

The COVID-19 Infection in Lombardia comes from China

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Received: 29 July 2020; Accepted: 10 September 2020

Citation: Cornelli Umberto, Belcaro Giovanni, Cesarone Maria Rosaria, et al. The COVID-19 Infection in Lombardia comes from China. *Microbiol Infect Dis.* 2020; 4(4): 1-4.

ABSTRACT

Background: Environmental and demographic variables may have an impact on the COVID-19 infection.

Objective: To correlate the number of Foreign Residents in Italy, particularly in Lombardia, with the positive cases of COVID-19.

Methods: Data concerning COVID-19 were taken from the public records of the Italian Protezione Civile updated up to May 25th, and the number of Foreign Residents was retrieved from the publically available data.

Results: The positive cases in Lombardia are correlated with Chinese residents while for Romanian, Ukrainian, Albanian and Moroccan residents no correlation was found.

Conclusions: The COVID-19 pandemia diffusion in Lombardia seems correlated to the number of Chinese residents.

Keywords

COVID-19, Demography, Lombardia, Chinese residents, Romanian residents, Albanian residents, Moroccan residents.

Introduction

During recent studies on the COVID-19 infection in Italy it was evident that this country was consistent as an example of the entire world, since there were Regions with very different rates of infection [1,2].

In Lombardia the 0.88% of the population was found positive; it is a figure much higher than in many of the European Countries or Regions. At the same time in the South of Italy and Islands the infections were very limited. It was found that the viral spreading, was particularly violent in the most prosperous Regions, characterized by an high population density, flat land,

water abundance, high number of companies and workers, while other variables such as temperature and humidity were not found correlated with the viral spreading. One particular aspect should be considered carefully in relation to COVID-19 and consists of Foreign Residents.

The aim of the present study is to focus the attention on the relationship between the Foreign Residents (FRs) number and the positive cases of COVID-19.

Methods

The positive cases were taken from the Public records of Italian Protezione Civile [3] in relation to the Region Lombardia and separately for the 10 Provinces (Table 1). The number of Foreign Residents were taken by the records of every City reported publically available [4].

Statistical methods

The correlations were calculated in terms of “r” taking as a cut off the value of $p < 0.05$). The JMP14 Pro of SAS Institute was used for the analysis.

Results

Italy as a whole Country

The number of cases affected by COVID-19 in the 20 Italian Regions the period between the starting of the official “awareness” of the infection (January 2020) and May 25th are reported in Table 1.

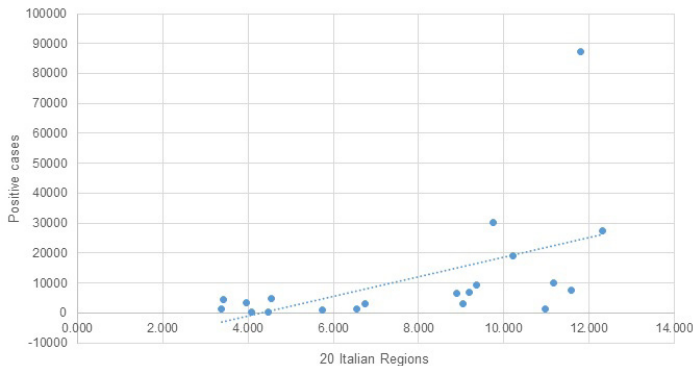


Figure 1: % Foreign Residents in Italy and COVID-19 positive cases.

