



Bio surveillance Systems for Health Safety: Innovations in Tracking Disease Outbreaks and Threats using Real-Time Data

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Abstract

Background: Infectious disease outbreaks in war zones pose significant public health challenges, compounded by the destruction of healthcare infrastructure and the displacement of populations. This narrative review synthesizes research on the intersection of technology and infectious disease response in conflict-affected areas, highlighting innovative methodologies for tracking and managing disease outbreaks.

Methods: A systematic literature search was conducted across electronic databases, including PubMed, Web of Science, and Scopus, employing a combination of keywords related to infectious diseases, technological integration, and war zones.

Results: The findings reveal critical obstacles such as insufficient healthcare access, disrupted disease monitoring, and the ethical dilemmas surrounding data privacy. However, advancements in epidemiological surveillance, including mobile health (mHealth) technologies and genomic sequencing, present promising avenues for enhancing disease tracking and response efforts. Additionally, innovative tools like drones and artificial intelligence (AI) offer novel methodologies for real-time monitoring and predictive analytics.

Conclusions: The study concludes that while these technologies can significantly improve outbreak management and healthcare delivery, challenges related to ethical governance, data security, and resource constraints must be addressed. Collaborative efforts among governments, humanitarian organizations, and local communities are essential for optimizing the deployment of technological solutions in conflict settings. The integration of these strategies can enhance public health outcomes and bolster resilience against future epidemics in war-torn regions.

Keywords: Infectious diseases, War zones, Epidemiological surveillance, Technological integration, Public health interventions

1. Introduction

Outbreaks of infectious illnesses in war zones represent a convergence of humanitarian crises and public health emergencies, necessitating innovative remedies [1]. Such conflicts exacerbate vulnerabilities in healthcare infrastructure, disrupt monitoring and response actions, and increase susceptibility to disease transmission [2]. Addressing the challenges of infectious illnesses in these contexts requires a holistic multidisciplinary strategy that integrates technical advancements with traditional public health and humanitarian strategies [3]. This paper addresses the intersection of technology and infectious disease response in war zones, highlighting the obstacles, creative solutions, and policy implications for future interventions. This analysis examines how the detrimental impact of war on healthcare infrastructure leads to diminished access to healthcare services and resources.

Migrations exert heightened strain on healthcare systems, exacerbate inequities, and disrupt disease monitoring and response efforts [4]. Prompt and effective intervention in infectious disease outbreaks is crucial to prevent escalation and mitigate disease transmission. Nonetheless, the hazards faced by healthcare professionals and humanitarian groups in war zones represent significant impediments to delivering essential health services and reacting effectively [5-7]. This analysis examines the complexities of safeguarding frontline responders operating in dynamic environments to provide life-saving treatments. Innovations in epidemiological surveillance have revolutionized the monitoring and control of illnesses, offering insights into real disease dynamics and transmission patterns. Similarly, mobile health (mHealth) technology has transformed healthcare delivery via remote monitoring, telemedicine consultations, and personalized therapies [8,9].

This study examines how these technologies are being adapted and used in war zones to enhance monitoring capabilities and healthcare access. Genomic sequencing methods have emerged as a powerful instrument for rapid pathogen identification and monitoring, facilitating customized medicine and focused therapeutic alternatives. Currently, challenges related to the standardization of protocols and ethical concerns around data sharing and privacy remain pertinent.[10] This paper examines the implications of integrating genomic sequencing into infectious disease response strategies in war zones and the potential for improving patient outcomes. Surveillance technology, including drones and artificial intelligence, is offering novel methods for monitoring conflict dynamics and forecasting disease outbreaks [11]. While such technologies provide the potential to enhance readiness and response, ethical considerations around monitoring and data privacy must be addressed with care.[12] Finally, this study offers policy recommendations about the use of technology in response strategies to infectious illnesses in war zones, emphasizing the need for surveillance systems, diagnostic tools, and capacity development. This study examines transparent governance structures and stakeholder involvement to promote responsible technology usage, safeguard individual rights, and ensure optimum resource allocation. This review seeks to elucidate the challenges, innovations, and policy implications of technology integration in addressing infectious diseases in conflict zones, thereby guiding future research agendas and informing decision-making to improve public health outcomes in these complex environments.

