

# COVID-19 and Cities: from Urban Health strategies to the pandemic challenge. A Decalogue of Public Health opportunities

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**Summary.** *Background and aim of the work.* The ongoing pandemic of COVID-19, which nowadays has exceeded 2.5 million notified infections in the world and about 200,000 deaths, is a strong reminder that urbanization has changed the way that people and communities live, work, and interact, and it's necessary to make the systems and local capacities resilient to prevent the spread of infectious diseases. How we can re-design the concept of Public Health in relation to the built environment and the contemporary cities? *Methods.* According to the previous statements and scenario, aim of this paper is to integrate the Urban Health strategic objectives, focusing the possible responses, both immediate and medium-long term, to the current environmental, social, and economic aspects of the "period" of physical distancing. *Results.* Immediate Actions are 01. program the flexibility of city schedules; 02. plan a smart and sustainable mobility network; 03. define a neighborhood services' plan; 04. develop a digitization of the urban context, promoting the smart communities; 05. re-think the accessibility to the places of culture and tourism. Medium-long term Actions are 06. design the indoor flexibility of domestic living spaces; 07. re-think building typologies, fostering the presence of semi-private or collective spaces; 08. renovate the basic care services' network; 09. integrate the existing environmental emergency plans, with those related to the health emergencies; 10. improve stakeholders' awareness of the factors affecting Public Health in the cities. *Conclusions.* The *Decalogue of Public Health opportunities* may provide a useful basis for Designers (Architects and Urban Planners), Policy Makers, Public Health experts and Local Health Agencies, in promoting actions and policies aimed to transform our cities in healthier and *Salutogenic* living environments. ([www.actabiomedica.it](http://www.actabiomedica.it))

**Key word:** post-COVID19 Cities; post-COVID19 Communities; post-COVID19 Urban Health; post-COVID19 Living Spaces; Resilient Cities; Public Health Decalogue; City Schedules; Emergency Mobility Network; Urban Digitization; Care Services' Network.

## The Pandemics' Role in Urban Contexts: Theoretical Scenario.

The ongoing pandemic of COVID-19 - which nowadays has exceeded 2.5 million cases and about 200,000 deaths in the world (1) - is a strong reminder

that urbanization has changed the way individuals and communities live, work, and interact, and that it's urgent to make the systems and the local capacities resilient, to prevent the spread of infectious diseases today and tomorrow (2).

Certainly, the on-going urbanization of the terri-

tories is achieving a great success, considering that the urban population, which currently accounts for 54% of humans, is expected to rise to the forecasted 70% by 2050 (03). A success? Looking at the built environment, the crowding of people in the urban areas, due to the continuous addition from rural areas, regularly results in poor housing, insufficient supply of fresh water, poor sanitation facilities, and ineffective ventilation systems, all events that multiply the risk of dissemination of infections and generate social and health inequalities (4).

From the other side, referring to the urban environment, fast urbanization might lead to encroachment into natural habitats and closer encounters with wildlife and zoonoses; and the increased proximity to animals in backyard farms and live animals markets also provide opportunities for zoonotic infections. Both SARS-COV-2 and COVID-19 might have originated from uncontrolled food markets, and - out of the 335 emerging infectious diseases identified between 1940 and 2004 - more than 60% were of zoonotic origin. In other words, economic development causes the intensive urbanization of the territories and the Urban Sprawl phenomena (5), that interrupt the ecological corridors, make the balance of ecosystems fragile and shortens the distances between urban humans and wild-life, reservoir of numerous diseases.

The pandemics of the 20th and 21st century, in the Western World, have been and are mostly transmitted by direct contact with body fluids (AIDS, Ebola) or through respiratory (pandemic influenza, SARS-COV-2, MERS) contact, differently from the past, when oral-fecal (Cholera) or vectorial (Malaria, Plague) routes were predominant. Such a situation is easy to explain, because the latter are made less likely by the increase of the level of personal, domestic and urban hygiene, while the former are favored by the urban and residential density, by the increment and crowding of meeting spaces, by the congestion of the public transport, such as undergrounds and suburban trains. The risk of respiratory transmission, enhanced by the proximity of people, is definitely less easy to counteract because wild urbanization is unavoidably associated with continuous occasions of crowding, and also causes great economic and social inequalities that, in turn, are associated with poor housing and

precarious life conditions. A recent example of such a situation is represented by what happened in the city-state of Singapore, where the COVID-19 pandemic, already under control, has violently come back because the poor immigrants' dormitories had been left out from the surveillance and the environmental remediation (6).

Moreover, coming back to the on-going pandemic of COVID-19 and to the initial dissertation about the impacts of human activities on environment, several hypotheses about the correlation between outdoor air pollution and infection intensity are being studied, but they are still supported by an insufficient amount of evidence. The high concentrations of fine dust (i.e. particulate matter like PM<sub>10</sub> or PM<sub>2.5</sub>) recorded in February 2020 in the Northern Italy (clear example of an urban megalopolis), may have created favorable individual conditions for the development of COVID-19 or its prognosis, even if these data need more appropriate epidemiological investigations (7).

