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Infectious Disease Dynamics and Control in Displaced Populations

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ABSTRACT

Global displacement has reached unprecedented levels, exposing millions to heightened infectious disease risks driven by overcrowding, inadequate water and sanitation systems, disrupted health services, and fragile surveillance mechanisms. This narrative review synthesizes current evidence on the epidemiological dynamics of infectious diseases in displaced populations and evaluates priority interventions for control. Population movement, whether to camps, informal settlements, or urban areas, transforms disease transmission patterns through altered mobility, contact structures, and environmental exposures. Common threats include airborne, fecal-oral, vector-borne, and vaccine-preventable diseases, often amplified by limited healthcare capacity and surveillance gaps. The review highlights operational challenges in data collection, early warning systems, laboratory confirmation, and health workforce constraints. It examines the role of targeted public health interventions such as vaccination, WASH improvements, infection prevention and control (IPC), case management, and integration with host health systems. Additionally, it explores the use of modelling tools and scenario planning to estimate disease spread and assess intervention impact under conditions of uncertainty. Ethical, equity, and resource-allocation considerations remain central to protecting vulnerable groups, particularly children, pregnant women, the elderly, and persons with disabilities. Persistent research gaps underscore the urgent need for improved surveillance systems, mobility-centred epidemiological models, and evidence-based policies that strengthen resilience in both displaced and host communities. By consolidating multidisciplinary insights, this review provides a comprehensive framework for anticipating infectious disease threats and guiding effective, context-sensitive responses in displacement settings.

Keywords: Displacement and Infectious Diseases, Humanitarian Health Systems, Vaccination and WASH Interventions, Surveillance and Early Warning Systems, and Epidemiological Modelling in Crises.

INTRODUCTION

Almost 80 million people are currently displaced around the world due to conflict, violence, human rights violations, food insecurity, and natural disasters [2]. Various studies have highlighted the marked increase in morbidity and mortality following population displacements. Such movements significantly impact population health, influence health-seeking behaviour, and rapidly change health facilities' workload. Populations may migrate internally or cross borders in search of safety. Forced migrants frequently enter refugee camps, return to their original sites, or settle in urban environments [5]. Return and self-settlement continue for various groups, especially internally displaced persons (IDPs). The conditions confronting these groups vary considerably on multiple points: population movement may involve hundreds of thousands or thousands of people, the duration of displacement may extend over decades or only a few months, and the technical or logistical challenges to conducting proper epidemiological studies may be constrained by various factors. Several factors combined lead to rapid public health changes [3]. Displacement often entails cultural changes and socioeconomic factors that restrict many aspects of people's lives, making it challenging to fulfil basic and non-basic needs. The effects can be particularly pronounced in health, education, water, food, shelter, and protection. Within the past three decades,

displacement within countries has surged and become more prolonged [1]. Refugees and other displaced populations share common risk factors that make them particularly vulnerable to infectious diseases. After water, sanitation, and hygiene, vaccination is prioritized in disease control during population movements [2]. When populations are forced to flee, they may be exposed to severe measles outbreaks; supplementary vaccination enhances control measures and limits measles spread. Prioritising the provision of vaccines for catch-up campaigns followed by routine vaccinations as opposed to the other way around improves logistical efficiency [2].

Epidemiological Context of Displacement

Population displacement often occurs in the context of armed conflict, the collapse of fragile states, natural disasters, and climate change [2]. Although data remains imperfect, in 2021, approximately 89.3 million refugees and internally displaced persons (IDPs) were reported worldwide, with an estimated 672 million individuals projected to be displaced by 2050 due to climate-related events [7]. Forced displacements of people fleeing disasters, climate change, armed conflict, terrorism, and violence have profound implications for the social, physical, and economic well-being of the displaced and surrounding host communities. Displacement can expose affected populations to excessive health risks. Overcrowded shelters emerge from rapid establishment and often lack sufficient water and sanitation supplies [9]. Furthermore, physical damage to health facilities, loss of supplies, interruption of essential services, and deterioration of security conditions impede outbreak detection. Global outbreak reporting remains hampered by ongoing under-enumeration and under-reporting of public health events, and population displacements further complicate surveillance, analysis, and response planning [4]. The most relevant infectious diseases risked during population displacement often differ from those commonly encountered during peaceful times [20]. These threats are conditioned by the magnitude and characteristics of displacements; the environmental, socioeconomic, and climatic conditions surrounding affected communities; the modes of migration; the period elapsed since onset; and the routing, branching, and recurrence of migration [4]. Priority pathogens can be grouped into airborne, fecal-oral, vector-borne, blood-borne, contact, and zoonotic diseases. Systems releasing early warning signals concerning epidemics under different modes of population displacement are helpful. In addition to precautionary and protective measures tailored to reduce the risk of transmission, near real-time assessments on the nature of priority pathogens following population displacement, the routes and forms of such displacements, and accompanying driver factors during migration in the affected area constitute strong epidemiological evidence on these pathogens [3, 2].

