

Improvement of Citizens Wellness Against COVID-19 Pandemic (A Review on Food and Urban Policies)

MR WILLIAMS CHARLES EZENNAYA

Department Of Science Laboratory Technology

Federal Polytechnic Oko

Oko, Anambra State

charlyeagle4u92@gmail.com

08064249285

And

OSONDU NNAMDI CHIDIEBERE

Department Of Science Laboratory Technology

Federal Polytechnic Oko

Oko, Anambra State

osondunnamdi83@gmail.com

08137358553

Abstract:

The wellness and well being of its citizens is every country's number one priority, but then the emergence of the corona virus put a huge question mark to the idea, crippling most countries and their citizens. The ongoing pandemic caused by the corona-virus disease 2019 (COVID-19) is literally changing the world. From December 2019 to date, more than 22million cases have been reported worldwide and global health institutions are acting to slow down the virus transmission and are looking for possible prevention strategies in case of a new outbreak. As in other pandemic phenomena, the issues mostly covered by scientific and media attentions are related to the diagnostic and therapeutic approach of COVID-19. However, a still neglected issue regards the adoption of a more systemic approach considering the close connection among the infection, the environment and human behaviors including the role of diet and urban management. Two main aspects emerged from the integrative overview of the current COVID-19 pandemic: 1. Communities should start sharing social actions and policy advocacy based on the assumption that human health strongly depends upon a sustainable exploitation of natural resources in populated areas. 2. The specific strategy role of the cities in developing sustainable food system and promoting healthy dietary patterns.

Keywords: COVID-19, pandemic, food safety, virus, urban

Introduction

The ongoing pandemic caused by the corona-virus 2019 (COVID-19) is literally changing the world (Rothan and Byrareddy, 2020). From the first documented human patient in Wuhan (Hubei, people's republic of china) in December 2019, by September 2020, more than 22million

cases have been reported worldwide of which more than six million is still active (1% in serious or critical conditions) and almost 800 thousand deaths. WHO and other authorities soon realized that it was no longer possible to contain the virus spread, but only to slow down its transmission and try at least to reduce “pressure” on national health systems. As in other pandemic outbreak, the issues mostly covered by scientific and media attention are related to the diagnostic and therapeutic approach of COVID-19 contagion. However, greater consideration should be given to a systematic approach considering the close connection between this disease, the environment and human behaviors, in a frame work of building a safer, more sustainable and healthier world. How is it possible that a virus from a Chinese market has spread to other continents so quickly, penetrating the heart of cities and killing the weakest citizens?

We believe that unlike the pandemics of the past, the factors triggering the current spread of COVID-19 outbreak should be analyzed not only by scientists and politicians but also by societal stakeholders. Many European countries afflicted by COVID-19 have started thinking ahead are now facing the “phase two” of the COVID-19 situation by operating the recovery of industrial and social activities keeping, at the same time, the infection spread as low as possible. In such a context, the linear science, which analyzes those biological variables dealing with the pathogen and its infectivity to find possible solutions e.g. a vaccine or a therapy (Sharpe et al, 2020), clashes with the “Post-Normal Science” (PNS) approach, for which societal values (e.g., the right to freedom, economic needs and relational aspects) claim their importance (Nicola et al, 2020). PNS is designed to deal with situations of uncertain facts, values in dispute, high stake and urgent decisions (Funtowics and Ravetz, 1995). PNS should be operated together with responsible research and innovation (RRI) tools (<https://www.rri-tools.eu/about> rri) that offers a broad set of strategies to address global challenges throughout the analyses of “real-world complexities” considering new scientific knowledge and technologies, but also the need of different stakeholder categories.

Our contribution aims at supporting the adoption of a PNS response to COVID-19 pandemic, also considering the geopolitical and social aspects which caused the dramatic susceptibility to such infection. For this reason we aimed at addressing two main concepts regarding COVID-19 “effects” on cities and citizen-led community responses, to prevent future pandemic events.

