

Perspective

# Challenges to Global Health Emerging from the COVID-19 Pandemic

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**Abstract:** The COVID-19 pandemic deepened challenges and opened new fronts where old and unresolved problems met with new problems triggered by the pandemic itself. There are several issues, problems, and challenges related to the post-COVID world we are in. This paper discusses some of them from different perspectives and elaborates on the future challenges and their solutions, which need to be tackled. Apart from the pre-existing problems, we are now also facing new military conflicts, interrupted supply chains, even in medicines supplies, as well as the worsening of climate change, further complicated by the military conflicts and a potential new global economic crisis. The COVID-19 pandemic left the world with many uncertainties about the future as there seem to be few answers ready to tackle the combination of the fallout of the COVID-19 pandemic coupled with the pre-existing problems and challenges. Inequalities in terms of socio-economic differences and inequalities in health are driving disease burden, which will again be marked by the population aging and non-communicable diseases (NCDs). Global collaboration and the joint search for solutions to global challenges have become inevitable. Research into behavioral determinants of health and health promotion are essential in understanding the sources of controversy regarding and resistance to proven public health interventions.

**Keywords:** COVID-19; global health; pandemic; NCD control; climate change; economic crisis



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## 1. Introduction

The recent and still ongoing COVID-19 crisis not only presented the world with a challenge of colossal proportions, but also unmasked some of the previously unsolved problems most of the world's societies had been faced with for decades before. The COVID-19 pandemic not only caused shockwaves in health systems across the world, but it also strongly pointed to many of the challenges and inequalities existing in the modern world. These have a determining impact on future global health and on overall welfare in large parts of the world. The pandemic also pointed to the fact that solidarity mechanisms to ensure access to much needed interventions, in this case vaccines and medicines, are insufficient to adequately respond to the challenges [1–3].

The pandemic reminded us of the magnitude of the problem in a globalised world with extremely rapid mobility. At the same time, it also pointed to the lack of solidarity when trying to address the need to rapidly provide vaccinations for billions of people. While most of the high- and very-high-income countries found their solutions, the rest of the world has been left to their ingenuity and to benefactorial initiatives, which were helpful but could not match the endeavours that would have been needed.

However, at the beginning of 2023 the world faces new, additional challenges, while it has still not resolved the old ones. In the first instance, we need to mention the pressures of the arising economic crisis, which is unfolding as a result of an interplay among the previous economic challenges, combined with the fallout of the COVID-19 pandemic, and the consequences of the war in Ukraine. Secondly, there is the issue of environmental

challenges, particularly the global climate crisis, where efforts so far have been largely insufficient and the forthcoming situation, given the challenges mentioned under the previous point, might trigger retrograde steps. Thirdly, there is an evident grave problem of the population aging, which is no longer limited only to Europe, North America, Japan, and Australia but is spreading into most middle-income countries and, in some cases, even into low-income countries. In particular, many of the LMICs might be significantly unprepared for the health and healthcare challenges of the increasing numbers of the elderly, for which many of them have no particular solutions in place. The COVID-19 pandemic further worsened the management of lifestyles, and of preventative and curative efforts in the field of healthcare. Fourthly, migration is becoming a reality of the modern world. In part, migrations are triggered by a hunger for work in the oldest societies in the world, but to a large degree they are the result of the striving for better lives, which pushes many younger people from LMICs to seek their future in wealthier environments. As a fifth challenge, rising socio-economic inequalities have been further enhanced by the COVID-19 pandemic, causing the disadvantaged to be at a greater loss than those who were better off before it had started.

The future of global health will be lying at an interplay of these five challenges; this paper will provide some in-depth reflections and elaborate on the possible solutions to these challenges in terms of global and local health when addressing them. The Sustainable Development Goals are the cornerstone for a minimum set of standards in moving toward global equity in health services [4].

The pandemic's overwhelming nature, which forced entire societies into a state of focusing mostly on pandemic management, pushed other burning topics aside. For some years, no 'pre-existing' topic merited attention, which demonstrates the extent of the crisis triggered by COVID-19. As indicated already in Horton's provocative editorial [5], early in the pandemic, we were faced with '-demics' of various manifestations, such as an infodemic and, more precisely, a syndemic situation. Several international and national organisations undertook actions to explore and advise on the topics of the syndemic and infodemic, both of which impacted many facets of the pandemic and its management [6–15].

