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# **COVID-19 in Italy: Remedies to Reduce the Infections and Deaths**

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## **Abstract**

COVID-19 is a novel (new) coronavirus fatal disease caused by SARS-COV-2 (2019-nCoV). The outbreak of this pandemic first has been identified in Wuhan, Hubei Province, China on 1 December 2019, and has spread worldwide very quickly. It is now a major global health threat. After the World War II, the world faces such a major challenge in health sector and economy. The virus is transmitted human-to-human through the respiratory system. From the poor to the rich, infants to old, every people are infected from this virus. The disease spreads in Italy very fast and the north of the country is mostly affected. Lombardy Region is the most infected region in the country. An attempt has been made here to discuss the aspects of infection and deaths due to COVID-19 in Italy.

**Keywords:** COVID-19 outbreak, SARS-CoV-2, pandemic, Lombardy outbreak, Italy

## 1. Introduction

Italy is a unitary parliamentary republic and official name is Italian Republic. Its capital city is Rome and official language is Italian. It is a European country consisting of a peninsula delimited by the Alps and surrounded by several islands. It is located in south-central Europe, and considered a part of Western Europe (Figure 1). Its total area is 301,340 km<sup>2</sup> (116,350 mile<sup>2</sup>). Population density is 206 per square km. It borders with France, Switzerland, Austria, Slovenia, and the enclave microstates of Vatican City and San Marino. In 2020, its total population become 60,461,826 (91.5% Italians Ethnic groups and 8.5% others); third-most populous member state of the EU. Of them 78% are Roman Catholic, 15% Irreligious and 7% others. Life expectancy is 84 years by birth (86 years for female and 81.9 for male), which is the 5<sup>th</sup> in the world (after Hong Kong, Japan, Switzerland, and Singapore) (Country Profile, 2020).

Coronaviruses (CoV) are a large family of non-segmented, enveloped, positive-sense, single-stranded RNA viruses that typically cause mild to severe respiratory disease in humans. COVID-19 is a new illness that is caused by a virus called SARS-CoV-2 (Figure 2) (Centers for Disease Control and Prevention, CDC, 2020). On 11 February 2020, the International Committee on Taxonomy of Viruses (ICTV) named the COVID-19 virus as “Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)” as the name of the new virus which causes COVID-19 (ECDC, 2020).

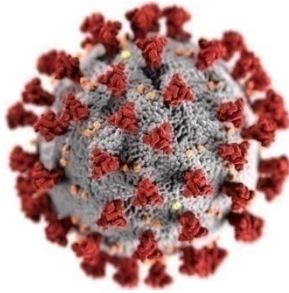
Up to March 2020, Italy has become the most hit of pandemic COVID-19 outbreak country outside of Asia (Remuzzi & Remuzzi, 2020). According to Government of Italy (GoI) and the Italian National Institute of Health (Istituto Superiore di Sanità (ISS)), a total infected case on 9 April is 139,400 with 17,700 deaths, and the region with the highest number of cases is Lombardy, which registered 53,414 with 9,722 deaths. The other infected regions on 9 April are Emilia-Romagna (18,238 with 2,234 deaths), Piedmont (13,883 with 1,378 deaths), Veneto (12,410 with 739 deaths), Tuscany (6,379 with 392 deaths), Liguria (4,906 with 654 deaths), Marche (4,859 with 652 deaths), Lazio (4,266 with 244 deaths), Campania (3,268 with 221 deaths), Apulia (2,634 with 219 deaths), Autonomous Province of Trento (2,602 with 255 deaths), Friuli-Venezia Giulia (2,218 with 169 deaths), Sicily (2,159 with 133 deaths), Abruzzo (1,859 with 179 deaths), Autonomous Province of Bolzano (1,835 with 183 deaths), Umbria (1,289 with 50 deaths), etc. On 15 May 2020, infected regions in Italy are Lombardy (84,342 with 16,000 deaths), Piedmont (29,370 with 3,400 deaths), Emilia-Romagna (27,100 with 3,955 deaths), Veneto (18,880 with 1,764 deaths), Tuscany (9,890 with 982 deaths),

Liguria (9,080 with 1,345 deaths), Lazio (7,330 with 610 deaths), Marche (6,618 with 977 deaths), Campania (4,650 with 395 deaths), etc. (Worldometer, 2020).



