


Delivering infectious disease interventions to women and children in conflict settings: a systematic review

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ABSTRACT

Background Conflict has played a role in the large-scale deterioration of health systems in low-income and middle-income countries (LMICs) and increased risk of infections and outbreaks. This systematic review aimed to synthesise the literature on mechanisms of delivery for a range of infectious disease-related interventions provided to conflict-affected women, children and adolescents.

Methods We searched Medline, Embase, CINAHL and PsychINFO databases for literature published in English from January 1990 to March 2018. Eligible publications reported on conflict-affected neonates, children, adolescents or women in LMICs who received an infectious disease intervention. We extracted and synthesised information on delivery characteristics, including delivery site and personnel involved, as well as barriers and facilitators, and we tabulated reported intervention coverage and effectiveness data.

Results A majority of the 194 eligible publications reported on intervention delivery in sub-Saharan Africa. Vaccines for measles and polio were the most commonly reported interventions, followed by malaria treatment. Over two-thirds of reported interventions were delivered in camp settings for displaced families. The use of clinics as a delivery site was reported across all intervention types, but outreach and community-based delivery were also reported for many interventions. Key barriers to service delivery included restricted access to target populations; conversely, adopting social mobilisation strategies and collaborating with community figures were reported as facilitating intervention delivery. Few publications reported on intervention coverage, mostly reporting variable coverage for vaccines, and fewer reported on intervention effectiveness, mostly for malaria treatment regimens.

Conclusions Despite an increased focus on health outcomes in humanitarian crises, our review highlights important gaps in the literature on intervention delivery among specific subpopulations and geographies. This indicates a need for more rigorous research and reporting on effective strategies for delivering infectious disease interventions in different conflict contexts.

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Key questions

What is already known?

- Conflict has especially devastating consequences for the implementation and delivery of health interventions for women, children and adolescents, including infectious disease interventions.
- Often, there are resurgences of infectious diseases such as HIV transmission, polio, measles and other vaccine-preventable diseases due to severed access to standard prevention and treatment services.

What are the new findings?

- In many conflict settings, coverage rates of infectious disease interventions are challenging to ascertain and are often unknown.
- Health workers, and the infrastructure and systems that support them, are debilitated by conflict. Prioritising local communities' needs and working collaboratively with multiple sectors to develop holistic and sustainable solutions that address security concerns is crucial in restoring operational functions to deliver essential infectious disease services.

What do the new findings imply?

- High-quality research is required to identify evidence-based infectious disease interventions to further support its provision and uptake in conflict-affected settings.
- There must be a greater focus on enhancing the availability of health data, as it relates to infectious diseases, of women and children in conflict settings. Accessible and timely data will encourage accountability and aid in the coordination of multiple actors across country, regional and global levels.

INTRODUCTION

Significant gaps in access to infectious disease interventions within health systems exist globally and are further impeded by war, civil unrest and political violence.¹ The populations most vulnerable to infectious disease transmission are those who are relegated to live in crowded conditions with inadequate shelter, poor sanitation, insufficient water

quality and quantity, limited food security and a lack of access to essential healthcare services.² These risk factors are major contextual determinants of child malnutrition, outbreaks of communicable diseases and low immunisation coverage in many low-income and middle-income countries (LMICs).³ Damage to sanitation facilities or a scarcity of clean water means that water-borne and vector-borne diseases are transmitted rapidly. Moreover, conflict-affected countries are potential zones of new emergence such as the case of Ebola imported into the Democratic Republic of Congo (DRC), and conflict often triggers the resurgence of previously controlled vaccine-preventable diseases (VPD) due to severed access to standard prevention and treatment services.^{4,5} For instance, despite fairly high preconflict VPD vaccination coverage rates in Syria, reports of measles outbreaks and acute flaccid paralysis related to poliovirus have become increasingly common.⁶ UNICEF figures show that in Syria, routine administration of first-dose measles-containing-vaccine decreased from 82% coverage in 2010 to 54% in 2014.⁷ Beyond hindering the provision of routine immunisations and treatment of acute conditions, the breakdown of a health system and restricted access to medical supplies can also disrupt the continuum of care for long-term treatment courses such as for HIV or tuberculosis (TB).¹

Similar to the case in LMICs where armed conflict is absent, acute respiratory infections (ARI, most notably pneumonia), TB, diarrhoea, measles and malaria account for the highest morbidity among children in crisis-affected populations.⁸ However, a lack of consensus on effective intervention implementation strategies and disrupted routine surveillance make it difficult to coordinate sound public health responses in such settings.⁹ To address this difficulty and help improve the quality of humanitarian response, a group of non-governmental organisations (NGOs) and the Red Cross and Red Crescent Movement collectively developed a humanitarian charter and a set of minimum standards as part of the *Sphere Project* initiated in 1997. Now in its fourth edition, the *Sphere Handbook* outlines minimum standards for humanitarian response across a range of sectors, including WASH, shelter, health and nutrition. It also outlines key actions for controlling infectious diseases in emergency settings: (1) swiftly implementing prevention measures; (2) establishing surveillance and reporting systems; (3) active diagnosis and case management and (4) outbreak preparedness and response in a timely and efficient manner.¹⁰ However, the *Sphere Handbook* does not sufficiently address how best to implement such actions, and there is little evidence-based guidance on implementation available elsewhere.¹⁰

Stronger scientific evidence on implementing effective infectious disease interventions is needed to effectively respond to humanitarian crises. Previous reviews have systematically characterised the evidence on the effectiveness of infectious disease interventions during humanitarian crises.^{11,12} Though there has been increased international focus to produce and

disseminate systematic and comprehensive guidelines for the delivery of infectious disease services in conflict settings, significant challenges remain in terms of provision and utilisation of critical health interventions.¹³ This paper is part of a set of eight systematic reviews using a common protocol to examine the delivery of reproductive, maternal, newborn, child and adolescent health and nutrition interventions in conflict settings, motivated by the urgent need to better address the vulnerabilities of women and children in humanitarian crises generally and in conflict settings particularly.^{14,15} Here we aimed to systematically characterise the literature on the delivery of infectious disease interventions to women, children and adolescents and identify key gaps in that literature; and to synthesise reported information on intervention delivery characteristics, including how they may vary by setting and by population displacement status.

METHODS

Search strategy

A systematic search of indexed literature published from 1 January 1990 to 31 March 2018 was conducted in Medline, Embase, CINAHL and PsychINFO databases using OVID and EBSCO interfaces. The 'Explode' function for the Medical Subject Heading Terms was activated for main sets of terms related to three concepts: (a) conflict; (b) women and children and (c) infectious diseases. Conflict-related search terms included war, crisis, refugees, internally displaced person (IDP) and stateless. Population-related terms included newborn, children, adolescents, women and pregnant. Infectious-disease-related terms included immunisation, cholera, measles, HIV, TB and other disease terms. The complete search syntax for Medline is presented in online supplementary appendix A. We also screened reference lists of key systematic reviews conducted previously in the field of humanitarian health.

For grey literature, we searched the websites of 10 major humanitarian agencies and organisations that are actively involved in responding to or researching conflict situations for reports on the delivery of health interventions in our population of interest. These websites included Emergency Nutrition Network, International Committee of the Red Cross, International Rescue Committee, Médecins Sans Frontières, Save the Children, United Nations Population Fund, United Nations High Commissioner for Refugees, United Nations Children's Fund, Women's Refugee Commission and World Vision. We used broad terms for conflict and health interventions tailored to the search functionality of each website. Grey literature documents published from 1 January 2013 to 30 November 2018 were reviewed.

Eligibility criteria

Eligible publications were limited to those reporting on populations affected by conflict in LMICs, as classified by the World Bank.¹⁶ The intervention must have

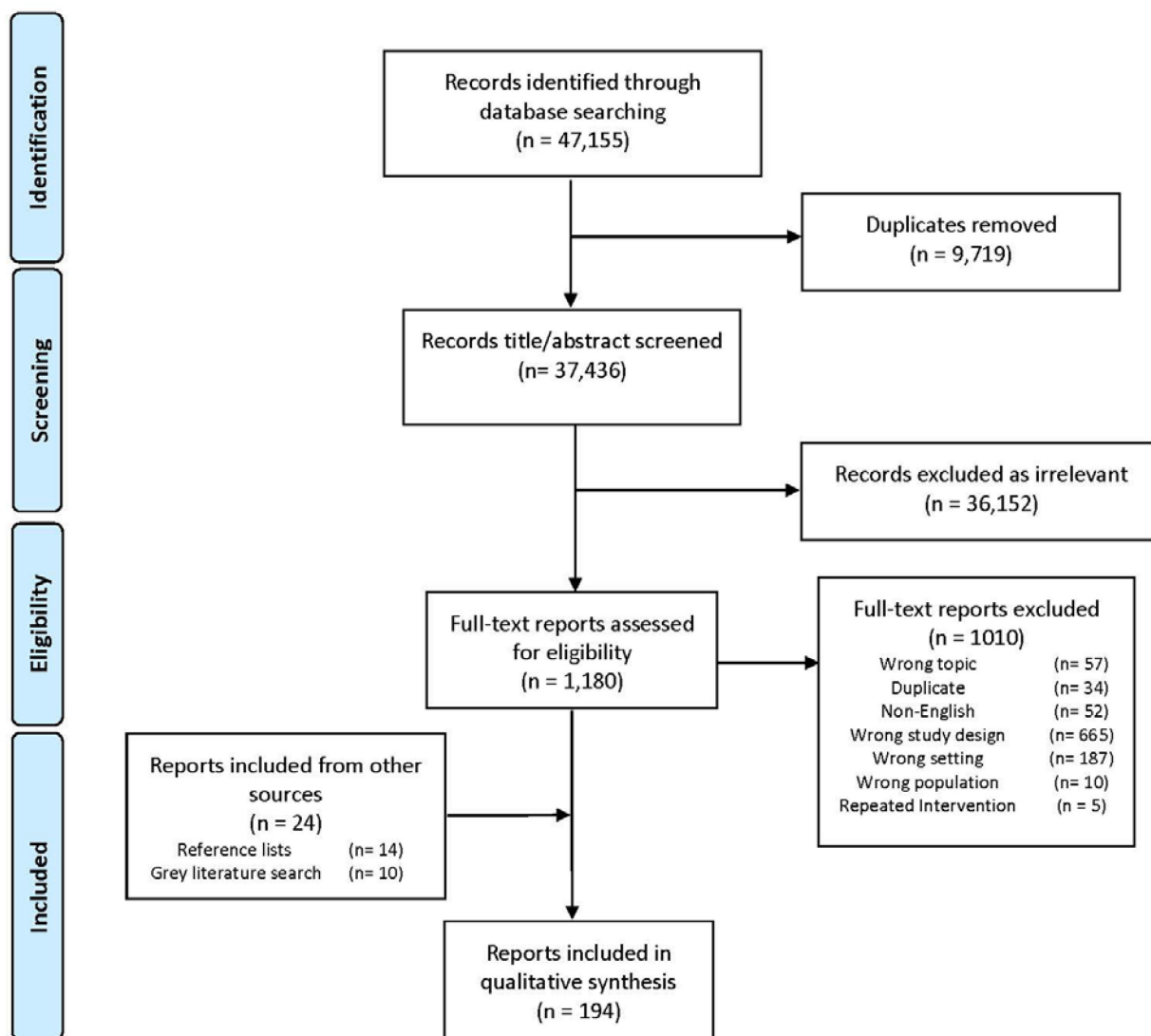


Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram: publication selection process for systematic review on the delivery of infectious disease interventions to women and children in conflict settings.

targeted or included neonates, children, adolescents or women of reproductive age. The publication must have also described an intervention being delivered during or within 5 years of cessation of conflict. A 5-year cut-off was applied to help ensure that we were capturing humanitarian rather than broader development contexts, and assuming that it may take recovering LMICs up to 5 years to be able to use foreign aid impactfully.¹⁷ If ongoing or recent cessation of conflict was not referred to explicitly in the publication, we consulted online encyclopaedic sources as well as the UN Office for the Coordination of Humanitarian Affairs website for information on conflict duration, to assess whether the reported time period of intervention delivery met the 5-year cut-off criterion. To identify the most informative resources from the large volume of grey literature that we retrieved even using a shorter publication window, the same population and

intervention delivery period criteria used for the indexed literature were applied, along with an additional requirement of explicit reporting in the grey literature on the delivery site and personnel for each intervention.