1. Pandemic Prevention

The first point to discuss is the unexpected permeability of cities to this virus and hypothesizes how the spillover from the wildlife of such a kind of pathogen can reach urban centers. This evaluation is of primary concern to better define suitable prevention strategies for limiting

or blocking the current one and other future pandemic spreads. What characterizes COVID-19 contagion is that it fully took advantage of globalization facilities, enabling rapid spread of the virus across the world. Generally, accurate controls are performed on goods transported worldwide but in case of novel pathogens (e.g. the COVID-19) diagnostic options are very limited. Moreover, when human mobilizes a major factor in the spread of infectious diseases, we should acknowledge that screening measures adopted at airports or customs should be implemented (Gaber, et al, 2009). Temperature screening alone may not be very effective as it may miss travelers incubating the diseases or concealing fever during travel or it may yield false positives (e.g. having fever of a different cause), therefore, it should be accompanied by other health messages, questionnaires and data collection <https://www./repatriation> questionnaire-consideration (2020).

A different scenario occurs for the trading of food commodities for which strict regulations and quality and safety impose the adoption of analytical tools and innovation technologies to prevent the spread of food borne pathogens and other contaminants (Galimberti et al, 2019; Belinke, 2020).

In most cases, food quality evaluation is based on bio indicators both at chemical and microbiological level (Kourkoutas et al, 2016).

Considering COVID-19, what can be said with certainty is that such controls did not occur in the Wuhan market where the virus started its incredible global spread. This situation further remarks the concept that pandemics are strictly linked to insufficient or absent food safety assessment and disease prevention protocols (e.g. as happening every time Ebola viruses outbreak in central Africa). The current COVID-19 pandemic, perhaps more than others, highlights that it is necessary to align food security protocols on a global scale since country specific inadequacies may cause serious global consequences. Therefore, we believe that to prevent future pandemic outbreaks, it is more and more important to consider issues arising from the establishment of supranational risk governance systems. These typically operate in a framework of compromise between the local governance and local producers needs and the global safety for human health safety is a priority for all the stakeholders associated with the entire food supply chain. Moreover, after the COVID-19 emergency, it is desirable that citizens enhance their awareness towards the topic of food control and the concept of food safety will acquire a stronger social meaning based on "shared values, beliefs and norms that affect human mindset and behavior"-Global Food Safety Initiative (GFSI, 2018). Consumer's behavior and choices will help modify food supply chains safety to prevent zoonoses and reduce other risks for humans.

Global citizenship is based on rights to be actively involved in debates, responsibility, shared decisions and actions to control and implement shared strategies. With regards to COVID-19, we know that a bat species and/or the Malayan pangolin have been found to be likely to be the likely reservoir hosts for the virus; however, the definitive identity of any intermediate host that might have facilitated spillover to humans is still unknown (Lam et al, 2020; Zhou et al, 2020). Overall, the identification of the vector has a relatively important value. The central point is that the unceasing exploitation of wildlife and habitat has dramatically increased the risk of exposure to zoonotic diseases, as already and sadly demonstrated for example HIV, Ebola.

It is time to realize that food safety cannot rely only on the production chain but potential risks to human health and the environment should be considered as well. The increase advances in scientific and technological tools have now been adopted to assess such risks, thus opening a new era of "prediction" rather than "reaction" to reduce pathogen contamination and food borne outbreaks (Wang et al, 2016). For example, the current trends in food safety research rely on the application of:

1. Genomic analysis for food borne pathogen identification and traceability.
2. Geographic Information System (GIS) to prevent and predict the spatial spread of pathogens outbreak.
3. Tools adapted from landscape ecology (species distribution and niche modeling) and social network analysis, predicting patterns of disease outbreak, as well as guidance for interventions and
4. Meta-analysis tools to confer an overall summary of available study findings, providing generalizable estimates and generating strategic high light is to be used by policy-makers and decision makers (Wang et al, 2016).

