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REVIEW ARTICLE

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THE IMPACT OF CLIMATE CHANGE ON HUMAN HEALTH: DOES LEGISLATION IN SERBIA ADEQUATELY RESPOND TO THE CHALLENGES?

Abstract: *The effects of climate change are numerous: from extreme weather events with enormous amount of precipitation, to extreme droughts in parts of the planet where this was previously uncommon. They can significantly affect the physical and mental health of the human population. This paper will focus firstly on recognizing the increasingly intense consequences of climate change in Serbia and their impact on human health. After that, it will answer the question whether the threat of climate change to human health is recognized in the strategies and legal regulations in Serbia, and if so, whether legislation in Serbia adequately responds to those challenges. The research results show that the connection between the climate change and human health is not recognized in all relevant legislation. Recommendations for appropriate legislative changes are provided.*

Key words: Climate Change, Human Health, Health Law, Climate Change Law, Strategies.

1. Introduction

Climate change has many consequences, from extreme events such as weather disasters with large amounts of precipitation, to extreme droughts lasting for months in parts of the planet where this was uncommon in previous decades. According to the United Nations Intergovernmental Panel on Climate Change (IPCC), global surface temperatures increased by 1.1°C in the 2011–2020 period compared to 1850–1900.[1]

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1 IPCC, Summary for Policymakers, in: Lee, H., Romero, J., (eds.), 2023, *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the*

Global warming is affecting people around the world. It is estimated that approximately 3.6 billion people live in areas that are highly vulnerable to consequences of climate change.[2]

The effects of climate change have significant influence on the physical and mental health[3] of the population.[4] Extreme weather events, especially heat waves, wildfires,[5] and floods, have resulted in human morbidity and mortality.[6] Consequences of climate change have contributed to the increase in the number of people with respiratory diseases, cardiovascular diseases, "vector-borne illnesses, food-borne and water-borne diseases,"[7] maternal and fetal health harms, mental health issues, etc.[8]

The situation regarding the impact of climate change on human health in Serbia has become cause for concern in recent years. Therefore, this paper will first focus on recognizing the increasing consequences of climate change in Serbia and their impact on population health. After that, the paper seeks to answer the question whether the threat of climate change to human health is recognized in the strategies and legal regulations in Serbia, and if so – whether the legislation adequately responds to those challenges. Recommendations are provided for appropriate changes in legislation for the challenges of the negative consequences of climate change on human health.

Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Geneva, IPCC, p. 4.

2 *Ibid.*, p. 5.

3 Cosh, S. *et al.*, 2024, The relationship between climate change and mental health: a systematic review of the association between eco-anxiety, psychological distress, and symptoms of major affective disorders, *BMC Psychiatry*, No. 24, pp. 2, 16.

4 IPCC, Sections, in: Lee, H., Romero, J., (eds.), 2023, *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Geneva, IPCC, p. 50.

5 Chen, G. *et al.*, 2024, Continuous wildfires threaten public and ecosystem health under climate change across continents, *Frontiers of Environmental Science & Engineering*, Vol. 18, No. 10, pp. 4–6.

6 Sovacool, B. K. *et al.*, 2024, Critically examining research funding patterns for climate change and human health, *npj Climate Action*, Vol. 64, No. 3, p. 2; Stewart, S., 2024, *Heart Disease and Climate Change*, Cham, Springer, p. 4.

7 *Ibid.*

8 *Ibid.*; Peters, E. *et al.*, 2022, Evidence-based recommendations for communicating the impacts of climate change on health, *Translational Behavioral Medicine*, Vol. 12, No. 4, p. 543; Yenew, C. *et al.*, 2025, Scoping review on assessing climate-sensitive health risks, *BMC Public Health*, Vol. 25, No. 1, pp. 3–7; Figueiredo, T. *et al.*, 2024, The interplay between climate change and ageing: A systematic review of health indicators, *PLoS ONE*, Vol. 19, No. 4, p. 2; Johansen, B. E., 2017, Climate Change: An Encyclopedia of Science, Society, and Solutions, *Volume III: Human impact and primary documents, Human health*, Santa Barbara, ABC-CLIO, pp. 37–45.