These conditions of environmental pollution, associated with very similar climatic parameters (temperature and humidity average of the period) between Northern Italy, Spain and the Chinese region of Hubei (where the well-known city of Wuhan is located), indicate that outdoor air quality has a key role in the spread of respiratory diseases matrix. It's well known that some viruses, transmitted by air, take advantage from fine particles as carriers to spread into the environment (8). It's, therefore, clearly possible that the environmental phenomena such as deforestation, global heating and atmospheric pollution, can accelerate the spread of viruses like SARS-COV-2 (9), without prejudice that the contamination occurs by direct contact with the population and therefore, in the absence of a specific vaccine, physical distancing and the lockdown of the population are among the most effective and immediate measures to be taken.

The emergence of an epidemic brings forth the need of a new concept of health and wellbeing in relation to the built environment, and beyond. Referring to the Urban Health theories deeply debated in previous scientific papers by the Authors (10), and considering the healthy urban planning and design strategies like vehicles of primary Public Health prevention and promotion (11), the contemporary challenge is: *how*

can we re-design the concept of Public Health in relation to the built environment and the contemporary cities? And how strong should be the collaboration between Designers (Architects and Urban Planners), Physicians, Epidemiologists and Policy Makers in promoting actions and policies aimed to transform our cities in healthier, Salutogenic and protective living environments?

In our view, now, even more than in the past, a multidisciplinary approach is essential, to develop systemic operational skills, capable of dealing with complexity and therefore, as a paradigm, also with the effects of the current pandemic.

**Which Strategies both for the immediate and medium-long term future? A possible Decalogue.**

According to the previous statements and scenario, aim of this position paper is to integrate *Urban Health* strategic objectives, previously defined, focusing on the possible responses, both the immediate and the medium-long term, to the current environmental, social, and economic criticalities that are characterizing this period of physical distancing. Hopefully, this Decalogue of Public Health opportunities may provide a useful basis for designers, local governments and public bodies, and for all professionals working at Local Health Agencies and Public Health experts.

This Decalogue is divided into two parts, the first one - including 5 actions - refers to the immediate post-epidemic period, when actions are to be taken to help the society to begin the return to a kind of “normality”, and includes mostly functional interventions; while the second part includes more structural interventions, which aim to change profoundly the basis on which the life and the activities are to be organized for the future.

*Immediate Actions:* from 01 to 05, the figure offers the list of the actions that must be planned during the acute stage of the pandemic, and enforced immediately after the acute stage is over. Probably it will be impossible to complete some of them during the post-acute stage, but it is imperative that *all of them* must be initiated and pushed on. In particular, action 4 is critical, because it will constitute the basis for many of the developments of the following stage.

*01. Program the flexibility of city schedules* to avoid gatherings in peak hours and to provide vitality of the neighborhoods during most of the day (at least 18h/day); considering that seats on public transport vehicles are to be reduced in order to guarantee physical distancing, it will be necessary to spread the commuters’ trips over more hours and, possibly, making Saturday and Sunday working days.

Public transportation systems will be characterized by a strong challenge in the coming weeks; surely,

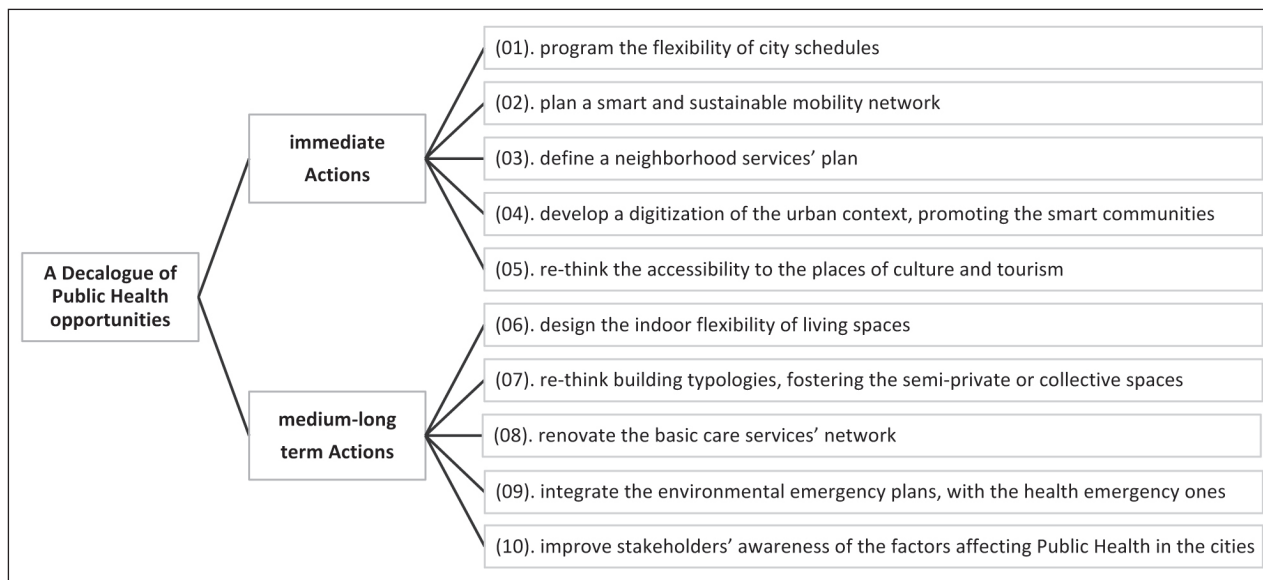


Figure 1.

they cannot be the same as before in terms of number, frequency and capacity, for reasons related to safety distance respect. The city of Milan, for example, is preparing to adopt transport actions such as blocking underground lines operation over a certain number of passengers - to reduce capacity at peak times to 30% - and to draw, on the cabs' floor, several circles to ensure the distance. Should this attempt fail, people who can afford it will decide to go back to the past, using their private vehicles, automatically increasing traffic congestion and outdoor air pollution.