Non-English publications; case reports of single patients; publications reporting on military personnel, refugee populations bound for a high-income country, surgical techniques, economic or mathematical modelling; and editorials and opinion pieces were excluded from our review. Other exclusion criteria included systematic reviews, guidelines and publications where no specific health intervention was described (eg, prevalence studies).

Data extraction and analysis

All identified indexed records were downloaded into EndNote software and duplicates were removed. Unique

records were then imported into Covidence software for screening. Titles and abstracts were screened for relevance in duplicate, and the full-text of each potentially relevant publication was then screened by a single reviewer who noted reasons for exclusion at this stage.

Relevant information and data from the eligible indexed and grey literature were extracted in duplicate into a customised and piloted form using REDCap software. Key variables included publication author, publication year, study design, setting, target population characteristics, intervention characteristics and delivery characteristics, including any author-reported narrative information on delivery barriers or facilitators. We also extracted reported quantitative data on intervention coverage and effectiveness (eg, sample size, point estimates, SD or errors, 95% CIs, p-values). The double-entry data were matched and any discrepancies were resolved through discussion, or by a third reviewer if needed.

We generated descriptive statistics to summarise key population and intervention characteristics, including population displacement status and intervention delivery characteristics, and we narratively synthesised factors inhibiting or facilitating the implementation of interventions by grouping reported information into common themes. We tabulated reported quantitative data on coverage and effectiveness; given the wide range of interventions, geographic settings, populations and delivery approaches across the publications, we did not undertake meta-analysis.

RESULTS

A total of 37 436 unique citations were retrieved from indexed databases, with 170 ultimately assessed as eligible (figure 1). From the screening and assessment of the grey literature and of the reference lists of relevant systematic reviews, a further 24 eligible publications were identified. From the total of 194 eligible publications^{18–211} included in our review (table 1; online supplementary appendix B), we captured 392 reported instances of infectious disease intervention delivery. Publication frequency varied since the beginning of the review study period in 1990, with peaks in 1996 and again in 2013 (n=26), and remaining high since then (figure 2). The frequency of reported intervention start years also varied, with a peak in 1994 relating to the genocide in Rwanda and a similar peak in 2005 relating to civil war in DRC, and later peaks in 2011 and 2013 relating to the conflict in Syria.

In regards to the geographic distribution of the included publications, more than half reported on intervention delivery in sub-Saharan Africa (106/194, 55%), most frequently in the DRC, South Sudan, Sudan, Tanzania and Ethiopia (figure 3). About 20% of included publications (41/194) were focused in East Asia, with Thailand accounting for the vast majority of these (36/41, 88%). South Asia (26 publications, 13%) and the Middle East and North Africa (15 publications, 8%) were the next most frequent regions, with the fewest publications

Table 1 Summary of publication characteristics (n=194)*

Geographic region	n
Sub-Saharan Africa	106
East Asia and Pacific	41
South Asia	26
Middle East and North Africa	15
Europe and Central Asia	3
Latin America and the Caribbean	3
Publication type	n
Non-research report	44
Mixed methods	5
Observational	104
Non-randomised controlled trial	5
Randomised controlled trial	36
Target population type†	n
All/general population	115
All women	32
Pregnant women	16
Children<5 years only	27
Adolescents	0
Displacement status of beneficiary population‡	n
IDPs	59
Refugees	102
Returning refugees	8
Non-displaced	45
Host	13
Unreported	16
Setting of displaced populations‡	n
Camp	101
Dispersed	26
Mixed	30
Unreported	3

*Refer to online supplementary appendix B for detailed information on included publications.

†Publications may be included in more than one category.

‡Only reflects publications that reported on displaced populations (refugees, IDPs, or returning refugees). IDP, internally displaced person.

focusing in Latin America (three publications, 2%), only consisting of El Salvador and Nicaragua, and Europe and Central Asia (three publications, 2%), including Macedonia and Azerbaijan. Of the included publications, 53% reported on intervention delivery in refugee populations and 30% in IDP populations. Publications from Uganda, South Sudan, DRC and Sudan predominantly focused on delivery to IDPs; publications from Thailand, Tanzania and Pakistan mostly focused on delivery to refugees from neighbouring countries (figure 4). Nearly 80% of publications reporting on intervention delivery

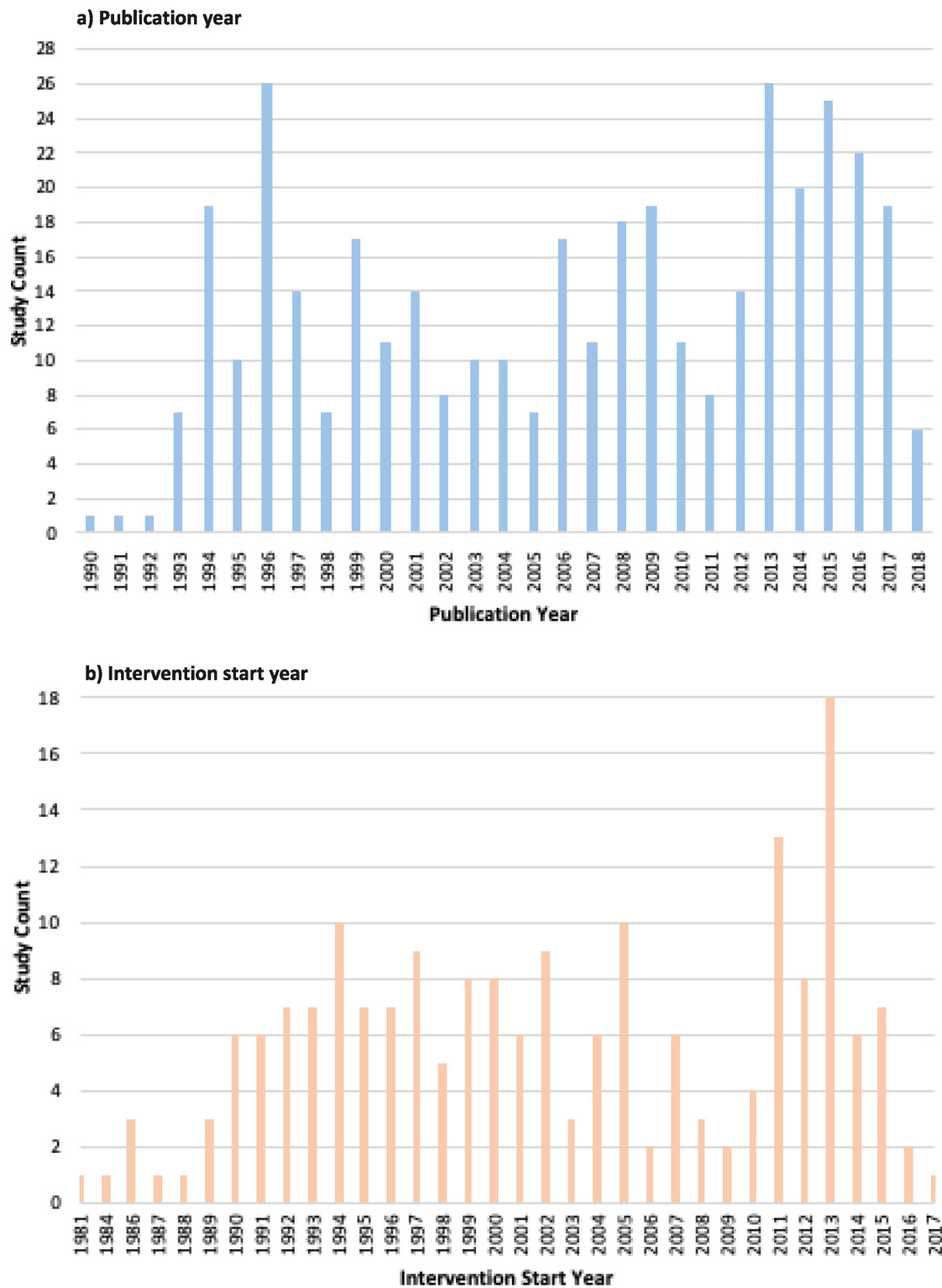


Figure 2 Publications counts by (a) publication year and (b) intervention start year.

to conflict-affected populations that were not displaced were focused in sub-Saharan Africa.

Overall, vaccines were the most commonly reported intervention delivered (figure 5). For interventions where there were mass immunisation campaigns, polio

and measles vaccines were the most frequently reported vaccines administered to children under five. These high priority vaccines were often reported to be delivered in conjunction with one another. Vitamin A was also frequently reported to be given in conjunction with



Figure 3 Geographic distribution of included publications.

the measles vaccine. The delivery of cholera and diphtheria, tetanus and pertussis (DTP) vaccines were also frequently reported. After vaccines, malaria treatment was the second most commonly reported intervention, followed by screening for infectious diseases and behaviour change or education interventions. Screening for HIV or other sexually transmitted infections (STIs) was often reported to be integrated into antenatal care. Of the 49 reported instances of a screening intervention, 27 targeted HIV/STIs (56%), and 10 screened for malaria (21%); the remaining were for TB referrals. Behaviour change or education interventions accounted for 12% of reported interventions delivered. Examples of these interventions included condom provision, hygiene promotion and psychosocial support services. About 62% of the 392 reported instances of intervention delivery occurred in camp settings, and about 30% in non-camp environments, with the remaining 8% occurring among conflict-affected populations who were not displaced. Among both refugees and IDPs, a large majority of reported interventions were delivered within camps compared with out of camps, particularly vaccines (figure 5). The relative frequency of different intervention types was similar in both settings.