2. Consequences of Climate Change in Serbia and Their Impact on Human Health

The consequences of climate change in Serbia have become increasingly visible in the past several decades. Studies have shown that compared to the 1961–1990 period, the increase in average temperature in Serbia for the 2011–2020 period was 1.8°C, and during the summer 2.6°C.[9] That temperature raise is significantly higher than the increase in global average temperature of 1.1°C.[10] Official statistics shows that the summer of 2024 was the warmest summer in Serbia since 1951, i.e., since official measurement began.[11] The minimum seasonal temperatures in 2024 in most parts of the country were the highest in the history of measurement.[12] The consequences of climate change are also visible through higher number of heat waves and severe weather conditions, ranging from intense droughts to floods. Changes have also occurred in terms of the amount and distribution of precipitation over the years. In the past ten years, the number of days with very heavy precipitation has increased 1–2 times on average, and in some parts of the country up to 5 times.[13]

Climate change, especially extreme events, have significant influence on population health. The diseases that "are expected to be most affected by climate change are: asthma, respiratory allergies and diseases; malignant diseases; vascular diseases; nutrition and diseases caused by nutrition; diseases and mortality caused by heat stress; mental health disorders, disorders caused by stress; neurological disorders; vector and zootomic diseases; diseases transmitted by water; diseases and mortality caused by weather conditions."[14]

9 Serbian Ministry of the Environment, 2024, Third Communication of the Republic of Serbia to the United Nations Framework Convention on Climate Change, p. 7, (https://www.ekologija.gov.rs/sites/default/files/2024-02/treci_izveshtaj_republike_srbije_prema_ okvirnoj_konvenciji_ujedinenikh_nacija_o_promeni_klime.pdf, 24. 2. 2025).

10 *Ibid.*; Serbian Government Climate Change Adaptation Program for the 2023–2030 Period, *Official Gazette of the RS*, No. 119/2023.

11 Republic Hydrometeorological Service of Serbia, 2024, Seasonal bulletin for Serbia, Summer 2024, p. 1, (https://www.hidmet.gov.rs/data/klimatologija/latin/leto.pdf, 18. 1. 2025).

12 *Ibid*.

13 Đurđević, V., Vuković, A., Vujadinović Mandić, M., 2018, Climate changes observed in Serbia and future climate projections based on different scenarios of future emissions, United Nations Development Programme, p. 13.

14 Sekulić, G. *et al.*, 2012, *Climate Vulnerability Assessment – Serbia*, Belgrade, World Wide Fund for Nature, Environmental Improvement Centre, p. 33; see Portier, C. J. *et al.*, 2010, *A Human Health Perspective on Climate Change: A Report Outlining*

Heat waves, which are becoming increasingly frequent in Serbia, pose significant threat to human health. According to data, there was a significant increase in the mortality rate in Belgrade during a heat wave in July 2007. The highest mortality was recorded among persons suffering from cardiovascular and malignant neoplasms, while "the highest relative increase in the mortality rate is related to diabetes (286%), chronic kidney diseases (200%), respiratory system diseases (73%), and nervous system diseases (67%). The mortality rate among women was over twice higher than the mortality rate among men."[15] The research results from summer 2022 show that the number of heat-related deaths in Serbia was 574, which is 81 person per million, affecting more the female population than the male.[16]

Consequences of climate change are also visible in terms of the number of days with extreme precipitation, which led to floods in Serbia in 2014, in which 51 persons lost their lives.[17] Floods also pose a threat to health[18] and they can contribute to the spread of different diseases.

Changed climate conditions affect the spread of diseases, introducing some that were previously not present in the territory of Serbia. One example is the West Nile virus. Namely, since the infection was officially registered in the human population in Serbia for the first time in 2012, the number of patients has been increasing, reaching 415 infected persons in 2018. At that time, Serbia was in second place in Europe in terms of the number of cases, but during the following years the number of patients decreased. According to data from the Institute of Public Health of Serbia, during the 2012–2021 period, the deaths of 101 persons were linked to the West Nile virus.[19] Higher air temperatures, as a consequence of climate

the Research Needs on the Human Health Effects of Climate Change, Research Triangle Park, Environmental Health Perspectives/the National Institute of Environmental Health Sciences.

15 United Nations Development Programme Country Office in Serbia, 2016, *Climate Change and Health*, p. 2.

16 Ballester, J. *et al.*, 2023, Heat-related mortality in Europe during the summer of 2022, *Nature Medicine*, Vol. 29, p. 1861.

17 Nikolić Popadić, S., 2021, Flood prevention in Serbia and legal challenges in obtaining the land for flood risk management, *Environmental Science and Policy*, Vol. 116, pp. 213–214; Nikolić Popadić, S., 2020, Pravni aspekti upravljanja rizicima od poplava, *Zbornik radova Pravnog fakulteta u Nišu*, Vol. 59, No. 86, p. 202.

18 Appuhamilage, G. P., Barbir, J., Lloveras, X. R., Analysis of Existing Disaster Risk Reduction Programs and Enhancement of Capacity Development for Health Risks from Floods in Western Balkan, in: Filho, W. L., Trbić, G., Filipovic, D., (eds.), 2018, *Climate Change Adaptation in Eastern Europe, Managing Risks and Building Resilience to Climate Change*, Cham, Springer, pp. 347–348.