*02. Plan a smart and sustainable mobility network* it refers to the design and realization of something temporary, like slow and sustainable urban paths, i.e. emergency cycle networks (12), drawn with a strip painted on the road, capable of offering a real alternative to those who decide to use a bike for active transport, not the public transport. Milan is the leader of the Italian municipalities that have begun to take agreements with the police (13) to realize an ambitious project aimed to reallocate street space from cars to cycling and walking, in response to the COVID-19 crisis, improving the Walkable Environment (14-15). These strategies include low-cost temporary cycle lanes, new and widened pavements, 30 kph (20mph) speed limits, and pedestrian and cyclist priority streets.

The benefits of this strategy are numerous: to reactivate - after a long period of sedentary lifestyle - active transportation choices, fostering urban daily physical activity (16), and to control the levels of outdoor air pollution caused by vehicular traffic.

In addition, *Smart Mobility* means that, through the appropriate combination of physical infrastructures, technologies and IT services, cities can be managed through continuous and effective levels of operation and digital monitoring over time. This transformation can generate enormous value for urban economies, allowing behavioral changes and at the same time ensuring a more reliable service for citizens. Reference strategies for *Smart Mobility* concern various areas such as: dynamic and resilient street lighting (i.e. sudden meteorological events and / or accidents) but also safety lighting according to occupancy levels of the street section (i.e. bus stop correspondence); proactive management of the transport corridors, to allow emergency vehicles to cross quickly; smart devices to

activate road maintenance services and to optimize the resources' use according to the needs.

*03. Define a neighborhood services' plan* according to population density and neighborhood size. The period of physical distancing has certainly underlined the importance the presence of a dense network of neighborhood services. After the Public Health emergency, this urban planning strategy could have significant impacts in terms of reducing sedentary lifestyle (promoting a Walkable Environment) and increasing social cohesion (17).

Examples of best practice include the *Ville du quart d'heure* (city of the quarter of an hour), designed by Professor Carlos Moreno, Scientific Director of ETI Chair at Paris1 Panthéon Sorbonne University (18), but also the *Superblocks Model* of Barcelona (19), the 20 minute neighborhoods of Portland and finally the *City ground floors' masterplan*, developed by MVRDV Architects for the city of Glasgow. These proposals have tried to offer an adequate level of quality of life at a short distance, taking into account some essential urban social functions, like: living, working, supplying, caring, learning and enjoying. In this sense, the neighborhood trade could also be valorized, like multiple small points spread across the urban network, and like an alternative to the large shopping center that create gatherings, difficult to manage without long queues.

For example, in the *Ville du quart d'heure* the neighborhood is designed in such a way that the main needs of the population can be met within a maximum distance of 15 minutes from their home. This project, like many others, seeks to provide tools for an ecological transformation of the city, aimed, above all, to improve the daily lives of the inhabitants, avoiding the crowds on public transportation systems, which represents a particularly important issue during the epidemic period.

Obviously, it can find application and represents an opportunity for all work activities that can be carried out remotely. In fact, as the quarantined period is showing, for many people, home-office will be an effective organizational resource, helping to reduce urban and peri-urban travel, avoiding the possibility of contagion (today) and overcrowding of public transportation systems and traffic congestion (next future). In a period when transport has become one of the main CO<sub>2</sub> sources, offering opportunities to change

urban life and activities, programming the hours of use, it can help significantly reduce the city's ecological footprint (20).

However, the travel reduction requires some warranties: for instance, the proper availability of adequate healthcare close to home, perhaps within a quality telemedicine network, but also quality of the proximity services, possibly at competitive costs, in an environmental context favorable to walkable (cycle and pedestrian) accessibility of the city (21-22).

*04. Develop a digitization of the urban context, promoting the smart communities* not merely for tracking people, but for monitoring and information purposes. The use of IoT systems permit huge and systematic data-collecting actions. One example could be the meteorological columns equipped with sensors capable of detecting and evaluating the presence of different atmospheric agents including outdoor air pollutants, sound pressure, temperature, humidity and wind speed. Air and acoustic pollution levels could be controlled, setting up appropriate mitigation policies, like small interventions on the outdoor spaces, such as sound masks from natural sources that improve the environmental quality in residential contexts. The collected data, about people's movements, can be used in an aggregate way, guaranteeing user privacy, allowing to test the effectiveness of the urban design and, if necessary, to re-configure it appropriately, with tactical urbanism actions.