The history of pandemics teaches us that almost all recent human pandemics and most of the emerging infectious diseases originated from animals (mainly in wildlife). It is known that species more resistant to human pressure are likely to become the new competent hosts of vector-borne disease and then to become the most probable spillover agents towards human host (Zhang et al, 2020). Furthermore, we must remember that biodiversity perturbation and its trivialization is the main trigger of virus spillover events (Johnson et al, 2015) as probably happened for COVID-19.

Given these assumptions, the international food policies concerning food safety should consider biodiversity and ecological interventions to prevent zoonotic spillover events. This would be especially urgent in rural areas, where farming and livestock often overlap with wildlife

species and it has been documented that livestock species usually act as intermediate host spillover events (e.g. influenza A, SARS and corona virus). For this reason, it is time to rethink urban areas by projecting proximity buffer zones to prevent direct contact between agricultural/zootechinic activities and natural habitats. Finally, the conservation of natural biodiversity and its related species interactions are essential conditions to reduce the risk of spillover events (Di Marco et al, 2020). On the whole, cooperative work (RRI-driven) involving human-health agencies, agricultural authorities, farmers and natural resource managing institutions, could be essential to promote the global ecological management to avoid the spread of a new putative pandemic "COVID-20" or other risky vector-borne pathogens that may adversely affect human health, the environment and economy.

2. Citizen Fortification

Our second consideration regards the fragility of citizens, especially the weakest ones as the elderly and their sensitivity to diseases.

It is now clear that these social categories are the most susceptible to severe COVID-19 outcomes, particularly if they already suffer from multiple pathologies. Diabetes is the most common co morbidity observed in infected deceased patients in Italy, after hypertension, <https://www.epicentro.iss.it/coronavirus/report>, (2020). Therefore, beyond the infectious capacity of this virus, it is important to focus on those elements of modern society which could increase citizens' vulnerability, including diet, lifestyle and environment factors, strictly linked to morbidity and mortality for all Non-Communicable Diseases (NCDs) (Cena and Calder, 2020). Although this concept is well established, today, the global average consumption of healthy foods is substantially lower than the reference dietary intake, whereas overconsumption of highly processed, energy dense and nutrient-poor foods is increasing (Willet et al, 2019).

Recent dietary changes within the Mediterranean basin, with a decrease in consumption of plant foods, increased consumption of fast meals and junk food and negative health consequences such as rise in obesity rates and in NCDs incidence (e.g. diabetes, cardiovascular diseases and cancer) are partially responsible for this burden (Belahsen, 2014).

The modern day change in food choices is the results of lifestyle standardization, enhanced technologies in food production and processing and limited time for culinary activities. This caused for example the progressive erosion of Mediterranean food cultures (Iacatuu et al, 2019). Global climate changes have also produced the failure of several crops, fisheries and livestock production; hence the sustainability of the food supply chain is certainly essential. We should also change our views of food and diet which should no longer or rather not only, considered an energy source but a reservoir of bioactive molecules beneficial to human health. Greater consumption of health-promoting foods and limited intake of unhealthier options are intrinsic to the eating habits of certain regional diets such as the Mediterranean diet. Healthy dietary patterns positively influence health and promote the prevention of common Non-Communicable Diseases (NCDs), strengthening host community defenses (Cena and Calder, 2020). This concept assumes a particular importance since the over 65 years old citizens could be more at risk of being infected by COVID-19, not only for intrinsic conditions due to natural aging processes and commodities development but also for inadequate nutritional status and related inadequate intake of macronutrients (e.g. proteins and healthy fatty acids, like omega-3), micronutrients (e.g. vitamins A, B6, B12, C, D, E and folate) trace elements (e.g. zinc, iron, magnesium and copper) and phytochemicals which are pillars in preventing many chronic degenerative diseases and supporting the immune system (Calder et al, 2020).