The legacy of the pre-covid period and the experiences of the past three years lead us to point out some of the crucial challenges for the forthcoming period.

## 2. Relevant Sections

### 2.1. Pandemic Preparedness

The pressures arising from the uncertainties in the first months of the pandemic triggered a chain reaction of 'blame-and-shame' accusations against international organizations (primarily WHO), but also against some national governments. In many countries, authorities were facing criticism that pandemic preparedness, which had been a hallmark of activities related to a quick response to the new potential epidemic, had not been fit for purpose in the pandemic situation. Such an intermediate conclusion was proposed given the late response, fragmented actions, and insufficient intensity of response in the very initial stages. The WHO took on some of the criticism very seriously and this resulted in a comprehensive report from an independent panel, which was presented to the Executive Board and to the General Assembly of the WHO [15]. The WHO joined forces with the World Bank in preparing a comprehensive report for the G20 Summit in Indonesia in 2022 that looked at both the health and financial sides of the preparedness challenge [16]. One of the crucial problems raised was, once again, the issue of gaps between high-income countries (HICs) on the one side and low- and middle-income countries (LMICs) on the other side. Pandemic preparedness requires investment, and this puts LMICs in a particularly fragile position. A recent study by the Global Fund found that 85% of global investment in pandemic preparedness will be needed in Global-Fund-eligible countries [17]. Such magnitude of investment needs to be planned and endorsed in good time to avoid some of the situations that occurred during the COVID-19 pandemic. There were multiple issues that put health systems under strain despite previous activities in the framework of pandemic

preparedness. They mostly related to the pre-existing shortages of staff in the health system entry points, especially in primary care [18], as well as shortages of staff in infectious disease management and critical care units (e.g., intensive care doctors and nurses as well as anaesthetists) [19–25]. Consequently, health systems became overwhelmed quickly by big numbers of acute patients with severe respiratory problems [26,27]. This also applies to a lack of personal protective equipment (PPE) [28,29] and its exorbitant prices at the beginning of the pandemic (due to missing stockpiling but also due to distant provisions), as well as the run of vaccines where global aspects of COVID-19 vaccine coverage were put behind the needs of those willing and able to pay more. It is impossible not to praise the quick development of vaccines against COVID-19, but their availability and efficacy varied greatly [30]. Only late in 2021 when supplies in high-income countries seemed to be excessive, was there more willingness to help especially low-income countries through vaccine donations [31–33]. Lepelletier et al. discuss the issues related to the syndemic effects of the COVID-19 pandemic and propose some approaches for the future [34].

There were examples of good practice in the current pandemic, such as health altruism, which was present in strong correlation with COVID-19 vaccination driven by externalities (under the conditions of an unlimited supply of vaccines). An interesting study demonstrating this correlation has recently been published by Hierro et al. [35]. The mapping of unvaccinated populations reveals the painful realities of the gaps between HICs and LMICs where the latter are lagging to an appalling degree [36].

## 2.2. Military Conflicts and the Lurking Economic Crisis

The world has never ceased to face repeated military conflicts and resulting national, regional, and global crises throughout the decades after WW2. They usually triggered severe consequences for health, social welfare, and economies, as well as regional and global stability.

Several military conflicts over the past ten years saw an escalation of these impacts at an important international scale. The civil war in Lybia, Syria, and Yemen [37], as well as the unstable situation in the Sahel region, impact the health of populations and are triggering movements towards neighbouring countries and across Europe. The beginning of the conflict in Ukraine, with the resulting annexation of Crimea by the Russian Federation in 2014 [38], saw the first waves of Ukrainian displaced persons and refugees mostly moving to Poland. The civil war in Syria and the latter creation and fall of ISIS, which caused a massive exodus and displacement of millions of persons towards neighbouring countries and towards Europe had important multifaceted impacts on health and health services [39,40]. This resulted in an important humanitarian and logistical crisis, and in the loss of lives in attempts to cross from Turkey to Greece and then across the Balkans towards Central and Northern Europe.