**Figure 1:** Map of Italy.

The mostly infected people are older than 50 years. On 9 April it is the third highest number of COVID-19 infected country and first in deaths. Death rate of Italy as of 9 April, 2020, by age group are 0-19 (0.1%), 20-29 (0.1%), 30-39 (0.4%), 40-49 (0.9%), 50-59 (2.4%), 60-69 (9%), 70-79 (23.4%), 80-89 (31.2%), 90+ (26.7%) (Statista, 2020).



**Figure 2:** Shape of SARS-CoV-2. Source: (CDC, 2020).

On 11 February 2020, the World Health Organization (WHO) named the zoonotic coronavirus disease as COVID-19 (“CO” stands for “corona”, “VI” for “virus” and “D” for “disease”, while “19” for the year), which belongs to the sarbecovirus subgenus of Coronaviridae family, subfamily Coronavirinae (Enserink, 2020). It is more contagious than both SARS-CoV (outbreaks in 2003, China) and MERS-CoV (outbreaks in 2012, Middle-East) (Wang et al., 2020a). On 20 March 2020, Italy becomes the second-largest COVID-19 infected country, after China and considers a serious threat to the Italian national health system. The health department of the country has limited capacity of Intensive Care Unit (ICU) (Saglietto et al., 2020). Depending on the fatality of 9 and 11 March 2020, the GoI takes progressive mitigation attempts, such as limits social interactions to prevent virus diffusion (Remuzzi & Remuzzi, 2020).

Minor to major symptoms of this illness are fever ( $>100.4^{\circ}\text{F}/38^{\circ}\text{C}$ ), dry cough, fatigue, sputum production, dyspnoea, shortness of breath, lymphopenia, anorexia, headache, hypoxemia, chills, nausea or vomiting, rhinorrhoea, muscle or joint pain, grand-glass opacities, myalgia, haemoptysis, sore throat, sneezing, nasal congestion, RNAemia, diarrhea, etc. Sometimes the symptoms transform to pneumonia (infection of the lungs), multi-organ failure (e.g., kidney, heart, etc.), and even to death. The period from the onset of COVID-19 symptoms to death ranged from 6 to 41 days with a median of 14 days (Carlos et al., 2020; Huang et al. 2020; Mohajan, 2020; Ren, et al., 2020; Wang et al., 2020a). However, some people who have been infected with COVID-19 experienced no symptoms. Some patients experienced loss of taste, appetite or smell (Culp, 2020).

On 30 January, the WHO declared the outbreak a “*Public-Health Emergency of International Concern (PHEIC)*” as the outbreak could spread to countries with fragile health systems (Callaway, 2020). On 11 March 2020, the WHO declared the global outbreak as a pandemic to minimize the infection and mortality rate (WHO, 2020b).

Older age, cardiovascular disease, diabetes, chronic respiratory disease, asthma, hypertension, and cancer are all associated with an increased risks of death from infection of COVID-19 in Italy (Yang et al., 2020). Obesity and smoking are also increase risks of death (Wang et al., 2020b). In Italy higher risks have also been reported in men than in women (Livingston & Bucher, 2020).

At present Italy is experiencing a pandemic of COVID-19 which emerged in the Lombardy region, Northern Italy. The virus of this fatal disease has come to Italy through foreign tourists or non-residents and the Italian citizens who travel abroad (Day, 2020).

Lethality (infected fatality rate (IFR)) of COVID-19 is very high in Italy compared with other major infected countries, such as the USA, Spain, China, the UK, France, the Netherlands, Iran, etc. Sometimes asymptomatic contacts spread COVID-19 largely. For example, estimated asymptomatic proportion was 18% for the outbreak on the Diamond Princess Cruise ship in Japan (Mizumoto et al., 2020). The disease is so widespread and there is no plausible reason of this high IFR. On 24 March 2020, case fatality rate (CFR) of Italy was 10%; and the corresponding figures of Spain, China and Germany were 7.2%, 4%, and 0.5% respectively (Villa, 2020).

