Introduction

Being healthy, rather than simply being not being ill, means living in a state of complete psychological, physical, and social well-being. This also confirms the fact that the individual health is not fully attainable as an absolute category.

According to the American public health expert, C.E.A. Winslow, public health is the art and science of disease prevention, lifespan extension, and physical health improvement. He focused on addressing and mitigating the causes of illness. From this viewpoint, we can view effective public health measures as being those that take place through organized societal efforts which include: environmental rehabilitation, infection control within the community, and hygiene education. The organization of health care services that provide early diagnosis, preventive care, and the development of social supports that improve the standard of living, all help make it possible for individuals to protect their health [1].

The World Health Organization (WHO) simplifies this definition by stating that public health is the art and science of disease prevention, lifespan extension, and health improvement through organized efforts by society [1].

According to the American Medical Association, public health is what society does to ensure the conditions that are necessary for people to be healthy. These efforts include a range of educational, economic, social and environmental initiatives.

Therefore, all definitions of individual health and public health, at their foundation, support physical wellbeing and a safe living environment, as well as efforts by individuals, population and society as a whole, that are supposed to provide/improve the working and living conditions.

One of the primary defining elements of an environment is the climate of a certain area. In modern times, the challenge of climate change and its influence on health and quality of life affects us all.

The global population is unstoppable nearing nine billion residents. However, living conditions in certain areas of our planet have not been adapted, either naturally or through human intervention, to sustain these numbers. As a result, different challenges emerge, including social, economic, and religious ones. It is also important to emphasize that, as human beings (Homo sapiens), we are homeothermic organisms. If our populations are widely spread out across the planet, we have very limited capacity to adapt to the external environment. This adaptive factor is of significance to human interaction with the environment, climate changes and the influence on morbidity, mortality and health systems as well.

Some Facts about Climate

The climate of an area is defined on the basis of average values, extreme and other statistical meteorological parameters throughout an interval of time - months, years, centuries. According to a more recent definition of climate, the climate is a dynamic system in which there are mutual influencing factors: atmosphere, oceans, ice and snow cover, processes on the ground (lithosphere) and biosphere - including those caused by humans and their activities. Each of these components in the climate system exhibits its own dynamics, on which other components exert influence and as such, cause changes to them [2].

This more recent, modern definition of climate had resulted from the precise need to explain changes which are visible and which have been recognized and felt on an individual level in the previous several decades (Figure 1) [3].

South-Eastern Europe is an area with continental climate having clear transitions between seasons,
and climate changes are quite obvious. Consequences are very noticeably felt and they are expected to be even more pronounced in the coming period.

Hygiene is defined as a health science which studies external environmental factors (biological, physical, social) and their effect on the health of individuals and populations. It also tends to define the measures and activities that lessen the effect of negative factors and increase the effects of positive factors in the external environment (individual effects or combined effects) [4].

Climate as a factor in the external environment is seen as positive, for example facilitating healing centers situated in favorable climatic areas, such as medical centers adjacent to thermal hot springs, climatic areas that are suitable for rest and vacations where people can enjoy the benefits of the sun, as well as other environmental benefits. However, much of what was previously seen as a recommendation has been brought into question in recent decades precisely because of evidenced changes in climate.

Climate changes have become an increasingly destructive process at a much faster rate than predicted. Climate change induced by greenhouse gas emissions caused by different human activities including high energy production and consumption is the biggest challenge faced by global health during the 21st century for the decision-makers in most diverse countries [5, 6].

Climate change, chemical contamination, water and air pollution are all exacerbating diseases worldwide [6].

**Climate Change, Environment, Urbanization, Energy, and Sustainability**

If our planet Earth were to be viewed as an organism, it could be said to have become “highly febrile”. It is nearly impossible to lower the temperature of the planet and difficult to even slow down its further increase. Human activities directed to both industrial and economic development as well as material gain alongside the completely absent or insufficient concern about their influence on the environment, have led to a reaction by the planet. Earth, with its delicate balance having been endangered, reacts with a spectrum of symptoms and presents clinical features of an illness which is becoming chronic in character. This malady is manifested through: floods, hurricanes, tsunamis, as well as other strong winds, heavy rains and all the more pronounced changes in temperatures and unstable weather in the restricted areas.