The year 2022 saw an escalation in military conflicts and wars that also brought war back to Europe. Apart from the physical destruction, there has been a high toll in terms of human victims as well as internal and external displacement of at least 20% of the pre-war population of Ukraine and of almost 8 million refugees across Europe, out of which 5 million are registered in their hosting countries for temporary protection [41]. This has put a great strain on the hosting countries, most notably on Poland where 1.56 million Ukrainian refugees remain according to official data by the UNHCR from 22 February 2023 [42]. At first the war complicated the management of COVID-19 in Ukraine but with its continuation and destruction of health infrastructure and lack of regular supplies, there will be serious impacts on health and healthcare in more general terms, including chronic diseases, most notably cancer [43].

The war in Ukraine unveiled another important challenge which had lately become evident, partly already triggered by the pandemic, and that is global interdependence and global supply chains. Ukraine is a major producer of grain, primarily wheat, which, in the pre-war period, was mostly exported to LMICs [44]. An agreement preventing a total blockade on these exports meant a relief to all those in need, not underestimating

the challenges triggered by the earlier impact of COVID-19 [45]. The economic impact of the war includes increasing energy prices, higher inflation rates, and disruptions in global supply chains. The latter have been affected to an important degree and the duration of interruptions is contributing to shortages of medicines even in HICs, deepening the trends registered even before the pandemic [46]. All of these will have a negative impact in countries far beyond the war-affected areas. Shortages in the supply of medicines and shortages of certain basic foodstuffs, coupled with increasing prices resulting from scarcity, could have disastrous effects especially for LMICs.

There is no clear estimate as to when and to what extent the new economic crisis might become out of control and overwhelm the world, such as the previous crisis from 2008 onwards [47,48]. Support to LMICs in any global crisis would be essential to at least maintain the levels of research [49] and support to healthcare as it stands today. In real terms, it is critical that scarce human resources [50,51] are maintained to keep up essential services for the future period [52].

### *2.3. Climate Change and the Pitfalls of Globalization*

There were many well-known problems related to the intense process of globalization even before the COVID-19 pandemic: the shifting of economic activity to other countries and continents, the global trading of even perishable goods, such as fresh fruit and vegetables, and the enhancing of tourism-fueled international and intercontinental travel and commerce. All these problems significantly contributed to the need for modes of transport using fossil fuels to be used with an unprecedented intensity. Apart from contributing to climate change, such activity generates a lot of pollution, especially sea freight transport by large vessels.

Climate change has a profound impact on the production of food, among others, and as an alternative for the future, vegetables, in particular the legumes [53]. This will not only have a quantitative impact but will affect the quality of crops. Seasonal and out-of-season flooding and droughts might affect regions of Europe that, in the past, had not experienced such extreme occurrences [54,55].

A particular feature of climate change are heat waves and increasing temperatures in all seasons, including reaching extreme values in summers, which has a profound impact on health, as evidenced by Leone M et al., on an international level [56]. Achebak et al. specifically studied the impact of heat on cardiovascular diseases in Spain [57].

Infectious agents and their vectors, such as zoonoses, are gradually moving north and south from the equatorial regions where they used to be endemic, as we can see from the study by Li et al. on the development of dengue in China [58]. The changing climatic conditions may have a profound impact on the reproductive cycles both in the animal world but also in plants, which is clearly described by Fernandez-Pascual [59].

The impact on human health is obviously most visible to human perception and sometimes this impact can affect countries which have been warm(er) in the past. Even in those countries, as Zhao et al. demonstrate with the example of Brazil, there is a clear relationship between environmental temperature increases and hospitalization rates [60]. For those workers who need to work in harsh conditions in the open air, increases in temperature do not only cause health problems but have a profound impact on their productivity [61]. Observations of the developments in the circumpolar north have been intensified over the past years because of their evident macro changes, and a study also explored the impact of these on human health [62]. Increasing temperatures bring with them complex impacts on inter-relationships between the natural environment, including disasters, impacts on human health, as well as direct impacts of high indoor temperatures during summers and the detrimental impact of ozone, particularly in cities, as these three studies from Europe demonstrate [63–65]. Interestingly, healthcare needs to address its own contributions to the carbon footprint and how to 'green' the present working practices. This interesting study on 'greening the operating room' tries to propose an approach [66].