*05. Re-think the accessibility to the places of culture and tourism* refers to one thing to be carefully planned and achieved as soon as possible; even if this problem can appear secondary, the re-opening of all the areas devoted to culture, like museums, temporary exhibitions, concerts, theatres, etc. will give the precise impression that life has come back, and that "normality" will soon arrive. For museums and exhibitions of every kind, limited access will be the rule. The number of subjects to be allowed in every, for example 15 minutes, must be calculated in advance and will be considered when bookings are accepted. People will be provided with gloves and masks and asked to stay silent or to speak softly during the visit. People will be also warned not to lose time during the visit. Consecutive admissions will be planned according to the number of visitors coming out. In this situation too, the digitization, which was in any case ongoing, could play a key role.

A different perspective will be applied for theatres, cinemas and concert halls. The critical aspect is that there should be a significant cut of available seats, and this action could make performances unprofitable (more so for theatres and concerts than for movies).

As far as the hospitality industry is concerned, hotels will have to respect general rules of caution for their guests, while special attention should be reserved to hotel workers, especially those devoted to the cleaning of rooms, who will have to wear masks and gown while at work, both to be replaced at every work shift. A very serious problem is represented by Bed&Breakfasts, very popular and massively present in many urban areas of touristic interest. Before the crisis, in spite of the modern laws that had tried to regulate them, too many of them were not registered, very often un-surveilled, and the crowding in rooms and common spaces where such that could not be accepted today anymore. If they will be allowed to re-open, a very strong nationwide surveillance will need to be organized and managed.

*Medium-long period actions:* as it can be easily understood, this group of actions are for the future and are very complex, therefore requiring a long period to be realized. Therefore, it is necessary to start their planning immediately, even before the end of the emergency period and during the post-emergency period.

*06. Design the indoor flexibility of domestic living spaces.* It refers to the opportunity to re-think living spaces, considering the renewed needs that have raised up in this period of physical distancing, improving the indoor well-being and sanitation needs.

In general, crowding is a result of a mismatch between the dwelling and the household. The level of crowding relates to the size and design of the dwelling, including the size of the rooms, and to the type, size and needs of the household. Whether a household is "crowded" depends not only on the number of people sharing the dwelling, but on their age, relationship and sex. At the same time, as underlined in the WHO Housing Guidelines (23) several studies have reported a direct association between crowding and adverse health outcomes, such as infectious disease and mental health problems. These problems mainly occur in low-income population, determining an evident inequality in health (24).

Therefore, ensuring housing that is not only available, but also appropriate and affordable, is crucial to reduce crowding, but also to reduce the incidence of several infectious diseases (25), like tuberculosis and now COVID-19.

This issue has implications for national and local governments, which usually need to build and refurbish housing, subsidize social or public housing, etc. In particular, it has to be argued that considering the demographic trends in Italy, the opportunity emerges to move toward a flexible approach in houses' design and refurbishment, such as to allow the adaptability to changes in the distribution and use of the housing spaces both in the short and long term (26). A good flexibility of the indoor spaces could be an advantage from several viewpoints: in order to realize isolation rooms, in situation like the present, to ensure adequate privacy for the study, agile work, relaxation and for children's play, but also larger spaces to guarantee the mobility of wheelchairs or other supports for elderly assistance, etc.

The overlapping of different activities (work, study, socialization, play, etc.) in small confined spaces can strongly influence family life, creating a difficult dynamic in the relationships between inhabitants of the same nucleus, and inducing states of depression, anxiety and stress and, in situations like the present, obstacles to the work productivity (27).

Ensuring flexible and adaptable spaces for all users in indoor environments can make housing more "sustainable", able to adapt to changing needs and also to changing lifestyles. Obviously, thermal insulation for energy efficiency and air changes will need to find an equilibrium.

Finally, another key strategy could be, especially in a co-housing situation, the presence of easily adaptable spaces to expand residential capacity and maintain physical distancing, like garrets and semi-basement (28) considering, in any case, that the minimum requirements coming from building codes and appropriate health prescriptions (29-30) suggest to guarantee high levels of cross-ventilation in domestic spaces (31).

*07. Re-think building typologies, fostering the presence of semi-private or collective spaces* refers to the needs, but also the opportunities, to re-think housing architectures, ensuring the presence of shared, both semi-private and

collective, outdoor spaces, suitable for spending healthy, safe and protected outdoor daily time, not merely during a period of physical distancing.

In densely built contemporary city, as never before, due to the impossibility to reach the closed public parks, people could appreciate those neighborhoods characterized by the presence of an internal courtyard, better if green. Of fundamental importance, the presence of private outdoor spaces like terraces, but also collective spaces such as shared internal courtyards, being able to support daily physical activity while keeping distances or promote high levels of social cohesion that could be at risk in similar "isolation" situations, should they occur again in the future.

The challenge for the roofs is to consider them as the buildings' fifth façade (elevation): they can be the place of green roofs - the benefits, both physically and visually, are known (32) - vegetable gardens (self-production of food at zero KM) or healing gardens, but also playgrounds (outdoor physical activity) or simple resting and reading places (Mental Health benefits). Policy Makers should be made aware of the promotion of tax incentives aimed to encourage roofs' renewal in this direction, as well as asking all the new constructions to adopt similar typological solutions. All the places previously described, should be re-designed or implemented, in light of the needs of physical distancing, providing for a flexible use of the furnishings and spaces.

Finally, referring to co-housing management, in addition to a conscious promotion of domestic waste management, it could be useful to share basic health devices such as a first aid kits, but also shared equipment for physical activity.

