero dei residenti per comune

(b)



Superficie dei comuni proporzionale alla popolazione residente in migliaia



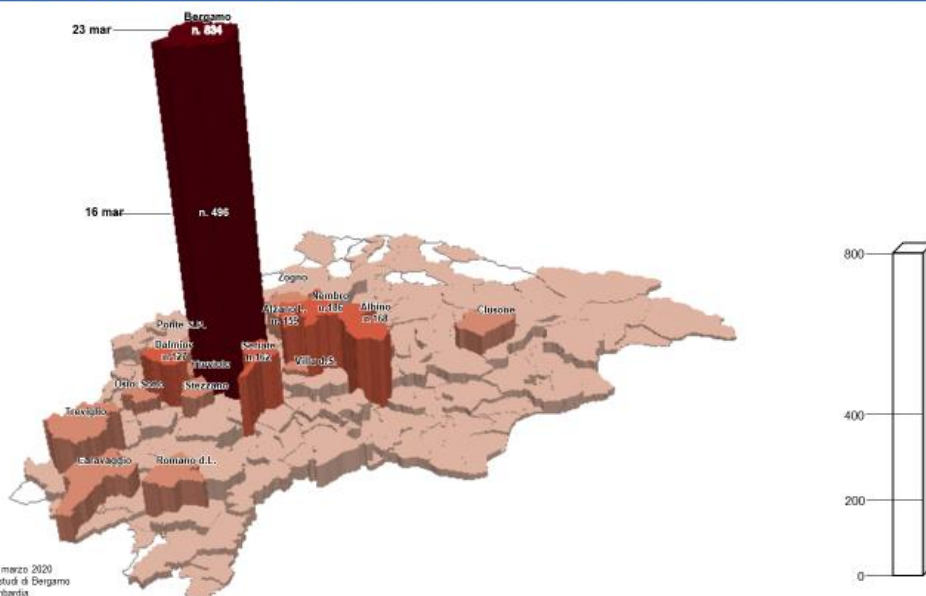
In map (a) the percentage of infected people in Lombardy is shown in relation to the municipal area. On the other hand, in the map (b), the same percentage is related to the number of residents per municipality. Both papers show that the highest contagion percentage (from 2% to 4%) does not concern cities, but countries belonging to the regional polycentric conurbation. Focusing on the first, it appears that the municipalities with the highest contagions - apart from the exception of some small municipalities - are located in a middle part of the Region which from South to North shows in the foreground Cremona, Lodi, some municipalities of Brescia and Bergamo with much of the Seriana Valley. The rest of the region is affected in a different way with insignificant incidence in the mountain part and, conversely, with contagion widespread in the rest of the plain.

Interpreting the second map, that is, the relationship between the number of inhabitants, two aspects emerge: the first is that - if Mantua is excluded - the highest percentage regards the south-eastern part, while the Milanese metropolitan area up to the territories of Como and Varese has a limited and continuous percentage, apart from a few Municipalities. The second aspect that emerges is that no Lombard city has a percentage higher than 0.9%, in fact Milan is represented in a percentage that is below 0.3%, while Bergamo, Brescia and Lodi have a percentage below by 0.9%.

Bergamo Province

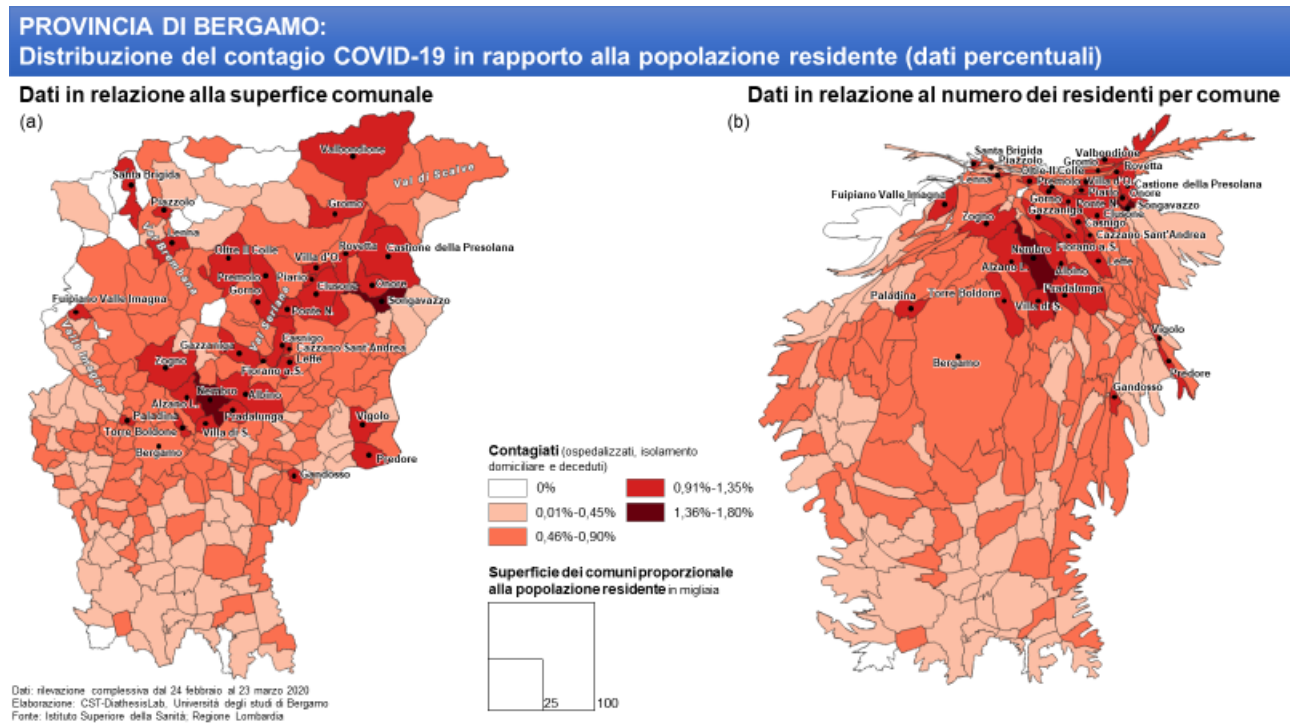
PROVINCIA DI BERGAMO:

Distribuzione del contagio COVID-19 (dati reali)

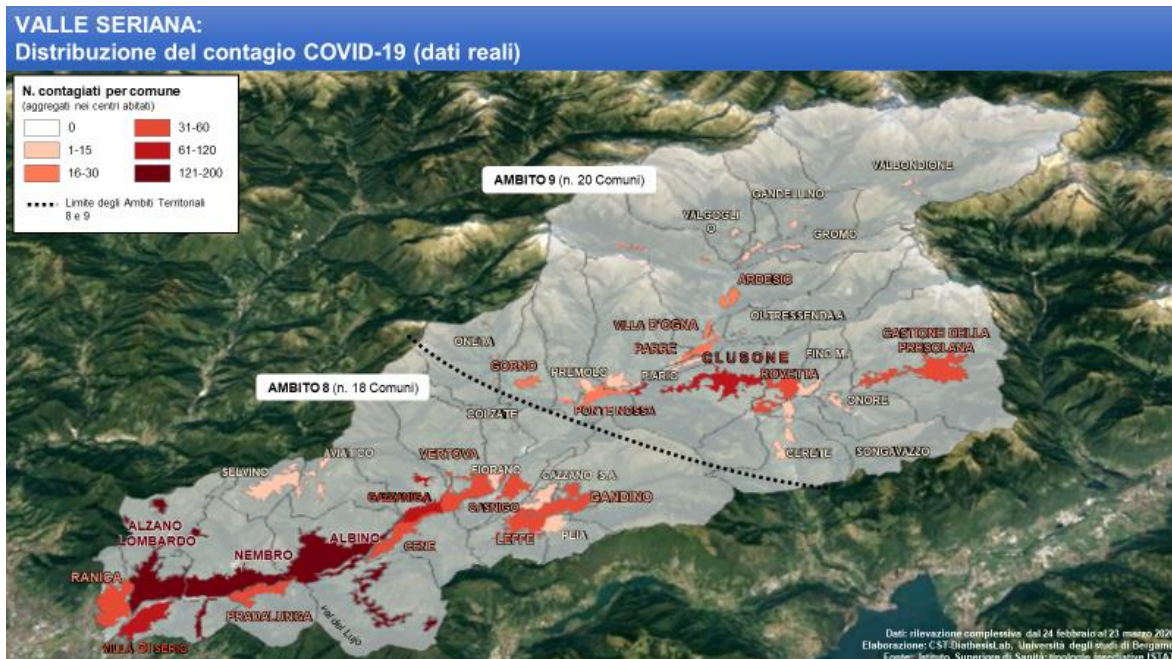


Dati: rilevazione complessiva dal 24 febbraio al 23 marzo 2020
Elaborazione: CST-DiathesisLab, Università degli studi di Bergamo
Fonte: Istituto Superiore della Sanità, Regione Lombardia

The municipal distribution of the contagion in the Bergamo Province on March 23rd shows the Orobic city as the most affected (which from March 16 to 23 goes from 496 to 834 contagions), followed by some minor municipalities with a sustained number and precisely Nembro (186), Albino (168), Seriate (162) Alzano Lombardo (159) and Dalmine (127). Overall, it should be noted that beyond the city the most affected municipalities are Nembro, Albino and Alzano Lombardo, in the lower Seriana Valley which also represent the first outbreak in Bergamo. In addition, the urban centers adjacent to the city of Bergamo, that is Dalmine and Seriate, register a greater number of people infected than those of Treviglio, Caravaggio, Romano di Lombardia and Clusone also supported.



In map (a) the percentage of the infected people in the Province of Bergamo is shown in relation to the municipal area. On the other hand, in the map (b), the same percentage is related to the number of residents per municipality. Overall, the situation in the province of Bergamo allows the detection of the virus outbreak in Alzano Lombardo-Nembro and its spread by proximity to the crown of municipalities that surround it. In the first map, Bergamo and the southern neighboring municipalities, the rest of the Val Seriana, the Brembana valley and the Imagna valley, show a percentage of uniform contagion, apart from the municipality of Valbondione which has a higher number of infected. The second card (b), which relates the percentage of contagion to the number of inhabitants, makes the Seriana Valley emerge as the area with the highest contagion even if the contained number of residents represents it contracted especially in the Upper part where Valbondione almost disappears. The part of the dilated Province, which includes the City, is the most populous and where the percentage of the infection is high but does not reach those of the Seriana Valley. Finally, the lower Bergamo area has a lower percentage.



The map shows the conurbation in the lower valley (Area 8 is composed of 18 municipalities) of populous centers which encompasses 71.7% of the total population, such as: Alzano Lombardo (about 14 thousand), Nembro (about 12 thousand) and Gazzaniga, which are located on the bottom of the valley, or in the municipalities of the Gandino side valley or the Selvino *plateau* also affected by the greatest number of infections; vice versa, the Upper Valley (Area 9 is composed of 20 municipalities) is less populated (28.3% of the population of the Valley) except for the town of Clusone and the centers of Castione della Presolana and Rovetta, where the infections are quite high with different incidence.