In addition to these physical manifestations, there are changes in biodiversity and the number of endangered species on the planet rises. There is an extreme increase in areas affected by drought, and many animal species move on looking for another habitat.

It is also essential to mention that people have created a “new form” of environment through urbanization and the concentration of populations into big cities. There is a significant cause and effect relationship between urbanization and climate change. Cities are the greatest causes of climate change, and the human population in cities is the most subjected to the health-damaging consequences [7, 8].

Due to climate change, the use of water resources and water supply is also damaged and endangered, in the sense of both quality and quantity. On one hand, there are droughts and the absence of water and on the other hand, there are floods and threats to infrastructure, material damage and increased risk for the spread of infection. All of these elements, as well as their relation to the intensification of migration, represent huge challenges and add strong arguments to the cause of climate change reduction and mitigation. Their resolution requires engagement that increases preparedness for and resilience to climate changes. However, they represent another strong argument for actions in the field of the mitigation of the climate changes [9].

The development of infrastructure, provision of necessary energy sources, and economic possibilities which include job availability, make urban settings attractive living environments for individuals and large populations. However, at the same time, there is a new increasing set of risks that are significant to human health. Urban settings are as much the source of the problem as they are the place to solve them.

It is predicted that 70% of the human population will live in urban settings by the year 2050. Urban health has become a new area of focus for health care. One of the most important goals related to urban health is the maintenance and improvement of infrastructure. This ought to occur simultaneously with the reduction of causes of climate change and the preservation of the health of the population. Dealing with the urbanization-related challenges influenced by climate change has become increasingly interesting to numerous experts who seek to ensure secure future for the generations ahead of us. Those involved in finding solutions understand the interdependence of the need for energy to
be provided from renewable resources, the sustainability of all systems (particularly health and education), as well as the increase of their resilience. According to the WHO, and other stakeholder organizations, cleaner energy systems, promoting the safe use of public transportation, and active movement (cycling or walking) could reduce carbon emissions, and reduce the burden of household air pollution [10, 11]. Urbanization trends, population growth and migration mean that the number of people exposed to high temperature extremes will increase, which has major implications for public health planning. Urban areas will expand: by 2030, urban land cover is projected to triple compared to its extent in the year 2000. The number of people exposed to the risks of climate change is intensified by social factors: the distribution of population density caused by urbanization, and changes in population demographics related to aging [10, 12].

Today, cities contribute to more than 60% of greenhouse gas emissions. Urbanization is responsible for 75% of energy consumption and a similar portion of all waste. Populations in cities are especially vulnerable to the consequences of climate change such as heat waves, increasing levels of air pollution, and rising sea levels in coastal areas [13]. Population health and climate change are in a state of mutual dependence with macroeconomics, energy policy, and urbanization. There is also a significant demographic factor.

It is very important to underline that environmental sustainability is a central concern of the Sustainable Development Goals and is addressed in goals for water and sanitation, energy, cities and climate change. Sustainable Development Goal 13 underlines that we should take an urgent action to combat climate change and its impacts. Climate change is one of the major health challenges of the future and its mitigation is a prerequisite for sustainable development. Climate change is related to many of these goals, affecting, for example, water resources, food production, desertification, air pollution, and therefore, human health [14].

**Climate Change, Global Health, and the Health of Population**

“The climate change factory” in its full capacity produces direct and indirect “by-products of climate changes” resulting in numerous consequences which affect individual health, the health of the population as a whole and the environment. This represents not only a challenge for public health, but also for health care systems and health professionals.

Human activities have significantly contributed to climate change. Its consequences are a reflection of the health of Planet Earth itself and they intensify the need for the increase in resiliency, and adaptation capability. We are in need of creative solutions that go above and beyond the necessary action required to mitigate climate change.

Indirect effects of climate change include consequences faced by the population such as air pollution, increasing vector disease, food insecurity, undernutrition, mental illness, climate displacement and migration. For example, according to the WHO, nearly 7 million people die annually from air pollution. Much of this is due to the same unsustainable transport, construction, and home energy production sources that contribute to climate change, directly or indirectly [15, 16].