*08. Renovate the basic care services' network* considering that the COVID-19 emergency is an opportunity to evaluate the impact and the future scenarios of the epidemic on the organization of the territorial social-health services' network. Starting point is the strategy already defined and tested on the territorial healthcare assistance model that some Italian Regions have recently adopted, such as the Social Healthcare Centers (PreSST) in Lombardy Region. This will be possible through the definition of an innovative concept - of spaces, positioning, governance and digital healthcare services for the citizenship - which requires

the urgent involvement of the scientific community, identifying guidelines for its assessment and scalability on the whole national territory.

Moreover, at the macro scale (urban) it will be important to promote a network of interactive facilities, in particular regarding the most socially disadvantaged city contexts; at the micro scale (neighborhood), it will be important to improve the disclosures regarding the location and times of primary-care services.

*09. Integrate the existing environmental emergency plans, with those prepared for the health emergencies.* This refers to a planning policy that has been discussed for several years, but has never been implemented. Italy approved the first Civil Protection Law (L.225/1992) in 1992 and the Civil Protection Code (D.Lgs.1/2018) in 2018; while the practical translation of these rules has been developed with respect to environmental disasters (i.e. earthquakes, floods, fragility of the territories, hydrogeological collapse, etc.), documenting the excellence of the “italian model” on various occasions, very little has been done concerning epidemic events and Public Health issues (33). Actually, both national and regional health services have shown, during the 2020 COVID-19 pandemic, their absolute lack of preparedness in terms of intervention plans, coordination between governmental and regional decision levels, availability of individual protection devices, etc.

The difficulties in relations between central State and Regions during the COVID-19 pandemic also stems in part from the fact that, with the constitutional modification of 2001, Healthcare became a matter of “competing” competence between the State and the Regions, while the competences on the subject of coordination of the Civil Protection remained in the exclusive power of the State. This aspect must certainly be reviewed for the future, as the response to epidemic emergencies involves the health aspects much more intensely than earthquakes and floods, from local medicine to the entire healthcare system.

*10. Improve stakeholders' awareness of the factors affecting public health in the cities.* The COVID-19 pandemic underlined how strong and crucial should the interdisciplinary and trans-disciplinary approach between Researchers and Practitioners be, from both technical and medical backgrounds, in order to address the main Public Health problems of the city and of

contemporary society. Urbanization provides opportunities for social, professional and cultural purposes, but can also become a source of health risks that represents a main concern for the National Health Systems, considering the phenomenon on itself.

For this reason, considering the health emergency and the lesson learnt from COVID-19, it will be crucial find new professional figures like the *Health City Manager* (34) who may be included in the Public Administrator team. Thanks to their specific competences in health management, it is expected that this new professional figure can collaborate with the Policy Makers who already operate both in the Municipalities - Mobility / Disability / Smart City Managers - and on the Territories, with the Public Health experts working in the Local Health Agencies. This desirable synergy is crucial and challenging, not merely for health management (35), but for Public Health protection and healthy life-styles promotion.

### **Take-Home Messages and Research Outlooks: Challenges and Opportunities.**

Humanity is facing a global crisis, perhaps the greatest of our generation. The decisions governments will take in the coming weeks will probably affect the World in depth for years. Many measures adopted during the emergency will become part of daily life, changing habits and behaviors.

The pandemic of COVID-19 has caused very serious consequences that can be assessed only in part, but it gave also an opportunity to review individual and collective choices and priorities.

First of all, national containment measures have significantly reduced air pollution. The strict lockdown has allowed to quantify its real environmental impacts and to understand how much it is necessary, at least from a traffic point of view, to hypothesize a medium- and long-term reduction. The air quality improvement has been also in part the consequence of the building heating conclusion, due to the incoming Spring, but this is not related to the pandemic.

Despite these positive effects, it is difficult, today, to quantify the real dimension of the environmental impacts of this pandemic.

For example, which consequences will determine - in terms of water and soil pollution - the increased use, sometime improper, of disinfectants and personal protective equipment (PPE)? Gloves, masks and other PPE are critical for those fighting the pandemic but are also widely used by the population. In this new circumstances, health concerns have outweighed the environmental concerns, with an evident shift in the value hierarchization in public opinion, determining also an incredible request for single-use-plastic objects more than in the recent past. Because they're not always disposed of properly, PPE could have negative consequences, like additional plastic pollution, on the environment. At the same time, it is known that coronaviruses can persist on inanimate surfaces, including plastic, up to 9 days (36). Discarded PPE can also contribute to spread viruses into the environment. Consequently, the need to adopt evidence-based decisions and to appropriately inform the public, will become even more relevant in the next future.

Some Authors suggested that global climate change might be accompanied by changes in infectious diseases outbreaks (37-39) and also that a relationship between meteorological conditions and the transmission of COVID-19 has been observed, showing that temperature and humidity play an important role in the virus viability (40). It is possible that, as the virus has adapted to gradually higher global ambient temperature, some new and previously unknown infectious diseases are likely to emerge and spread (39), such as SARS-COV-2. The emergence and spread of novel coronavirus since December 2019 might be related to the ongoing climate change.

