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Role of Artificial Intelligence in Achieving Universal Health Coverage: A Mongolian Perspective

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Universal health coverage (UHC) is a global goal aimed at ensuring that all individuals, irrespective of their socioeconomic status, have access to comprehensive and quality health services without incurring financial hardships. The UHC is measured and monitored using two main indicators: service coverage and financial protection. According to the latest UHC global monitoring report, the health service coverage in Mongolia is estimated at 65% [1]. In terms of financial protection, 7.1% of households spend at least 10% of their income on health, with out-of-pocket payments accounting for over one-third (34.7%) of current health expenditure. Therefore, further efforts are required to control and reduce health expenditures to ensure equitable access to healthcare services for the entire population. In the pursuit of UHC, emerging technologies such as artificial intelligence (AI) can provide effective ways to solve real-life challenges and have positive impacts on UHC progress. This article focuses on the role of AI in achieving UHC from a Mongolian perspective.

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Snapshot of Mongolia's Healthcare System

Mongolia's healthcare system, established in 1921, followed the centralized Semashko system. The system played a crucial role in enhancing overall health, particularly in rural populations. However, following the collapse of socialism in 1990, Mongolia embraced political and economic reforms, transitioning to a democratic system and a neoliberal economy. These changes resulted in modifications to the healthcare system [2]. The mission of the Ministry of Health is to provide quality and safe access to health services to every citizen and increase the average life expectancy of the population by improving their quality of life. The average life expectancy at birth is 70.7 years (76.2 for women and 66.7 for men; the gender disparity is two times higher than the global average of 5.1 years). Inequalities in life expectancy exist not only by gender but also by region. For instance, 4 of 21 provinces have a life expectancy lower than the national average [3].

Mongolia is known as a country with a vast landscape and the sparsest population density in the world. The country has limited financial resources to provide comprehensive social services, including healthcare. Rural and urban populations have highly unequal access to healthcare of different qualities. Approximately 67% of the healthcare facilities are located in the capital city, Ulaanbaatar, which requires shorter travel times than the rural population. As per a reported estimate, people travel 35 minutes in rural areas to reach the nearest healthcare provider, compared with 13 minutes in urban areas [4]. Furthermore, a gap exists in the breadth of healthcare between rural and urban areas. According to the national referral system, the minimum number of main specialty cares provided at the

"A level" soum health clinics (the secondary administrative division of Mongolia) is 4 out of the 30 main specialty cares listed in Mongolia [5]. Because soum health clinics are the primary contacts for the rural population, it is crucial to support and enable them to deliver high-quality healthcare services. Recent studies have revealed that addressing inefficiencies at these centers could increase the overall resource utilization of health services by approximately 23% and potentially improve output by approximately 47% at the current inputs [6,7]. Inefficiency in resource use seems to be a common hurdle in Mongolia to deliver quality healthcare to its 3.4 million scattered population that needs innovative solutions. The authors propose that this is an area in which the impact of digital technologies such as AI can play a transformative role.

Reality and Potential of AI for UHC, Including Radiology Examples

From the perspective of a healthcare domain expert, AI is a tool that reduces risks for beneficiaries and boosts the efficiency of healthcare businesses. In recent years, AI has emerged as a powerful tool in various fields of medicine, reshaping healthcare organizations. Although AI cannot solve all real-life problems, it can be utilized to address the main challenges that largely contribute to UHC progress, such as accessibility, availability, and affordability.

According to a systematic literature review, AI is predominantly utilized to achieve UHC, among other health agendas [8]. Mongolia has taken steps towards embracing AI in healthcare. AI was introduced in Mongolia in 2017 through the contributions of foreign health technology companies from South Korea, Thailand, and Taiwan. AI began in the fields of sexually transmitted infectious diseases and radiology. Consequently, AI-powered diagnostics and health screening have had a direct impact on healthcare delivery. Technically, it would increase equal access to radiological and imaging modality services, which are currently limited. Increasing evidence suggests that AI-powered imaging tools can improve the accessibility of such services. The next most promising field is respiratory disease, which is prevalent in Mongolia owing to various factors including harsh winters, high levels of air pollution, and tobacco consumption. Lung cancer is often diagnosed at a late stage (approximately 91.5% of all lung cancers are diagnosed at stages III or IV) [3]. In 2020, the First Central Hospital, Intermed Hospital, eClinic limited liability company (LLC), ICT Group, and Mongolian Society of Radiology partnered to develop the first medical AI decision support system to diagnose lung diseases on chest radiographs while minimizing the cost. This public–private partnership in developing AI is the best example for preventing a facility-related digital divide in healthcare. In addition, such solutions not only offer improved quality of care but also address the accessibility and availability concepts of UHC by providing services in rural areas that otherwise were not available or accessible to the population.