Determinants of Transmission in Displacement Settings

The transmission of infectious diseases in humanitarian situations can differ markedly from conditions typically encountered in non-displacement settings [4]. Because the underlying determinants of infectious disease transmission vary widely between different humanitarian contexts, prior to assessing the specific pathways, risk factors, and transmission dynamics of infectious diseases in a given displacement or humanitarian situation, it may be useful to delineate some of the broad classes of determinants that will govern the transmission of infectious diseases in the setting[3]. Within highly mobile populations, exposure to some pathogens may occur across long distances and multiple settings, which can further complicate the identification of risk factors [6]. Displacement situations can exacerbate infectious disease threats, and a number of contextual factors play an important role in determining the specific threats encountered [8]. These factors can vary widely even within settings deemed broadly comparable, such as camps or urban settings, and an understanding of them is vital to anticipating pathogen risks. For example, crowding, sanitation, water access, mobility patterns, diet, vaccination gaps, age and comorbidity profiles, and health system factors all critically affect the nature of threats encountered [4, 5].

Common Infectious Diseases Encountered

Pathogen prioritization is vital to effectively target public health interventions following population displacement. High-burden infectious agents are grouped according to transmission mode, clinical impact, and seasonal variation [1]. In camps, host communities, and urban settlements, displaced populations face considerable exposure risk to pathogens transmitted via droplet, fecal-oral, and vector routes [6]. Disease transmission tends to increase during the dry season, when WASH conditions deteriorate or when stigma associated with certain conditions leads to underreporting. Displaced populations encounter a range of infectious diseases that are highly context-dependent, requiring tailored policy responses [3].

Surveillance and Data Gaps

The components and systems of public health surveillance, reporting, and data access relevant to infectious diseases have been categorized, and the availability, timeliness, representativeness, and compatibility of these data have been assessed [17]. The primary role of medical and surveillance data is to inform action against high-priority public health threats, to gather evidence for improved settings and plans, and to coordinate interventions across different stakeholder groups [11]. Some monitoring frameworks and methods have been detailed for the humanitarian context to promote efficient adaptation and implementation [16]. Single or modest frequency events

may be reported through various unstructured channels that are system-dependent and often based on personal contacts, community, or social media. Multiple systems mutually reinforce their efficacy in identifying pertinent events, while variable data availability prevents consolidation into a single framework, necessitating separate analyses [17].

Methods for Monitoring in Humanitarian Contexts

Monitoring and Evaluation (M&E) systems are crucial for analysing the temporal impact of humanitarian assistance, but implementing them in unstable or highly dynamic contexts poses numerous challenges [16]. Even the mere collection of health data can be difficult in such conditions, yet unconsolidated and sporadic information is often readily available [17]. Despite these technical and logistical constraints, multiple methods can nevertheless be applied to monitor health trends and estimate disease incidence in humanitarian settings. Such alternatives can draw on experiences with syndromic surveillance, event-based surveillance, and rapid assessments in heterogeneous settings [11]. Sentinel surveillance and Event-Based Surveillance (EBS) have been implemented in humanitarian contexts, adapted to the dynamics of the emergency [12]. For instance, EBS can be adapted to detect imminent epidemics and rapidly assess hazardous situations affecting health. Additionally, communities can be encouraged to alert health authorities in real time of unusual events, triggering thorough analyses to determine the existence or absence of an outbreak [15]. Similarly, one or several facilities providing health services to the displaced population can be appointed as the principal providers of routine health statistics or information about particular events [16]. The technical and physical capacity to conduct laboratory analyses may be lacking in camps, making it impossible to confirm suspected epidemics for pathogens that require specialized techniques. Enabling the community to report outdoor deaths or obstetric events such as stillbirths may help identify unusual health problems [15]. Individuals linking communities to the health system may be trained to recognize priority diseases, including their clinical case definitions, facilitating the dissemination of the patient's illness history to health officials. Establishing a close collaboration among the displaced population, health providers, and concerned authorities further communicates health problems [19].