The rapid movement of millions of people across the globe facilitates trade, tourism, family ties, and culture. At the same time, it poses a constant threat that, at some stage, there could be an easily transmitted pathogen that could then be propagated with ease globally. That is what eventually happened with the SARS-CoV-2 virus. Although the International Health Regulations and the pandemic preparedness documents clearly defined procedures and protocols to be followed, their implementation and national and local adoption failed.

#### *2.4. Ageing and Frailty Worsened Due to Disrupted Functioning of the Healthcare System*

Even before the pandemic of COVID-19, many countries were experiencing hesitation and facing challenges when trying to promote a more preventative orientation in their healthcare. Part of the disruption was due to hesitancy around introducing restrictive measures, as these had been seen as a challenge to personal freedom [67]. As Wang points out in their study, HICs were allocating more resources and attention to some of the preventative services than LMICs [68]. Even though a comprehensive approach at the primary care level had been promoted for more than four decades, some of the issues need to be repeated often [69]. In many countries several of the building blocks of health systems were unprepared and insufficiently prepared for the pandemic. This was reflected in shortcomings in leadership and governance, often with delayed responsiveness of critical services. Furthermore, service delivery was rapidly subject to total streamlining to satisfy the needs of the infected and their treatment, while sidetracking or freezing all other services for shorter or longer periods of time [70]. Health workforce shortages or inappropriate working conditions from the pre-pandemic times were only worsened by the spike in the needs of the health system due to the pandemic. Health information systems were—in some cases—supportive of distant communication and in the provision of consultations and medicines, but largely fell short in adapting to the realities of the pandemic. Supply chains were affected by border closures, lockdowns, and irregularity in international trade and shipping. We will present below some of the findings of three studies exploring the responsiveness of health systems to the challenges of different financing and provisions of health services.

The COVID-19 pandemic caused disruptions in normal preventative, diagnostic, and therapeutic processes as it became the primary focus of health service delivery at all levels. Many countries had weaknesses in preventative services prior to the pandemic and these were then deepened during the pandemic. The full extent of the consequences of these disruptions will be visible over the next years. One of the consequences already explored, which might have an important and complex impact on future morbidity, is the deepened syndemic of obesity [71]. Preventative programs were often stopped or severely restricted due to the need to channel health professionals to services related to pandemic management. The impact on the elderly, who were a typical vulnerable population, combined with their exposure to a respiratory virus, was devastating, causing most deaths in persons over 75 years of age [72,73].

A particular feature of the period of the COVID-19 pandemic has been its impact on mental health. It is worth noting that there were three specific features of this impact. The first was the impact on mental health of the entire population facing long-standing lockdowns with severe disruption in regular life routines, a lack of social life, interrupted relations with people beyond ones household, the need to adapt to working from home, and a lack of amusement and sports activities. The second was the specific impact on the mental health of children and adolescents [74]. As was the case with adults, among young people there was seeking of blame for the situation experienced during the restrictions imposed due to COVID-19 [75]. The lack of social life for children and young people had an even more profound effect than on adults. This was, importantly, coupled with significantly reduced physical activity during the pandemic as well as with inappropriate nutrition patterns. Thirdly, there was the severe impact of COVID-19 on carers and on health professionals [76].

### 2.5. Increasing Inequality through Previous Problems Further Worsened by COVID-19

The COVID-19 pandemic put most societies globally under enormous strain. Whitehead, Taylor-Robinson, and Barr discuss the interrelationship between poverty, health, and COVID-19 [77]. As we have seen through the pandemic, different population strata were not affected equally. COVID-19 hit particularly hard those who were frail, elderly, poor, and all those whose health had been under strain due to difficult living conditions. Apart from the direct toll the pandemic took on these populations in terms of lives, prolonged course of disease, and disability caused by the consequences of long treatment or disease or both, there were also long absences from work and from family. These caused, in some cases, a loss of employment and put families in difficulty.