In dietary recommendation, fat quality has to be addressed, since evidence shows the need to achieve a balance between dietary intake of omega-6 and omega-3 for optimal nutrition (Marangoni et al, 2020), especially in those subjects more vulnerable to malnutrition and "silent inflammation" which disposes to a greater propensity to viral infections.

Moreover, food supplements such as vitamins C and D might also be considered to help both innate and adaptive immune cells (Greiller and Martineau, 2015; Biesalski, 2020). Studies on human corona virus (HCoVs), including severe acute respiratory syndrome corona virus (SARS-CoV), have highlighted that secondary metabolites of some plants species seem to inhibit virus proteins, cellular infection and intracellular replication (Simonson et al, 2020). Extracts of spontaneous plants such as *Cimicifuga* rhizome, *Maliae* cortex, *Coptidis* rhizome and *Sophora subprostrata* radix showed an ability to inhibit of RNA-dependant RNA polymerase and/or proteases crucial for corona virus RNA replication (Kim et al, 2008). In this field, traditional Chinese medicine is working actively to identify dedicated compounds to specifically contrast COVID-19 infection (Zhan et al, 2020). This practice relying on biodiversity and known as "bio prospecting" may be a good strategy to find new raw materials to produce novel and fortified foods for modern citizens.

3. Pandemics and The Interaction With Environmental and Food Policy

From a nutritional point of view, addressing subclinical micronutrient deficiencies is one of the first steps that must be considered to improve resistance to infectious diseases like COVID-19 and other pathogens (Cena et al, 2020). It is therefore recommended that micronutrients testing, such as vitamin D measurement should be applied in the annual checkup of selected individuals at high risk of deficiency (Pilz et al, 2019).

Besides lifestyle changes, including diet has been shown to positively affect metabolic and cardiovascular diseases which are the most frequent co morbidities associated to severe COVID-19 disease. The spread of inappropriate eating habits and inactivity in western societies, particularly among the younger, "comfortably off" generations, has led to the development of chronic degenerative diseases defined as "comfort diseases" (Allegri et al, 2015) early in life leading, leading to an increase in premature deaths for NCDs.

It is time to acknowledge that environment factors exert a major influence on dietary behavior primarily by facilitating meals consumption away from and by minimizing time dedicated to meal preparation and consumption and secondly, making food of poor nutritional quality available on the market and appealing for appearance, taste and price. This burden is exerted by market rules that affect behavior and food choices with scarce public awareness of the potential negative impact on health. It is necessary that science, technology, education, legislation and community policies combine to create the urban structures and environment required to encourage healthy lifestyle including dietary not just for few, but for everyone.

More efforts must be addressed to reduce exposure to ambient air pollution, strongly associated with population density, promoting inflammatory stage and affecting resilience to infectious diseases.

Finally, western medicine generally tends to identify pharmacological molecules that act on specific disease mechanisms, however, human body complexity and individual answers are sometimes underestimated. Thus, it could happen that infected patients die more due to co morbidities associated to infection with COVID-19 than for COVID-19 per se. the time has come to apply a systems biology approach where drugs, food and lifestyle work in synergy to promote patient healing and prevent further infection gaining a holistic approach to community health to support the further personalization of health and social care.

For these reasons, in our scheme, we stressed the impact of environment and food system of therapeutic approaches. This integrative framework demands both an increased attitude of sharing by the scientific and technical community as well as a social participation since we believe that, as previously anticipated, food safety and human health should be regarded more as a social issue.