Challenges in Data Quality and Reporting

In conflict-affected contexts, many countries experience deficiencies in routine health information systems. Surveillance data are often biased, with severe underreporting and missing denominators [8]. Security concerns restrict access to health facilities, further hampering detection [15]. Monitoring is shaped by diverse data governance arrangements for systems operating in global humanitarian frameworks. Numerous factors contribute to low reporting and widespread incompleteness [9]. In many settings, the surveillance system is poorly designed for reporting and compiling clinically important diseases, resulting in incomplete data. In these contexts, syndromic surveillance is an appropriate alternative, but proper implementation remains critical [18]. Prosecutions and threats against members of the healthcare community have made information gathering hazardous in certain areas [19]. System design issues and security constraints thus limit the accessibility and quality of data available through national mechanisms [16].

Public Health Interventions

Outbreaks of infectious diseases can devastate displaced populations, particularly in camps. Tackling these threats requires swift, well-targeted public health interventions adapted to the specific context [4]. Despite the vital role of a multi-faceted package that comprises vaccination, WASH, infection prevention and control (IPC), and clinical management, many responses to displacement fail to deliver even this fundamental suite [1]. Targeted catch-up vaccination campaigns become critical once displaced children outnumber the pre-displacement population [3]. Timely integration with routine booster programmes is essential to address both displacement and vaccine hesitancy. Raising permanent vaccination coverage considers differential mobility and stopover durations, urban settings, and the fate of transient vaccines [7]. Water quality, vector control, hygiene promotion, and sanitation retrofit, including step-by-step repairs and simple, low-cost upgrades, alleviate faecal-oral transmission, with those at birth, pre-weaning, under-five, lactating, and with two years of gap particularly targeted. Behavioural changes support droplet and faecal-oral protection [8]. Emergency contexts elevate case severity and fall into acute, early, or late categories. Uncertainty surrounding case spread demands triage approaches along contagion, isolation capacity, and case-fatigue factors, enabling both community and facility-response continuity. Precision case definitions, onward referral routes, and host-healthcare-system contacts shape management protocols under heavy displacement [6]. Cohorting, respiratory PPE, portable lavatories, extensive solid-waste collection and disposal, simple-to-use domestic disinfectants, and cleaning items bolster hygiene without contravening other rights; WASH improvement remains paramount despite IPC ubiquity [8].

Vaccination Strategies in Displaced Populations

Displaced populations typically experience wider vaccination gaps than host communities, whereas a rapid increase in population density leads to more contact between previously unvaccinated individuals. As a result,

catch-up vaccination campaigns are essential in this context [20]. Vaccination may need to take place under challenging logistical conditions, particularly if population mobility remains high [25]. Cold chain requirements also restrict vaccine choices and limit the coverage of liquid vaccine presentations, both of which can slow vaccination speed [18]. These considerations suggest undertaking vaccination activities in a phased, spatially structured manner in priority geographic areas that allow a wider array of vaccines to be deployed more quickly [25]. Strategies that align catch-up campaigns with regular booster doses already planned in national vaccination schedules may help alleviate supply constraints and minimize the risk of discovering or introducing other vaccine-preventable diseases at the same time [8]. The disruption caused by displacement and associated misinformation often gives rise to hesitancy against receiving or repeating routine vaccinations or newly introduced campaigns [12]. Community engagement, participatory techniques, culturally appropriate communication channels, diverse messaging formats, and feedback loops with affected populations can encourage vaccination uptake and inform adjustments [27]. The immunization status of specific groups, as well as access to vaccination services through engagement with local authorities, can also assist in prioritizing catch-up deliveries and tracking equity [9].

Water, Sanitation, and Hygiene Improvements

Water, sanitation, and hygiene (WASH) interventions are crucial to controlling waterborne and droplet-transmitted infections in humanitarian settings [16]. High population density in displaced settings increases the risk of transmission through both routes, particularly when open defecation is common, transportation of excreta to designated locations is not assured, or waste management is ineffective [10]. The installed WASH infrastructure and facilities need to be monitored regularly to ensure their functionality, and an adequate response can be provided to any issues arising before a disease outbreak occurs. All measures need to consider the context and do not advocate for any general solutions [15].