## **2. Literature Review**

Matteo Villa has compared the case fatality rate (CFR) and infected fatality rate (IFR) of SARS-CoV-2 in Italy. He shows that CFR (about 10%) is higher and faster than in other countries of Europe. But relying on this figure will be misleading for measuring the fatality rate of this disease. He shows that the CFR is not a good measure of plausible lethality of COVID-19 in Italy (Villa, 2020). Marta Paterlini points out that the COVID-19 outbreak is having catastrophic effects on the Italian economy, which is likely to plunge into a recession, as well as social and psychological effects on the population (Paterlini, 2020). Ashleigh R. Tuite, Victoria Ng, Erin Rees, and David Fisman try to estimate COVID-19 outbreak size in Italy based on international case exportations. They have identified 46 cases of COVID-19 reported in 21 countries in Europe, Africa, North America, and South America which were either in individuals with recent travel from Italy, or who had presumed infection by a traveler from Italy (Tuite et al., 2020).

Martin Enserink and Kai Kupferschmidt estimate that as the new COVID-19 infections and deaths are increasing exponentially; the USA, Italy, Spain, the UK, France, and Netherlands will need twice as many ICU beds as estimated previously (Enserink & Kupferschmidt, 2020). In editorials report Rachel E. Jordan, Peymane Adab, and K. K. Cheng observe that in Italy, higher risks have been reported in men than in women due to their higher smoking rates and subsequent comorbidities (Jordan et al., 2020). Guzzetta Giorgio and his coauthors indicate that three regions Lombardy, Emilia Romagna and Veneto are most affected regions of COVID-19 from February to March in Italy. They have projected the number of COVID-19 cases in 593 municipalities of Lombardy where at least one case of community transmission had been recorded by 8 March 2020 (Giorgio et al., 2020).

Andrea Saglietto and his coauthors show epidemic curves for European 18 countries. They urge that all European countries accept the Italian lesson of high fatality and immediately adopt very restrictive measures to limit viral diffusion, ensure appropriate health system response, and reduce mortality (Saglietto et al., 2020). Andrea Remuzzi and Giuseppe Remuzzi indicate that China has reduced the new infections by more than 90% of COVID-19; this reduction is not the case elsewhere, such as in the USA, Italy, the UK, Spain, France, and Brazil. They confirm that the maximum number of infected patients reaches in Italy and the maximum number of patients require ICU admission (Remuzzi & Remuzzi, 2020).

Neil M. Ferguson and his coauthors assess non-pharmaceutical interventions to reduce contact rates in the population and reduce transmission of the virus. They apply a previously published micro-simulation model to two countries; the UK and the USA. They advise to follow the strategies of suppression that was possible in the short-term in China and South Korea. According to them two fundamental strategies are; i) mitigation, which focuses on slowing but not necessarily stopping epidemic spread—reducing peak healthcare demand while protecting those most at risk of severe disease from infection, and ii) suppression, which aims to reverse epidemic growth, reducing case numbers to low levels and maintaining that situation indefinitely (Ferguson et al., 2020). Victor M. Corman and his coauthors stress on real-time Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) to detect causative viruses from respiratory secretions in public health laboratories during international health emergencies by coordination between public and academic laboratories (Corman et al., 2020).

### **3. Methodology of the Study**

Research is the process of collecting, analyzing, and interpreting the data in order to understand a phenomenon. Methodology is merely the study of a particular method, or methods, for reaching a desired end in a continuous procedure (Leedy & Ormrod, 2001). According to C. R. Kothari research methodology is the systematic procedure adopted by researchers to solve a research problem that maps out the processes, approaches, techniques, research procedures, and instruments. It may be understood as a science of studying how research is done scientifically (Kothari, 2004). Reliability and validity are necessary conditions for a good research and these are maintained to present this study in a concise, but precise manner (Mohajan, 2017; 2018). To prepare this article we have used the secondary data. The data are collected and designed the article from previous published articles, books of famous authors, websites, theses, conference papers, case studies, various statistical data, and various research reports.