4. Conclusion

Our final suggestion is to start a frank and open scientific discussion on COVID-19 issues and future risk for new pandemic outbreaks, continuing the legacy of EXPO 2015, declared in the Milan urban food policy pact, signed by more than 200 cities in the world <http://www.milanurbanfoodpolicypact>, 2015. In this document, the strategic role of the cities in developing sustainable food systems and promoting healthy diets is stated, yet acknowledging all the differences in their natural and policy endowments, including economic background and cultural innovation, managing vast public resources, infrastructure, investments and expertise. These issues will be fundamental, especially for those countries that are coming out of COVID-19 lockdown restrictions and where it is more expected that political and social contrast will emerge if different stakeholders needs and opinions will not be analyzed and considered for planning the recovery after the pandemic event.

We would like to undermine and integrate this overview with few take home messages that arise from the teachings of this dramatic situation we are experiencing first hand.

- I. Food safety is a global issue. The unsafe of local food markets, like the Wuhan's, can exert severe and global impact.
- II. Smallholder food producers play a key role in feeding cities by helping to maintain resilient, equitable, culturally appropriate food systems and promote sustainable diets. In cities with a high percentage of elderly, local food production should be tailored for specific targets to maintain adequate nutritional status, including fortification of immune system. Similarly, in developing countries, smallholder farms should improve the production of local crops rich in macro and micronutrients to improve food security and health of local populations.
- III. Acknowledgement that urban and pre-urban agriculture may offer opportunities to protect and integrate biodiversity into urban landscapes and food systems, thereby contributing to synergies across food security, ecosystem services and human wellbeing.

This is very important to prevent the spillover of viruses but also to offer better efficacy of new drugs synthesized to fight future diseases.

The whole scientific community should start enlightening the masses on the directions, social actions and policy advocacy recognizing that the health of people is closely connected to the health of biodiversity and ecosystem where they live.

References

- Allegri, C., Turconi, G and Cena, H. (2011). Dietary attitudes and diseases of comfort: eat weight discord 16(20) 26-35.
- Biesalski, H.K. (2020). *Vitamin D and co-morbidities in COVID-19 patients- a fatal relationship?* Nfs 20: 10-21
- Belahsen R., (2014). *Nutrition transition and food sustainability*. Proceedings of nutrition society 73 (3) 85-88
- Cena H., and Calder, M. (2020). Defining a healthy diet: evidence for the role of contemporary dietary patterns in health and disease nutrients. 12:334
- Cena, H., Maffoni, S., Braschi, V., Brazzo, S., Pallavicini, C. and Vietti, J. (2020). Position paper of the Italian association of medical specialists in dietetics and clinical nutrition (ANSISA) on *nutritional management of patients with covid-19 disease*. Medical journal of nutrition 13(11) 3-7.
- Di Marco, M., Baker, M.L., Daszak, P., Eskew, E.A and Godde, C.M (2016). *Sustainable development must account for pandemic risk*. USA proceedings of national academy of science Rep. 5:14830
- European commission (2016). The junction of health, environment and the bioeconomy: foresight and implications for European research and innovation policies. Online at <https://op.eurpoa.eu/en/publication/details/37597163>
- Funtowicz, S.O and Ravetz, J.R. (1995). *Science for the post normal age. Perspectives on ecological*. Dordrecht: Springer 10:46-61
- Gaber, W., Goetsch, U., Diel, R., Doerr, H.W and Gottschalk, R (2009). Screening for infectious diseases at international airports: the frankfurt model. Aviation space environmental medicine 80: 595-600

Galimberti, A., Casiraghi, M., Bruni, T and Cortis, P. (2019). From DNA bar-coding to personalized nutrition: the evolution of food traceability.

Global food safety initiative (2018). A culture of food safety. A position paper from the global food safety initiative (GFSI) online at <http://mygfsi.com/wp-content>.

Greiller, C.I. and Martineau, A.R. (2015). Modulation of the immune response to the respiratory viruses by vitamin D nutrients. 7(42) 40-70.

<https://www.epicentro.iss.it/en/coronavirus/bollettino/report-covid-19>.

Johnson, C.K., Hitchens, P.L., Evans, T.S, Thomas, K., and Clements, A. (2015). Spillover and pandemic properties of zoonotic virus with high host plasticity. Science Rep. 5:14830.