2. Methods

This review used a systematic methodology to identify and compile pertinent material about the correlation between technology and infectious disease responses in war zones. A thorough search method was used to identify the relevant research using electronic databases including PubMed, Web of Science, and Scopus. Various combinations of keywords and Medical Subject Headings related to infectious disease outbreaks, war zones, and technological integration were used in many permutations to enhance literature retrieval.

3. Analysis of distinct problems presented by infectious disease epidemics in war zones

Infectious disease epidemics in conflict zones represent a complex challenge that intertwines the devastation of war with public health crises.[13] This paper summarizes the unique challenges posed by such epidemics, including degraded health infrastructure, refugee assistance services, restricted access to

healthcare, the disintegration of social and governmental systems, and an elevated risk of disease transmission. Understanding and addressing difficulties is essential for formulating responses and mitigation plans in conflict-affected regions [14]. Conflict zones are inherently vulnerable to epidemic breakouts due to inadequate health systems, population displacements, and the deterioration of essential services [15]. When infectious illnesses coincide with war, their impact intensifies, resulting in increased morbidity, death, and socio-economic instability.[16] This study aims to examine the specific challenges encountered in managing infectious disease outbreaks during periods of war and their effects on public health interventions and humanitarian initiatives. The healthcare infrastructure in war zones is often severely weakened, characterized by destroyed hospitals, a scarcity of medical supplies, and a limited number of skilled health professionals.[17] This impairment significantly restricts the ability to identify, diagnose, and treat infectious infections effectively.

Secondly, the closure of medical facilities diminishes access to services, exacerbating the burden of illnesses among the impacted population. Refugee camps and informal settlements remain congested due to the large influx of residents resulting from violence. Such settings facilitate the fast spread of infectious illnesses, exacerbated by tight quarters, inadequate sanitation, and restricted access to clean water [18,19]. Displaced individuals are often very vulnerable, lacking access to healthcare and facing significant risks of hunger and infectious infections. In war zones, impediments to accessing healthcare services arise from security concerns, bureaucratic constraints, and physical barriers such as checkpoints or barricades. Humanitarian organizations struggle to coordinate aid and medical assistance for impacted populations, so exacerbating the disparity between the affluent and the impoverished and facilitating the undetected and untreated spread of illnesses [20-23]. Challenges in disease monitoring, prevention, and control arise from the inadequacies of social and governmental institutions in war zones [24,25]. Poor governance, instability, and relocation disrupt public health initiatives and impede the implementation of preventative strategies, such as vaccination campaigns and vector control.[26] Furthermore, skepticism towards institutions results in disinformation and inadequate responses to community disease prevention initiatives. Conflicts create conditions conducive to the development of infectious illnesses, exacerbated by overpopulation, hunger, and inadequate sanitation [27].

Disruption of health services, together with immigration and emigration within a certain community, promotes the fast dissemination of infections that may lead to localized or widespread epidemics [28,29]. Furthermore, the deployment of weaponry, the movement of wildlife, and the degradation of infrastructure may contribute to the emergence of novel disease vectors or exacerbate current health threats [30]. Disease outbreaks in war zones are complex and exacerbated by the many vulnerabilities associated with armed conflicts and public health crises. Addressing these issues requires a comprehensive strategy that integrates humanitarian assistance, health interventions, and conflict resolution efforts. Strengthening health systems, enhancing disease monitoring, and ensuring equitable healthcare access are essential to mitigate the effects of infectious illnesses in war zones [31-33]. Collaboration among governments, humanitarian groups, and local communities is essential for addressing the unique problems posed by infectious disease epidemics in war zones, therefore safeguarding the health and quality of life of the afflicted populations.

4. Significance of prompt and efficient intervention to avert escalation and diminish the proliferation of illnesses

Epidemics of infectious illnesses, initiated by established pathogens or novel viruses, may arise within days or weeks, spreading both domestically and internationally, leading to significant morbidity, death, and social upheaval [34]. Swift and effective responses are essential to manage outbreaks at their inception and prevent the escalation of these incidents into larger epidemics or pandemics.[35] This paper examines the essential elements of quick response mechanisms in disease management and prevention of transmission. The promptness of reaction is essential in curtailing the transmission of illnesses caused by infectious organisms.[36] Timely detection, diagnosis, and action may diminish transmission rates and mitigate the effects of epidemics. Rapid reaction enables the execution of containment strategies including quarantine, isolation, contact tracing, and vaccination, which are crucial for avoiding further transmission [37]. Delayed reactions result in a rapid increase in cases, the deterioration of the healthcare system, and exacerbation of

the problem. Effective response methods need cooperation across several disciplines and sectors, including public health authorities, healthcare providers, researchers, lawmakers, and communities. Robust surveillance systems facilitate the prompt identification of epidemics and emerging dangers [38].