Health literacy was an important factor in response to the global health crisis. It affected collective and individual decisions related to the protection of health and the level to which measures, which had been imposed, were eventually respected and taken up, ranging from wearing masks to vaccine uptake [78].

As Marmot [79] describes with several examples, even the richest societies of the world were not responding adequately and were not even prepared to appropriately cope with the pandemic. This stemmed from a multitude of reasons and from the fact that health is a result of an interplay of many individual, societal, economic, and psychological determinants that together produce an outcome. Social inequality had a profound impact on those determinants that predisposed the affected populations to higher risks, among which were racial and ethnic minorities [80].

## 3. Discussion

A disruptive agent such as SARS-CoV-2 can have a multitude of impacts at a societal level. Pandemics of infectious diseases are one of the 'expected' events occurring occasionally every few decades and, consequently, adequate preparedness for such occurrences should be in place. This relates primarily to healthcare being overwhelmed with the number of critically and severely ill persons. However, it is also about changes in the functioning of the entire society caused by the measures aimed at limiting the detrimental health effects of the pandemic itself. Non-pharmacological measures (e.g., lockdowns, other types of limitations of movement, facial masks, and hand hygiene) were dominant mostly in the initial stages of the pandemic although they persisted throughout the pandemic between 2020 and 2022. Lockdowns are the most challenging intervention that may yield the most undesirable consequences for pandemic management [81]. Lockdowns caused important consequences, ranging from limiting people's social and family life [82], which impacted mental health [83] as well as overall health and lifestyles [84], but also triggered disruptions in industry, supply chains, tourism, and energy [85]. The offsetting of the impact of these measures, and even their introduction, was easier for the HICs [86], although these effects were not uniform. In LMICs, there were combined effects of various factors, additionally complicating the recovery from the pandemic [87]. In turn, these faced significant resistance both to the general measures, such as lockdowns and other limitations of movement, as well as to vaccination requirements and obligatory testing. Updated and innovative approaches to pandemic preparedness will be warranted as suggested by Harrington, Kackos, and Webby [88].

Notwithstanding the attractiveness of the epidemiological transition concept, which had, since late 20<sup>th</sup> century, taken root in the broader public health community [89], every occurrence of epidemics reminds us of the continued importance of both pandemic preparedness as well as awareness of the potential that communicable diseases can develop. The WHO had been warning for decades that a new pandemic was imminent and was supporting the development of national pandemic preparedness plans [90]. Experiences with the SARS-1 [91], MERS [92], and H1N1 flu pandemics [93] were noted but had not had a more profound impact on the modifications to pandemic preparedness approaches.

The closures of borders and restrictions of incoming traffic were some of the key features of this approach [94–97]. Even supranational structures, such as the European

Union, had not arrived at an agreement on a common approach to conditions regarding the crossing of internal borders for an extended period. Furthermore, this even happened in the so-called Schengen area, where travelling was barrier-free before COVID-19. Eventually, a common instrument was developed in the form of a QR code known as a 'COVID-19 pass' [98].

Military conflicts often have an impact on regional or global health situations, depending on their extent and the respective consequences. Several of these conflicts started decades ago and persisted through longer periods of time, such as the military activities in Afghanistan or the situation in the Middle East. Some of the conflicts had a profound effect on the health of one of the parties, such as is the case of Yemen [99–101] in the war between Saudi Arabia and Yemen. A study analysing the situation with military conflicts and COVID-19 in three countries also points at the threats in terms of the rapid spread of the disease in the instance of poor epidemiological surveillance and control as well as a fragile pre-COVID situation [37]. The war in Ukraine, that had its predecessors in the conflicts in Donbass and the annexation of Crimea, opened even more challenges. The extent of the conflicts in the territorially second largest country in Europe presented three challenges for wider stability:

1. A refugee crisis where, at the peak of exodus, around 8 million Ukrainians fled their country.
2. An energy crisis through interruptions, bans on imports, and restrictive measures on gas and oil trade.
3. A crisis regarding the provision of grain, which threatened primarily LMICs, and which was averted through an international agreement, showing some reason at these critical moments [45].