19 "Dr Milan Jovanović Batut" Institute of Public Health of Serbia, 2022, Information on the current epidemiological situation of West Nile fever in the territory of the Republic of Serbia, (https://www.batut.org.rs/index.php?content=2401, 24. 1. 2025).

change, favor the reproduction of disease-carrying mosquitoes, affecting the vector population growth and increasing transmission efficiency.[20]

According to estimates provided in the Climate Change Adaptation Program for the 2023–2030 period, the population of Serbia is "highly vulnerable to the impacts of climate change," which negatively affect its health and which will be more pronounced in the coming decades. It is estimated that 45% to 55% of the population in Serbia is at high risk – they are "very likely to suffer the consequences of climate change that will threaten their health and living conditions", while "20% to 30% is at extremely high risk (they will certainly suffer the consequences of climate change that will endanger their health and living conditions)."[21] The population that is particularly vulnerable are elderly (people over 65 years of age), the poor, the rural population (due to poor access to health system services, outdoor work, and generally lower access to information), outdoor workers (over 3 million people), children, pregnant women, people with disabilities, people with chronic diseases (especially respiratory diseases, cardiovascular diseases, malignant diseases).[22]

Based on the previous analysis, we can conclude that the consequences of climate change in Serbia are very significant and a large part of the population is exposed to negative impacts, the effects of which will become increasingly pronounced in the coming years. The question that arises is whether the threat of climate change to human health has been recognized in Serbian strategies and regulations and, if so, whether the legislation in Serbia adequately responds to those challenges. The following sections will be dedicated to finding answers to those questions.

3. Is the Threat of Climate Change to Human Health Recognized in the Strategies and Legal Regulations in Serbia?

For decades, there have been attempts at the global level to set goals and directions for countries to take actions to reduce climate change. Serbia has been part of these global efforts: the United Nations Framework Convention on Climate Change was ratified in 1997 at the level of the Federal Republic of Yugoslavia; the Kyoto protocol was ratified by Serbia

20 Wang, H. R. *et al.*, 2024, Impact of climate change on the global circulation of West Nile virus and adaptation responses: a scoping review, *Infectious Diseases of Poverty*, Vol. 13, No. 38, p. 8.

21 Serbian Government, Climate Change Adaptation Program for the 2023–2030 period.

22 *Ibid*.

in 2007; the Doha Amendment to the Kyoto Protocol was ratified in 2017; and the Paris Agreement was ratified on 25 July 2017.[23] These international agreements oblige Serbia to implement activities to reduce its contribution to climate change, and also to implement adaptation measures. The realization of activities and measures involves and affects various sectors, including the field of public health.

Climate-related health problems can be addressed in various ways. One of them is to adequately recognize the risks that climate change poses to human health – within the framework of health regulations, but also in regulations that govern climate change issues – and to direct activities towards minimizing the negative effects of climate change on health, as well as to reduce the contribution of human activities to climate change. Bearing in mind the close connection between health and climate change, we analyzed the strategies and legislation in Serbia in order to answer the question: is the threat of climate change to human health adequately recognized in Serbia?

The analysis of the strategies and laws is conducted in chronological order, according to the years of their adoption, with a division between strategies and legislation in the field of health and in the field of climate change. We analyzed the health and climate regulations that are in force in Serbia, with the latest amendments in March 2025. Specifically, in the field of health we analyzed the Patient Rights Act, the Public Health Law, the Public Health Strategy of the Republic of Serbia for the 2018–2026 Period, and the Law on Healthcare. We selected these laws and strategy as they cover health risks, and climate change represents one of the health risks. So, the logical conclusion would be that climate change should be recognized as one of the health risks in the aforementioned legislation and consequently should be regulated. Regarding the field of climate change, we analyzed the main legislation and strategies that are currently in force.

3.1. HEALTH

The Serbian Patient Rights Act from 2013 is one of the laws in the field of health which deals with health risks in one part. Namely, it is stated in the law that "health institution has the obligation to implement

23 For more details see: Mihajlov, A., Aleksić, D., Komparativna analiza Klimatskog pakta Evropske unije i implementacije relevantnih od Srbije potpisanih i ratifikovanih međunarodnih ugovora, in: Nikolić Popadić, S., Milenković, M., (eds.), 2023, *Klimatske promene – pravni i društveni izazovi*, Belgrade, Institute of Social Sciences, pp. 36–37; Todić, D., Princip zajedničke ali diferencirane odgovornosti i Pariski sporazum o klimi, in: Nikolić Popadić, S., Milenković, M., (eds.), 2023, *Klimatske promene – pravni i društveni izazovi*, Belgrade, Institute of Social Sciences, pp. 17–18; Todić, D., 2019, Gde su granice prava klimatskih promena?, *Zbornik radova Pravnog fakulteta u Nišu*, Vol. 83, pp. 47–52.

preventive measures in order to exercise the patient's right to appropriate health services for the purpose of preserving and improving health, prevention, suppression and early detection of diseases and other health disorders, by raising people's awareness and providing health services at appropriate intervals, for population groups that are exposed to an increased risk of illness."[24] The law does not specify the health risks or the specific sources of health risks. As we concluded in the previous section, the consequences of climate change represent a health risk, so this provision should also be applicable in the case of health risks stemming from the effects of climate change. It is especially important that health institutions have to also act preventatively and to raise awareness, which should in practice also include measures and actions related to the climate change risks that can affect human health. "The health institution is also obliged to ensure safety in the provision of healthcare, as well as to continuously monitor risk factors and take measures to reduce them, in accordance with the regulations governing quality in healthcare. The patient must not suffer damage caused by inadequate functioning of the health service."[25] Although climate change as such is not mentioned specifically in the Patient Rights Act, its provisions should be interpreted in a way that also includes risk factors stemming from the consequences of climate change.