Region	Inhab N x 10 ³	COVID-19 Positive cases	% of FRs over total inhabitants							Total %
			Chinese	Romanian	Peruvians	Filipinos	Cubans	Indians	Albanian	
Lombardia	10.02	87258	0.690	1.763	0.428	0.583	0.048	0.473	0.022	11.796
Lazio	5.90	7643	0.428	3.958	0.269	0.786	0.049	0.514	0.415	11.587
Campania	5.84	4755	0.237	0.733	0.017	0.067	0.022	0.143	0.121	4.541
Sicilia	5.06	3427	0.146	1.156	0.004	0.105	0.012	0.041	0.179	3.956
Veneto	4.91	19097	0.728	2.586	0.029	0.136	0.036	0.319	0.668	10.211
Emilia Romagna	4.45	27587	0.678	2.119	0.080	0.324	0.052	0.395	1.303	12.307
Piemonte	4.39	30228	0.457	3.367	0.268	0.144	0.042	0.121	0.932	9.742
Puglia	4.06	4467	0.150	0.888	0.004	0.045	0.014	0.100	0.559	3.416
Toscana	3.74	10067	1.499	2.274	0.281	0.353	0.047	0.178	1.605	11.153
Calabria	1.97	1157	0.154	1.824	0.002	0.141	0.015	0.245	0.150	5.754
Sardegna	1.65	1354	0.208	0.856	0.012	0.115	0.024	0.038	0.041	3.381
Liguria	1.57	9497	0.345	1.348	0.266	0.197	0.042	0.0127	1.397	9.348
Marche	1.53	6716	0.619	1.704	0.144	0.109	0.061	0.270	1.301	8.903
Abruzzo	1.32	3227	0.331	2.016	0.020	0.054	0.046	0.072	0.895	6.754
Friuli Venezia Giulia	1.22	3240	0.317	2.082	0.016	0.071	0.034	0.205	0.787	9.048
Trentino Alto Adige	1.06	6998	0.226	1.300	0.106	0.040	0.044	0.215	1.064	9.196
Umbria	0.89	1430	0.292	2.982	0.162	0.212	0.041	0.180	1.473	10.973
Basilicata	0.57	399	0.159	1.599	0.004	0.011	0.021	0.179	0.343	4.071
Molise	0.31	432	0.081	1.315	0.006	0.008	0.018	0.189	0.260	4.477
Valle d' Aosta	0.12	1179	0.247	1.951	0.074	0.036	0.065	0.059	0.579	6.537
Total	60.59	230158	299823	1206938	97128	168292	22273	157965	439027	5255503
r Vs pos cases			0.3768	0.1539	0.6827	0.5395	0.2997	0.5593	0.2618	0.5139
% positive cases in the country		0.380	0.006	0.009	0.441	0.015	0.018	0.012	0.036	

Table 1: COVID-19 positive cases (May 25th) in the Italian Regions and % of Foreign Residents (FRs).

Legenda; inhab= inhabitants; statistically significant correlations ($p < 0.05$) are reported in **italic bold** characters.

Significant correlations were found with the number of FRs in general. However, considering the different countries of origin, Chinese, Romanians, Cuban and Albanian seemed to be not correlated. The Countries with the highest percentages of positive cases are Peru followed by Italy, all other Countries are at least one order of magnitude lower.

In Figure 1 the correlation with COVID 19 in Italy and all FRs is reported.

Despite significantly positive ($p < 0.05$) Lombardia appears as one outlier which may interfere with a linear correlation. The significant value of r seems to be determined mainly by Peruvian, Filipinos and Indians. An example was the analysis of Peruvian Residents (Figure 2) in which Lombardia again behaves as an outliers despite a linear fitting can be obtained.

Lombardia divided into the 12 main cities.

The same evaluation was done considering the Region Lombardia divided by its 12 major cities only. As reported in Table 2, many different FRs are present in these cities. Their distribution is not the same of the Italian territory in that Peruvians, Filipinos and Indians are almost absent. The most represented FRs are reported in Table 2.

City	Inhabitants N	Positive cases	Positive Cases %	Chinese Residents %	Romanian Residents %	Albanian Residents %	Ukrainian Residents %	Moroccan Residents %	Total Residents %
Milano	1390434	22726	1.63	2.18	1.08	0.00	0.62	0.57	19.45
Bergamo	122383	12954	10.58	1.01	1.44	0.87	1.34	1.16	16.50
Brescia	199415	14479	7.26	1.20	2.05	1.13	1.49	0.00	18.40
Como	85258	3760	4.41	0.47	1.03	0.96	0.59	0.44	13.00
Cremona	72680	6396	8.80	0.70	6.6	1.72	0.27	1.39	15.10
Lecco	48562	2724	5.61	0.41	1.04	0.76	0.39	0.65	11.00
Lodi	45872	3406	7.43	0.47	4.65	1.47	0.00	0.43	14.50
Mantova	49565	3320	6.70	0.93	1.51	0.88	1.16	1.86	15.20
Monza	123784	5460	4.41	2.38	1.65	0.92	0.00	0.56	11.50
Pavia	73195	5206	7.11	0.59	2.46	1.00	1.49	0.43	13.90
Sondrio	21614	1426	6.60	0.74	0.73	0.44	0.88	1.98	9.00
Varese	81027	3511	4.33	0.52	0.80	2.43	1.02	0.57	12.50
Total	2313789	85516		1.72	1.48	0.47	0.72	0.61	288769
Under control		1890a							
r Vs % Positive cases				0.6186	-0.0818	-0.4157	-0.2292	-0.2044	0.8472
% Positive cases in the original country				0.062	0.930	0.363	0.049	0.223	

Table 2: Main Cities of Lombardia: number of inhabitants, % of positive COVID-19 cases, and % of Foreign Residents.

a = under control to be confirmed.

Statistically significant correlations are reported in *Italic bold characters*.