A sudden and uneven demographic growth in the population number causes migration which is additionally intensified due to climate change (as well as due to wars, economic upheaval, etc.). For these reasons, climate changes and migration are priorities that can be viewed as separate but yet similar and partly interconnected processes [17, 18].

According to the WHO, rising temperatures and variable precipitation are likely to decrease the production of staple foods in many of the poorest regions. This will increase the prevalence of malnutrition and undernutrition, which currently cause 3.1 million deaths every year [10, 16].

Based on some non-optimistic assessments, catastrophes due to climate change are inescapable; however, their arrival is gradual. This is primarily relevant to changes that affect agriculture and food production. Agriculture and provision of sufficient quantities of safe food and clean water are huge present and future challenges [19].

According to the WHO, climatic conditions, strongly influence water-borne diseases and diseases transmitted through insects, snails or other cold-blooded animals. Changes in climate are likely to lengthen the transmission seasons of significant vector-borne diseases and alter their geographic range. Malaria is also strongly influenced by climate and kills more than 600,000 people every year – mainly African children under the age of 5. Besides, studies suggest that climate change is likely to continue to increase the exposure to the dengue virus [10, 17].

Lack of safe water can compromise hygiene and increase the risk of diarrheal disease, which kills approximately 760,000 children under 5 years of age every year. In extreme cases, water scarcity and drought lead to famine. By the late 21st century, climate change is likely to increase the frequency and intensity of drought at both regional and global levels [10, 20, 21].

Research on the influence of climate change on mental health suggests their connection with the development of post-traumatic stress. Serious anxiety disorders are correlated to acute disasters such as earthquakes, floods, fires, and hurricanes. Traumatic exposure can cause reactions ranging from general somatic and mental disorders with difficult recovery to serious psychopathology, increased aggression, as well as suicide. Climate change is associated with increasingly longer and harder periods of extreme heat and/or drought. These situations can permanently drive people from their homes, making them displaced persons at a higher risk of developing depression and trauma due to irreversible losses. It is assessed that by 2050 there could be 150 million displaced persons due to floods, erosion, and agricultural degradation [22].
According to available data, the WHO has concluded that climate change is expected to cause approximately 250,000 additional deaths per year between 2030 and 2050; 38,000 deaths of elderly people due to their suffering resulting from heat exposure, 48,000 and 60,000 deaths caused by diarrhea and malaria, respectively and 95,000 due to childhood undernutrition. Some human population categories are more vulnerable than others (the poor, children, elderly, people with disabilities or those with pre-existing medical conditions) [10].

**Climate Change, Health Care System, and Role of Health Care Professionals**

Climate changes are not only associated with the population health condition and the frequency of individual illnesses, but also with the ability of the health care system to address related consequences. It is especially significant to consider the potential influence of climate change on the organization of the health care itself, the work of individual branches of clinical medicine, and also on planning aspects related to the provision of health care. More equipment and consumables, better preparedness, smart organization, and efforts to increase the future resiliency of the health sector are necessary steps in dealing with climate change [23, 24].

The health systems are significant participants in the total energy balance. Insisting on the renewable energy sources and on the diversification of the energy sources also relates to the infrastructure in health care, and not only to the economy and habitation. Responsible leaders within the health care sector are devoted to green energy and carbon footprint reduction. Such care and concern for environmental factors also plays a role in raising health care standards and improving the quality of care for the patient.

Current regulations regarding the observation of policies and requirements related to energy efficiency are also applicable to the health care sector. Health care institutions to be built in the future must be highly advanced when it comes to their energy efficiency measures.

Within the health care system itself, it is not enough only to think about adapting to climate change and increasing our preparedness to respond to newly occurring needs at the same time. A meaningful action must be undertaken to reduce the greenhouse gas (GHG) footprint - and thus establish mitigation as a strategic direction.

The knowledge and skill of medical professionals, especially specialists such as surgeons and anesthesiologists can be of benefit only if proper infrastructural conditions are present. Elements such as energy sources, microclimate, and water supply are crucial for frontline health care providers such as primary care physicians who practice in the areas that are heavily burdened by climate change. The continuous increase of the resiliency of the health care system as a whole can support doctors in treating patients whose health is negatively affected by climate change.