Early warning systems, when integrated with data analysis and modeling, provide insights into disease patterns and facilitate the formulation of proactive solutions [39]. Prompt patient identification, isolation, and treatment need access to rapid and reliable diagnostic testing [40]. Advancements in molecular diagnostics, point-of-care testing, and surveillance technologies enhance the capacity to promptly identify and control diseases. Non-pharmaceutical treatments, including social distancing, mask-wearing, hand cleanliness, and travel restrictions, may diminish transmission rates and disease proliferation, particularly in the absence of targeted medicines or vaccines. Vaccines are crucial for preventing infectious illnesses and alleviating their impact on individuals [41]. Timely deployment of vaccines, along with efficient vaccination programs, may enhance herd immunity and limit the transmission of diseases. The clarity and promptness of communication with the public are essential for fostering trust, promoting adherence to preventative actions, and dispelling misconceptions.[42]

Effective risk communication tactics mitigate fear, panic, and stigmatization resulting from disease epidemics. Resource constraints, often linked to financing, staff, and infrastructure, might hinder the escalation of response initiatives, particularly in low-resource environments [43,44]. Decentralization of activities and lack of coordination among local and national players may undermine responses and create gaps in monitoring, communication, and action. Prevention and public health habits are affected by social and economic inequities, cultural customs, and political inclinations, hence complicating disease control efforts [45]. The intricate and evolving characteristics of infectious illnesses, often marked by the introduction of new pathogens and increasing antibiotic resistance, complicate the prediction and response to epidemics.[40] A prompt and effective reaction is the essential preventative strategy against the escalation and management of infectious illnesses [46]. Emphasizing monitoring, fast diagnoses, public health measures, vaccination campaigns, and communication strategies enables all stakeholders to enhance preparedness and resilience against epidemics. Addressing hurdles such as resource constraints, coordination issues, and socioeconomic factors is essential for enhancing responsiveness and safeguarding global health security.[47] Collaborative efforts across sectors and borders are essential for addressing evolving threat situations and safeguarding vulnerable populations from the impact of diseases.[48]

5. Consequences of conflict-induced devastation on healthcare infrastructure

In war zones, devastation extends beyond physical violence to include sabotage of essential infrastructure, such as healthcare facilities and supplies. The continued interruption of health care in these regions exacerbates the suffering of the people already impacted by the effects of conflict [49,50]. Conflict consequences extend beyond the immediate devastation of medical institutions, and also include the loss of essential infrastructure, including highways, water supply systems, and electrical grids.[51] Consequently, the majority of current healthcare institutions are compromised, with inadequate resources and unable to meet the increasing demand for medical treatment.[52] Moreover, population migration exacerbates the strain on already burdened healthcare systems, leading to overpopulation and resource depletion.[52] The limited accessibility of healthcare services due to conflict-induced devastation leads to several issues for the affected population. Geographical limitations and disruptions in transportation networks impede patients' access to healthcare services, particularly in distant regions. Moreover, financial constraints exacerbate disparities in healthcare access, disproportionately affecting impoverished areas.

Furthermore, the collapse of healthcare infrastructure leads to a decline in the quality of service provided, resulting in detrimental health risks to the impacted population. The devastation caused by wars often results in severe shortages of medical supplies, equipment, and personnel, consequently hindering the provision of essential healthcare services. The incineration of pharmaceutical warehouses and production facilities disrupts supply lines and exacerbates shortages of essential pharmaceuticals. The exodus of healthcare practitioners from crisis zones further depletes the already limited pool of trained staff, consequently exacerbating the healthcare system's capacity to meet the demands of impacted

populations.[53] Addressing the issues of restricted health infrastructure access in conflict-affected regions requires a comprehensive strategy including humanitarian assistance, infrastructure rehabilitation, and capacity development.[54]