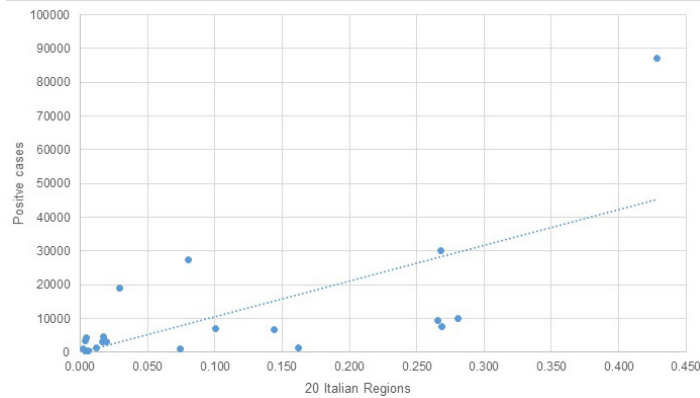


Figure 2: % Peruvian Residents and COVID-19 positive cases.

Statistically significant correlations are reported in *Italic bold characters*. In total 2.219 million people were tested in Lombardia (the total figure is higher because some of subjects were tested more than once), and positive cases were 85516 (around 3.8%) with a very large difference among cities (depending upon the number of swabs taken).

The total of FRs is 288769 corresponding to 12.48% of the total population of the 12 cities; the % of their presence ranges between 0.47% and 1.72%, and the highest figure is represented by Chinese Residents. The positive correlations with COVID-19 cases were statistically significant ($p < 0.01$) for the total % of FRs, and for the % of Chinese residents only. For the other Residents it was negative though not significant (despite very close to be significant for Albanian Residents).

In Figure 3 it is reported the correlation between the COVID-19 in the 12 main cities of Lombardia and the relative percentages of FRs.

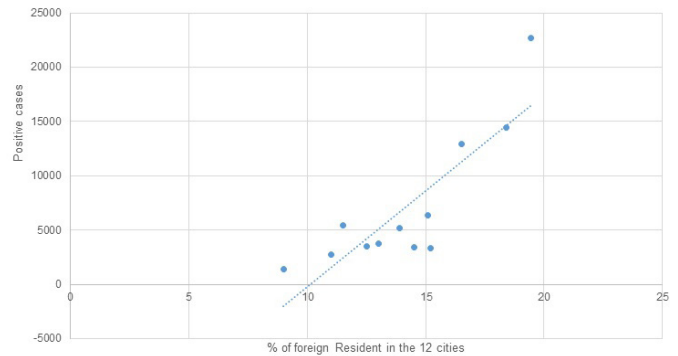


Figure 3: Foreign Resident in the 12 main cities in Lombardia and COVID-19.

The increase of COVID-19 positive cases seems significantly correlated with the % of FRs in the 12 cities. The different countries of the FRs were analyzed separately (Table 2). Chinese Residents were emerging as significantly correlated with COVID-19 only (Figure 4).

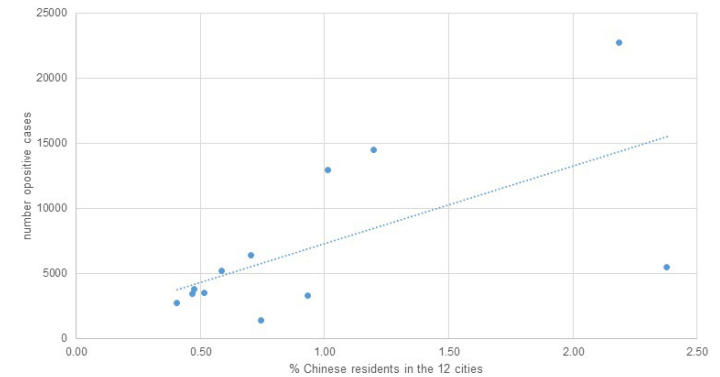


Figure 4: Chinese residents in the 12 main city of Lombardia and COVID-19.

Discussion

In Italy it seems that the wave of the COVID-19 infection will last almost 6 months, with a pick settled around the end of March and slowly declining with an asymptotic shape which should reach the minimum around June 15th [2].

The hypothesis that a second wave can be expected is merely a speculation due to some doomsayers and it is free of scientific data. One aspect is evident, the COVID-19 infection in Italy can be compared to the similar pandemics in the country of 1954 and 2015, causing respectively around 20,000 and 55,000 deaths [2].

In relation to the possible vehicle of infection, the analysis of the viral spreading was addressed to some of the FRs whose countries were reporting cases of COVID-19 around the same period of time.

One limitation of this study is that no attention was paid to the problem until China was declaring the lockdown in Wuhan, and also no mention of this was reported by the WHO. This can determine a bias in the real numbers.