It is necessary to rethink priorities and needs at individual and professional levels within the health sector. The patients’ safety and care must remain the main goal, but we must also include advocacy of environmental health, sustainable healthcare, and high standards in energy efficiency [23].

The agreement [COP 21 - Climate Summit 2016] to keep global warming below 2°C above pre-industrial levels is important not only politically and economically, but also when it comes to public health, and it encourages the following:

- actions and measures that will limit climate change and decrease risks to the global health sector to be as low as possible,
- financing and supporting measures for the adjustment of climate change, and public health initiatives to decrease risks resulting from extreme weather,
- actions by which health is improved alongside contributions made to decrease climate change, which decreases the incidence of individual malignant diseases, respiratory and cardiovascular diseases [caused by air pollution],
- increasing awareness among health care professionals and within the general population about climate change health risks, and the benefits of decarbonisation,
- development and implementation of measures for limiting climate change, health protection at the workplace, and within society,
- actions for decreasing the environmental and climate footprint of health care institutions and the health care system itself, alongside the improvement of health care services.

The health sector should contribute to the improvement of health and living conditions of populations living in polluted areas, and reducing its climate footprint is one of the ways to do so. The WHO suggests several elements of a climate-friendly hospital: energy efficiency, green building design, green energy generation, environmentally-friendly transportation, adequate food, waste and water policy [24].

**Conclusion**

The voice of health is calling for a cure to the climate change malady. Health care professionals have the unique ability to reach both individual patients and influential institutions. Across the sector, physicians, nurses, paramedics and other health care providers are seen as leaders in their communities. Their efforts to educate patients, advocate within their workplaces, and shape policy can cause tremendous momentum leading to meaningful solutions to the climate change malady affecting our Earth. Efforts to adapt to and mitigate climate change directly contribute to resiliency throughout the health care sector. Scientific and professional achievements in medicine, patients’ satisfaction with the health care services provided, and the working conditions of health professionals all directly depend on our ability to treat and cure the climate change malady.

Health professionals represent great leadership potential when it comes to reducing the patients’ vul-
nervability to climate change, and promoting health while reducing carbon emissions. To fulfill this potential, the public health sector requires support and assistance in the capacity-building efforts [10].

Climate change is a challenge for the educational system in general, but also for the education of health care professionals. The educational process is essential for changing the mindset of the whole population and especially that of health professionals. Health professionals can take a leadership role in addressing climate change and increasing health literacy related to climate change. Within their curricula for all health professionals, medical schools should include topics related to environmental health, climate change and climate change mitigation [23].

Recommended actions within health care facilities include: educating hospital staff about climate change issues; reviewing facility procurement practices, and following sustainable practices whenever possible; auditing, measuring, monitoring, and reducing the climate footprint of healthcare facilities; recognizing potential co-benefits of climate mitigation activities; identifying the ways by which sustainability practices can be incorporated into accreditation standards [23, 34].

The health sector as a significant consumer of energy, and simultaneously a source of greenhouse gas emissions, can achieve significant economic and health benefits from the implementation of sustainability strategies to reduce energy use. Improving ventilation in health care settings can reduce airborne disease cross-infection (by monitoring these components the performance and energy efficiency could be improved).

The health sector should react to the challenge of climate change by taking a concrete leadership role in mitigation efforts, beginning with its own policies and practices. Health professionals can and must play a leadership role in mitigating climate change, and in helping societies adapt to climate change and the health risk it poses. There is a great potential for health care providers, hospitals, public health systems and the decision makers that govern them to lead us towards an economy based on clean, renewable, efficient and healthy energy. The education process is essential for changing the mindset of the entire population, but especially that of all health professionals.

Mitigating the climate impact of health care facilities is an essential part of this process. By taking action to move us towards low carbon health care systems, health professionals can lead by being the example to the others. Their voices are able to inspire, motivate, and educate interconnected groups of people of all ages, from patients to policy makers. Rethinking and reinventing the public health system to respond properly to climate change is an important priority and an opportunity for all health professionals to lead us towards better healthcare in the future.

References


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