The methodology of this article is to discuss the aspects of pandemic outbreak of COVID-19 in Italy. In this study we have tried to discuss the background and transmission of COVID-19, and healthcare system to cure patient from this pandemic disease in Italy. We also indicate high risk people in the country, and prevention and treatment techniques to face COVID-19 efficiently.

On 9 April 2020, total infections in Italy reached to 139,400 with 17,700 deaths; on 16 April the corresponding figures become respectively 168,941 and 22,170. On 15 May 2020, total infections in the country became 223,096, total recovered 115,288 and total deaths reached to 31,368 (Worldometer, 2020).

### **4. Objective of the Study**

The main objective of this study is to create consciousness of COVID-19 among the people of Italy. The other objectives are as follows:

- to highlight the pandemic of this disease,
- to provide the fatality of COVID-19 in Italy, and
- to analyze the transmission, prevention, and treatment techniques of the disease in Italy.



## 5. Background

On 1 December 2019, the COVID-19 has been identified in a person who had not had any exposure to the Huanan Seafood Wholesale Market of Wuhan, Hubei Province of China, has spread quickly nationwide and globally. It is a new illness that is caused by a virus called SARS-CoV-2. It has not been previously found in people and spread globally from China through human-to-human contact (WHO, 2020a). Three human coronaviruses; SARS-CoV (outbreak in 2003), MERS-CoV (outbreak in 2012), and SARSCoV-2 (outbreak in 2019) are thought to spread from infected animals-to-people through contact (Guarner, 2020; Wang et al., 2020a).

The diseases spread outward from Hubei Province at the late December 2019 (Li et al., 2020). The first confirmed death was on 9 January 2020 in Wuhan. The first death outside China occurred in the Philippines, and the first death outside Asia was in France. On 31 January 2020, two Chinese tourists were found positive COVID-19 in Rome, Italy (Holm & Moritsugu, 2020). On 30 January, the WHO declared the outbreak a “*Public-Health Emergency of International Concern (PHEIC)*” as the outbreak could spread to countries with fragile health systems (Callaway, 2020). On 11 March 2020, the WHO declared the global outbreak as a pandemic to minimize the infection and mortality rate (WHO, 2020b). On 5 April total infected people reached to 1,225,360 and total deaths became 66,542 worldwide. Italy is the most vulnerable in the world and on 5 April total infected people in this country reached to 1,225,360 and total deaths became 66,542. On 8 April 2020, total 209 countries and territories around the world are affected; global total infection reached to 1,455,987, total recovered 310,108, and total death became 83,687. In Italy the corresponding figures became 135,586; 24,392; and 14,555. On 16 April 2020, total infection in Italy became about 168,941 with 22,170 deaths. On 15 May 2020, total infections in the country became 223,096, total recovered 115,288 and total deaths reached 31,368 (Worldometer, 2020).

## 6. Transmission of COVIT-19

The virus is transmitted mainly from person-to-person in close contact with others. Respiratory droplets transform from infected person by talking, coughing or sneezing; touching an object or surface with the virus on it and then touching mouth or eyes before washing hands. Droplets only stay suspended in the air for a short time. Minimum personal distance between two people becomes one meter (3 feet) (Chan, et al., 2020; WHO, 2020a). The COVID-19 infected patients were

confirmed by RT-PCR kit diagnosis system performed using nasopharyngeal swabs (Corman et al., 2020).

### **6.1 Spread of COVID-19 in Italy**

On 31 January 2020, two Chinese (a Chinese couple) tourists were found positive COVID-19 in Rome. On that day the GoI suspended all flights to and from China and declared a state of emergency with the duration of six months and introduced thermal scanners and temperature checks on international passengers arriving at Italian airports (Corriere Della Sera, 2020). On 6 February 2020, an Italian man backed to Italy from the city of Wuhan, China, confirmed as the third case in Italy (Onder et al., 2020).

