

Planetary health and climate crisis as a new paradigm for medical education

Saúde planetária e crise climática como um novo paradigma para a educação médica

Nelzair Araujo Vianna¹ 
Marcos de Assis Moura² 

¹Corresponding author. Fundação Oswaldo Cruz (Salvador). Bahia, Brazil nelzair.vianna@fiocruz.br

²Universidade Federal de Juiz de Fora (Juiz de Fora). Minas Gerais, Brazil.

Faculdade de Ciências Médicas e da Saúde de Juiz de Fora (Juiz de Fora). Minas Gerais, Brazil

"A sick planet cannot shelter healthy people. If the patient who needs emergency care is the planet, what life support would doctors give this patient?"¹ These analogies, points to the need for a different perspective on the new risks to human health in the 21st century. To this end, it is important to know the risks that are threatening the health of civilization and to understand how this new planetary crisis exposes society to both chronic non-communicable diseases and exacerbates the risks of the emergence of infectious diseases.

The way of life of modern society has been responsible for the emergence of new risks that impact human health², especially considering the influence of anthropological issues. Understanding these aspects requires expanded approaches that dialogue with new health concepts, from an interdisciplinary perspective, to better understand the impacts, especially considering the interconnection of risks between the Earth's natural systems and interactions with human health.³ The complexity of this crisis is marked by the paradox brought about by civilization and its mode of economic development. On one hand, new technologies have brought a better quality of life and improved indicators related to increased

life expectancy, reduced infant mortality worldwide and a decrease in extreme poverty.² On the other hand, these same technologies have brought, at an unprecedented rate, an imbalance in the planet's biophysical conditions, which leads to an imbalance in the ecosystem, affecting the essential conditions for the maintenance of life² and consequently human health.

A new model of economic prosperity recognizes that human well-being must allow each person to lead a dignified life with opportunities, while safeguarding the integrity of the Earth's natural systems.⁴ However, current economic development points to a warning about planetary limits, where at least four of the nine limits have already been exceeded: climate change, biodiversity loss, land use change, and soil fertilization. Other limits considered in this ecological ceiling are the contamination of air, freshwater, and oceans, chemical pollution, and the destruction of the ozone layer. The distribution of health risks has been categorized into five categories: environmental, social, geopolitical, technological, and economic.⁵ According to these categories, a study analyzed potentially synergistic risks that could lead to a global systemic health

Submitted Sept. 4th, 2024, Accepted Sept. 9th, 2024,

Published Oct. 18th, 2024

Inter. J. Educ. Health, Salvador, 2024;8:e5909

<http://dx.doi.org/10.17267/2594-7907ijeh.2024.e5909> | ISSN: 2594-7907

Assigned editors: Iêda Aleluia, Ana Cláudia Carneiro

How to cite this article: Vianna NA, Moura MA. Planetary health and climate crisis as a new paradigm for medical education. Inter J Educ Health.

2024;8:e5909. <http://dx.doi.org/10.17267/2594-7907ijeh.2024.e5909>



crisis, pointing to climate change, biodiversity loss, extreme events, water crisis, and food insecurity as the main health risks.⁵

In 2015, coinciding with the 2030 Agenda that establishes the goals for sustainable development, a publication by the Rockefeller Foundation and Lancet proposed planetary health as a new field of knowledge that studies the health of civilization and the natural resources on which they depend, bringing as a central discussion the safeguarding of human health in the Anthropocene era.² In this expanded concept, planetary health is the achievement of the highest possible standard of health, well-being and equity throughout the world, through careful attention to the human systems – political, economic and social – that shape the future of humanity and the Earth's natural systems, defining safe environmental limits where humanity can flourish.² Thus, expanding the vision of health to a more holistic perspective requires paradigm shifts, also including aspects of valuing ancestral knowledge. This is a topic that requires cultural competence, critical awareness and a greater appreciation of marginalized voices.⁶

The effects of climate change on health can be direct and indirect. The emission of greenhouse gases from the burning of fossil fuels has been the main culprit in the climate crisis, being responsible for global warming that has raised the planet's temperatures. Global warming initially affects the hydrological cycle, causing climate disasters, floods and extreme droughts, affecting human health in different ways, amplified by vulnerability factors, economic and social conditions. The effects on health can be due to heat waves, air pollution, water security (contamination and water shortages), food security (malnutrition and reduced food production), changes in vector migration (emergence of infectious diseases), and even mental disorders as a result of forced migration and extreme events. Lack of access to health services can also negatively impact outcomes. Studies have linked the effects of climate change on respiratory and cardiovascular health, cancer, kidney disease, depression, anxiety, infectious diseases, among others.^{7,8}