Infection Prevention and Control in Shelters

Preventive measures aim to reduce the transmission of respiratory (e.g., SARS-CoV-2) and other pathogens in emergency shelters while creating the conditions for physical and mental well-being [7]. In common situations, the following measures are recommended: separate groups with symptomatic respiratory infections from others; promote regular hand hygiene upon entry and exit; provide facial and respiratory hygiene materials to symptomatic individuals; and manage solid waste and conduct regular cleaning of containers and frequently touched surfaces [11]. The shelter must promote access to handwashing facilities; consider the group and environmental factors to foster adherence to the proper use of personal protection equipment (PPE) such as masks, gloves, goggles, and face shields; ensure the use of PPE is a voluntary decision; and remove it promptly once no longer necessary[12].

Case Management and Clinical Care

In a public health emergency, ensuring that the delivery of health services and appropriate medical treatment is maintained is critical [12]. Regardless of whether infectious disease outbreaks are confirmed or suspected, the following case management protocol should be initiated [10]. In multi-disease outbreaks, the establishment of clinical case definitions for priority diseases using monitoring systems will be of considerable benefit. At the point of entry to any health facility, patients should undergo urgent triage based on clinical case definition(s). For suspected LRTIs, COVID-19, and measles, diagnostic tests should be mandated [14]. For suspected acute watery diarrhea, routine laboratory testing is unnecessary; test for cholera only if response is warranted. Clear referral pathways for each of the major priority diseases should be established [8]. If a suspect case presents at a lower-level facility, treatment should be initiated until transfer to advanced healthcare can be arranged [9]. Continuity of care should be maintained within host health systems for previously treated PLHIV, TB, and other chronic diseases. Any new or currently untreated cases should be linked with the relevant host national programme for continued management [13].

Health Systems and Workforce Considerations

Displacement exerts pressures on existing health systems and personnel through caseload increases, utilization shifts, mobility demands, and institutional interactions [1]. Health system assessments provide insight into capacity and resilience, enabling alignment with host service delivery architectures [1]. Capacity and workload indicators inform response strategies according to disruptions experienced [14]. Developing and implementing health packages requires an understanding of service delivery, financing, governance, and capacity parameters, as well as the effects of invasion on these elements [17]. Service delivery approaches are influenced by community engagement degrees and operational safety, shaping intervention types and modalities [6]. Interactions with both technical services and overall service delivery are also important for prioritization and delivery approaches. These include temporary, continued, or intensified use of host structures with desired constituencies and resource trajectories; effectively servicing a displaced population without major disturbance to host systems; and focusing solely on the displaced segment of the population [7].

Integration with Host Healthcare Systems

Effective infection control interventions in displacement settings necessitate collaboration with existing health infrastructures and compliance with national frameworks to prevent disruption in long-term care [18]. Strengthening the linkage between displaced and national populations, including patients and health professionals, is vital for addressing both groups' needs and promoting system resilience after displacement subsides [1]. Crafting referral systems to facilitate the transfer of potentially infectious patients from emergency healthcare services to primary care is a crucial early step for the integration of camp and host population epidemiological surveillance with national systems [6]. Methods for analytically monitoring population movement during emergencies can assist in maintaining connections between national and refugee populations [15].

Community Engagement and Risk Communication

Promotion of widespread awareness of the nature of the incident and symptomatology through community engagement is essential in the prevention and detection of infectious disease outbreaks in displaced populations [22]. These messages must flow through trusted local channels to ensure that the information can be effectively understood by the population [15]. Community collaboration must therefore be sought at an early stage to guarantee accurate understanding of the target audience's cultural context and to guarantee that messages are co-created in ways that clearly convey cultural conceptions of disease causation or symptom identification and thus enhance the likelihood of the dissemination plan having the desired effect [16]. If and when misinformation arises, it should be addressed promptly through reliable and accurate information to audiences via the same trusted channels [13]. Channels of two-way communication that enable feedback from the population to health authorities must also be employed; these serve to determine the reach of the awareness campaign and put forward perceptions or counter-messages present in the community that require additional attention [17].