The delivery of interventions was categorised into three tiers of the care continuum: ‘outpatient’, consisting of delivery in hospitals and clinics; ‘outreach’, where service mobility is a component, such as delivery through temporary health posts or mobile clinics and ‘community-based’ care, which includes intervention delivery in homes, markets, places of worship, schools or other communal spaces (figure 6). Clinics were used as delivery sites for all reported intervention types, but outreach and

community-based delivery were also common levels of care for intervention delivery. In terms of home-based delivery, malaria prevention interventions (eg, the distribution of insecticide-treated nets and indoor residual spraying) were the most frequently reported, while vaccines were also often delivered at the home using door-to-door strategies. Reported behaviour change/education interventions were mostly delivered in community settings, using the broadest range of delivery personnel types (figure 7). UN/NGO staff and health workers were the most frequently reported delivery personnel across all displacement settings, including among those who were non-displaced. Community health workers (CHWs) most often delivered health interventions to homes. Skilled birth attendants delivered interventions such as prevention of mother-to-child transmission of HIV and malaria treatment for pregnant women during antenatal care services. In some cases, civic and religious leaders were enlisted to encourage the uptake of polio vaccines where communities were misinformed or where public trust was compromised.^{185 212}

Multiple barriers to implementing and scaling up the delivery of infectious disease interventions in conflict settings were highlighted in the included literature (table 2). Many of the obstacles revolved around limited access to target populations due to active combat, as well as logistical constraints, especially with the procurement and storage of vaccines. Public trepidation and reluctance to use health services delivered by foreign agencies also presented as a common barrier accounting for lower than expected coverage of some interventions. Other key barriers to delivery included a shortage of trained health workers, as well as stigma for receiving treatment for

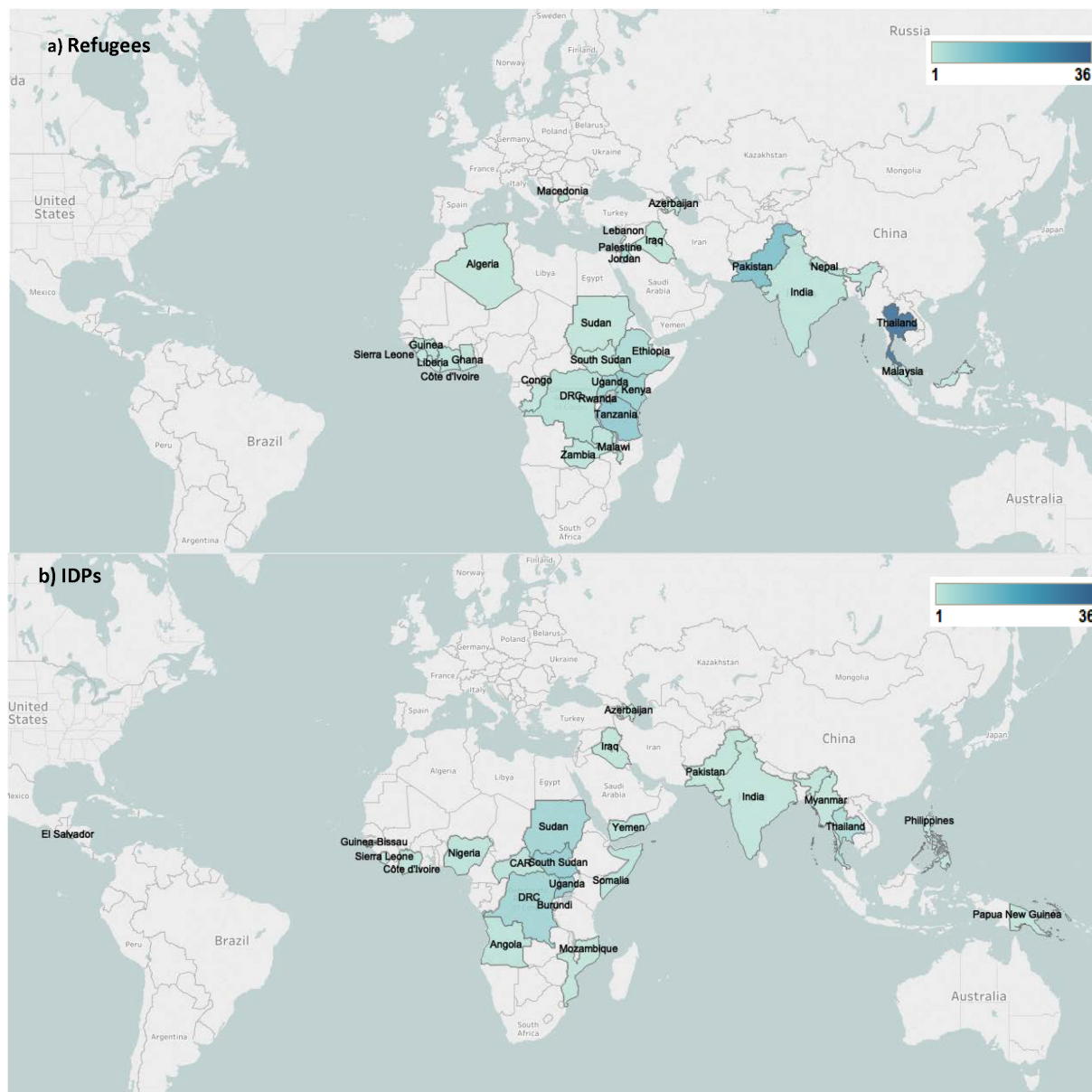


Figure 4 Geographic distribution of included publications by population displacement status. IDPs, internally displaced persons.

certain illnesses considered taboo, like HIV for example. Multiple strategies to counter some of these barriers were also documented in the literature. The most notable facilitator to implementing interventions was adopting social mobilisation strategies by coordinating a multisectorial approach. This was accomplished in out-of-camp settings by working with the Ministry of Health, engaging prominent local leaders, including CHWs in intervention delivery and integrating health promotion programmes at the community level to ensure accurate and harmonised messaging. Instituting reliable surveillance and population data in camp settings was also crucial for the roll-out of interventions. Some other common facilitators were capacity building—enriching the knowledge and practical skills of local workers, and ensuring that

intervention delivery had an outreach component so it was flexible to move with populations.

Only 15% of included publications (30/194) reported data on intervention coverage. Most reported on coverage data related to vaccinations, especially polio vaccines for children under 5 years and measles vaccine for those under 15 years, with some data available on cholera, DTP, tetanus, meningitis and TB vaccination coverage (online supplementary appendix C). Reported coverage rates for polio and measles vaccines often exceeded 80%. There was no observable difference between polio and measles coverage by displacement status or setting. Only 7% of publications (13/194) reported data on intervention effectiveness, most frequently evaluating malaria treatment regimens including different dosages

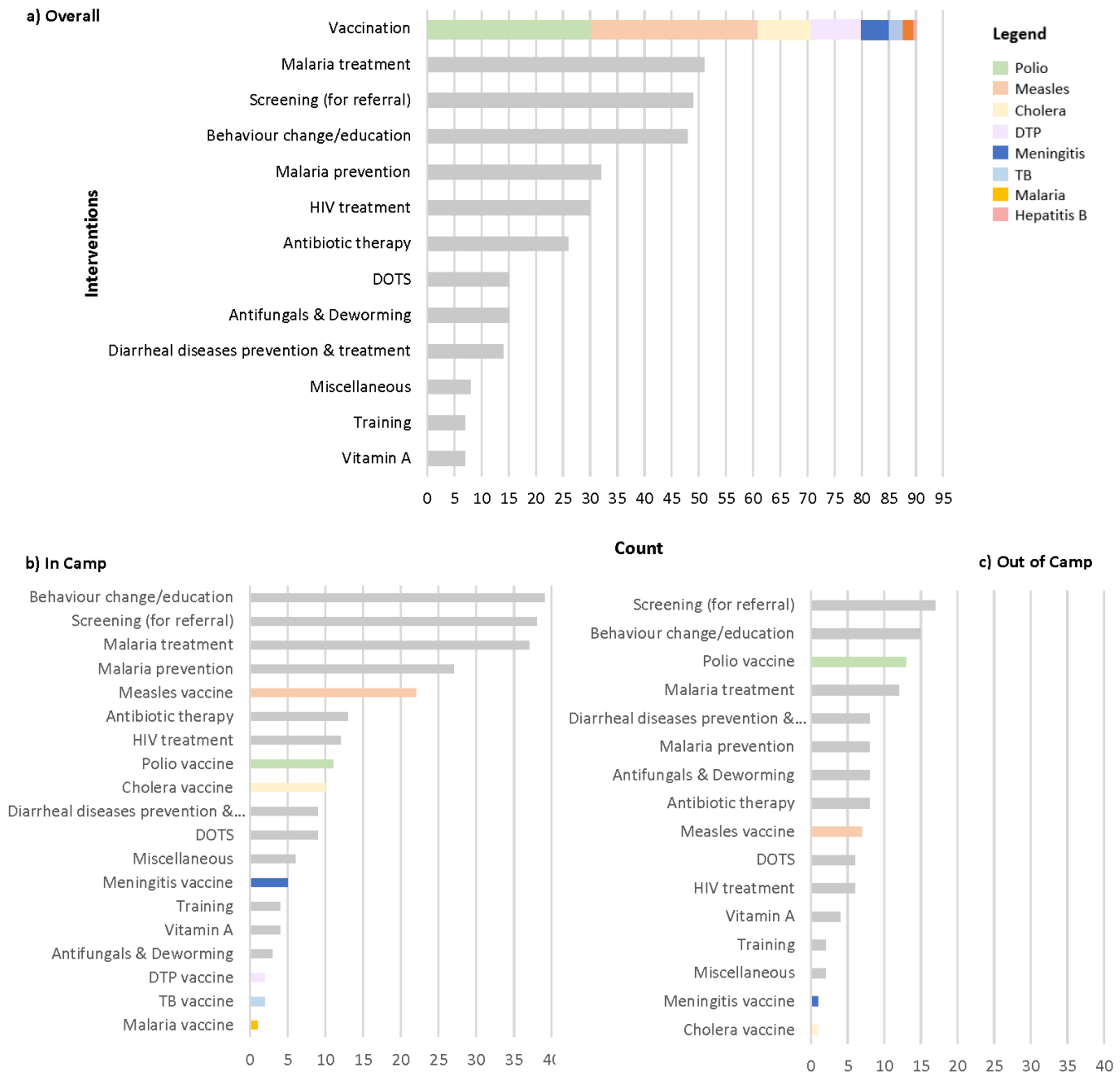


Figure 5 Frequencies of reported interventions delivered (a) overall, (b) in camps and (c) out of camps.

of antimalarial medications, and malaria prevention interventions including insecticide-treated bednets and clothing.

DISCUSSION

Principal findings

This systematic review identified 194 publications from 1990 to 2018 that report on delivery modalities of infectious disease interventions for women, children and adolescents in conflict-affected zones. While a range of delivered interventions was reported in the literature, interventions for vaccine-preventable diseases predominated, particularly for polio and measles virus.