About COVID-19 some Authors (40) also found that every 1°C increase in environmental temperature was related to the decline of daily confirmed case counts, the corresponding overall RR was 0.8 (95% CI: 0.75-0.85).

Therefore, a challenge is to invest in actions reducing urban ecological footprint, for example, adding to those targeted to urban transport, the increase of greenery, the incentive of local foods production and of their consumption, the valorization of circular economy, etc.

In addition, it is crucial to make urban areas more resilient to emergencies (41), ensuring a first effective

response from the territory and health infrastructures, to face epidemics and other possible future emergencies of every kind. Last but not least, the economic emergency, which is already showing itself as an unprecedented social disruption, with companies and entire industries running into economic difficulties and politics are facing a multidimensional crisis.

Therefore, scientists need to become active as knowledge brokers, facilitating a common goal-oriented debate among politicians, producers, and others, including the broader public (42), to develop new sustainable economics and job opportunities.

Agile work, imposed where possible by the quarantine, has contributed to ensure production continuity, but also to improve the balance between work and family life and, perhaps, in some cases to improve - or to worsen - family relationships. This, along with many other opportunities offered by digitalization, has helped to understand the potential benefits and prospects of use.

At the same time, the physical distancing imposed, as far as necessary, may have amplified social and health inequalities in the population, particularly for those who live alone. A greater expansion of remote services, such as e-commerce, could jeopardize the future of neighborhood commercial activities, which up to now have ensured vitality to neighborhoods, with a significant social function. This too will be a challenge that urban policies will have to accept to ensure the survival of proximity shops.

The strategies and the issues described in this paper are at the basis of a social and infrastructural rethinking of the city (43), attentive to the needs of welfare and public health, in the belief that social and environmental justice are now essential and unavoidable values on which, as recommended by the United Nations SDGs for 2030, it will be increasingly necessary to invest. The lesson of COVID-19 pandemic is that people health is connected and dependent on the planet' health and cities are the fulcrum of their relationship.