Ethical and Equity Considerations

Health priorities for displaced populations typically adhere to the principle of the greatest good for the greatest number. This utilitarian perspective, frequently counterbalanced by rights-based approaches, often neglects equity, rights, and the protection of vulnerable groups [18, 1, 19]. Yet these values remain critical even in resource-constrained settings, where challenged healthcare systems and weakened service frameworks place primary-care services beyond the reach of large segments of the population [16]. Population displacement, especially in low-resilience settings, generally maintains that urgent intervention is warranted even when assistance urgently needed by subpopulations remains unresolved [21]. Priority should be given to the most vulnerable groups, including children, the elderly, the disabled, refugees, pregnant women, and survivors of intimate-partner, sexual, or gender-based violence [22]. Where assistance is limited, harm-prevention activities should continue, with care sought to avoid exacerbating existing inequities.

Resource Allocation and Priority Setting

During displacement emergencies, decisions on the allocation of limited resources and the priority assigned to different health interventions are ultimately political [19]. However, normative criteria can help shape the discussion and promote a clearer understanding of trade-offs [26]. Recommended criteria include: effectiveness in averting deaths, disease, or disability; equity across age, gender, disability, legal status, and location; urgency of the health need, including acute disease control; feasibility under specific contextual constraints; and cost-effectiveness [18]. Transparency in decision-making processes is also crucial: stakeholder consultations, open-data platforms, and public communications on projected impact can enhance accountability, legitimacy, and community ownership [20]. Decision-makers must strike a delicate balance that prioritizes protection against transmission of the most harmful and communicable pathogens while moving towards a more comprehensive package of care. Interventions against measles are a prime example [7]. Although the virus causes fewer immediate deaths among older refugees and displaced persons, widespread disruption of vaccination services and low campaign coverage can allow transmission to escalate rapidly [8]. Admission of unvaccinated individuals into communal facilities is a serious complicating factor [1].

Protection of Vulnerable Groups

Displacement and disruptions to ongoing therapeutic care expose children, pregnant women, the elderly, and disabled persons to heightened health risks [21]. To ensure adequate service provision related to maternal and child health, sexual and reproductive health, and disability access, camps should collect and analyze disaggregated data on these groups [22]. Housing construction and the provision of temporary housing significantly affect refugee populations. Individuals who receive assistance tend to occupy makeshift structures since much housing support fails to accommodate their requirements [22]. These individuals are disqualified from housing support owing to the presence of non-residential structures, rendering them eligible only for activation services and thereby potentially exposed to more serious risks [23].

Modeling and Scenario Planning

Modeling tools such as systems of ordinary differential equations (ODEs) and agent-based models can be employed to depict transmission within temporary settlements for various pathogens [24]. These tools facilitate the projection of expected disease progression and the assessment of intervention efficacy, thereby quantifying potential health impacts [23]. Model specifications should accurately reflect the conditions encountered in different disrupted settings, including enhanced mobility patterns and the presence of waste-transmitted pathogens in the absence of adequate water, sanitation, and hygiene measures, coupled with diminished vaccination coverage and case management resources [5]. Risk estimates derived from these models remain uncertain due to scarce field data on key parameters and diverse epidemiological conditions across temporary settlements, host-community settings, and urban environments [25]. Sensitivity analyses help elucidate the influence of such uncertainties on projected outcomes and identify critical parameters requiring empirical investigation [25]. Health-improving initiatives such as vaccination interventions, water, sanitation, and hygiene (WASH) enhancements, infection prevention and control (IPC) measures, and comprehensive case management adapted to the definitive transmission patterns are universally beneficial[20]. Analogous modeling frameworks utilized in the context of political uprisings emphasize the pressing need for intervention under high presumed transmission levels at early phases, as subsequent deterioration inhibits effective response with limited resources [21].

Transmission Dynamics in Temporary Settlements

In temporary settlements, the dynamics of disease transmission are shaped by multiple factors associated with displacement. Household and community mobility influence interactions within the space and with the surrounding population [27]. The contexts of camps, urban environments, and informal gatherings present variations in how mobility modifies these interactions and the specific types of diseases transmitted [8]. Models addressing population mobility have been developed to broaden the applicability of the epidemiological frameworks outlined in section [22]. In urban areas, compartmental models have been extended through methods that explicitly incorporate mobility data and interactions between dislodged and stationary groups [24]. For temporary settlements, the mobility structures encountered can promote agent-based approaches that trace movements across networks and neighbourhoods. Such models can capture different scales of prediction, from a city-aggregate analysis to specified local settings for particular camps. An interface that utilises Anonymised Cellular Location Data provides movement data for the aim of simulating specific transmission dynamics during displacement [26].