Malaria treatment in Thailand and infectious disease screening, especially for HIV across sub-Saharan Africa, were also reported frequently. Though clinic-based delivery was evident for all intervention types reported, many reported interventions were also delivered using outreach approaches, highlighting the advantage of mobile health services in many conflict settings. Due to the constraints of maintaining and accessing static clinics in areas of armed conflict, and because of high population movement, health personnel often provided interventions through the installation of health posts and mobile clinics. Moreover, most reported interventions were delivered in camps, likely reflecting the generally

	Interventions (all ages)	Outpatient			Outreach		Community-based				Other	
		Hospitals	Clinics	Research Centers	Health Posts	Mobile Clinics	Home	Markets	Places of worship	Schools	Community Spaces	Electronic/Print
Treatment	Antibiotic therapy											
	HIV treatment											
	Antifungals & Deworming											
	TB treatment											
	Malaria treatment											
	Diarrheal diseases treatment											
Prevention	Malaria prevention											
	Screening (for referral)											
	Vitamin A											
	Training											
	Cholera vaccine											
	DTP vaccine											
	Malaria vaccine											
	Measles vaccine											
	Meningitis vaccine											
	Polio vaccine											
	TB vaccine											
	Behaviour change/education											
	Hepatitis B vaccine											

Figure 6 Reported intervention delivery sites. DTP, diphtheria, tetanus and pertussis; TB, tuberculosis.

higher access to target populations in these settings, but perhaps also reflecting greater documentation of health service delivery in camp sites than in other settings. Few publications provided estimates for intervention coverage and effectiveness, with data for vaccine coverage being most commonly reported. Most of the reported intervention coverage and effectiveness data were captured from people living in camp settings. Multiple publications reported that collaboration through participatory processes involving prominent community actors, and modifying interventions to adapt to the cultural and religious context led to added coverage and impact. This includes inviting key stakeholders and respected community leaders to design programmes and assist with the dissemination and delivery of interventions.²¹³

Evidence gaps

The results of this review highlight several important gaps in the literature, relating to populations, geography and targeted health conditions. Very few publications were included from Latin America, with none from Colombia, despite having the most severe internal displacement situation in the world,²¹⁴ or from other conflict-affected countries in the region such as Honduras, Nicaragua and El Salvador. Despite the need for adolescent-focused sexual and reproductive health programming including

HIV/STI prevention and treatment in humanitarian settings,²¹³ we found no reporting on infectious disease interventions targeting adolescents, and therefore no evidence on coverage rates in this population group. That much of the included literature focuses on the delivery of polio and measles vaccination is also not surprising. Poliovirus is of great concern in humanitarian crises as the move towards eradication is stalled when immunisation coverage is threatened by conflict; polio eradication relies on accessing over 95% of children with vaccines. Disturbances to routine immunisation and surveillance systems rapidly reduce population immunity, inevitably making individuals more susceptible to polio outbreaks. Measles is also of concern due to its highly contagious nature, especially among young children. Considering the mode of transmission, measles outbreaks are exacerbated by conflict and inhabiting overcrowded spaces.²¹⁵ Nonetheless, the very limited reporting on the delivery of interventions for other important infectious disease conditions in the context of conflict is disproportional. Only one publication reported on the delivery of interventions for ARI including pneumonia, despite ARI morbidity often being very high in crowded camp settings.²¹⁶ There was also limited reporting of neglected tropical disease (NTD) interventions, despite the elimination of NTDs by

	Interventions (all ages)	Doctors	Nurses	Health workers	Skilled birth attendants	UN/ NGO staff	CHWs	Trained civilians	Teachers	Civic leader	Religious leaders
Treatment	Antibiotic therapy										
	HIV treatment										
	Antifungals & Deworming										
	TB treatment										
	Malaria treatment										
	Diarrheal disease treatment										
Prevention	Behaviour change/education										
	Malaria prevention										
	Screening (for referral)										
	Vitamin A										
	Training										
	Cholera vaccine										
	DTP vaccine										
	Malaria vaccine										
	Measles vaccine										
	Meningitis vaccine										
	Polio vaccine										
	TB vaccine										
	Hepatitis B vaccine										

Figure 7 Reported intervention delivery personnel. DTP, diphtheria, tetanus and pertussis; TB, tuberculosis.

2020 being a global goal. The major NTD focus in the literature was visceral/cutaneous leishmaniasis, likely due to the high morbidity and striking symptomology of the condition. Many NTDs often spike during warfare, with displacement in densely populated spaces, but very few publications reported on trachoma, deworming or other NTD interventions.²¹⁷

Limitations

Previous reviews of the literature have examined the size and quality of the evidence base for infectious disease interventions delivered in humanitarian settings,^{11 12} but this review is the first, to our knowledge, to focus on the mechanisms of intervention delivery to women and children affected by armed conflict. Nonetheless, this systematic review has several limitations. Methodologically, our decision to restrict the eligible literature to reports published only in English means that key information may have been missed, considering many conflicts occur in regions where English is not widely spoken and many humanitarian organisations operate and may document their operations in languages other than English. Our inclusion of interventions delivered within 5 years of the cessation of a conflict means that some interventions delivered during peacetime may also have been included

inadvertently, potentially biasing our findings on how and by whom these interventions have been delivered in conflict settings and what the key delivery barriers and facilitators have been. The vast majority of the publications included in our review referred explicitly to delivery in a conflict context however, and so we would expect the influence of peacetime intervention delivery on our findings to be minimal. Furthermore, our approach in conducting a comprehensive but not exhaustive search of the grey literature means that we will have excluded other relevant publications, some of which may have provided different information on intervention delivery than what we have currently captured.

Beyond the limitations of our methodological approach, several limitations derive from the nature of the literature itself: much humanitarian health action goes undocumented and is not evaluated, and so it is not possible to estimate how well the infectious disease interventions and delivery patterns that have been reported and are captured here actually reflect those on the ground. Specifically, reporting on the coverage and effectiveness of these interventions was very poor. This major gap is likely due to multiple factors that make the monitoring and evaluation of intervention delivery

Table 2 Barriers and facilitators to the delivery of infectious disease interventions in conflict settings

Barriers

General themes	Examples
Constrained access	Difficulty accessing target populations due to ongoing conflict, insecurity and armed insurgency. This includes bans on health services and attacks on health workers by antigovernment groups or armed militia. A challenging physical environment, for example: rainy seasons, winter weather or long distances.
Community buy-in	Lack of community support and political hesitancy to embrace health campaigns from foreign agencies. Mistrust and misinformation from local community members, particularly around the administration of polio vaccines.
Poor infrastructure	Destruction of health infrastructure and a lack of transit centres along borders, causing limited access to facilities for care provision. Displaced persons who established living quarters in crowded areas with scarce sanitation and poor water supply, further facilitating an environment for the spread of highly infectious diseases like measles and poliovirus.
Logistics	Logistical problems with supply chain, specifically with the storage and shipment of vaccines to various vaccination sites. Resource constraints and rising costs due to the high demand of services, resulting in a shortage of diagnostic tools, drugs and equipment.
Human resources	Ongoing violence in conflict countries induced an exodus of thousands of doctors and nurses, seriously threatening the already strained health system. Major turnovers of international staff, a shortage of trained health workers and the presence of inexperienced teams during the early phases of an intervention contributed to delays in service delivery.
Stigma	Challenges noted with introducing HIV care into areas with minimal HIV knowledge; concerns that people diagnosed as HIV-positive could face serious negative consequences (eg, abandonment, physical violence, discrimination). Language barriers with care providers, and a fear of stigmatisation for receiving services for other taboo illnesses.
Mobile populations	High patient mobility was challenging for ensuring the continuity of care, particularly for HIV and TB treatment. Frequent movements of conflict-affected populations also accounted for lower than expected screening members and limited vaccination coverage during immunisation efforts.

Facilitators

Social mobilisation	Forming strong partnerships with local community leaders (eg, elders, civic and religious figures) who leveraged their influence to negotiate access and promote community uptake of health interventions. Swift coordination with Ministry of Health or other partners in developing comprehensive operational plans to allocate resources quickly and efficiently. Employing strategies to provide knowledge to population; guided by promotion efforts (eg, radio broadcasting, precampaign focus-group interviews, etc)
Capacity building	Providing skills training to enrich and strengthen the role of CHWs and other national staff who are most familiar with the context; particularly useful for behavioural change/education and screening interventions. Optimising the use of pre-existing resources, facilities and tools with limited resources.
Safeguards and resource provision	Ensuring sufficient and working equipment for communication and feedback (eg, telephone/internet connection, camera, copier machine and computers). As well as obtaining sufficient resources and long-term commitment from aid agencies. Regular monitoring of the security situation and adapting contingency plans; allowing patients/staff coming from distant locations to stay near project sites.
Operational mobility	Flexibility to move 'temporary fixed posts' (ie, mobile clinics, health posts), frequently in response to caregivers' demand to bring interventions (specifically vaccines) closer to their homes. Working within closed camps or areas with restricted movement of populations helped to ensure intervention coverage and the continuity of care.
Reliable surveillance	Instituting sustainable and reliable infectious disease surveillance helped to guide health planning for refugee populations. Detailed mapping of population settlements and their movements, aided in identifying communities with the largest target populations.
Negotiating ceasefires	Negotiating cease-fire or tranquillity days between warring factions, particularly for national immunisation days, allowing health workers to vaccinate children in areas with ongoing conflict.

CHWs, community health workers.

difficult in conflict settings, including insecurity, high population mobility and a lack of both human and logistical resources to reliably and systematically collect and analyse quality data. Where coverage or effectiveness data were reported, very few publications reported gender-disaggregated data, precluding any analysis of potential gender differences. Further, where documentation of delivered interventions does exist (often in non-research

reports or in cross-sectional studies), detailed information is rarely presented on how those interventions were delivered (eg, where and by whom, overcoming what barriers with what facilitators) or on their coverage or effectiveness. Finally, we must recognise that the highly contextual nature of humanitarian crises, with great variation geographically, socially, culturally and politically, can produce considerable heterogeneity in intervention

delivery patterns and even intervention effectiveness across settings.

Potential implications of findings for programming and future research

The limited information available on how such interventions are currently being delivered, and the paucity of data on achieved intervention coverage and effectiveness make recommendations on delivery strategies for different conflict contexts difficult to make. Our results strongly indicate that more rigorous and timely research is needed to identify effective strategies for delivering evidence-based infectious disease interventions in different conflict contexts. Future data collection should also enable gender analyses to be undertaken, to investigate gendered differences in health needs, access and uptake of services.

There is much variation in practice across UN/NGOs in programming for infectious disease interventions, suggesting a need for further consensus-building to develop a comprehensive set of standard operating procedures and implementation protocols for intervention delivery that could be accessed, adapted and applied in different conflict contexts. In the meantime, it is evident that infectious disease intervention planning must include components to address the security concerns of health service beneficiaries as well as providers, with a focus on restoring pre-existing facilities and operational functions that deliver essential services. At a broader level, preventing attacks on healthcare facilities and staff requires sustained effort at international, national and community levels. Moreover, garnering support and acceptance from local communities and influencers, including local authorities, appears to be critical, suggesting that health actors should aim to educate those around them while maintaining the perception of their impartiality and neutrality;^{218 219} further work to identify effective and efficient ways of doing this may be similarly critical. Further training and counselling of less-skilled health workers to enable appropriate task-shifting/sharing is required to better exploit delivery opportunities along the continuum of care, including community-based delivery.

Correction notice This article has been corrected since it was published online to fix the word review in title.