The present data are relative to the relationship between COVID-19 infection and the presence of FRs in Lombardia where the virus caused a mortality of around 1.57 %.

In previous studies [1,2] it was shown that in Italy the viral spreading was particularly violent in the prosperous areas characterized by flat land, Gross Domestic Product (GPD), high number of Companies, workers and social activities.

Particularly, these last variables are related to the FRs who are an important part of the local economy and usually maintain a very close connection with the country of origin.

This is an ideal condition for the viral spreading from a country to the other. The analysis of the relationship between FRs and the condition in Lombardia was logical, since this Region has the highest economical indexes in Italy, which is parallel to the highest number of foreigners interested in business or dedicated to some support activities (e.g. care givers, home servants).

This is most probably the reason of the significant relationship between positive cases to COVID-19 and FRs in Lombardia (Table 2 and Figure 2).

As mentioned before, also the care of elderly people needs the presence of FRs. However, some important distinction has to be made in that Filipinos, South Americans (e.g Peruvians) and Eastern Europe residents are more involved in this last activity, while Chinese are not, being more dedicated to activities such as business (shops, restaurants, small industrial activity) and none of them are working as a caregiver for elderly Italians.

These last aspects are important for the relationship between positive cases of COVID-19 and FRs. In fact, the correlation was positive for Chinese Residents, who are not involved in

this activity, and travel frequently to China that apparently was seriously affected by the COVID-19.

However, many times it may happen that what is logical contains some bias which can modify the entire picture. In the first part of the analysis (concerning the relationship between FRs and COVID-19 in Italy; Table 1) a positive correlation was shown between the number of positive cases and some FRs like Peruvians, Filipinos and Indians.

Considering the country of origin, Peru was found to have higher figures than Italy and could be considered as a source of the virus. It is surprising how with such a high number of people infected (and relative deaths), the WHO was not paying a particular attention.

In relation to Lombardia, only 4 cities had significant Peruvian Residents (most are living in Milan, followed by Monza, Lodi, and Varese) and due to this limitation, it was not possible to draw any conclusion about the correlation with Lombardia. The same was for Filipinos since only 5 cities had sufficient numbers (Milan, Bergamo, Brescia, Como, and Monza) to set up a correlation.

A completely different story came out for Chinese Residents, who were present in all the 12 cities of Lombardia making the correlation statistically significant. Let's now consider the matter with a different perspective, assuming that COVID-19 was already spread in the world since a longer period of time than expected, and causing nonspecific pneumonia in few cases only [5]: in other terms, the virus may have an extremely high capacity of diffusion but a very low clinical expression becoming evident when numbers increase substantially.

The clinical expression may depend upon by viral charge, such that up to a certain level of contamination the clinical symptoms are clinically irrelevant, and may generate antibodies that confer some resistance to the virus. Winter, the people density at work, the public places where a high concentration of humans is possible can allow the viral charge to increase, then the disease will take place. The virus most probably is already part of the meta-organism of many humans as for some other RNA viruses (e.g. herpes, hepatitis virus).

Particular conditions may have allowed in Philippines, Peru or China, singularly or all together to increase the viral charge up to the level of a very consistent spreading. In the light of all this, nobody can be considered the culprit, and everybody can be the victim.

In these conditions the lockdown is the only rapid way to minimize the viral charge, and to generate slowly the viral resistance, waiting for vaccination, despite some simple prevention (like with eucalyptol aerosol) and the common oral hygiene can be sufficient to control the viral charge.

Though, snakes, birds, fishes, mammals can be the viral generators/amplifiers/carries, so that we may expect many others

unknown ills in the future. In general, humans are paying the bill to increase their life expectancy and prosperity [6] and pandemics are the result of this choice made by 7.5 billion of people, unfortunately at the expenses of millions of victims. Most of the times prevention is not possible, and the problem has to be faced contingently.

In this occasion, the figures of Lombardia are addressing the Chinese Residents as the most probable carries of COVID-19. On the other side it seems illogical to consider as a worry the immigrants coming from Africa since the % of positive cases in that territory is 0.008 (111348 cases/1,341 million of people), which is among the lowest figures in the world.

Conclusion

The dramatic conditions in Italy due to the COVID-19 infections are particularly affecting Lombardia which is among the most productive and prosperous Italian Regions. Because of this, Lombardia is addressed as an important territory for business (financial, commercial) and needing personnel for elderly assistance also. The consequence is that a large worldwide community of FRs is approaching Lombardia and may bring the virus from

their original country facilitating the local viral spreading. This probably was the case of Peruvian and Filipinos Residents, but the figures are addressing particularly the Chinese Residents.

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