Impact Assessment of Interventions

Assessment of health outcomes and resource needs under different intervention scenarios quantifies the potential benefits of vaccination, WASH, IPC, and case management strategies in displacement contexts [4]. A comparative analysis of four intervention strategies: vaccination, WASH improvements, infection prevention and control (IPC), and case management was undertaken to illustrate the likely health impact of these countermeasures under realistic yet uncertain conditions and to inform resource planning [7]. Intervention-specific parameters were explicitly integrated into the transmission dynamics models described previously. Inputs for post-vaccination immunity duration and population turnover were varied to reflect conditions across different camps [13, 25]. As already noted, the intervention implementation timelines are conservative. Timing and sequencing can be adjusted to match operational constraints or emerging priorities [6]. Simulation outcome data characterizing each intervention strategy can be drawn upon directly, supplemented by established estimates of other relevant parameters, to support broader planning [26]. Immediate catch-up vaccination campaigns provide the most considerable benefit, both overall and for different types of shelters. In camps and transient shelters, additional investments in the other intervention areas can yield substantial further gains; these other avenues are much less advantageous once vaccination is complete [7].

Research Gaps and Future Directions

Millions of people are forcibly displaced every year as a result of violent conflict, natural disasters, or environmental degradation [21]. Population movement can compromise the management of many infectious diseases. Households may be rendered homeless, and people may be compelled to share already-congested shelters, for instance, at government-designated centres or with host families. Displaced people may also migrate within or across borders to seek safety [23]. Many of the world's largest refugee populations originate from or are hosted in countries with weak health systems, where even non-displaced persons face challenges accessing essential health services. Displacement undermines existing health systems and forces displaced persons to adapt to new ones. Yet little empirical evidence is available to guide health interventions before, during, and after population displacement or to inform the design of integrated health systems addressing the needs of displaced and non-displaced persons alike [25]. Publicly available data show that globally reported displacement emergency notifications and official

humanitarian funding do not correspond with large-scale population movements. Important processes, such as urbanisation and honouring falsified national elections that prompt people to flee, may remain hidden from open-source mapping. Data gaps confound understanding of displacement events and complicate reliable epidemiological modelling during outbreaks. Numerous methodologies exist for open-source mapping of informal camps, unregistered settlements, and other informal infrastructure, as do algorithms that estimate missing demographic denominators for affected populations [26]. The vast majority of reports describing displaced populations and their peri-urban practices, wherever located, are based on several-year-old data, and few specifically address health outcomes. The only multi-country synthesis mapping the intersection of 50 pivotal epidemiological parameters with key determinants of displacement remains unreleased [25]. Most humanitarian organisations still track chronic communicable diseases, such as tuberculosis, that characterise non-displaced populations in the absence of surveillance linkages, especially within camps or informal peri-urban settlements where almost 80 % of forcibly displaced persons worldwide now reside[27-32]. Well-documented but poorly known within two decades of the last global outbreak in many regions prior to the COVID-19 pandemic, the epidemiological profiles of several infectious diseases, including measles, polio, and cholera, continue to evolve amid shifting socio-ecological environments, infections, and viral mutations. Given comparatively less attention to peri-urban and urban displacement contexts where most displaced populations globally now reside, informative and timely events reported from high-risk regions remain under-tracked and poorly mapped [33-35].

CONCLUSION

Displaced populations face a unique and amplified burden of infectious diseases shaped by mobility, overcrowding, disrupted services, and environmental vulnerabilities. The evidence reviewed demonstrates that transmission dynamics in these settings cannot be understood or addressed through routine public health frameworks alone. Instead, effective disease control requires integrated, adaptable, and context-specific approaches combining vaccination, WASH improvements, IPC measures, case management, and robust engagement with host healthcare systems. Strengthening surveillance, including syndromic and event-based methods, is essential for early detection and timely response, particularly where security constraints limit formal reporting. Protecting vulnerable subpopulations and ensuring ethical, equitable allocation of scarce resources must remain central to intervention strategies. Modelling tools offer valuable guidance for anticipating epidemic trajectories and optimizing response sequencing, though their accuracy depends on addressing persistent data gaps. Ultimately, reducing infectious disease risks in displaced populations demands coordinated humanitarian action, improved data systems, strong community engagement, and sustained investment in resilient health infrastructures. By bridging operational practice with epidemiological insight, the global health community can better safeguard displaced populations and strengthen preparedness for future crises.

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