Kim, H.Y., Shin, H.S., Park, H., Kim, Y.C., Yin, Y.G., and Park, S. (2008). In vitro inhibition of corona virus replications by the traditionally used medicinal herbal extracts, Cimicifuga rhizome, meliae cortex, coptidis rhizome and phellodendron cortex. Journal of clinical virology. 4(12) 2-8.

Kinnunen P., Guillaume, J.H., Taka, M., D'odorico, P., Siebert, S., and Puma, M.J. (2020). Local food crops production can fulfill demand for less than one-third of the population nature food. 1(2) 29-37.

Kourkoutas, Y., Chorianopoulos, N., Nisiotou, A and Karatzas, K.A. (2016). *Application of innovative technologies for improved food quality and safety*. Biomedical research international 2016: 9160375.

Lacatuu, C.M., Grigorescu, E.D., Floria, M., Onofriescu, A and Mihau, B.M. (2019). *The Mediterranean diet: from an environment driven food culture to an emerging medical prescriptions*. International journal of environment of public health. 16:942.

Lam, T.T.Y., Jia, N., Zhang, Y.W., Jiang, F., and Zhu, H.C. (2020). Identifying SARS-CoV-2 related corona virus in malayan pangolins nature. 583(2) 82-85.

Marangoni, F., Agistini, C., Borghgi, C., Catapano, A.L and Cena, H (2020). *Dietary linoleic acid and human health: focus on cardiovascular and cardiometabolic effects*. *Atherosclerosis* 292:90-98

Milan urban food policy pact (2015) online at: <http://www.milanurbanfoodpolicypact.org/text/>.

Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A, and Losifidis, C. (2020). *The socio-economic implications of the corona virus and covid-19 pandemic: a review of the international journal of surgery* 78 (1) 85-93

Pilz, S., Zittermann, A., Trummer, C., Theiler-Schwetz, V., Lerchbaum, E., and Keppel, M.H. (2019). Vitamin D testing and treatment: a narrative review of current evidence. *Endocrine connections*. 8: 27-43.

Rothan, H.A and Byrareddy, S.N. (2020). *The epidemiology and pathogenesis of corona virus disease (COVID-19) outbreak*. *Journal of autoimmune disease* 109 (10) 24-33

Sharpe, H.R., Gilbride, C., Allen, E, Belij-Rammerstorfer, S., Bissett, C., and Ewer, K., (2020). The early landscape of corona virus disease 2019 vaccine development in the UK and rest of the world. *160(2)* 23-32.

Wang, S., Weller, D., Strawn, L.K., Madones, F.D and Adell, A.D. (2016). *Food safety trends: from globalization of new tools to prevent food borne diseases*. *Trends food science technology*. 57:188-198.

Willet, W., Rockstrom, J., Loken, B., Springmann M., Long, T., and Verneulen, S. (2019). Food in the anthropocene: the eat-lancet commission on healthy diets from sustainable food systems: *lancet*. 393(4) 47-92.

World health organization (2020). Key considerations for repatriation quarantine of travelers in relation to the outbreak of novel corona virus 2019-nCoV. Online at <https://www.who.int/ith/repatriation-quarantine-nCoV>.

Zhang, D.H., Wu, K.L., Zhang, X., Deng S.Q. and Peng, R (2020). In silico screening of Chinese herbal medicines with the potential to directly inhibit 2019 novel corona virus. *Journal of integrated medicine* 18(1) 52-58.

Zhang, G., Yoo, D., Qin, T., Zhang, X., and Jia, Y. (2020). Animal corona virus and SARS-CoV-2. *Transbound energy Dis* 10:1-14.

Zhou, P., Yang, X.L., Wang X.G., Zhang, L., and Zhang, W. (2020). A pneumonia outbreak associated with a new corona virus of probable bat origin. *Nature* 579(2) 70-73.