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REFERENCES

- 1 Coninx R. Tuberculosis in complex emergencies. *Bull World Health Organ* 2007;85:637–40.
- 2 Hammer CC, Brainard J, Hunter PR. Risk factors and risk factor cascades for communicable disease outbreaks in complex humanitarian emergencies: a qualitative systematic review. *BMJ Glob Health* 2018;3:e000647. doi:10.1136/bmjgh-2017-000647
- 3 Grundy J, Biggs B-A. The impact of conflict on immunisation coverage in 16 countries. *Int J Health Policy Manag* 2018;8:211–21.
- 4 Connolly MA, Heymann DL. Deadly comrades: war and infectious diseases. *The Lancet* 2002;360:s23–4.
- 5 Culbert H, Tu D, O'Brien DP, et al. HIV treatment in a conflict setting: outcomes and experiences from Bukavu, Democratic Republic of the Congo. *PLoS Med* 2007;4:e129.
- 6 de Lima Pereira A, Southgate R, Ahmed H, et al. Infectious disease risk and vaccination in northern Syria after 5 years of civil war: the MSF experience. *PLoS Curr* 2018;10. doi:10.1371/currents.dis.bb5f22928e631dff9a80377309381feb. [Epub ahead of print: 02 Feb 2018].
- 7 Ismail SA, Abbara A, Collin SM, et al. Communicable disease surveillance and control in the context of conflict and mass displacement in Syria. *Int J Infect Dis* 2016;47:15–22.
- 8 Connolly MA, Gayer M, Ryan MJ, et al. Communicable diseases in complex emergencies: impact and challenges. *The Lancet* 2004;364:1974–83.
- 9 Elias CJ, Alexander BH, Sokly T. Infectious disease control in a long-term refugee camp: the role of epidemiologic surveillance and investigation. *Am J Public Health* 1990;80:824–8.
- 10 Frison S, Smith J, Blanchet K. Does the humanitarian sector use evidence-informed standards? A review of the 2011 sphere indicators for wash, food security and nutrition, and health action. *PLoS Curr* 2018;10. doi:10.1371/currents.dis.40805a591152be1c1431b5dad43e516d. [Epub ahead of print: 30 Nov 2018].
- 11 Blanchet K, Sistenich V, Ramesh A, et al. An evidence review of research on health interventions in humanitarian crises. *LSHTM* 2015.
- 12 Lam E, McCarthy A, Brennan M. Vaccine-Preventable diseases in humanitarian emergencies among refugee and internally-displaced populations. *Hum Vaccin Immunother* 2015;11:2627–36.

- 13 Singh NS, Smith J, Aryasinghe S, *et al*. Evaluating the effectiveness of sexual and reproductive health services during humanitarian crises: a systematic review. *PLoS One* 2018;13:e0199300.
- 14 Wagner Z, Heft-Neal S, Bhutta ZA, *et al*. Armed conflict and child mortality in Africa: a geospatial analysis. *The Lancet* 2018;392:857–65.
- 15 Wagner Z, Heft-Neal S, Wise PH, *et al*. Women and children living in areas of armed conflict in Africa: a geospatial analysis of mortality and orphanhood. *Lancet Glob Health* 2019;7:e1622–31.
- 16 World bank country and lending groups: the world bank group, 2018. Available: <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>
- 17 Panic M. Reconstruction, development and sustainable peace: a unified programme for post-conflict countries, 2005. Available: <https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/CDP-bp-2005-8.pdf>
- 18 Aaby P, Hedegaard K, Sodemann M, *et al*. Childhood mortality after oral polio immunisation campaign in Guinea-Bissau. *Vaccine* 2005;23:1746–51.
- 19 Aaby P, Garly ML, Bale C, *et al*. Survival of previously measles-vaccinated and measles-unvaccinated children in an emergency situation: an unplanned study. *Pediatr Infect Dis J* 2003;22:798–805.
- 20 Abdullah S, Al Ardi R RS. *Scaling up nutrition services and maintaining service during conflict in Yemen: lessons from the Hodeidah sub-national nutrition cluster*. New York, NY: UNICEF, 2016.
- 21 Adam IF. Evidence from cluster surveys on the association between home-based counseling and use of family planning in conflict-affected Darfur. *Int J Gynaecol Obstet* 2016;133:221–5.
- 22 Adam IF, Nakamura K, Kizuki M, *et al*. Relationship between implementing interpersonal communication and mass education campaigns in emergency settings and use of reproductive healthcare services: evidence from Darfur, Sudan. *BMJ Open* 2015;5:e008285.
- 23 Agutu WO. Short-Course tuberculosis chemotherapy in rural Somalia. *East Afr Med J* 1997;74:348–52.
- 24 Ahmadzai Het *et al*. Scaling up TB dots in a fragile state: post-conflict Afghanistan. *Int J Tuberc Lung Dis* 2008;12:180–5.
- 25 Ahoua L, Tamrat A, Duroch F, *et al*. High mortality in an internally displaced population in Ituri, Democratic Republic of Congo, 2005: results of a rapid assessment under difficult conditions. *Glob Public Health* 2006;1:195–204.
- 26 Al-Kamel MA. Impact of leishmaniasis in women: a practical review with an update on my ISD-supported initiative to combat leishmaniasis in Yemen (ELYP). *Int J Womens Dermatol* 2016;2:93–101.
- 27 Alleman MM, Chitale R, Burns CC, *et al*. Vaccine-Derived polioviruses outbreaks and events in 3 provinces of Democratic Republic of the Congo, 2017. *WHO Weekly epidemiological record* 2018;93:117–32.
- 28 Ambler MT, Dubowitz LM, Arunjerda R, *et al*. The neurological assessment in young children treated with artesunate monotherapy or artesunate-mefloquine combination therapy for uncomplicated Plasmodium falciparum malaria. *Malar J* 2009;8:207.
- 29 Apiyo R. *Regional supply hub mechanism as a strategy for wash emergency response in Somalia*. Nairobi, Kenya: UNICEF, 2014.
- 30 Ashley EA, Krudsood S, Phaiphun L, *et al*. Randomized, controlled Dose-Optimization studies of Dihydroartemisinin-Piperaquine for the treatment of uncomplicated Multidrug-Resistant falciparum malaria in Thailand. *J Infect Dis* 2004;190:1773–82.
- 31 Ashley EA, Lwin KM, McGready R, *et al*. An open label randomized comparison of mefloquine-artesunate as separate tablets vs. a new co-formulated combination for the treatment of uncomplicated multidrug-resistant falciparum malaria in Thailand. *Trop Med Int Health* 2006;11:1653–60.
- 32 Ashley EA, McGready R, Hutagalung R, *et al*. A randomized, controlled study of a simple, once-daily regimen of dihydroartemisinin-piperaquine for the treatment of uncomplicated, multidrug-resistant falciparum malaria. *Clin Infect Dis* 2005;41:425–32.
- 33 Augusto GF. Use of services for prevention of mother-to-child transmission in Angola: a retrospective analysis. *J Public Health* 2016;38:371–7.
- 34 Azman AS, Parker LA, Rumunu J, *et al*. Effectiveness of one dose of oral cholera vaccine in response to an outbreak: a case-cohort study. *The Lancet Global Health* 2016;4:e856–63.
- 35 Azman AS, Rumunu J, Abubakar A, *et al*. Population-Level effect of cholera vaccine on displaced populations, South Sudan, 2014. *Emerg Infect Dis* 2016;22:1067–70.
- 36 Bam TS, Enarson DA, Hinderaker SG, *et al*. High success rate of TB treatment among Bhutanese refugees in Nepal. *Int J Tuberc Lung Dis* 2007;11:54–8.
- 37 Banks T, Kang J, Watts I, *et al*. High hepatitis B seroprevalence and risk factors for infection in pregnant women on the Thailand-Myanmar border. *J Infect Dev Ctries* 2016;10:384–8.
- 38 Bannink-Mbazzi F, Lowicki-Zucca M, Ojom L, *et al*. High PMTCT program uptake and coverage of mothers, their partners, and babies in northern Uganda: achievements and lessons learned over 10 years of implementation (2002–2011). *J Acquir Immune Defic Syndr* 2013;62:138–45.
- 39 Barr RG, Menzies R. The effect of war on tuberculosis. Results of a tuberculin survey among displaced persons in El Salvador and a review of the literature. *Tuber Lung Dis* 1994;75:251–9.
- 40 Bekolo CE, van Loenhout JAF, Rodriguez-Llanes JM, *et al*. A retrospective analysis of oral cholera vaccine use, disease severity and deaths during an outbreak in South Sudan. *Bull World Health Organ* 2016;94:667–74.
- 41 Benjamin JA. Aids prevention for refugees. The case of Rwandans in Tanzania. *Aids* 1996;3:4–9.
- 42 Benny E, Mesere K, Pavlin BI, *et al*. A large outbreak of shigellosis commencing in an internally displaced population, Papua New Guinea, 2013. *Western Pacific Surveillance and Response* 2014;5:18–21.
- 43 Bile KM, Shadoul AF, Raajmakers H, *et al*. Learning through crisis: development and implementation of a health cluster strategy for internally displaced persons. *East Mediterr Health J* 2010;16:82–90.
- 44 Bohler M, Mustafaa SA, Morkve O. Tuberculosis treatment outcome and health services: a comparison of displaced and settled population groups in Khartoum, Sudan. *Int J Tuberc Lung Dis* 2005;9:32–6.
- 45 Boru WG, Kikui G, Omollo J, *et al*. Aetiology and factors associated with bacterial diarrhoeal diseases amongst urban refugee children in Eastleigh, Kenya: a case control study. *African Journal of Laboratory Medicine* 2013;2.
- 46 Bouma MJ, Parvez SD, Nesbit R, *et al*. Malaria control using permethrin applied to tents of nomadic Afghan refugees in northern Pakistan. *Bull World Health Organ* 1996;74:413–21.
- 47 Brooks HM, Jean Paul MK, Claude KM, *et al*. Use and misuse of malaria bed nets in an internally displaced persons cAMP in the Democratic Republic of the Congo: a mixed-methods study. *PLoS One* 2017;12:e0185290.
- 48 Brown V, Reilley B, Ferrir M-C, *et al*. Cholera outbreak during massive influx of Rwandan returnees in November, 1996. *The Lancet* 1997;349:212.
- 49 Burns M, Rowland M, N'Guessan R, *et al*. Insecticide-Treated plastic sheeting for emergency malaria prevention and shelter among displaced populations: an observational cohort study in a refugee setting in Sierra Leone. *Am J Trop Med Hyg* 2012;87:242–50.
- 50 Bustami F, Khraisha S. Enterobius vermicularis infection in three refugee camps in Jordan. *Jordan Medical Journal* 2010;44:432–6.
- 51 Carrara VI, Sirilak S, Thonglirum J, *et al*. Deployment of early diagnosis and Mefloquine-artesunate treatment of falciparum malaria in Thailand: the Tak malaria initiative. *PLoS Med* 2006;3:e183–64.
- 52 Casey SE, Larsen MM, McGinn T, *et al*. Changes in HIV/AIDS/STI knowledge, attitudes, and behaviours among the youth in Port Loko, Sierra Leone. *Glob Public Health* 2006;1:249–63.
- 53 CDC. *From the centers for disease control and prevention. outbreak of poliomyelitis-Angola, 1999*. United States, 1999.
- 54 CDC. *Progress toward poliomyelitis eradication during armed conflict-Somalia and southern Sudan, January 1998-June 1999*. United States, 1999.
- 55 Centers for Disease Control and Prevention (CDC). Progress toward poliomyelitis eradication--Afghanistan, 1994-1999. *MMWR Morb Mortal Wkly Rep* 1999;48:825–8.
- 56 Cetorelli V. The impact of the Iraq war on neonatal polio immunisation coverage: a quasi-experimental study. *J Epidemiol Community Health* 2015;69:226–31.
- 57 Charchuk R, Houston S, Hawkes MT. Elevated prevalence of malnutrition and malaria among school-aged children and adolescents in war-ravaged South Sudan. *Pathog Glob Health* 2015;109:395–400.
- 58 Charlwood JD, Qassim M, Elinsur EI, *et al*. The impact of indoor residual spraying with malathion on malaria in refugee camps in eastern Sudan. *Acta Trop* 2001;80:1–8.
- 59 Ciglenecki I, Masson S, Peyraud N, *et al*. Vaccinations in acute humanitarian emergencies: Minkamman, lakes state, South Sudan. *Trop Med Int Health* 2015;20.