While the climate crisis has been a major threat to health in the 21st century⁹, fossil fuel burning and its impacts on health have become the subject of editorials in high-impact medical journals.¹⁰ Knowledge about the causes of the climate crisis and its impacts on health has become an area of medical interest, but there are still many educational gaps. The paradigm shift proposed by some authors regarding the understanding of health and disease processes¹¹ calls for an imperative for climate action with the leading role of health professionals and urgent implementation in clinical practice.⁷

A new approach to medical education should include new content with different perspectives on understanding the risks of climate change and its effects on health. However, how to include planetary health content in medical education is still a challenge, considering the knowledge gaps in the training of the current generation of teachers. Due to planetary health being a field that is still underexplored, limited confidence and knowledge among educators can be barriers to these approaches.¹²⁻¹⁴ Studies have revealed a wide disparity in the education that medical students receive on the topics of planetary health and sustainability.^{15,16} Education has not adequately prioritized sustainability or reflected advances in planetary health knowledge. Medical students in the United Kingdom have developed a metrics-based tool to assess and improve planetary health content in medicine, revealing a substantial gap between existing curricular content and the required content that reflects the reality of the impacts of environmental degradation on health in 60 schools in 5 countries, where large disparities were demonstrated.¹⁷ Adapting the medical curriculum with new content is imperative, but there can be a gap of up to 17 years between the translation of research into actual medical practice¹⁸, which demonstrates the challenges in translating scientific knowledge. Sixth-year medical students at the University of Oxford called for a more climate science-integrated curriculum, recognizing that it could also help reduce the environmental impact of health care, specifically by increasing the emphasis on innovative treatment methods such as sustainable prescribing.¹⁹ Participants in the Planetary Health Academy reported their

emotions about climate change, attitudes toward the responsibilities of health professionals, self-efficacy, and the contribution of the Planetary Health Academy to their knowledge and actions.²⁰ A study conducted in Germany found interprofessional cooperation as well as rapid implementation of planetary health education. Topics on this topic were introduced in several courses. In the context of a learning spiral, faculty from other medical disciplines were contacted so that more perspectives could be highlighted at different points in the curriculum. In addition, interdisciplinary teaching formats were developed to consider the complexity of interrelationships.²¹

Several studies have discussed tools for integrating planetary health content into the medical curriculum. Planetary health concepts were initially integrated into a Physiology course as a temporary approach while the planning for longitudinal integration into the curriculum was underway.²²

Others have used evidence from the medical education literature to support medical schools in implementing Planetary Health throughout the course by proposing maps that can be used as a guide for educators, university leadership, and policymakers.^{23,16}

The climate crisis requires mutual efforts from society, including mitigation actions to reduce emissions, as well as adaptation to accommodate health outcomes. Therefore, it is necessary to bring discussions into medical education from different perspectives, both in understanding diseases and in understanding the contribution of the health sector to the carbon footprint resulting from the entire chain of care.²⁴ The first challenge is to train professionals capable of perceiving this crisis, its impacts, and their role as decision-makers.

Given the complexity of this civilizational crisis, studies point to the need for an educational approach that can open dialogues between different areas of knowledge to understand the interconnection of risks and the inclusion of different professionals in the implementation of solutions for risk management. The current scenario of the climate crisis requires an expansion of ethics and medical practice beyond

its conventional focus on the relationships between patients, doctors, and societies. We must propose an ethics that cares for our relationship with the planet we inhabit. This new paradigm requires medical curricula that include skills and competencies focused on planetary health, integrating the aspects of interdependence between human health and the planetary health.

