

Food insecurity and modern technologies: A necessary paradigm shift for public health policy

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Editorial

Food insecurity remains one of the foremost public health challenges both globally and in Iran. According to the FAO's 2026 report, approximately 645 million people worldwide suffer from chronic hunger, 2.1 billion experience moderate-to-severe food insecurity, and 2.7 billion lack the financial means to afford a healthy diet (1). This crisis is most acute in Africa and Asia. Similarly, in Iran, numerous studies have demonstrated the prevalence of food insecurity across various groups and regions, including impoverished neighborhoods in Kerman, rural areas of Gilan, university students in Kashan, and heart failure patients in the northern provinces and rural and urban areas of Golestan (2-6). Its consequences include impaired growth in children, micronutrient deficiencies among adolescent girls, and diminished maternal mental health (7-9).

Despite the existence of national policies and programs, Iran's policy performance in food security has been limited. Official reports and policy research reveal that the gap between policy and implementation, weak institutional capacity, economic volatility, international sanctions, and regulatory challenges in food safety have collectively hindered meaningful progress (6,10-14). This underperformance indicates that traditional approaches alone are insufficient to address the complexity of contemporary food insecurity.

The path forward lies in a technology-driven, data-centric paradigm. The integration of precision agriculture, big data analytics, artificial intelligence (AI), and climate-smart agriculture can enhance production efficiency, supply predictability, and the resilience of the food supply chain (6,12,13,15). Within this framework, AI can support predictive modeling of production cycles and market disruptions, while big data enables continuous monitoring of supply, demand, and price fluctuations. Furthermore, digital social protection platforms can facilitate more targeted distribution of subsidies and nutritional support (16,17).

However, technology is not a sufficient solution in itself. Without investment in infrastructure, digital literacy, and equitable access, the digital transition risks deepening the divide between smallholder farmers and large-scale actors (15,17-20). The proposed transformation must therefore be grounded in equity, local empowerment, and intersectoral collaboration linking the Ministry of Health with agriculture and economic sectors. In terms of governance, traditional top-down frameworks should be replaced by agile, data-driven systems capable of rapid response to market and access dynamics (6,18,21).

At the policy level, it should be highlighted three principal priorities: first, dismantling the separation of agricultural policy from public health outcomes; second, modernizing food governance to respond more swiftly to market and access changes; and third, promoting nutrition literacy through digital tools as an integral component of public health. Ethical considerations are equally critical, as the deployment of AI and big data may introduce algorithmic bias. Accordingly, the primary measure of success for any digital intervention must be the tangible reduction of food insecurity among the most vulnerable populations (19,22).

In conclusion, synergizing digital innovation with social policy can steer Iran toward a more resilient, equitable, and sustainable food system. Achieving this goal requires political will, targeted investment, and efforts to bridge the digital divide in order to secure the fundamental right to adequate nutrition for all citizens.

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