Since we have concluded that the consequences of climate change represent one of the risks to public health, it would be logical for this risk to be recognized within the Public Health Law (PHL). This is important as PHL from 2016 is the basic law for regulating planning and implementation of activities related to the "preservation and improvement of the health of the population". Health is defined in the PHL in a same way as in the Constitution of the World Health Organization, as "a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity."[26] According to the PHL, "public health is a set of knowledge, skills and activities aimed at improving health, preventing and suppressing diseases, prolonging and improving the quality of life through organized measures of society."[27] Some of the main public health tasks listed in this law are "monitoring and response to health hazards and emergency situations, health protection, including the safety of the environment and working environment, food and others; health promotion," as well as "prevention and suppression

24 Patient Rights Act, *Official Gazette of the RS*, No. 45/2013, 25/2019, Art. 8, translated by author.

25 *Ibid.*, Art. 10.

26 Public Health Law, *Official Gazette of the RS*, No. 15/2016, Art. 2; Constitution of the World Health Organization, *Off. Rec. Wld Hlth Org., 2, 100*, p. 1.

27 Public Health Law, Art. 2, translated by author.

of infectious and non-infectious diseases."[28] From the definition of public health and its main tasks we can conclude that the risks and consequences of climate change should find a place within them. Namely, as we saw in the sections 1 and 2 of this paper, the effects of climate change to human health and wellbeing are numerous, therefore monitoring and prevention should also include climate change-related health issues. One of the areas for public health action within this law is the environment and population health, which includes, among other activities, "1) monitoring and analysis of the state of the environment, i.e., analysis of water [...], air, soil, noise, vibrations, ionizing radiation, non-ionizing radiation, wastewater and waste; [...] 7) assessment of the risk to the health of the population based on the register of sources of pollution; 8) monitoring and analysis of the health status of the population and assessment of health risks related to environmental influences, including the assessment of the epidemiological situation; 9) spreading knowledge and involving the population in actions to improve the state of the environment."[29] It is important to introduce changes in this part, so that it would also include the issue of climate change. Assessment of the health risks related to the effects of climate change should be added. Also, the provision related to the spread of knowledge and involvement of the population should be expanded to include actions related to climate change adaptation and mitigation measures. The spread of knowledge and information is also stipulated within the provisions dedicated to social care for public health at the level of the province and local self-government units. The competent state authorities and the public have to be informed about all risks and other public health problems that may have negative consequences for the health of the population.[30] This should also include information about the risks that climate change and its consequences (may) have on the health of the population. The law stipulates that the institute for public health, independently or in cooperation with other participants in the public health system, proposes public health programs to the local self-government unit, which include the collection and analysis of public health data, interpretation of public health information and its use in the process of decision-making and development of public health activities.[31] We suggest that these programs and proposals for the creation of activities also cover the risks associated with climate change, taking into account their negative impact on health. The PHL defines who the participants in the field of public health as "bodies

28 *Ibid*.

29 *Ibid.*, Art. 8.

30 *Ibid.*, Art. 14.

31 *Ibid.*, Art. 22.

of the Republic of Serbia, autonomous provinces, local self-government units, health service, health insurance organizations, social protection system, health councils at local self-government units, educational and other institutions, media, economic companies, public companies, entrepreneurs, humanitarian, religious, sports and other organizations and associations, families and citizens."[32] As we can see, public health permeates and applies to almost all subjects in society. Given that the consequences of climate change also apply to and affect the vast majority of subjects, it is very important that climate change is recognized as a health risk and that the activities of various subjects are adapted to the goal of reducing the risk of climate change and adapting to climate change, aiming to reduce the negative consequences to the health of the population.

The connection between climate change and health is recognized in the Public Health Strategy of the Republic of Serbia for the 2018–2026 Period, but only in a very general way, as one of the objectives of the Strategy. Namely, within the general goal of improving the environment and the working environment, one specific objective is foreseen related to climate change: "improving the state of the environment and responding to climate change."[33] The Strategy envisages activities that should lead to the achievement of the stated goal. Those are reduction of emissions of harmful gases from industry, domestic combustion plants and motor vehicles by 20%, compared to emissions in 2015; continuous improvement of the control of the application of plant protection products and mineral fertilizers in order to preserve soil quality and achieve food safety; development of strategic noise maps, action plans for noise protection and acoustic zoning of cities; development of action plans for responding to climate change in cities; adoption and implementation of action plans for improving energy efficiency.[34] Dedicating part of the Public Health Strategy to the issue of climate change is an important step in linking climate change and health, but for specific changes strategy is not enough. Adopting action plans and implementing them in practice is essential in order to achieve change.