Certainly, one of the main tools available to physicians is to use scientific evidence to make clinical decisions. Therefore, investing in including this content in the curricula of medical courses will certainly have a major impact on protecting the health of current and future generations.⁷ The climate imperative requires health professionals to take decisive action to redirect life on the planet. Teaching about planetary health should be continuous throughout the medical course, where in the first years of college, still in the basic cycle, content ranging from pathology to epidemiology should be included. As students enter clinical practice, in addition to discussions of clinical cases in all specialties, greater emphasis can be placed on the sustainability of medical care. Students evolve in clinical aspects and can make sustainable decisions²⁴ in their medical practices. Skills in this topic should be distributed across all curricular components²⁵ so that students can develop the skills necessary for medical practice with a planetary health lens, regardless of specialty. This lens should provide professionals with elements that broaden their diagnostic hypothesis and lead to an approach beyond the clinical setting, establishing the correlation between health and the environment and thus conducting a therapeutic plan that includes prevention aspects related to the patient's exposure to different environmental risks.

Therefore, in this climate crisis scenario, physicians have a fundamental leadership role, whether in mitigating risks or adapting to adequate health care, far beyond the clinical setting. They can also contribute to research and education on climate change and health and can support health systems in reducing greenhouse gas emissions by adopting sustainable practices in the healthcare process. They can promote healthy behaviors and policies with low environmental impact by encouraging their patients.

They can support any intersectoral action to reduce the carbon footprint of society in general and in the health system. In short, future physicians are facing a new paradigm that requires new curricular guidelines, where they need to be trained to provide sustainable medical care while protecting the health of their patients from new environmental perspectives.

Authors contributions

The authors declared that they have made substantial contributions to the work in terms of the conception or design of the research; the acquisition, analysis or interpretation of data for the work; and the writing or critical review for relevant intellectual content. All authors approved the final version to be published and agreed to take public responsibility for all aspects of the study.

Conflicts of Interest

No financial, legal, or political conflicts involving third parties (government, companies, private foundations, etc.) have been declared for any aspect of the submitted work, including but not limited to grants and funding, participation in advisory boards, study design, manuscript preparation, statistical analysis, etc.

Indexers

The International Journal of Education and Health is indexed by [DOAJ](#) and [EBSCO](#).



References

1. Dunk JH, Jones DS, Capon A, Anderson WH. Human health on an ailing planet—historical perspectives on our future. *New England Journal of Medicine*. 2019;381(8):778–82. <http://doi.org/10.1056/NEJMms1907455>
2. Whitmee S, Haines A, Beyrer C, Boltz F, Capon AG, Dias BFS, et al. Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health. *Lancet*. 2015;386:1973–2028. [http://dx.doi.org/10.1016/S0140-6736\(15\)60901-1](http://dx.doi.org/10.1016/S0140-6736(15)60901-1)
3. The Lancet Planetary Health. The bigger picture of planetary health. *Lancet Planet Health*. 2019;3(1):e1. [http://doi.org/10.1016/S2542-5196\(19\)30001-4](http://doi.org/10.1016/S2542-5196(19)30001-4)
4. Raworth K. A Doughnut for the Anthropocene: humanity's compass in the 21st century. *Lancet Planet Health*. 2017;1(2):e48–e9. [http://doi.org/10.1016/S2542-5196\(17\)30028-1](http://doi.org/10.1016/S2542-5196(17)30028-1)
5. Future Earth. Risks Perceptions Report 2020: First Edition. 2020. Available from: https://futureearth.org/wp-content/uploads/2020/02/RPR_2020_Report.pdf
6. Prescott SL, Logan AC. Planetary Health: From the Wellspring of Holistic Medicine to Personal and Public Health Imperative. *Explore*. 2019;15(2):98–106. <https://doi.org/10.1016/j.explore.2018.09.002>
7. Haines A, Ebi K. The imperative for climate action to protect health. *N Engl J Med*. 2019;380(3):263–73. <https://doi.org/10.1056/NEJMra1807873>
8. Perera F, Nadeau K. Climate change, fossil-fuel pollution, and children's health. *New England Journal of Medicine*. 2022;386(24):2303–14. <https://doi.org/10.1056/NEJMra2117706>
9. World Health Organization. COP24 special report: health and climate change. World Health Organization. 2018. Available from: <https://iris.who.int/handle/10665/276405>