The migrant and refugee crises were modified by COVID-19, with fewer migrants arriving from sub-Saharan countries and more from Northern Africa. On the other hand, as the IOM states in its report from February 2021 [102], aspirations for migration had grown in the meantime and many who wanted to migrate were blocked in their own country, leading to exposure to harassment, torture, and other consequences. Migration trends, which are, in part, inevitable as a result of global economic inequalities, should be steered and controlled with the support of international organizations, such as the World Bank, the International Organization for Migration (IOM), the United Nations High Commissioner on Refugees (UNHCR), the WHO, the EU and the US Agency for International Development (USAID). Adequate retention strategies should be developed in order to protect the levels of health already achieved and control key public health challenges. The COVID-19 pandemic also temporarily impeded these movements, but they are unlikely to disappear in view of the rising economic difficulties in some countries and regions [103].

A potential new economic crisis could have devastating consequences for health systems around the globe in the post-COVID period. Although COVID-19 brought health and healthcare to the frontline of our attention, the previously high level of alertness is generally becoming more moderate. The financial levels are recalibrating to pre-COVID levels, which may often be insufficient due to the backlog in the demand for healthcare. This aside, many health professionals left healthcare due to physical and mental exhaustion during the pandemic. Some cases, where there has been a structured response to the mental health needs of health professionals, can serve as experience and provide lessons for similar situations in the future [104].

Climate change is likely to drive the political agenda in most of the world over the next decades, mostly for two principal reasons. One is in the fact that not enough has been done on slowing it down and the other is the fact that the negative impacts show a multitude of facets, most of which importantly include a detrimental effect on human health and wellbeing. The impact of the carbon footprint related to travel, whether work- or leisure-related, will likely remain important [105]. The reversal back to 'normal' life, and the return to normal levels of industrial activity, global trade, and tourism, among others, raises the importance of a circular economy [106,107].

The Sustainable Development Goals (SDGs) seemed to have been side-tracked over the past few years in the routine policy practices of many countries. Their comprehensive and objective interrelationships are essential for a responsible global developmental agenda. The extent of the effects of the health, economic, and social crises resulting from the pandemic, in addition to the climate crisis, is still uncertain, but it seems clear that the main issues are inefficient waste management, supply chain issues, adaptation to online education, and energy concerns [108].

Health systems exhibited varied levels of resilience and flexibility in response to the acutely unravelling crisis. Their responses varied greatly, as we can see in the examples of some of the studies, where differences are evident also among HICs themselves [109]. On the one hand, some countries, among which were the US and many Western European countries, counted on evading economic consequences by not adopting the strictest measures. In contrast, several developed countries decided on stricter policies ranging from 'no-COVID' in China to severe restrictions in travel, such as Taiwan, Hong Kong, Australia, and New Zealand. The impact of the different types of health systems was also studied as a potential contributing factor to the adverse effects, especially mortality, but also more broadly on access to non-COVID-19-related services [110]. Nevertheless, experiences from the pandemic provide important messages for global health security and universal health coverage [111], including about how to address the planning of needs for anesthetists [112]. Health systems' approaches were analyzed using experiences from several European countries, studying two different aspects of tackling the COVID-19 pandemic. The first of the two, by Schmidt AE et al. [113], studies the approaches taken in the selected social health insurance countries, where it was evident that these countries were structurally less prepared for crisis situations and had to resort to additional funding from national budgets. The second one, by Waitzberg R et al. [114], explores provider payment incentives in 20 countries.

Lockdowns caused important consequences, ranging from limiting people's social and family life [82], which impacted mental health [83] as well as overall health and lifestyles [84], but also triggered disruptions in industry, supply chains, tourism, and energy [85]. The offsetting of the impact of these measures and even their introduction was easier for HICs [86]. In turn, these countries faced significant resistance both to the general measures, such as lockdowns and other limitations of movement, as well as to vaccination requirements and obligatory testing.