### **6.2 Spread in Lombardy Region**

In the night of 20 February 2020, the first case (a 38 year old man, marathon runner) of COVID-19, local transmission was confirmed in the intensive care unit (ICU) in the Hospital of Codogno, Lodi, Lombardy Region (a district of 10 million people), Italy. He had a history of a typical pneumonia that was not responding to treatment (Bai et al., 2020). He can breathe on his own after more than two weeks in ICU for severe pneumonia. By the following day, 21 February 2020, about 28 positive cases were identified and later an initial outbreak was identified around the city of Codogno (Cereda et al., 2020). On 22 February 2020, a 77 year old woman died in Lombardy, first death in Italy (Giurida & Beaumont, 2020).

### **6.3 Spread in Mainland of Italy**

By the beginning of March, the virus had spread to all regions of Italy. The disease appears to have a much higher severity in Italy than elsewhere. The number of infected patients increases at the exponential rate. On 28 February 2020, there were over 530 infections and on 8 March the figure became 5,830. On 8 March 2020, the GoI expanded the quarantine to all of Lombardy and 14 other northern provinces, and on the following day to all of Italy, placing more than 60 million people in quarantine. On 11 March 2020, Conte prohibited nearly all commercial activity except for supermarkets and pharmacies. On 15 March 2020, infected more than 24,747 people (2,026+ healthcare staff) and 1,809 deaths; the fatality rate of Italy became 7.2, which was higher than in China (3.8) (Paterlini, 2020). On

19 March 2020, Italy became the country with the highest number of confirmed deaths in the world. On 21 March 2020, all non-essential businesses and industries are closed and enforced restrictions to movement of people. On 30 March 2020, the total of confirmed cases becomes 101,739 with 11,591 deaths, and 14,620 recoveries. On 3 April total infected people became 115,200 and total deaths 13,915. On 5 April total infected people became 124,632, total recovered 20,996, and total deaths became 15,362. On 16 April 2020, total infection in Italy became about 168,941 with 22,170 deaths. On 15 May 2020, total infections in the country became 223,096, total recovered 115,288 and total deaths reached to 31,368 (Worldometer, 2020).

#### **6.4 Most Infected Areas**

The disease appears to have a much higher severity in Italy than elsewhere. Lombardy, the region around Milan is the most affected in Italy. It has about 1,000 beds for patients of ICU. March 5, about 72% positive cases were observed in the provinces of Bergamo, Lodi, and Cremona (Paterlini, 2020). On 9 April most infected regions are Lombardy (53,414 with 9,722 deaths), Emilia-Romagna (18,238 with 2,234 deaths), and Piedmont (13,883 with 1,378 deaths) (Worldometer, 2020).

#### **7. Healthcare System in Italy**

In Italy the number of patients infected since 21 February and the infection increases exponentially. Italy has about 5,200 beds for intensive care units (ICUs). Of those, as of 11 March 2020, about 1,028 are already filled by patients with SARS-CoV-2 infection. It is estimated that more than 4,000 hospital beds will be needed by mid-April, 2020. To decrease Italian outbreak, the country must follow strategy of China (Remuzzi & Remuzzi, 2020). After infection of 24,747 people (including 2,026 healthcare providers) and killed off 1,809; GoI imposed state of emergency lockdown from northern Italy to the whole country. The country is experiencing a chronic shortage of healthcare workers. On 9 March the GoI announced a plan to add 20,000 new doctors, nurses, and hospital employees to meet the demand (WHO, 2020c).

Healthcare providers have been working day and night since 20 February and of them about 20% have become infected, and some have died. On 11 March 2020, according to the Istituto Superiore di Sanità (ISS) about 12,462 patients were

infected and 827 died. Those who died had diabetes, cardiovascular diseases, or cancer, or were smokers. Of them age boundary: 14.1% were 90+, 42.2% were 80–89, 32.4% were 70–79, 8.4% were 60–69, and 2.8% were 50–59 (Cereda et al., 2020; Tuite et al., 2020).

