CHPATER 7

Utilization of Artificial Intelligence in Healthcare: Opportunities and Risks

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ABSTRACT

In recent times, artificial intelligence technology has proved to be a significant force in influencing the public health industry, but the change is accompanied by its own set of challenges both from practical and ethical perspectives. In this chapter, the discussion revolves around intelligent computer usage in the public health sector in relation to monitoring diseases, making predictions regarding future epidemics, analysis of demography data, and creation of preventive solutions. From the qualitative assessment of literature, including government documents and case studies provided by reputable health organizations all around the world, the chapter assesses the pros and cons of using the technological advancements for making informed decisions. It is clear that the use of these technologies comes with many benefits such as efficiency and prediction ability, but there are many concerns associated with data privacy issues, algorithm bias, lack of digital technology in certain countries, and regulatory issues.

Introduction

Democracy shapes public health in ways that are not always obvious. Transparency, accountability, participation, equity these are not decorative values. They are what makes health policy actually function. When people do not trust the institutions managing their health, they ignore the guidance. That dynamic has played out visibly enough in recent years that it is hard to argue otherwise. Health policy in a democracy is supposed to reflect what communities need, not what's cheapest or most convenient to deliver. That includes protecting individual rights and making sure access does not quietly depend on where you live or what you earn. These goals are often in tension with each other, and democracy is the process for working through that tension in the open rather than letting it get resolved quietly by whoever has the most institutional leverage. Artificial intelligence (AI) involves computational models that learn from raw data, covering fields such as natural language processing (NLP), deep learning (DL), and machine learning (ML) to identify patterns and based on those patterns, make predictions. AI has long been applied in clinical medicine, such as image analysis and diagnostics. Its use in public health is a more recent and accelerating trend, particularly highlighted during the COVID-19 pandemic[1]. Public health, as a discipline, has always been data-intensive. Epidemiologists, biostatisticians, and health policy analysts have long relied on surveillance data, mortality records, hospital admissions, and demographic surveys to understand the distribution and determinants of disease. AI extends this capacity significantly. By incorporating and analyzing a variety of multi-modal data sources, these systems offer the chance to gain a deeper understanding of the broader determinants of health and to identify at-risk populations with greater accuracy[2]. AI has become a practical tool in public health operations, shifting routine tasks from manual processes to automated ones. The Centers for Disease Control and Prevention (CDC), for example, uses AI-powered chatbots to accelerate patient report analysis for immediate treatment, and uses AI to examine satellite images and automatically identify cooling towers in affected areas enabling swift detection of potential outbreak origins. The pandemic brought AI adoption for

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[1] Hattab, Georges, Irrgang, Christopher, Körber, Nils, and Kühnert, Denise. 2025. "The Way Forward to Embrace Artificial Intelligence in Public Health." American Journal of Public Health, 115(2): 123-128. https://doi.org/10.2105/AJPH.2024.307888.

[2] Puech, Paula del Rey, Payne, Rebecca, Saund, Jasjot, and McKee, Martin. 2026. "Mind the (Widening) Gap: Why Public Health Must Engage with AI Now." *Public Health*, 250: 106047. https://doi.org/10.1016/j.puhe.2025.106047.

population-level applications into sharp focus. Throughout Covid-19, AI was instrumental in forecasting transmission, tracing contacts, ensuring medication safety, and enabling rapid testing and identification[3]. Perhaps most strikingly, a commercial analytics firm detected the onset of the Covid-19 outbreak Before public health organizations had issued warnings using machine learning and natural language processing techniques to examine social media conversations, official health reports, and news feeds at a scale no human team could replicate[4].

AI in public health gets discussed mostly in terms of what it can do. The less comfortable conversation is about what it might quietly get wrong and who absorbs that cost. Privacy is where most people start, and it matters. But bias is a deeper problem. These systems train on historical data, and healthcare data carries decades of unequal access, missed diagnoses in certain communities, and treatment gaps that nobody officially designed but everyone implicitly accepted. A model trained on that history does not flag it as a problem. It learns it as normal. The result is that people already underserved tend to stay that way not because of a decision anyone made, but because of one nobody reviewed. There is also the question of who actually controls these systems. A small number of technology companies and well-resourced institutions are building the infrastructure that public health agencies now depend on. That is a real shift in where decisions get made, and it doesn't fit neatly into any accountability structure most citizens can access or influence. Underneath all of this is an infrastructure gap that gets less attention than it deserves. Data systems that do not connect, staff without adequate training, regulations written for a different era these create the conditions where sophisticated tools get rolled out unevenly, and the distance between who benefits and who bears the risk quietly widens. Calls to action to address these barriers include integrating AI and data science into public health education, fostering cross-disciplinary collaboration, investing in data infrastructure, and ensuring

[3] Olawade, David B., Wada, Ojima Zechariah, David-Olawade, Aanuoluwapo Clement, Kunonga, Edward, Abaire, Olawale, and Ling, Jonathan. 2023. "Using Artificial Intelligence to Improve Public Health: A Narrative Review." Frontiers in Public Health, 11:1196397. https://doi.org/10.3389/fpubh.2023.1196397.

[4] Kaur, Jasleen, and Zahid, Ahmad Butt. 2025. "AI-Driven Epidemic Intelligence: The Future of Outbreak Detection and Response." *Frontiers in Artificial Intelligence*, 8:1645467. https://doi.org/10.3389/frai.2025.1645467.