Recently, several telemedicine projects have been initiated in Mongolia. One of them, called "Close to Us", implemented by USAID's (United States Agency for International Development) Leaders Advancing Democracy Program fellows in 2020, enabled access to 51 services for children with disabilities living in Bayan-Ulgii province, northwest Mongolia. Otherwise, the locals would have to travel about 1500 km to a rehabilitation center in Ulaanbaatar for children with disabilities. The project saves both the direct and indirect costs associated with these services. We believe that adding AI algorithms to analyze healthcare statistics and identify needs in a target area can help improve service availability, quality, and delivery based on people's needs.

In resource-poor situations, the classic applications of AI and big data analysis could be used to assess healthcare needs as well as the social determinants of health profiles among the population and to assist health policymakers in making evidence-based decisions and allocating resources appropriately while reserving the biggest impact. Appropriate allocation of scarce resources means offering more accessible care across the country. The basis for appropriate resource allocation is a real-time and accurate assessment of people's needs across the country.

Challenges

Establishing appropriate legal and regulatory frameworks is essential for ensuring the responsible and ethical use of AI in healthcare. The Mongolian Society of Artificial Intelligence in Medicine initiated the effort and organized the first 'Workshop on AI Ethics' in 2021. The Ulaanbaatar Declaration, the first ethical recommendation document, was developed and approved by participants which

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comprised representatives of the Ministry of Health and the Ministry of Digital Development and Communication, health technology companies, health information technology professionals of public hospitals, human rights activists, and physicians. Considerable efforts are still required in the domain of legal regulations, as robust regulations can guide the proper development of the field by fostering trust, protecting patient rights, and mitigating the potential risks associated with AI technologies.

Mongolia is in phase three of five of the Global Digital Health Index (GDHI). The use of AI in Mongolia suggests that the biggest barrier to benefitting from AI solutions in medicine is the fragmentation of data availability and standardization of health-related information. Therefore, addressing data gaps and ensuring the standardization of healthcare data, including electronic health records, medical imaging, and genetic information, are crucial. Establishing data-governance frameworks and interoperability standards will enable the effective use of data for AI-driven healthcare solutions.

Building a skilled workforce proficient in AI and digital health technology is critical. The rule of thumb in medicine is not to cause harm initially. In this sense, medical professionals need to understand what is behind AI and how it works, similar to how physicians understand the mechanisms of the human body when diagnosing and treating diseases. Moreover, training healthcare professionals, data scientists, and specialists in AI applications, data analytics, and digital health will help drive the adoption and integration of AI into Mongolia's healthcare system. Collaboration between academia, industry, and government is crucial for supporting the development of educational programs and initiatives to enhance human resource capacity in AI.

Finally, adequate funding is necessary to support the research, development, and implementation of AI solutions in healthcare. Investing in AI infrastructure, data collection and curation, research projects, and training programs would be essential for this journey.

CONCLUSION

AI holds immense promise for advancing Mongolia's journey towards achieving UHC. By leveraging AI technologies, Mongolia can overcome geographical barriers and limited resources and improve healthcare access, diagnostics, and resource allocation.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

Author Contributions

Conceptualization: Bayarbaatar Bold. Data curation: Zoljargal Lkhagvajav. Formal analysis: Bayarsaikhan Dorjsuren. Investigation: Bayarbaatar Bold, Zoljargal Lkhagvajav. Methodology: Zoljargal Lkhagvajav, Bayarsaikhan Dorjsuren. Resources: Bayarsaikhan Dorjsuren. Supervision: Bayarbaatar Bold. Writing—original draft: Bayarbaatar Bold, Zoljargal Lkhagvajav. Writing—review & editing: Bayarsaikhan Dorjsuren.

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