The law in the field of health that recognizes climate change is the 2019 Law on Healthcare (LHC). Unfortunately, this law does not regulate in detail the issue of the effects of climate change on human health and potential measures that could be applied. Climate change is mentioned only at one place; namely, it states that social care for health at the level of the country include the adoption of a national program in the field of

32 *Ibid.*

33 Public Health Strategy of the Republic of Serbia for the 2018–2026 Period, *Official Gazette of the RS*, No. 61/2018, section 4.2.

34 *Ibid.*, section 4.2.5.

health protection from the effects of factors in the living and working environment that can adversely affect health: harmful and dangerous substances in the "air, water and soil, disposal of waste materials, dangerous chemicals, sources of ionizing and non-ionizing radiation, noise and vibrations".[35] The program should contain climate change adaptation measures, based on the analysis of the risks to the health of the population of Serbia. The program should be adopted by both the minister responsible for health and the minister responsible for environmental protection.[36] To the author's knowledge, this program has not yet been adopted. The LHC also prescribes social care for health at the provincial level and at the level of the local self-government unit, which includes, among other things, "planning and implementation of a program for the preservation and protection of health" from environmental pollution by harmful and hazardous substances.[37] We suggest that these provisions be expanded to include the preservation and protection of health from the effects of climate change at the provincial and local levels. According to LHC, the citizen has "the right to information that is necessary for the preservation and improvement of health and the acquisition of healthy lifestyle habits, as well as to information on factors of the living and working environment," which may affect health.[38] We suggest that this provision can also be expanded so to include information regarding climate change, especially information regarding effects of climate change on health and information on measures that should be taken in order to preserve health in environment which is affected by climate change. The Institute of Public Health also has an important role in informing population. One of its duties is "to monitor and analyze the health status of the population, [...] and risk factors from the environment that may adversely affect people's health, and to report this to the competent authorities and the public, [...] inform and educate the population about ways of preserving and improving the state of the environment, as well as preventing the harmful effects of environmental risk factors."[39] We suggest that these provisions be expanded in a way that includes climate change risk factors. Although the law does not mention climate change in this provision regarding the role of Institute of Public Health in informing the population, the website of the "Dr Milan Jovanović Batut" Institute of Public Health of Serbia includes a special

35 Law on Healthcare, *Official Gazette of the RS*, No. 25/2019, 92/2023, Art. 10, translated by author.

36 *Ibid*.

37 *Ibid.*, Arts. 12, 13.

38 *Ibid.*, Art. 16.

39 *Ibid.*, Art. 101.

section called climate and health, which provides biometeorological forecast, and recommendations for extremely hot and cold weather.[40] Although those recommendations are very general, they can be useful to the public. It should be noted that the website was latest updated in 2019, even though weather situation and circumstances changing every year. This information should be updated more regularly, especially having in mind the consequences of climate change and the fact that the summer 2024 was the warmest summer in Serbia since 1951.

3.2. CLIMATE CHANGE

The first Law on Climate Change (LCC) in Serbia was enacted in 2021. Unfortunately, the connection between human health and climate change is not specifically recognized and regulated in this law. One of the goals of the LCC is "to establish a system to reduce greenhouse gas (GHG) emissions in a cost-effective and economically efficient manner, thus contributing to reaching the scientifically necessary levels of GHG emissions, in order to avoid dangerous global climate changes and the adverse impacts of climate change."[41] By analyzing and interpreting this provision, we can conclude that this goal also includes reducing the negative impact on human health, given that avoiding the adverse impacts of climate change certainly includes health. This interpretation is confirmed by further analysis of the law. Namely, in determining the meaning of the terms used in the law, Article 5 states that "adverse impacts of climate change mean changes in the physical environment or 'biota', due to climate change, which have significant adverse consequences on the composition, recovery or productivity capacity of natural and managed ecosystems, or on the functioning of socio-economic systems or human health and wellbeing."[42] Therefore, the activities envisaged in this law should also contribute to reducing the negative influence of climate change on health. However, given the significant risk to health, the legislator could have focused more on the connection between climate change and health. Following the adoption of the LCC, we hoped that the strategies and programs whose adoption was prescribed by that law would pay more attention to this issue. The following analysis of the strategies and programs will show whether this was done.

40 "Dr Milan Jovanović Batut" Institute of Public Health of Serbia, website, (https://www.batut.org.rs, 22. 2. 2025).