## **8. High Risk People**

All people of Italy are in the risk of COVID-19. From infant to old every people are infected from this disease. Older people whose ages are more than 50 years with weakened immune systems are infected tremendously. In 2019, approximately 23% of the Italian population was aged 65 years or older. So that, higher case fatality rate of Italy is higher than other countries (Onder et al., 2020). The patients of hypertension, cardiovascular disease, chronic respiratory illness, asthma, cancer and diabetes infected and deaths are in high in the country (CDC, 2020).

## **9. Prevention and Treatment**

To heal from the COVID-19 there is no vaccine or antibiotic. Treatment consists of supportive care and relief of symptoms. Supportive treatments are; i) rest isolate, ii) take pain and fever medications except aspirin, iii) drink plenty of liquids, iv) use a room humidifier, and v) take a hot shower to help ease a sore throat and cough. Other supportive treatments for critically ill patients are supplemental oxygen, fluid administration, being managed in intensive care units (ICUs) and receiving rescue therapies, such as extracorporeal membrane oxygenation (Center for Health Security, 2020; Mohajan, 2020).

Prevention is the best way to protect this virus (CDC, 2020). The prevention techniques are as follows (Kampf et al., 2020; Mohajan, 2020; UK, 2020; WHO, 2020d):

- Wash hands vigorously with soap and water for at least 20 seconds after going to the toilet, after coughing and sneezing, before and after caring for an ill person, after caring healthy or sick animals, before preparing and serving foods, and before eating. After hand washing, dry with tissue, clean towel or hand dryer. Hand washing must continue at least one time in an hour even a person is at home.
- If soap and water is not available, use a 62–71% alcohol-based hand sanitizer.

- Avoid close contact, such as kissing, sharing cups, or sharing eating utensils with sick people.
- Isolate quarantine at home or hospital if anybody feels sick.
- Cover nose and mouth with a tissue when coughing or sneezing, cannot use this tissue for several times and throw the tissue in the covered trash immediately.
- Avoid touching eyes, nose, or mouth with unwashed hands.
- Avoid hand shaking.
- Avoid contact with sick animals and infected people if possible. Use PPEs if care them.
- Wash hands after animal contact and after visiting farms, markets, barns, petting zoos and agricultural fairs, and then touch the nose, eyes or mouth.
- Maintain healthy habits, such as get enough exercise, a well-balanced diet, eat healthy foods, thoroughly cooked meat and animal products, drink sufficient water and fruit juices, get sufficient sleep, manage stress, and avoid smoking and alcohol taking.
- If any healthy person has traveled from an affected area, there may be restrictions on movements for up to 2 weeks.
- Clean and disinfect objects (e.g., doorknobs, desks, counter parts (tops, keyboards, and mouse), light switches, water tap, phones, toys, railings of stairs, etc.), touched surfaces, and clean floor where the patients stay.
- Maintain at least one meter (3 feet) distance from other people at all times, not touching face with unwashed hands, etc.
- Everybody infected or uninfected must cover nose and mouth with a tissue or a bent elbow when coughing.
- Masks use who are infected with the virus, who are taking care of the patients, who go to any public place but no need for the healthy family members in home. Avoid touching the mask while using it, remove the mask using the lace from behind, do not touch the front of a mask and do not reuse single use masks.

## **10. Conclusions and Recommendations**

In this study we have tried to discuss the pandemic outbreak of COVID-19 in Italy. In Europe the country has gained the experience of more infections and more deaths. The Lombardy region is the most affected area in the country. Hand washing, maintain healthy habits, masks use, and supportive treatment can reduce the fatality of this disease in Italy.

Italy has a high proportion of older patients and COVID-19 deaths are mainly observed among older and male patients who also have multiple comorbidities. Since the people of Italy have captured the prevention techniques and supportive treatments of COVID-19. As the GoI have taken various steps to reduce the disease, we hope that both the infections and deaths will reduce in Italy in a very short period (within July 2020).

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