Vaccine coverage against COVID-19 showed important variations across countries. In part, lower rates can be attributable to vaccine hesitancy and 'no-vax' movements that had been strong in some countries across Europe already before the COVID-19 pandemic. Nevertheless, vaccine hesitancy was also present in other continents and in LMICs, as studied by Moola S et al. [115]. However, it was in the organization of the vaccination where some countries proved to be much more successful than others. An excellent insight into the predictors of success, as well as of hesitancy, was carried out on 37 different cases from across the world in a paper by Pires [116]. Contrary to the past, there had been significant decisiveness to address challenges related to vaccine hesitancy during the COVID-19 pandemic. Inadequate approaches to health were evident where an adequate level of health literacy was absent, matching the need to understand rather complex messages as to why younger population groups should also get vaccinated against COVID-19. The shortcomings in this area contributed to various conspiracy theories and 'no-vax' movements [117,118]. These developments might have a detrimental effect on other vaccinations, such as routine vaccinations in childhood. Interestingly, these objections continued despite growing evidence that there is also an important percentage of persons who develop what is described as 'long covid' [119]. There is mounting evidence that new, innovative approaches in the promotion of all vaccination might be needed in view of these experiences [120–124].

The COVID-19 pandemic unveiled all the shortcomings that even the HICs had been underplaying in the past. This particularly goes for the position of and care for vulnerable groups, especially the elderly. Long-term care for the frail has not been developed

to the extent where these vulnerable groups would be protected from the catastrophic consequences of the fast-spreading pandemic [125]. However, it also refers to the flexibility and adaptability of the entire health system. There is a mounting body of evidence showing the positive experience of good health system governance under complex circumstances [126,127]. Overall, most governments and societies were not prepared for an epidemiological earthquake of these proportions, but studying different responses and their effectiveness might provide potential scenarios for the future [128]. Furthermore, the importance of the role that nursing professionals have in caring for the frail and the elderly has been further evidenced [129].

#### 4. Future Directions

Global collaboration and solidarity have become inevitable principles to follow in order to tackle the challenges and problems discussed in this paper. Partial or limited solutions will not resolve global problems and cannot mitigate the impact these problems have for the greater part of the world. Notwithstanding that, it is important to learn from successful approaches at the national level in order to propose potentially successful strategies [130–132]. They underline a clear case for public health financing, organization, and workforce orientation.

Comprehensive and internationally harmonized approaches to pandemic preparedness, which would include experiences from tackling the COVID-19 pandemic, are going to be essential in view of future pandemics. These would include:

- a. A comprehensive approach to the whole health system's pandemic preparedness.
- b. An adequate investment into human, physical, and infrastructural resources in order to adequately support the functioning of health systems under the conditions of a pandemic.
- c. A clear outline for the use of pharmacological and non-pharmacological measures.
- d. An agreement from the different governmental sectors on the key functioning of the society to be preserved.

Mitigating the effects of military conflicts is complex as their duration and intensity vary as well as the extent of territories and countries involved. Some of the recent conflicts have spread over an entire region, causing severe consequences for health and wellbeing of entire populations. International concerted support activities to all in need are essential to support the vulnerable and the weak. This should include:

- A. Concerted actions to manage the movement of a significant number of refugees.
- B. The addressing of energy and food policies that would be resilient to greater shocks.
- C. The addressing of migration flows in a comprehensive manner that would provide safe options for those most in need, while supporting the countries of origin to prevent 'brain-drains', which will further impoverish many LMICs.
- D. The addressing of migration flows which requires requires concerted action by all key international actors, including the IOM, the UNHCR, the WHO, and UNICEF.

Addressing climate change is becoming a matter of urgent action which can no longer be delayed or postponed for additional excuses. Addressing climate change is essential for the future wellbeing of entire populations. The harm caused to human health through the direct and indirect effects of climate change will need to be monitored and quantified as it has important economic consequences. The COVID-19 pandemic showed us how much human activity contributes to the emissions related to global warming. While in recovery from the pandemic, it will be important to remain aware of the need to also address climate change with regards to those aspects which directly impact on health, such as:

- a. The facilitation of the spread of zoonoses and other infections due to global travel and global warming.
- b. The implementation of and strict adherence to the International Health Regulation (IHR) to mitigate the potential global spread of diseases.
- c. An increase in the preparedness for heat waves.