- 60 Coldiron ME, Lasry E, Bouhenia M, *et al.* Intermittent preventive treatment for malaria among children in a refugee cAMP in northern Uganda: lessons learned. *Malar J* 2017;16:218.
- 61 Cookson ST, Abaza H, Clarke KR, *et al.* "Impact of and response to increased tuberculosis prevalence among Syrian refugees compared with Jordanian tuberculosis prevalence: case study of a tuberculosis public health strategy". *Confl Health* 2015;9:18.
- 62 Cossa HA, Gloyd S, Vaz RG, *et al.* Syphilis and HIV infection among displaced pregnant women in rural Mozambique. *Int J STD AIDS* 1994;5:117–23.
- 63 Culbert H, Tu D, O'Brien DP, *et al.* HIV treatment in a conflict setting: outcomes and experiences from Bukavu, Democratic Republic of the Congo. *PLoS Med* 2007;4:e129.
- 64 de Lima Pereira A, Southgate R, Ahmed H, *et al.* Infectious disease risk and vaccination in northern Syria after 5 years of civil war: the MSF experience. *PLoS currents* 2018;10.
- 65 Depoortere E, Guthmann J-P, Presse J, *et al.* Efficacy and effectiveness of the combination of sulfadoxine/pyrimethamine and a 3-day course of artesunate for the treatment of uncomplicated falciparum malaria in a refugee settlement in Zambia. *Trop Med Int Health* 2005;10:139–45.
- 66 Depoortere E, Guthmann J-P, Sipilanyambe N, *et al.* Adherence to the combination of sulphadoxine-pyrimethamine and artesunate in the Maheba refugee settlement, Zambia. *Trop Med Int Health* 2004;9:62–7.
- 67 Dierberg KL, Dorjee K, Salvo F, *et al.* Improved detection of tuberculosis and multidrug-resistant tuberculosis among Tibetan refugees, India. *Emerg Infect Dis* 2016;22:463–8.
- 68 Dolan G, ter Kuile FO, Nosten F, *et al.* Halofantrine versus mefloquine in treatment of multidrug-resistant falciparum malaria. *Lancet* 1993;341:1044–9.
- 69 Doumbouya B, Zaho M, Adouko S, *et al.* The challenge of maintaining continuum of care and support to PLHIV in health facilities located in military conflict zones in Ivory Coast. *J Int AIDS Soc* 2012;15.
- 70 Duroch F, Schulte-Hillen C. Care for victims of sexual violence, an organization pushed to its limits: the case of Médecins sans Frontières. *International Review of the Red Cross* 2014;96:601–24.
- 71 Ehui E, Couitchéré LS, Kouakou GA, *et al.* Antiretroviral chemoprophylaxis in children and adolescents victims of rape in Abidjan. *Médecine et Maladies Infectieuses* 2015;45:324–7.
- 72 Ellman T, Culbert H, Torres-Feced V. Treatment of AIDS in conflict-affected settings: a failure of imagination. *Lancet* 2005;365:278–80.
- 73 Elsayed A NM. Emergency measles control Activities—Darfur, Sudan, 2004. *Cdc Mmwr* 2004;53:897–9.
- 74 Erickson M, Goldenberg SM, Akello M, *et al.* Structural determinants of dual contraceptive use among female sex workers in conflict-affected Gulu, Northern Uganda. *Canadian Journal of Infectious Diseases and Medical Microbiology* 2015;26.
- 75 Ezard N, Burns M, Lynch C, *et al.* Efficacy of chloroquine in the treatment of uncomplicated Plasmodium falciparum infection in East Timor, 2000. *Acta Trop* 2003;88:87–90.
- 76 Fabiani M, Nattabi B, Opio AA, *et al.* A high prevalence of HIV-1 infection among pregnant women living in a rural district of North Uganda severely affected by civil strife. *Trans R Soc Trop Med Hyg* 2006;100:586–93.
- 77 Feroz F, Sherazi A, Ashgar A. *Nationwide measles vaccination campaign for children aged 6 months-12 years-Afghanistan, 2002.* United States, 2003.
- 78 Garang PG, Odoi RA, Kalyango JN. Adherence to antiretroviral therapy in conflict areas: a study among patients receiving treatment from Lacor Hospital, Uganda. *AIDS Patient Care STDS* 2009;23:743–7.
- 79 Garenne ML, Coninx R, Dupuy C. Effects of the civil war in central Mozambique and evaluation of the intervention of the International Committee of the red cross. *J Trop Pediatr* 1997;43:318–23.
- 80 Gaspar M, Leite F, Brumana L, *et al.* Epidemiology of meningococcal meningitis in Angola, 1994–2000. *Epidemiol Infect* 2001;127:421–4.
- 81 Gelaw Y, Abateneh A. Blinding trachoma among refugees: complicating social disaster. *Asian Pac J Trop Biomed* 2015;5:124–7.
- 82 Adhanom Ghebreyesus T, Alemayehu T, Bosma A, *et al.* Community participation in malaria control in Tigray region Ethiopia. *Acta Trop* 1996;61:145–56.
- 83 Goodrich S, Ndege S, Kimaiyo S, *et al.* Delivery of HIV care during the 2007 post-election crisis in Kenya: a case study analyzing the response of the academic model providing access to healthcare (AMPATH) program. *Confl Health* 2013;7:1–12.
- 84 Goodson J, Alexander J, Husain F. Measles - horn of Africa, 2010–2011. *MMWR Morb Mortal Wkly Rep* 2012;61:678–84.
- 85 Gorbacheva O, Mishra AK, Shapovalov D, *et al.* Prevalence of Bacteriologically confirmed pulmonary tuberculosis in the Bhutanese refugees in Nepal. Results of active case finding. *Int J Infect Dis* 2010;14:e150.
- 86 Graham K, Mohammad N, Rehman H, *et al.* Comparison of three pyrethroid treatments of top-sheets for malaria control in emergencies: entomological and user acceptance studies in an Afghan refugee cAMP in Pakistan. *Med Vet Entomol* 2002;16:199–206.
- 87 Graham K, Mohammad N, Rehman H, *et al.* Insecticide-Treated plastic tarpaulins for control of malaria vectors in refugee camps. *Med Vet Entomol* 2002;16:404–8.
- 88 Habib M, Soofi S, Cousens S, *et al.* Community engagement and integrated health and polio immunisation campaigns in conflict-affected areas of Pakistan: a cluster randomised controlled trial. *The Lancet* 2017;5:593–603.
- 89 Haelterman E, Boelaert M, Suetens C, *et al.* Impact of a mass vaccination campaign against a meningitis epidemic in a refugee cAMP. *Trop Med Int Health* 1996;1:385–92.
- 90 Hampton T. Innovative program offers HIV therapy to internally displaced persons in Uganda. *JAMA* 2008;300:493.
- 91 Hamze H, Charchuk R, Jean Paul MK, *et al.* Lack of household clustering of malaria in a complex humanitarian emergency: implications for active case detection. *Pathog Glob Health* 2016;110:223–7.
- 92 Hehenkamp A, Hargreaves S. Tuberculosis treatment in complex emergencies: South Sudan. *Lancet* 2003;362 Suppl:s30–1.
- 93 Helda E *et al.* Successful management of a national tuberculosis programme under conditions of war. *Int J Tuberc Lung Dis* 1997;1:16–24.
- 94 Hemhongs P, Tasaneeyapan T, Swaddiwudhipong W, *et al.* TB, HIV-associated TB and multidrug-resistant TB on Thailand's border with Myanmar, 2006–2007. *Trop Med Int Health* 2008;13:1288–96.
- 95 Hindiyyeh MY, Aboudy Y, Wohoush M, *et al.* Characterization of large mumps outbreak among vaccinated Palestinian refugees. *J Clin Microbiol* 2009;47:560–5.
- 96 Howard N, Durrani N, Sanda S, *et al.* Clinical trial of extended-dose chloroquine for treatment of resistant falciparum malaria among Afghan refugees in Pakistan. *Malar J* 2011;10:171.
- 97 Hutagalung R, Paiphun L, Ashley EA, *et al.* A randomized trial of artemether-lumefantrine versus mefloquine-artesunate for the treatment of uncomplicated multi-drug resistant Plasmodium falciparum on the Western border of Thailand. *Malar J* 2005;4:46.
- 98 ICRC. *Facts and figures 2016: Cotabato office*, 2016.
- 99 Iyer AS, Bouhenia M, Rumunu J, *et al.* Immune responses to an oral cholera vaccine in internally displaced persons in South Sudan. *Sci Rep* 2016;6:35742.
- 100 Jarallah JS. Tuberculosis among Afghani refugees: epidemiology, clinical pattern and assessment of default and non-compliance. *Saudi Med J* 1993;14:233–6.
- 101 Javaloy J *et al.* Follicular conjunctivitis caused by Chlamydia trachomatis in an infant Saharan population: molecular and clinical diagnosis. *British Journal of Ophthalmology* 2003;87:142–6.
- 102 Kaiser R, Kedamo T, Lane J, *et al.* HIV, syphilis, herpes simplex virus 2, and behavioral surveillance among conflict-affected populations in Yei and Rumbek, southern Sudan. *AIDS* 2006;20:942–4.
- 103 Kajechechiwa L, Thwin MM, Shee PW, *et al.* The acceptability of mass administrations of anti-malarial drugs as part of targeted malaria elimination in villages along the Thai-Myanmar border. *Malar J* 2016;15:494.
- 104 Kamadjeu R, Mahamud A, Webeck J, *et al.* Polio outbreak investigation and response in Somalia, 2013. *J Infect Dis* 2014;210 Suppl 1:S181–6.
- 105 Kasereka CM, Katsuva JPM, Hawkes M. Malaria case-finding and treatment strategies in an internally displaced persons (IDP) cAMP in the Democratic Republic of Congo. *Am J Trop Med Hyg* 2014;91:105.
- 106 Keus K, Houston S, Melaku Y, *et al.* Field research in humanitarian medical programmes. treatment of a cohort of tuberculosis patients using the Manyatta regimen in a conflict zone in South Sudan. *Trans R Soc Trop Med Hyg* 2003;97:614–8.
- 107 Kiboneka A, Nyatia RJ, Nabyiro C, *et al.* Combination antiretroviral therapy in population affected by conflict: outcomes from large cohort in northern Uganda. *BMJ* 2009;338:201:b201.
- 108 Kim AA, Malele F, Kaiser R, *et al.* HIV infection among internally displaced women and women residing in river populations along the Congo river, Democratic Republic of Congo. *AIDS Behav* 2009;13:914–20.