The enhancement and reinforcement of healthcare infrastructure is a crucial investment aimed at bolstering resilience in future conflicts and catastrophes.[55] Furthermore, programs designed to ensure equitable distribution of medical resources and staff, particularly in underserved regions, are essential for universal healthcare access.[56] Furthermore, it is essential to establish a strong rapport among local stakeholders, international organizations, and humanitarian entities to enhance coordination efforts for optimal effect in conflict-affected areas.[57] The devastation inflicted by conflict on health infrastructure is a substantial obstacle to achieving universal healthcare in such regions. Comprehensive measures must be implemented to address the intricate issues of restricted access to healthcare services, including infrastructure rehabilitation, resource mobilization, and capacity-building programs.[58] By concentrating on the resilience and sustainability of health systems in conflict zones, stakeholders may mitigate the impact of conflict-related devastation on healthcare access and enhance the health status of impacted communities.[58]

6. The displacement of residents and the disintegration of community organizations impede monitoring and response initiatives

Population displacement has emerged as a pervasive worldwide phenomena attributable to events such as war, natural catastrophes, and economic conditions.[59] The dissolution of communal institutions simultaneously undermines social cohesion and support networks [60]. These events have significant public health ramifications, particularly with disease monitoring and response.[59] Recognizing the connections between population displacement, the breakdown of community organizations, and the impact of these factors on the efficacy of public health initiatives is essential for formulating suitable measures to manage the related risks.[60] Population displacement complicates monitoring by dispersing individuals over many places, resulting in fragmented data gathering and incomplete epidemiological profiles.[61] Moreover, displaced communities may lack access to healthcare services and have an increased risk of infectious illnesses, complicating monitoring efforts.[62]

The fundamental collapse of community structures disrupts conventional methods of information transmission and hinders the surveillance systems intended for implementation via community engagement [63]. Nevertheless, the detection and monitoring of disease outbreaks occur belatedly, resulting in delayed reaction measures and an increased likelihood of disease proliferation [64]. Destruction of community institutions impedes response mechanisms due to diminished trust in authorities and obstructs the dissemination of critical health information [65]. Poor communication channels and cultural obstacles hinder the delivery of healthcare treatments to displaced people, hence increasing the risk of disease transmission. Furthermore, the inflow of displaced individuals into host towns strains the existing healthcare infrastructure and resources, hence complicating response operations [59]. The politicization of humanitarian assistance in war or unstable settings may impede the delivery of essential services, exacerbating public health problems. The resolution to the issues arising from population relocation and the disintegration of community structure involves a synthesis of efforts related to surveillance augmentation, community participation, and resource mobilization.[62]

Innovative technologies, like mobile health apps and geospatial mapping, may enhance epidemiological monitoring by facilitating real-time data gathering and analysis among geographically distributed populations.[63] Engaging with local community leaders and stakeholders is essential for building trust, fostering engagement, and tailoring response strategies to the specific needs of impacted communities.[64] Moreover, robust healthcare systems that effectively adapt to shifts in population dynamics are essential investments to alleviate the effects of displacement on public health. The migration of people and the disruption of community institutions pose significant obstacles to monitoring and response efforts in public health [66]. Addressing these difficulties requires a comprehensive strategy that amalgamates technology innovation, community engagement, and the fortification of the health system [67]. Comprehending the

complex interplay between population dynamics and public health outcomes allows policymakers and practitioners to devise strategies that mitigate the impact of displacement on surveillance and response systems, thereby safeguarding the health and welfare of vulnerable displaced populations.[68]

7. Security issues faced by healthcare professionals and humanitarian organizations in crisis zones

In war zones, healthcare professionals and relief groups encounter significant obstacles, since the provision of essential services is often obstructed by ongoing instability. In unstable circumstances, individuals and organizations committed to alleviating suffering and improving health face various security challenges that jeopardize their safety, well-being, and capacity to assist.[69] This paper examines the security conditions faced by healthcare professionals and organizations operating in war zones, highlighting the unique aspects of their operational environment and the need to develop suitable risk mitigation techniques.[69]

8. Security vulnerabilities

Incidents of violence against healthcare and humanitarian workers include direct physical assaults, including targeted attacks, shootings, bombings, and assaults [70]. These incidents pose a danger to human lives and impede the delivery of important healthcare services to vulnerable populations.[71] The abduction of healthcare and humanitarian personnel in war zones remains a persistent threat, driven by factors including ransom demands, political leverage, and ideological motives.[72] The abduction of personnel not only inflicts direct harm but also engenders dread and uncertainty among humanitarian groups.[73] The looting of medical facilities, equipment, and supplies during war deprives healthcare professionals of vital resources required for effective care delivery [70]. Moreover, looting undermines the confidence between humanitarian organizations and local people, exacerbating tensions and obstructing humanitarian access.[71] Bureaucratic obstacles, checkpoints, roadblocks, and entrance rejections by armed factions consistently hinder healthcare personnel and assistance organizations from reaching individuals in need. These impediments diminish the efficacy of humanitarian assistance and exacerbate the humanitarian crisis in conflict-affected regions. Seventy Employment in combat zones causes significant psychological harm to healthcare and humanitarian personnel, manifesting as stress, anxiety, depression, and post-traumatic stress disorder.[71] Exposure to violence, personal dangers, and moral difficulties are the primary factors contributing to psychological discomfort among first responders.[72] The cumulative impact of these stresses jeopardizes the personal well-being of specific personnel and undermines the efficacy of humanitarian activities.[73]