41 Law on Climate Change, *Official Gazette of the RS*, No. 26/2021, Art. 3, translated by author.

42 *Ibid.*, Art. 5 (19).

In June 2023, the Government adopted Low Carbon Development Strategy of the Republic of Serbia for the 2023–2030 Period with Projections Until 2050. The risk that climate change poses to the health is recognized already at the beginning. The Strategy states that "the effects of climate change are already a threat, while future risks could jeopardize, among else [...] public health."[43] There is also connection between health benefits and implementation of certain measures within the strategy, which prescribes that measures related to the reduction of PM2.5 emissions should contribute to the decrease of PM2.5 emissions by 7% in 2030, with a 28.7% decrease by 2050, which should also "contribute to cleaner air and to the reduction of health problems associated with air pollution."[44] Although, apart from air pollution, strategy does not specify which consequences of climate change and in which way can have negative effects on human health, it is very important that the threat posed by climate change to public health is recognized.

According to the LCC, the Government is obliged to adopt a climate change adaptation program, which was done in December 2023. The connection between climate change and population health is recognized within the Climate Change Adaptation Program for the 2023–2030 Period (CCAP).[45] There is special section dedicated to human health and safety, stating that "climate change affects the physical, mental and emotional health of individuals and society."[46] Unfortunately, there is no systematical vulnerability and risk assessment for the effects of climate change on public health sector at the national level, but there is a list of groups of climate hazards within the CCAP, which are currently known to have or may have an important impact on human health and safety. Four groups of climate hazards have been identified. The first hazard is excessively warm weather, which can cause heatstroke and exhaustion, "increased risk of diseases, allergies and chronic illnesses."[47] Excessively warm weather can also lead to reduced availability of food and drinking water, and it can increase the risk of fire, causing air pollution. The second hazard is excessively wet weather, which can also increase "risk of diseases and other health prob-

43 Low Carbon Development Strategy of the Republic of Serbia for the 2023–2030 Period with Projections Until 2050, *Official Gazette of the RS*, No. 46/2023, pp. 1, 6, translated by author.

44 *Ibid.*, p. 26.

45 It is stated that climate change increases climate hazards including "climate and weather conditions that can directly or indirectly cause damage to nature, property, and human safety and health". Serbian Government Climate Change Adaptation Program for the 2023–2030 Period, 3.3.1.

46 *Ibid.*, 5.1.

47 *Ibid.*, 5.1. table 3, translated by author.

lems."[48] Wet weather can lead to the occurrence of floods and flash floods which can lead to "infectious diseases outbreaks due to deteriorated hygiene conditions, reduced availability of drinking water and reduced capacity to provide emergency medical assistance"[49] in the event of flooding. The third hazard is excessively dry weather, which can also influence reduction in "the availability of drinking water and water needed for hygiene." Dry weather can also have an impact the quality and availability of food. The last hazard identified in the CCAP are storms. It is stated that the impact of storms can be through "increased risk of injuries, deteriorated living conditions, and reduction in ability to provide emergency medical care."[50] The consequences of all four hazards are the same according to the CCAP: "worsening of health conditions, premature deaths; deteriorated living conditions; healthcare system overload due to climate hazards and inadequate public healthcare and rescue services overload; reduced functionality of emergency health services."[51] As it is already explained in the Section 2, more than half of the population in Serbia is at high risk to suffer consequences of climate change.[52] One of conclusions within the CCAP is that there is a "high confidence that risks from climate change in the public health sector will increase in the future."[53] Therefore, the CCAP provides a recommendation of "measures that need to be implemented to increase the Serbian population's resilience to climate change." Some of them are to "increase population preparedness for extreme weather conditions and other climate hazards," which should be done through "timely public sharing of information on extreme weather events, providing guidelines on behavior and ways to reduce risks to health, organizing timely risk reduction activities at the local level,"[54] etc. Other measures whose implementation is recommended are: "increasing the intervention capacities of emergency services and healthcare institutions; strengthening the capacities of other emergency response services; protecting outdoor workers; improving disease and infections monitoring and preventing disease spreading or implementing early interventions; improving monitoring of food and water quality; strengthening education and raising awareness among children and youths; expanding knowledge

48 *Ibid*.

49 *Ibid*.

50 *Ibid*.

51 *Ibid.*

52 See section 2. Consequences of climate change in Serbia and their impact on the health of the population.

53 Serbian Government Climate Change Adaptation Program for the 2023–2030 Period, 5.1, translated by author.

54 *Ibid.*, 5.1. table 5.

about vulnerability and risks to human health and safety."[55] There are also implementation methods for the measures recommended in the CCAP. Among them, there is a suggestion to "develop an analysis of the spatial distribution of climate change vulnerability and risks to human health and safety for the whole country, taking into account the distribution of vulnerable population groups, age distribution, gender differences, identify risk types and levels, as well as to develop guidelines for measures that would increase the population resilience to climate change,"[56] which would be highly important for the adaptation to changing climatic conditions and health protection. Changes brought about by the CCAP are very important, as finally, an official document recognizes in greater detail the inextricable connection between climate change and human health. It is also significant that the measures that need to be taken have been identified, as have the methods for their implementation. However, for concrete changes, further development of measures, elaboration and final implementation in practice are all necessary in order to achieve the intended results.