- 109 Kimani EW, Vulule JM, Kuria IW, *et al.* Use of insecticide-treated clothes for personal protection against malaria: a community trial. *Malar J* 2006;5:63.
- 110 Kline D, Dakkak H, Cami A, *et al.* Vaccination campaign for Kosovar Albanian refugee children—former Yugoslav Republic of Macedonia, April–May, 1999. *MMWR Morb Mortal Wkly Rep* 1999;48:799–803.
- 111 Koop DG, Jackson BM, Nestel G. Results of the expanded program on immunization in the Macedonian refugee camps. *Am J Public Health* 2001;91:1656–9.
- 112 Koscalova A M I. *Evaluation of two emergency interventions: outbreak of malaria and epidemic of measles, DRC.* Geneva, Switzerland: MSF, 2014.
- 113 Kouadio IK, Koffi AK, Attoh-Toure H, *et al.* Outbreak of measles and rubella in refugee transit camps. *Epidemiol Infect* 2009;137:1593–601.
- 114 Krause S, Williams H, Onyango MA, *et al.* Reproductive health services for Syrian refugees in Zaatri cAMP and Irbid City, Hashemite Kingdom of Jordan: an evaluation of the minimum initial services package. *Confl Health* 2015;9:S4–10.
- 115 Kruk ME, Rockers PC, Williams EH, *et al.* Availability of essential health services in post-conflict Liberia. *Bull World Health Organ* 2010;88:527–34.
- 116 Lam E, Al-Tamimi W, Russell SP, *et al.* Oral cholera vaccine coverage during an outbreak and humanitarian crisis, Iraq, 2015. *Emerg Infect Dis* 2017;23:38–45.
- 117 Legros D, Paquet C, Perea W, *et al.* Mass vaccination with a two-dose oral cholera vaccine in a refugee cAMP. *Bull World Health Organ* 1999;77:837–42.
- 118 Liddle KF, Elema R, Thi SS, *et al.* Tb treatment in a chronic complex emergency: treatment outcomes and experiences in Somalia. *Trans R Soc Trop Med Hyg* 2013;107:690–8.
- 119 Luxemburger C, Nosten F, Raimond SD, *et al.* Oral artesunate in the treatment of uncomplicated hyperparasitemic falciparum malaria. *Am J Trop Med Hyg* 1995;53:522–5.
- 120 Luxemburger C, van Vugt M, Jonathan S, *et al.* Treatment of vivax malaria on the Western border of Thailand. *Trans R Soc Trop Med Hyg* 1999;93:433–8.
- 121 Luxemburger C, Perea WA, Delmas G, *et al.* Permethrin-impregnated on the Thai-Burmese, bed nets for the prevention border. *Trans R Soc Trop Med Hyg* 1994;88:155–9.
- 122 Luxemburger C, ter Kuile FO, Nosten F, *et al.* Single day mefloquine-artesunate falciparum resistant malaria. *Trans R Soc Trop Med Hyg* 1994;88:213–7.
- 123 Luxemburger C, Thwai KL, White NJ, *et al.* The epidemiology of malaria in a Karen population on the Western border of Thailand. *Trans R Soc Trop Med Hyg* 1996;90:105–11.
- 124 Mahalanabis D, Choudhuri AB, Bagchi NG, *et al.* Oral fluid therapy of cholera among Bangladesh refugees[17]. *WHO South-East Asia journal of public health* 2012;1:105–12.
- 125 Makokha FM, Unshur A, Hussein A, *et al.* Coverage during an immunization campaign providing inactivated and oral polio vaccines in refugee camps and host communities, Kenya-December 2013. *Am J Trop Med Hyg* 2014;91:433.
- 126 Marfin AA *et al.* Infectious disease surveillance during emergency relief to Bhutanese refugees in Nepal. *J Am Med Assoc* 1994;272:377–81.
- 127 Matthys F, Male S ZL. Cholera outbreak among Rwandan refugees — Democratic Republic of Congo, April 1997. *CDC*;1998:389–91.
- 128 Mayaud P. The challenge of sexually transmitted infections control for HIV prevention in refugee settings: Rwandan refugees in Tanzania. *Trans R Soc Trop Med Hyg* 2001;95:121–4.
- 129 Mbaeyi C, Ryan MJ, Smith P, *et al.* Response to a large polio outbreak in a setting of conflict — middle East, 2013–2015. *MMWR Morb Mortal Wkly Rep* 2017;66:227–31.
- 130 McGinn T, Allen K. Improving refugees' reproductive health through literacy in Guinea. *Glob Public Health* 2006;1:229–48.
- 131 McGready R, Boel M, Rijken MJ, *et al.* Effect of early detection and treatment on malaria related maternal mortality on the north-western border of Thailand 1986–2010. *PLoS One* 2012;7:e40244.
- 132 McGready R, Brockman A, Cho T, *et al.* Randomized comparison of mefloquine-artesunate versus quinine in the treatment of multidrug-resistant falciparum malaria in pregnancy. *Trans R Soc Trop Med Hyg* 2000;94:689–93.
- 133 Mendelsohn JB, Schilperoord M, Spiegel P, *et al.* Is forced migration a barrier to treatment success? similar HIV treatment outcomes among refugees and a surrounding host community in Kuala Lumpur, Malaysia. *AIDS Behav* 2014;18:323–34.
- 134 Minetti A, Camelique O, Hsa Thaw K, *et al.* Tuberculosis treatment in a refugee and migrant population: 20 years of experience on the Thai-Burmese border. *Int J Tuberc Lung Dis* 2010;14:1589–95.
- 135 Morrison V. Contraceptive need among Cambodian refugees in Khao Phlu cAMP. *Int Fam Plan Perspect* 2000;26:188–92.
- 136 Msuya W, Mayaud P, Mkanje R, *et al.* Taking early action in emergencies to reduce the spread of STDs and HIV. *Afr Health* 1996;18:24.
- 137 Mupere E, Onek P, Babikako HM. Impact of emergency mass immunisations on measles control in displaced populations in Gulu district, Northern Uganda. *East Afr Med J* 2005;82:403–8.
- 138 Navarro-Colorado C, Mahamud A, Burton A, *et al.* Measles outbreak response among adolescent and adult Somali refugees displaced by famine in Kenya and Ethiopia, 2011. *J Infect Dis* 2014;210:1863–70.
- 139 Nnadi C, Damisa E, Esapa L, *et al.* Continued endemic wild poliovirus transmission in Security-Compromised areas — Nigeria, 2016. *MMWR Morb Mortal Wkly Rep* 2017;66:190–3.
- 140 Nosten F, Luxemburger C, Kyle DE, *et al.* Randomised double-blind placebo-controlled trial of SPf66 malaria vaccine in children in northwestern Thailand. *The Lancet* 1996;348:701–7.
- 141 Nosten F, McGready R, Simpson JA, *et al.* Effects of Plasmodium vivax malaria in pregnancy. *The Lancet* 1999;354:546–9.
- 142 Nosten F, ter Kuile F, Maelankirri L, *et al.* Malaria during pregnancy in an area of unstable endemicity. *Trans R Soc Trop Med Hyg* 1991;85:424–9.
- 143 Obol JH, Ononge S, Orach CG. Utilisation of insecticide treated nets among pregnant women in Gulu: a post conflict district in northern Uganda. *Afr Health Sci* 2013;13:962–9.
- 144 O'Brien DP, Mills C, Hamel C, *et al.* Universal access: the benefits and challenges in bringing integrated HIV care to isolated and conflict affected populations in the Republic of Congo. *Confl Health* 2009;3:1–10.
- 145 O'Laughlin KN, Kasozi J, Walensky RP, *et al.* Clinic-Based routine voluntary HIV testing in a refugee settlement in Uganda. *J Acquir Immune Defic Syndr* 2014;67:409–13.
- 146 Petersen E, Baekeland S, Memish ZA, *et al.* Infectious disease risk from the Syrian conflict. *Int J Infect Dis* 2013;17:e666–7.
- 147 Phares CR, Date K, Travers P, *et al.* Mass vaccination with a two-dose oral cholera vaccine in a long-standing refugee cAMP, Thailand. *Vaccine* 2016;34:128–33.
- 148 Plewes K, Lee T, Kajeewchewa L, *et al.* Low seroprevalence of HIV and syphilis in pregnant women in refugee camps on the Thai-Burma border. *Int J STD AIDS* 2008;19:833–7.
- 149 Porta MI, Lenglet A, de Weerd S, *et al.* Feasibility of a preventive mass vaccination campaign with two doses of oral cholera vaccine during a humanitarian emergency in South Sudan. *Trans R Soc Trop Med Hyg* 2014;108:810–5.
- 150 Porter JDH, Gastellu-Etchegorry M, Navarre I, *et al.* Measles outbreaks in the Mozambican refugee camps in Malawi: the continued need for an effective vaccine. *Int J Epidemiol* 1990;19:1072–7.
- 151 Price R, Luxemburger C, van Vugt M, *et al.* Artesunate and mefloquine in the treatment of uncomplicated multidrug-resistant hyperparasitaemic falciparum malaria. *Trans R Soc Trop Med Hyg* 1998;92:207–11.
- 152 Price R, Chongsuphajaisiddhi T, Luxemburger C, *et al.* Artesunate versus artemether for the treatment of recrudescing multidrug-resistant falciparum malaria. *Am J Trop Med Hyg* 1998;59:883–8.
- 153 Price RN, Nosten F, Luxemburger C, *et al.* Artesunate versus artemether in combination with mefloquine for the treatment of multidrug-resistant falciparum malaria. *Trans R Soc Trop Med Hyg* 1995;89:523–7.
- 154 Price RN, Nosten F, Luxemburger C, *et al.* Artesunate/mefloquine treatment of multi-drug resistant falciparum malaria. *Trans R Soc Trop Med Hyg* 1997;91:574–7.
- 155 Price RN, Nosten F, Luxemburger C, *et al.* Effects of artemisinin derivatives on malaria transmissibility. *The Lancet* 1996;347:1654–8.
- 156 Protopopoff N, Van Herp M, Maes P, *et al.* Vector control in a malaria epidemic occurring within a complex emergency situation in Burundi: a case study. *Malar J* 2007;6:93.
- 157 Raoult D, Ndiokubwayo JB, Tissot-Dupont H, *et al.* Outbreak of epidemic typhus associated with Trench fever in Burundi. *The Lancet* 1998;352:353–8.
- 158 Reid T, Engelgem IV TB, *et al.* Providing HIV care in the aftermath of Kenya's post-election violence Medecins SANS Frontieres' lessons learned January – March 2008. *Conflict and Health*;2008:1–5.
- 159 Reynolds MG, Emerson GL, Pukuta E, *et al.* Detection of human monkeypox in the Republic of the Congo following intensive community education. *Am J Trop Med Hyg* 2013;88:982–5.
- 160 Richards AK, Banek K, Mullany LC, *et al.* Cross-Border malaria control for internally displaced persons: observational results from