10. Solomon CG, Salas RN. Climate change, fossil-fuel pollution, and children's health. *N Engl J Med*. 2022;386(24):2303-14. <https://doi.org/10.1056/NEJMra2117706>
11. Myers SS. Planetary health: protecting human health on a rapidly changing planet. *Lancet*. 2017;390(10114):2860-2868. [https://doi.org/10.1016/s0140-6736\(17\)32846-5](https://doi.org/10.1016/s0140-6736(17)32846-5)
12. Wellbery C, Sheffield P, Timmireddy K, Sarfaty M, Teherani A, Fallar R. It's time for medical schools to introduce climate change into their curricula. *Academic Medicine*. 2018;93(12):1774-7. <https://doi.org/10.1097/ACM.0000000000002368>
13. Shea B, Knowlton K, Shaman J. Assessment of Climate-Health Curricula at International Health Professions Schools. *JAMA*. 2020;3(5):e206609. <https://doi.org/10.1001/jamanetworkopen.2020.6609>
14. Goldman RH, Zajac L, Geller RJ. Developing and implementing core competencies in children's environmental health for students, trainees and healthcare providers: a narrative review. *BMC Med Educ*. 2021;21(503):1-10. <https://doi.org/10.1186/s12909-021-02921-3>
15. Hampshire K, Islam N, Kissel B, Chase H, Gundling K. The Planetary Health Report Card: a student-led initiative to inspire planetary health in medical schools. *Lancet Planetary Health*. 2022;6(5):e449-e454. [https://doi.org/10.1016/S2542-5196\(22\)00045-6](https://doi.org/10.1016/S2542-5196(22)00045-6)
16. Bevan JH, Kumaran K, Walker IV, Wilkinson J. Every medical school should have a planetary health teaching fellow. *BMJ*. 2023;382:2026. <https://doi.org/10.1136/bmj.p2026>
17. Bevan J, Blyth R, Russell B, Holtgrewe L, Cheung AHC, Austin I, et al. Planetary health and sustainability teaching in UK medical education: A review of medical school curricula. *Med Teach*. 2023;45(6):623-32. <https://doi.org/10.1080/0142159X.2022.2152190>
18. Morris ZS, Wooding S, Grant J. The answer is 17 years, what is the question: understanding time lags in translational research. *J R Soc Med*. 2011;104(12):510-20. <https://doi.org/10.1258/jrsm.2011.110180>
19. Shaw E, Walpole S, McLean M, Alvarez-Nieto C, Barna S, Bazin K, et al. AMEE Consensus Statement: Planetary health and education for sustainable healthcare. *Med Teach*. 2021;43(3):272-86. <https://doi.org/10.1080/0142159X.2020.1860207>
20. Gepp S, Jung L, Wabnitz K, Schneider F, Von Gierke F, Otto H, et al. The Planetary Health Academy—a virtual lecture series for transformative education in Germany. *Lancet Planet Health*. 2023;7(1):e68-e76. [https://doi.org/10.1016/S2542-5196\(22\)00253-4](https://doi.org/10.1016/S2542-5196(22)00253-4)
21. Schwienhorst-Stich EM, Wabnitz K, Geck E, Gepp S, Jung L, Mumm A, et al. Initiatives promoting planetary health education in Germany: An overview. *GMS J Med Educ*. 2023;40(3):Doc38. <https://doi.org/10.3205/zma001620>
22. Moro C, McLean M, Phelps C. Embedding planetary health concepts in a pre-medical physiology subject. *Med Teach*. 2023;179-186. <https://doi.org/10.1080/0142159X.2022.2118041>
23. Oudbier J, Weiland NHS, Boerboom T, Ravesloot JH, Peerdeman S, Suurmond J. An evidence-based roadmap to integrate planetary health education into the medical curriculum. *Med Teach*. 2023;45(3):1-5. <https://doi.org/10.1080/0142159X.2022.2137015>
24. Rasheed FN, Baddley J, Prabhakaran P, Barros EF, Reddy K S, Vianna NA, et al. Decarbonising healthcare in low and middle income countries: potential pathways to net zero emissions. *BMJ*. 2021;375:n1284. <https://doi.org/10.1136/bmj.n1284>
25. Schmid J, Mumm A, König S, Zirkel J, Schwienhorst-Stich EM. Concept and implementation of the longitudinal mosaic curriculum planetary health at the Faculty of Medicine in Würzburg, Germany. *GMS J Med Educ*. 2023;40(3):Doc33. <https://doi.org/10.3205/zma001615>