4. Conclusion

The consequences of climate change are becoming pronounced in Serbia and have an increasingly significant influence on population health. Based on the analysis, we can conclude that it is necessary to recognize the connection between climate change and health, both within strategic documents and in legal regulations, and to anticipate measures that would reduce negative influence on health and adapt to new climate conditions.

The results of our research show that climate change is not recognized as a risk to human health in the Public Health Law and Patient Rights Act of Serbia. The Serbian Law on Healthcare recognize this risk, but only in one place and not in a detailed manner. The connection between climate change and human health is recognized in the Public Health Strategy, but only in a very general manner. We can conclude that the existing legal provisions are insufficient. The research results show that there is a necessity to change legislation, to recognize climate change as one of the threats to human health. In Section 3.1 we suggested which articles of the laws should be amended in order to include climate change.

After analyzing climate change legislation and strategies, we can conclude the following. The connection between human health and climate

55 *Ibid.*, translated by author.

56 *Ibid.*

change is not specifically recognized and regulated in Serbia's LCC, but it is mentioned indirectly. Since one of the goals is to reduce GHG emissions, that should also contribute to the reduction of the negative impacts on human health. The risk that climate change poses to human health is recognized in the Low Carbon Development Strategy, and in the CCAP. We can conclude that the CCAP is the first document in which the connection between the effects of climate change and human health is clearly stated, with a classification of four groups of climate hazards, and their impact and consequences on human health and safety. The population groups that are vulnerable to climate change and their characteristics have been identified. The program recommends "measures that need to be implemented in order to increase the Serbian population's resilience to climate change, measures to reduce vulnerability to future climate conditions and consequently reduce risks, and measures to increase the speed of recovery."[57] Given that specific measures and activities have been provided in the program, further steps towards their implementation are the responsibility of the Ministry of Health and the Ministry of Environmental Protection.

It is also of the utmost importance to raise public awareness both about the negative influence of climate change on health and the negative effects of human activities on the climate, together with specific measures that must be implemented in order to reduce negative consequences. Providing timely and accurate information to the public, especially regarding the concrete measures that should be applied in the case of higher risks, is crucial, as lack of information can also lead to negative consequences. People need to know how they should act in certain situations and to be informed about the risks that consequences of climate change pose to health, and how to prevent or mitigate them. This is the field that requires improvement in Serbia. It should be noted that some of the measures within the CCAP, which we have analyzed, include increasing awareness, "improving knowledge and understanding of the impact of climate change and its consequences, ensuring timely information to the public about extreme weather events,"[58] etc. so we hope that we will see some changes in the coming years.

In general, we can conclude that the connection between the impact of climate change and human health is not recognized in all relevant legislation. The laws and strategies where that recognize the connection do not do so in an adequate way (as explained in the Section 3), considering the high risk that the consequences of climate change pose to human health.

57 *Ibid.*, 5.1.

58 *Ibid.*

Our evaluation was based on various principles. One of them is the principle of integration, which requires the alignment of policies across different sectors. It originates from the Treaty Establishing the European Community according to which "environmental protection requirements must be integrated into the definition and implementation of the Community policies and activities."[59] This principle can also be applied in Serbian policies in different sectors. From the results of our research, we can conclude that environmental considerations are implemented to the certain extent in health legislation (as explained in the Section 3.1), but this is unfortunately not the case for climate change issues and objectives. The principle of integration should also be applied to climate change. One of the examples of principle of integration can be found in the European Climate Law which states that "policies on adaptation in the Union and in Member States [...] work towards better integration of adaptation to climate change in a consistent manner in all policy areas, including relevant socioeconomic and environmental policies and actions, where appropriate, as well as in the Union's external action. They shall focus, in particular, on the most vulnerable and impacted populations and sectors, and identify shortcomings in this regard in consultation with civil society."[60] Therefore, health and climate change policies and legislation should be compiled, and climate change objectives should be integrated into relevant policies and legislation (especially in the field of health – the European Climate Law emphasizes the necessity to "address the growing climate-related risks to health").[61] The Serbian Law on Climate Change also prescribes that "public policy documents in the sectors most affected by climate change, as well as planning documents of autonomous provinces and local self-government units," should be based on climate change adaptation goals.[62] As can be concluded from the research results, the Public Health Strategy recognizes climate change issue, but that is only the first step. The CCAP has brought about improvement, but legislation is still lacking an integrative approach towards the issue of the impact of climate change on human health.