- d. The addressing of the potential loss of housing and income for populations living in coastal areas.

Research into the behavioral determinants of health is an important area to be further enhanced. COVID-19 unmasked more profound differences within populations regarding the values placed on preventative measures, adherence to them, the acceptance of a minor risk to avoid a major one, and the general taking up of responsibility in protecting oneself and thus also others (humanistic altruistic behavior). These differences are related to diverse levels of health literacy but also to socio-economic differences as well as trust in authorities and in medical and other health professionals. In view of this, special attention needs to be given to the involvement of the scientific societies, not only those in the biomedical field but also those from social sciences and psychology. In that way, it would be easier to develop better and more efficient strategies in addressing the challenges presented by a global emergency of such a magnitude as the case of COVID-19.

There had been a widespread systemic failure to protect the vulnerable segments of the population in the pandemic, evidenced by the high toll of deaths among the elderly living in protected communities, such as nursing homes. Similarly, the shifts of services and workforces towards the management of the pandemic left many acute and chronic patients with unmet needs that will take several months to years to resolve. This will have a serious impact on the survival for chronic noncommunicable diseases and the quality of life of chronic patients. The flexibility of healthcare delivery under the conditions of a pandemic will require special focus in future pandemic preparedness. A study mapping and analyzing responses from 28 countries is one of the analyses which may help decisionmakers to face the future challenges better prepared [133].

The international community, but especially international organizations, such as the WHO, UNICEF, the World Bank, as well as supranational structures such as the European Union, will have to aim at defining clearer and more harmonized measures in future pandemics and other international health threats as well as at agreeing on the requirements for their introduction. Support from NGOs, both international as well as local, will be needed, especially in LMICs. This should greatly improve the initial response as well as contribute to a fairer and more balanced approach to global solutions.

## 5. Conclusions

The world we live in after three years of the COVID-19 pandemic is not that different due to the continued presence of unresolved problems from the pre-pandemic period. It has become more difficult to manage as the old problems have mostly been worsened by the pandemic. At the same time, responses and measures to contain the pandemic have caused a range of new problems, which raise additional challenges about the future.

Pandemic preparedness in the future will have to address more than just the direct measures to contain the pandemic. It will have to include a comprehensive, societal plan with a clear governmental commitment to address all aspects of the impact and of the measures required to manage the pandemic.

Military conflicts have, even under 'normal' conditions, a detrimental effect on entire countries and regions, and often involve several countries. The direct suffering of the victims in the conflict is worsened by refugee crises, insufficient healthcare, and economic challenges. Apart from military conflicts, there are other reasons that push people from many countries to migrate to better lives, including better employment opportunities and escape from persecution for several reasons given the specific context of the country in question. All these were eclipsed by the COVID-19 pandemic, but just temporarily as the reasons for migrations remain largely the same.

Climate change and its global effects had temporarily been sidetracked. The temporary reduction in industrial activity as well as global trade and tourism showed encouraging results. However, the recovery period is showing a return to pre-pandemic levels. Problems arising from climate change have profound health effects and need to be addressed adequately through global, regional, and national coordinated activities.

Health systems failed to protect the most vulnerable—the elderly and the frail. At the same time, the shortcomings of health systems that existed before the pandemic, such as health workforce shortages, their difficult working conditions, their limited capacity for critical care, and the lack of reserve for increased demand, caused delays in the management of chronic patients, and increased waiting lists and waiting times.

The public health community has been striving to promote the importance of building healthy societies, not only of caring for those persons in direct need of healthcare, ever since the Ottawa Charter on health promotion from 1986 [134] and its successors, notably the Shanghai declaration [135]. This orientation should be guiding future efforts in the improvement of population health and wellbeing. Only a comprehensive approach to health that includes all relevant sectors, and all population strata, can lead to the development of healthy populations that are resistant to health threats of different types, including those of pandemics such as COVID-19. Health needs to be a societal and governmental commitment as only synergies across the different sectors will yield the adequate responses to extreme situations, such as those we have recently experienced with COVID-19.

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