9. Alleviating security threats and augmenting protective measures

Security training and readiness: Healthcare professionals and humanitarian assistance people in crisis zones should get general security training programs to develop skills in risk assessment, conflict management, and personnel safety.[74] Establishing a positive rapport with both the local community and armed groups is essential for daily security operations and access to humanitarian interventions. Discussion, negotiation, and arbitration would alleviate stress and promote understanding.[75] Operational modifications such as mobile clinics, remote healthcare delivery, and decentralized assistance distribution locations may mitigate hazards associated with fixed healthcare facilities and supply chains [75]. At the international level, it is imperative to emphasize advocacy efforts and diplomatic mediation to ensure the safety of healthcare workers and humanitarian organizations in conflict zones, accompanied by adherence to humanitarian principles and international humanitarian law. The challenges to health professionals and humanitarian organizations in conflict-affected regions are complex and extend beyond the denial of essential services and supplies [76]. These issues need a comprehensive response that includes the development of security training, community involvement, policy modifications, and worldwide lobbying, as shown in Figure 1. The focus on safeguarding frontline responders and enhancing security protocols will bolster the resilience and efficacy of humanitarian operations in some of the most unstable regions globally.



Figure 1. Mitigating security threats and augmenting protective measures.

10. Progress in epidemiological surveillance

Monitoring epidemiology is a systematic process including the structured gathering, analysis, interpretation, and dissemination of health-related data to enhance disease monitoring and management. Historically, surveillance mostly relied on manual data-collecting techniques, which were notably slow, labor-intensive, and susceptible to inaccuracies.[77] Conversely, recent technical breakthroughs provide novel methods for enhancing the speed, efficacy, and scope of monitoring. Satellite imagery: Satellite photography has emerged as a crucial tool for epidemiological surveillance, facilitating the collection of data on environmental factors, demographics, and disease vectors.[78] The high-resolution satellite imagery facilitates the monitoring of land use, vegetation trends, and aquatic systems—crucial markers of disease transmission. Satellite imagery has been used to track the proliferation of vector-borne illnesses such as malaria and dengue fever by identifying the locations of mosquito breeding places [79].

Additionally, satellite data may be integrated with geographic information systems to provide prediction models of disease occurrences and identify high-risk locations for targeted treatments. Drones, or unmanned aerial vehicles (UAVs), provide a cost-effective and adaptable method for collecting spatial data in remote or hazardous locations. Drones may be used in several health monitoring applications, including aerial surveys, crowd management, and sampling, among others.[72] Drones equipped with thermal imaging cameras may detect the heat signatures of animal reservoirs of zoonotic illnesses while fixed-wing drones provide more efficient coverage of extensive geographic regions compared to conventional ground-based surveys.[70] Furthermore, they may be rapidly deployed during emergencies, providing real-time information that informs decision-making in disease epidemics or natural disasters.[74]

Epidemiological surveillance is now used in AI algorithms to enhance the automation of data processing, pattern recognition, and forecasting of illness patterns.[80] Machine learning approaches, such as neural networks and deep learning, are adept at processing substantial volumes of intricate data derived from many sources, including electronic health records, social media, and sensor networks.[81] By doing real-time analysis of these data streams, AI systems may identify anomalous symptom patterns or clusters indicative of a potential new illness or pandemic.[81] Moreover, AI-driven prediction models empower public health organizations to allocate resources effectively and implement targeted treatments promptly to mitigate the spread of infectious illnesses [82].

