

The Future Biostatistics and Epidemiology in the Age of Artificial Intelligence

Maedeh Arshadi ^{1*} , Farzan Madadzadeh² 

1. Center for Healthcare Data Modeling, Department of Biostatistics and Epidemiology, School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

2. Medical Informatics Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran

ARTICLE INFO

Letter to the Editor

Received: 06 Oct 2025

Accepted: 17 Nov 2025



Corresponding Author:

Maedeh Arshadi

maedeharshadi@gmail.com

How to cite this paper:

Arshadi M, Madadzadeh F. The Future Biostatistics and Epidemiology in the Age of Artificial Intelligence. J Community Health Research 2025; 14(1): 242-243.

Dear Editor,

As we look ahead to the future of epidemiology and biostatistics in the age of artificial intelligence (AI), one thing is clear: the intersection of these fields has the potential to revolutionize public health practice in ways previously unimaginable. With the onset of AI technologies such as machine learning and predictive modeling, researchers and health practitioners are now better equipped than ever to break down big data sets and mine valuable information that can inform evidence-based decision-making (1).

Perhaps the most significant way that AI is transforming epidemiology and biostatistics is by being capable of quickly and accurately analyzing complex datasets. Traditional statistical methods

often are not up to the task of handling the amount of information that is being generated in today's digital age, but AI algorithms excel at sorting through the information to identify patterns and trends that would have been impossible to discern through conventional means (2).

Also, AI is able to accelerate the research process by automating repetitive tasks and accelerating data analysis (3). This not only saves time and resources but also allows researchers to focus on more complicated aspects of their research, such as hypothesis generation and study design. In this way, AI is revolutionizing the research field by allowing for more efficient and thorough investigation of public health issues.

Another area in which AI is being increasingly used is outbreak prediction and disease surveillance. By analyzing health data in real time from social media, wearable sensors, and electronic health records, AI algorithms can recognize patterns that indicate potential outbreaks before they occur. This early indication can be very helpful in managing and limiting the spread of infectious diseases, thus saving lives and averting economic losses (4). Furthermore, the use of AI in epidemiology and biostatistics can enable the customization of healthcare interventions at the population level. By utilizing predictive modeling and risk stratification algorithms, healthcare providers can tailor treatment protocols to individual patients based on their unique characteristics and disease histories. This type of precision medicine holds enormous promise for improving patient outcomes while reducing healthcare costs over the long run (1, 5).

Copyright: ©2025 The Author(s); Published by Shahid Sadoughi University of Medical Sciences. This is an open-access article distributed under the terms of the Creative Commons Attribution License CCBY 4.0 (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

However, as we further enter the age of AI-driven healthcare, it is critical to address ethical and privacy concerns that will inevitably arise. The use of AI on sensitive health data in algorithms raises questions of data security, informed consent, and algorithmic bias that must be carefully considered to foster responsible and equitable deployment of these technologies (1, 6). Moreover, the pace of technological advancement in AI comes with challenges in keeping abreast of recent developments and updating regulatory frameworks to reflect these changes. Policymakers and healthcare professionals must work together in developing clear guidelines and standards for the transparent and ethical use of AI in biostatistics and epidemiology for patient privacy protection and data integrity (7).

In conclusion, the future of biostatistics and epidemiology in the artificial intelligence era is bright with potential, with unprecedented opportunities to advance public health research and practice. By harnessing the potential of AI in data analysis, outbreak prediction, customization of interventions, and healthcare delivery optimization, we can chart a course toward a healthier and more resilient population.

Acknowledgments

None

References

1. Imran M, Yamin S, Fadare Sa, et al. Transforming Healthcare Decision-Making: The Role Ofai In Evidence-Based Medicine.
2. Waller La. Biostatistics And Artificial Intelligence. Artificial Intelligence In Cardiothoracic Imaging: Springer. 2022; 95-101.
3. Chubb J, Cowling P, Reed D. Speeding Up To Keep Up: Exploring The Use Of Ai In The Research Process. Ai & Society. 2022; 37(4): 1439-57.
4. Fisher S, Rosella Lc. Priorities For Successful Use Of Artificial Intelligence By Public Health Organizations: A Literature Review. BMC Public Health. 2022; 22(1): 2146.
5. Tian S, Yang W, Le Grange Jm, et al. Smart Healthcare: Making Medical Care More Intelligent. Global Health Journal. 2019; 3(3): 62-5.
6. Panch T, Pearson-Stuttard J, Greaves F, et al. Artificial Intelligence: Opportunities And Risks For Public Health. The Lancet Digital Health. 2019; 1(1): E13-E4.
7. Kleczyk Ej. Unveiling Ethical Complexities In Ai's Role In Healthcare. Peercite J Artif Intell & Mach Learn. 2024; 2(S1): 2018-29.

Conflicts of interest

The authors declared no conflict of interests.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethical considerations

Not applicable, as this study did not involve human participants or animal subjects.

Code of ethics

None

Authors' contributions

All the authors contributed to the initial writing and subsequent revisions of the article. They had collectively approved the final version of the manuscript and taken the responsibility for the accuracy and integrity of its content.

Open access policy

JCHR does not charge readers and their institution for access to its papers. Full text download of all new and archived papers is free of charge.

Keywords

Artificial intelligence (AI), Biostatistics, Epidemiology