**Conflict of interest:** Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article



## References

- World Meters. <https://www.worldometers.info/coronavirus/> (last access 20<sup>th</sup> April 2020)
- Lee VJ, Ho M, Wen Kai C, Aguilera X, Heymann D, Wilder-Smith A. Epidemic preparedness in urban settings: new challenges and opportunities. *Lancet Infect Dis* 2020 Published Online March 27, 2020 [https://doi.org/10.1016/S1473-3099\(20\)30249-8](https://doi.org/10.1016/S1473-3099(20)30249-8)
- Talukder S, Capon A, Nath D, Kolb A, Jahan S, Boufford J. Urban health in the post-2015 Agenda. *Lancet* 2015, 385, 769. Published: February 28, 2015 [https://doi.org/10.1016/S0140-6736\(15\)60428-7](https://doi.org/10.1016/S0140-6736(15)60428-7)
- World Health Organization (WHO). International Workshop on Housing, Health and Climate Change: Developing Guidance for Health Protection in the Built Environment - Mitigation and Adaptation Responses. Available online: [http://www.who.int/hia/house\\_report.pdf](http://www.who.int/hia/house_report.pdf) (last access 20<sup>th</sup> April 2020)
- D'Alessandro D, Arletti S, Azara A, Buffoli M, Capasso L, Cappuccitti A, Casuccio A, Cecchini A, Costa G, De Martino AM, Dettori M, Di Rosa E, Fara GM, Ferrante M, Giammanco G, Lauria A, Melis G, Moscato U, Oberti I, Patrizio C, Petronio MG, Rebecchi A, Romano Spica V, Settimo G, Signorelli C, Capolongo S, et Al. Strategies for Disease Prevention and Health Promotion in Urban Areas: The Erice 50 Charter. *Annali di Igiene*. 2017; 29(6):481-493. <https://doi.org/10.7416/ai.2017.2179>
- Singapore Seemed to Have Coronavirus Under Control, Until Cases Doubled. *New York Times*. <https://www.nytimes.com/2020/04/20/world/asia/coronavirus-singapore.html> (last access 20<sup>th</sup> April 2020)
- Pisano GP, Sadun R, Zanini M. Lessons from Italy's Response to Coronavirus. *Harvard Business Review*. <https://hbr.org/amp/2020/03/lessons-from-italys-response-to-coronavirus> (last access 20<sup>th</sup> April 2020)
- Società Italiana di Medicina Ambientale (SIMA). Relazione circa l'effetto dell'inquinamento da particolato atmosferico e la diffusione di virus nella popolazione. Position Paper. [https://www.simaonline.it/wpsima/wp-content/uploads/2020/03/COVID19\\_Position-Paper\\_Relazione-circa-l'effetto-dell'inquinamento-da-particolato-atmosferico-e-la-diffusione-di-virus-nella-popolazione.pdf](https://www.simaonline.it/wpsima/wp-content/uploads/2020/03/COVID19_Position-Paper_Relazione-circa-l'effetto-dell'inquinamento-da-particolato-atmosferico-e-la-diffusione-di-virus-nella-popolazione.pdf) (last access 20<sup>th</sup> April 2020)
- Wu X, Nethery RC, Benjamin Sabath M, Braun D, Dominici F. COVID-19 PM2.5. A national study on long-term exposure to air pollution and COVID-19 mortality in the United States. *medRxiv* 2020.04.05.20054502; doi: <https://doi.org/10.1101/2020.04.05.20054502>
- Fehr R, Capolongo S. Healing environment and urban health. *Epidemiol Prev* 2016; 40 (3-4): 151-152. <http://doi.org/10.19191/EP16.3-4.P151.080>
- Capolongo S, Rebecchi A, Dettori M, Appolloni L, Azara A, Buffoli M, Capasso L, Casuccio A, Conti Oliveri G, D'Amico A, Ferrante M, Moscato U, Oberti I, Pagliano L, Restivo V, D'Alessandro D. Healthy design and urban planning strategies, actions, and policy to achieve salutogenic cities. *International Journal of Environmental Research and Public Health*; 2018 15(12): 2698. <https://doi.org/10.3390/ijerph15122698>
- Rebecchi A, Buffoli M, Dettori M, Appolloni L, Azara A, Castiglia P, D'Alessandro D, Capolongo S. Walkable environments and healthy urban moves: Urban context features assessment framework experienced in Milan. *Sustainability (Switzerland)*; 11(10): 2778. <http://doi.org/10.3390/su11102778>
- Congiu, T.; Sotgiu, G.; Castiglia, P.; Azara, A.; Piana, A.; Saderi, L.; Dettori, M. Built Environment Features and Pedestrian Accidents: An Italian Retrospective Study. *Sustainability* 11(4) · February 2019. <https://doi.org/10.3390/su11041064>
- Appolloni L, Corazza MV, D'Alessandro D. The Pleasure of Walking: An Innovative Methodology to Assess Appropriate Walkable Performance in Urban Areas to Support Transport Planning. *Sustainability* 2019, 11(12), 3467; <https://doi.org/10.3390/su11123467>
- Rebecchi A, Boati L, Oppio A, Buffoli M, Capolongo S. Measuring the expected increase in cycling in the city of Milan and evaluating the positive effects on the population's health status: A Community-Based Urban Planning experience. *Annali di Igiene*. 2016; 28(6):381-391. <https://doi.org/10.7416/ai.2016.2120>
- Health Development Agency. Making the Case: Improving Health through Transport. London, UK, 2005.
- Active Living Research. Promoting Activity-Friendly Communities. Active Living Research: San Diego, CA, USA, 2015; pp. 3-7.
- The 15 minutes-city: for a new chrono-urbanism. <http://www.moreno-web.net/the-15-minutes-city-for-a-new-chrono-urbanism-pr-carlos-moreno/> (last access 20<sup>th</sup> April 2020)
- Superblock conceptual model. Agencia de Ecología Urbana de Barcelona. <http://www.bcnecologia.net/en/conceptual-model/superblocks> (last access 20<sup>th</sup> April 2020)
- World Health Organization (WHO). Towards More Physical Activity in Cities Transforming Public Spaces to Promote Physical Activity. A Key Contributor to Achieving the Sustainable Development Goals in Europe. BMC Public Health: Copenhagen, Denmark, 2017. [http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0018/353043/2017\\_WHO\\_Report\\_FINAL\\_WEB.pdf?ua=1](http://www.euro.who.int/__data/assets/pdf_file/0018/353043/2017_WHO_Report_FINAL_WEB.pdf?ua=1) (last access 20<sup>th</sup> April 2020)
- D'Alessandro D, Assenso M, Appolloni L, Cappuccitti A. The Walking Suitability Index of the Territory (T-WSI): A new tool to evaluate urban neighborhood walkability. *Ann Ig.* 2015 Jul-Aug;27(4):678-687. <https://doi.org/10.7416/ai.2015.2059>
- D'Alessandro D, Appolloni L, Capasso L. How walkable is the city? Application of the Walking Suitability Index of the Territory (T-WSI) to the city of Rieti (Lazio Region, Central Italy). *Epidemiol Prev* 2016; 40 (3-4):237-242. <https://doi.org/10.19191/EP16.3-4.P237.090>
- World Health Organization (WHO). Housing and health guidelines. <https://apps.who.int/iris/bitstream/hand>