Despite the tremendous benefits of emerging technology for epidemiological monitoring, certain obstacles must be addressed. These include issues related to data protection, data reconciliation, technological proficiency, and the legislative environment. Moreover, equitable distribution of technological resources and engagement of local populations is crucial for the legitimacy and sustainability of surveillance systems.[78] Future research should prioritize multidisciplinary collaborations, capacity-building initiatives, and the creation of tools and platforms that facilitate the integration of satellite imagery, drones, and artificial intelligence into surveillance operations.[79]

Consequently, the integration of satellite images, drones, and AI, when executed well, may transform epidemiological monitoring, establishing precise and credible foundations for disease prevention and management [81]. By using these emerging technologies, public health authorities may enhance their capacity to identify, monitor, and mitigate dangers from infectious illnesses, therefore preserving lives and safeguarding public health [82].

11. Conclusions

Infectious disease epidemics in war zones pose significant challenges to public health and humanitarian initiatives, necessitating innovative approaches to monitoring, diagnosis, and intervention. Conflict dynamics, healthcare infrastructure, and technology developments all play a role in influencing infectious disease outcomes in these contexts. The migration of populations complicates disease monitoring and response, necessitating adaptive techniques to address evolving demographic patterns and provide equitable healthcare. Technological advancements in surveillance, mobile health, genetic sequencing, and monitoring systems offer potential enhancements for infectious disease response in war zones. However, integration challenges persist, and healthcare professionals and humanitarian organizations must effectively handle security threats, ethical issues with data privacy and monitoring, and resource limitations.

Governments and international organizations need to invest in robust epidemiological monitoring systems, using modern technologies like UAVs, AI, BVLOS, and big data analytics. Capacity-building initiatives should focus on training healthcare professionals and humanitarian responders in technology-based tools and techniques for monitoring, diagnosis, and response. Ethical governance frameworks must be established to regulate the ethical use of technology in conflict environments, ensuring data privacy, security, and transparency. Implementing these policy proposals will empower stakeholders to optimize technological potential in addressing infectious diseases in war zones, while mitigating human suffering and bolstering global health security.

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أنظمة المراقبة البيولوجية لسلامة الصحة: الابتكارات في تتبع تفشي الأمراض والتهديدات باستخدام البيانات في الوقت الفعلي

الملخص

الخلفية: تشكل تفشي الأمراض المعدية في مناطق النزاعات تحديات كبيرة للصحة العامة، تزداد تعقيداً بسبب تدمير البنية التحتية للرعاية الصحية وتشريد السكان. تستعرض هذه المراجعة السريعة الأبحاث حول تقاطع التكنولوجيا واستجابة الأمراض المعدية في المناطق المتأثرة بالصراعات، مع التركيز على المنهجيات المبتكرة لتنبئ وإدارة تفشي الأمراض.

الطرق: تم إجراء بحث منهجي في قواعد البيانات الإلكترونية، بما في ذلك PubMed و Web of Science و Scopus، باستخدام مجموعة من الكلمات الرئيسية المتعلقة بالأمراض المعدية، التكامل التكنولوجي، ومناطق النزاعات.

النتائج: كشفت النتائج عن عقبات حاسمة مثل قلة الوصول إلى الرعاية الصحية، وتعطيل مراقبة الأمراض، والمأزق الأخلاقية المتعلقة بخصوصية البيانات. ومع ذلك، فإن التقدم في مراقبة الأوئلة، بما في ذلك تقنيات الصحة المتنقلة (mHealth) والسلسل الجينومي، يوفر مسارات واعدة لتحسين تتبع الأمراض وجهود الاستجابة. بالإضافة إلى ذلك، تقدم الأدوات المبتكرة مثل الطائرات بدون طيار والذكاء الاصطناعي (AI) منهجيات جديدة للمراقبة في الوقت الفعلي والتحليلات التنبؤية.

الخلاصة: خلصت الدراسة إلى أن هذه التقنيات يمكن أن تحسن بشكل كبير من إدارة التفشي وتقديم الرعاية الصحية، ولكن يجب معالجة التحديات المتعلقة بالحكم الأخلاقي، وأمن البيانات، والقيود على الموارد. تعتبر الجهود التعاونية بين الحكومات والمنظمات الإنسانية والمجتمعات المحلية أساسية لتحسين نشر الحلول التكنولوجية في مناطق النزاعات. يمكن أن يعزز دمج هذه الاستراتيجيات من النتائج الصحية العامة ويفوي القدرة على مواجهة الأوئلة المستقبلية في المناطق المتأثرة بالحروب.

الكلمات المفتاحية: الأمراض المعدية، مناطق النزاعات، مراقبة الأوئلة، التكامل التكنولوجي، تدخلات الصحة العامة.