Taking "precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects," as stated in

59 Consolidated version of the Treaty Establishing the European Community, *Official Journal of the European Communities*, C 325/33, 24. 12. 2002, Art. 6.

60 Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC), No. 401/2009 and (EU) 2018/1999 ('European Climate Law'), *Official Journal of the European Union*, L 243/1, 9. 7. 2021, Art. 5.

61 European Climate Law, (5).

62 Law on Climate Change, Art. 15.

the United Nations Framework Convention on Climate Change,[63] should be also applied in the health sector. The precautionary principle "enables decision-makers to adopt precautionary measures when scientific evidence about an environmental or human health hazard is uncertain and the stakes are high."[64] Therefore, the decision-makers should follow this principle when changing the legislation in the field of health and climate change. Our research shows that precautionary/preventive measures, which are concretely and specifically related to negative effects and risks of climate change on the health of the population, are not provided in Serbia's health regulations.[65] It is necessary to integrate climate change risks into health legislation in a more detail way. Binding obligations that can contribute to the prevention and mitigation of the negative effects of climate change on human health should be incorporated into health legislation. It is crucial to go further than mere general statements which are hardly being implemented in practice. Introducing concrete measures into legislation – which would be binding for the institutions, but also implementable in practice – is one of the ways to achieve integration and alignment between the areas of climate change and health. Another possible approach is to provide a legal basis in health legislation for prescribing concrete measures in bylaws. Leaving the burden of such important issues to strategies and programs, which is currently the case, has not yielded the necessary results that would protect human health from the effects of climate change. The legislation should be also improved by integrating cross-sector coordination, which is significant for addressing the complex issue of the impact and consequences of climate change on population health. Cross-sector coordination would be in line with the Health in All Policies approach[66] which is also prescribed by the Serbian PHL.[67]

63 United Nations, 1992, United Nations Framework Convention on Climate Change, Art. 3, (https://unfccc.int/resource/docs/convkp/conveng.pdf, 19. 5. 2025).

64 Bourguignon, D., 2015, *The precautionary principle: Definitions, applications and governance*, European Union, European Parliamentary Research Service, (https://www.europarl.europa.eu/RegData/etudes/IDAN/2015/573876/EPRS_IDA(2015)573876_EN.pdf, 4. 3. 2025).

65 As mentioned in Section 3, the LHC refers to the national program in the field of health protection from the effects of factors in the living and working environment that can adversely affect health, which should also include climate change adaptation measures, based on the analysis of risks to the health of the citizens of Serbia. Consequently, the concrete measures are left to the program.

66 Formally legitimated as a European Union (EU) approach in 2006, according to Koivusalo, M., 2010, The state of Health in All policies (HiAP) in the European Union: potential and pitfalls, *Journal of Epidemiology and Community Health*, Vol. 64, No. 6, p. 500.

67 Public Health Law, Arts. 2, 3.

Therefore, based on the results of our research we can conclude that changes are necessary. The only good example that we found is the CCAP, as explained above, but having a plan is not enough – we have to see how implementation will work in practice in the coming years.

We hope that this paper will contribute to filling the literature gap, as to the author's knowledge there is no similar literature in Serbia dedicated to the analysis of strategies and legislation in the field of health and climate change. We also hope that this paper will be helpful to policy makers in their future decisions, as we identified which legislation has the potential for changes, as a way of responding to the challenges that climate change poses to human health.

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UTICAJ KLIMATSKIH PROMENA NA ZDRAVLJE LJUDI: DA LI ZAKONODAVSTVO U SRBIJI NA ADEKVATAN NAČIN ODGOVARA NA IZAZOVE?

Sofija Nikolić Popadić

APSTRAKT

Posledice klimatskih promena su brojne: od ekstremnih događaja, kao što su vremenske nepogode sa velikom količinom padavina, do ekstremnih suša, koje traju nekoliko meseci u delovima planete gde to nije bilo uobičajeno u ranijim decenijama. Efekti klimatskih promena imaju značajan uticaj na fizičko i mentalno zdravlje stanovništva. U radu smo se fokusirali pre svega na prepoznavanje sve intenzivnijih posledica klimatskih promena u Srbiji i njihovog uticaja na zdravlje ljudi. Nakon toga smo rad posvetili analizi i traženju odgovora na pitanje da li je opasnost od klimatskih promena po zdravlje ljudi prepoznata u strategijama i zakonodavstvu u Srbiji, i ako jeste, da li propisi u Srbiji na adekvatan način odgovara na te izazove. Rezultati istraživanja pokazuju da veza između uticaja klimatskih promena i zdravlja ljudi nije prepoznata u svim relevantnim zakonima. Postoji potreba za poboljšanjem u ovim oblastima, zbog čega smo u radu dali preporuke za izmene zakona.

Ključne reči: klimatske promene, ljudsko zdravlje, zdravstveni zakoni, zakon o klimatskim promenama, strategije.

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