- le/10665/276001/9789241550376-eng.pdf (last access 20<sup>th</sup> April 2020)
24. Capasso L, Gaeta M, Appolloni L, D'Alessandro D. Health inequalities and inadequate housing: the case of exceptions to hygienic requirements for dwellings in Italy. *Ann Ig* 2017; 29: 323–331. <https://doi.org/10.7416/ai.2017.2159>
  25. Capasso L, Capolongo S, Faggioli A, Petronio MG, D'Alessandro D. Do Italian Regulations and policies protect poor people's health? *Ann Ig* 2015; 27: 688–689. <https://doi.org/10.7416/ai.2015.2060>
  26. D'Alessandro D, Raffo M. Adapting the answer to new problem of living in a changing society. *Ann Ig* 2011; 23: 267–274. PMID: 22013706
  27. Lindert J. Environment and mental health: developing a research agenda. *European Journal of Public Health*, Volume 29, Issue Supplement\_4, November 2019, ckz185.074, <https://doi.org/10.1093/eurpub/ckz185.074>
  28. Mezzoiuso AG, Gola M, Rebecchi A, Riccò M, Capolongo S, Buffoli M, Tirani M, Odone A, Signorelli C. Ambienti confinati e salute: revisione sistematica della letteratura sui rischi legati all'utilizzo dei seminterrati a scopo abitativo. *Acta Biomed.* 2017; 88(3): 375–382. <https://doi.org/10.23750/abm.v%vi%i.6741>
  29. Dettori M, Altea L, Fracasso D, Trogu F, Azara A, Piana A, Arghittu A, Saderi L, Sotgiu G, Castiglia P. Housing Demand in Urban Areas and Sanitary Requirements of Dwellings in Italy. *J. Environ. Public Health* 2020, 1–6. <https://doi.org/10.1155/2020/7642658>
  30. Azara A, Dettori M, Castiglia P, Piana A, Durando P, Parodi V, Salis G, Saderi L, Sotgiu G. Indoor Radon Exposure in Italian Schools. *Int. J. Environ. Res. Public Health* 2018, 15(4), 749. <https://doi.org/10.3390/ijerph15040749>
  31. Gola M, Settimo G, Capolongo S. Indoor Air Quality in Inpatient Environments: A Systematic Review on Factors that Influence Chemical Pollution in Inpatient Wards. *Journal of Healthcare Engineering*; 2019 8358306. <https://doi.org/10.1155/2019/8358306>
  32. Buffoli M, Rebecchi A, Gola M, Favotto A, Procopio GP, Capolongo S. Green SOAP. A calculation model for improving outdoor air quality in urban contexts and evaluating the benefits to the population's health status. In Mondini G, Fattinanzi E, Oppio A, Bottero M, Stanghellini S. (eds) *Integrated Evaluation for the Management of Contemporary Cities*. 2018 Springer, Green Energy and Technology: 453–467. [https://doi.org/10.1007/978-3-319-78271-3\\_36](https://doi.org/10.1007/978-3-319-78271-3_36)
  33. Capasso L, Faggioli A, Rebecchi A, Capolongo S, Gaeta M, Appolloni L, De Martino AM, D'Alessandro D. Hygienic and sanitary aspects in urban planning: Contradiction in national and local urban legislation regarding Public Health. *Epidemiol Prev* 2018; 42 (1):60–64. <https://doi.org/10.19191/EP18.1.P060.016>
  34. Lenzi A, Capolongo S, Ricciardi W, Signorelli C, Napier D, Rebecchi A, Spinato C. New competences to manage urban health: Health City Manager core curriculum. *Acta Biomed* 2020; Vol. 91, Supplement 3: 21–28. <https://doi.org/10.23750/abm.v91i3-S.9430>
  35. Capolongo S, Buffoli M, Mosca EI, Galeone D, D'Elia R, Rebecchi A. Public Health Aspects' Assessment Tool for Urban Projects, According to the Urban Health Approach. In Della Torre S, Cattaneo S, Lenzi C, Zanelli A. (eds) *Regeneration of the Built Environment from a Circular Economy Perspective*. Research for Development. Springer, 2020. Cham.325–335. [https://doi.org/10.1007/978-3-030-33256-3\\_30](https://doi.org/10.1007/978-3-030-33256-3_30)
  36. Kampf G, Todt D, Pfaender S, et Al. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. *The Journal of Hospital Infection*. 2020 104: 246–251. <https://doi.org/10.1016/j.jhin.2020.01.022>
  37. Bezirtzoglou C, Dekas K, Charvalos E. Climate changes, environment and infection: facts, scenarios and growing awareness from the public health community within Europe. *2011 Anaerobe* 17 (6), 337–340. <https://doi.org/10.1016/j.anaerobe.2011.05.016>
  38. Anwar A, Anwar S, Ayub M, et Al. Climate change and infectious diseases: evidence from highly vulnerable countries. *Iran J Public Health*, Vol. 48, No.12, Dec 2019, pp.2187–2195. Available at <http://ijph.tums.ac.ir>
  39. Casadevall A. Climate change brings the specter of new infectious diseases. *J Clin Invest* 2020. 130 (2), 553–555. <https://doi.org/10.1172/jci135003>
  40. Jiangtao L, Ji Z, Jinxi Y, Xiaxia Z, Lanyu L, et Al. Impact of meteorological factors on the COVID-19 transmission: a multicity study in China. *Science of the Total Environment* 2020;726:138513 <https://doi.org/10.1016/j.scitotenv.2020.138513>
  41. D'Alessandro D, Appolloni L, Capasso L. Public Health and urban planning: A powerful alliance to be enhanced in Italy. *Ann. Ig.* 2017, 29, 452–463. <https://doi.org/10.7416/ai.2017.2177>
  42. Dobbins M, Robeson P, Ciliska D, Hanna S, Cameron R, O'Mara L, DeCorby K, Mercer S. A description of a knowledge broker role implemented as part of a randomized controlled trial evaluating three knowledge translation strategies. 2009. *Implementation Science* 4. <http://doi.org/10.1186/1748-5908-4-23>
  43. Azzopardi-Muscat N, Brambilla A, Caracci F, Capolongo S. Synergies in Design and Health. The role of architects and urban health planners in tackling key contemporary public health challenges. *Acta Biomed* 2020; Vol. 91, Supplement 3: 9–20 <https://doi.org/10.23750/abm.v91i3-S.9414>

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Received: 26 April 2020

Accepted: 28 April 2020

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