- a pilot programme in eastern Burma/Myanmar. *Trop Med Int Health* 2009;14:512–21.
- 161 Richardson L, Bush A GA. *An Independent Review of UNHCR's Response to the Somali Refugee Influx in Dollo Ado, Ethiopia, 2011*. Geneva, Switzerland: UNHCR, 2013.
- 162 Roca MG, Charle P, Jiménez S, et al. A new malaria protocol in a Congolese refugee cAMP in West Tanzania. *Glob Public Health* 2011;6:398–406.
- 163 Rodger AJ, Toole M, Lalnuntluangi B, et al. Dots-Based tuberculosis treatment and control during civil conflict and an HIV epidemic, Churachandpur district, India. *Bull World Health Organ* 2002;80:451–6.
- 164 Rosenberg JS, Bakomeza D. Let's talk about sex work in humanitarian settings: piloting a rights-based approach to working with refugee women selling sex in Kampala. *Reprod Health Matters* 2017;25:95–102.
- 165 Rowland M, Bouma M, Ducornez D, et al. Pyrethroid-impregnated bed nets for personal protection against malaria for Afghan refugees. *Trans R Soc Trop Med Hyg* 1996;90:357–61.
- 166 Rowland M, Downey G, Rab A, et al. Deet mosquito repellent provides personal protection against malaria: a household randomized trial in an Afghan refugee cAMP in Pakistan. *Trop Med Int Health* 2004;9:335–42.
- 167 Rowland M, Durrani N, Hewitt S, et al. Permethrin-treated chaddars and top-sheets: appropriate technology for protection against malaria in Afghanistan and other complex emergencies. *Trans R Soc Trop Med Hyg* 1999;93:465–72.
- 168 Rowland M, Durrani N, Kenward M, et al. Control of malaria in Pakistan by applying deltamethrin insecticide to cattle: a community-randomised trial. *The Lancet* 2001;357:1837–41.
- 169 Rowland M, Durrani N. Randomized controlled trials of 5- and 14-days primaquine therapy against relapses of vivax malaria in an Afghan refugee settlement in Pakistan. *Trans R Soc Trop Med Hyg* 1999;93:641–3.
- 170 Rowland M, Webster J, Saleh P, et al. Prevention of malaria in Afghanistan through social marketing of insecticide-treated nets: evaluation of coverage and effectiveness by cross-sectional surveys and passive surveillance. *Trop Med Int Health* 2002;7:813–22.
- 171 Rowland M, Hewitt S, Durrani N, et al. Sustainability of pyrethroid-impregnated bednets for malaria control in Afghan communities. *Bull World Health Organ* 1997;75:23–9.
- 172 Rowland M, Hewitt S, Durrani N. Prevalence of malaria in Afghan refugee villages in Pakistan sprayed with lambda-cyhalothrin or malathion. *Trans R Soc Trop Med Hyg* 1994;88:378–9.
- 173 Rowley EA, Spiegel PB, Tunze Z, et al. Differences in HIV-related behaviors at Lugufu refugee cAMP and surrounding host villages, Tanzania. *Confl Health* 2008;2:1–14.
- 174 Ruckstuhl L, Lengeler C, Moyon JM, et al. Malaria case management by community health workers in the central African Republic from 2009–2014: overcoming challenges of access and instability due to conflict. *Malar J* 2017;16:388.
- 175 Rull M, Masson S, Peyraud N, et al. The new who decision-making framework on vaccine use in acute humanitarian emergencies: MSF experience in Minkaman, South Sudan. *Confl Health* 2018;12:1–9.
- 176 Rutta E, Gongo R, Mwansasu A, et al. Prevention of mother-to-child transmission of HIV in a refugee cAMP setting in Tanzania 2008;3:62–76.
- 177 Rutta E, Kipingili R, Lukonge H, et al. Treatment outcome among Rwandan and Burundian refugees with sputum smear-positive tuberculosis in Ngara, Tanzania. *Int J Tuberc Lung Dis* 2001;5:628–32.
- 178 Salami O, Buzu A, Nzeme C. High level of adherence to HAART among refugees and internally displaced persons on HAART in Western equatorial region of southern Sudan. *J Int AIDS Soc* 2010;13:P123.
- 179 Sallam FA, Albably K, Zvandaziva C, et al. *Community engagement through local leadership: increasing access to nutrition services in a conflict setting in Yemen*. Sanaa, Yemen: Nutrition Exchange, 2018.
- 180 Salse N TS, Xavier KF, et al. *Effectiveness of nutritional supplementation (ready-to-use therapeutic food and multi micronutrient) in preventing malnutrition in children 6–59 months with infection (malaria, pneumonia, diarrhoea) in Uganda*. Geneva, Switzerland, 2013.
- 181 Santaniello-Newton A, Hunter PR. Management of an outbreak of meningococcal meningitis in a Sudanese refugee cAMP in northern Uganda. *Epidemiol Infect* 2000;124:75–81.
- 182 Saroufim M, Charafeddine K, Issa G, et al. Ongoing epidemic of cutaneous leishmaniasis among Syrian refugees, Lebanon. *Emerg Infect Dis* 2014;20:1712–5.
- 183 Seaman Jet al. Epidemic visceral leishmaniasis in southern Sudan: treatment of severely debilitated patients under wartime conditions and with limited resources. *Ann Intern Med* 1996;124:664–72.
- 184 Shamomesh M, Shamanesh M. The prevalence of urogenital Chlamydia trachomatis infection in a refugee community in El Salvador. *Department of Medicine, Middlesex Hospital* 1994;5:381–2.
- 185 M Shuaibu F, Birukila G, Usman S, et al. Mass immunization with inactivated polio vaccine in conflict zones – experience from Borno and Yobe states, north-eastern Nigeria. *J Public Health Policy* 2016;37:36–50.
- 186 Smithuis FM, van Woensel JB, Nordlander E, et al. Comparison of two mefloquine regimens for treatment of Plasmodium falciparum malaria on the northeastern Thai-Cambodian border. *Antimicrob Agents Chemother* 1993;37:1977–81.
- 187 Somigliana E, Sabino A, Schrettenbrunner C, et al. A comprehensive and integrated project to improve reproductive health at Oyam district, Northern Uganda: insights from maternal death review at the district hospital. *Arch Gynecol Obstet* 2011;283:645–9.
- 188 Spencer S, Grant AD, Piola P, et al. Malaria in camps for internally-displaced persons in Uganda: evaluation of an insecticide-treated bednet distribution programme. *Trans R Soc Trop Med Hyg* 2004;98:719–27.
- 189 Sukrakanchana-Trikham P, Puéchal X, Rigal J, et al. 10-Year assessment of treatment outcome among Cambodian refugees with sputum smear-positive tuberculosis in Khao-I-Dang, Thailand. *Tubercle and Lung Disease* 1992;73:384–7.
- 190 Swerdlow DL, Malenga G, Begkoyian G, et al. Epidemic cholera among refugees in Malawi, Africa: treatment and transmission. *Epidemiol Infect* 1997;118:207–14.
- 191 Tanaka Y, Kunii O, Hatano T, et al. Knowledge, attitude, and practice (KAP) of HIV prevention and HIV infection risks among Congolese refugees in Tanzania. *Health Place* 2008;14:434–52.
- 192 ter Kuile FO, Nosten F, Chongsuphajaisiddhi T, et al. Halofantrine versus mefloquine in treatment of multidrug-resistant falciparum malaria. *The Lancet* 1993;341:1044–9.
- 193 Tomashek KM, Woodruff BA, Bioland P, et al. Randomized intervention study comparing several regimens for the treatment of moderate anemia among refugee children in Kigoma region, Tanzania. *Am J Trop Med Hyg* 2001;64:164–71.
- 194 Toole MJ. Public health impact of Rwandan refugee crisis: what happened in Goma, Zaire, in July, 1994? *Lancet* 1995;345:339–44.
- 195 Tshipala D, Cornier N, Gounongbe M, et al. Ensuring continuity of antiretroviral therapy among displaced populations during Ivorian post-election violence, 2011. *J Int AIDS Soc* 2012;15:266–7.
- 196 UNICEF. *Evaluation of Social Mobilization Network (SMNet) - Final Report*. New York, NY: UNICEF, 2014.
- 197 UNICEF. *The UNICEF response to the crisis in the central African Republic*. New York, NY: UNICEF, 2016.
- 198 van Vugt M, Looareesuwan S, Wilairatana P, et al. Artemether-lumefantrine for the treatment of multidrug-resistant falciparum malaria. *Trans R Soc Trop Med Hyg* 2000;94:545–8.
- 199 Vugt MV, Gemperli B, White NJ, et al. Efficacy of six doses of artemether-lumefantrine (benflumetol) in multidrug-resistant Plasmodium falciparum malaria. *Am J Trop Med Hyg* 1999;60:936–42.
- 200 van Vugt M, Brockman A, Gemperli B, et al. Randomized comparison of Artemether-Benflumetol and Artesunate-Mefloquine in treatment of Multidrug-Resistant falciparum malaria. *Antimicrob Agents Chemother* 1998;42:135–9.
- 201 van Vugt M, Leonardi E, Phaipun L, et al. Treatment of uncomplicated Multidrug-Resistant falciparum malaria with Artesunate-Atovaquone-Proguanil. *Clinical Infectious Diseases* 2002;35:1498–504.
- 202 Vitek CR, Velibekov AS. Epidemic diphtheria in the 1990s: Azerbaijan. *J Infect Dis* 2000;181:S73–9.
- 203 Von Roenne A, Von Roenne F, Kollie S, et al. Reproductive health services for refugees by refugees: an example from Guinea. *Disasters* 2010;34:16–29.
- 204 WHO. *Combined use of inactivated and oral poliovirus vaccines in a large-scale campaign in refugee camps and host communities - Kenya, December 2013, 2014*.
- 205 WHO. *Expanded programme on immunization (Epi). poliomyelitis outbreak*. Switzerland, 1994.
- 206 WHO. *Oral cholera vaccine campaign among internally displaced persons in South Sudan*. World Health Organization, 2014.
- 207 WHO. *Poliomyelitis outbreak in Somalia and Kenya, 2013*. Switzerland, 2013.
- 208 WHO. *Prevention of measles deaths in Darfur, Sudan*. Switzerland, 2004.

- 209 WHO. *Progress toward poliomyelitis eradication-Democratic Republic of Congo, 1996-1999*. United States, 2000.
- 210 WHO/GPA. *Gpa joins emergency efforts in Rwanda*. Switzerland, 1994.
- 211 Witzig R, Ismail A, Sayer A, *et al*. Portable HECT-CL thermotherapy for *L. tropica* cutaneous leishmaniasis in Aleppo, Syria during 2014. *Trop Med Int Health* 2015;20:32.
- 212 Habib MA, Soofi S, Cousens S, *et al*. Community engagement and integrated health and polio immunisation campaigns in conflict-affected areas of Pakistan: a cluster randomised controlled trial. *The Lancet* 2017;5:e593.
- 213 United Nations Population Fund. Adolescent girls in disaster & conflict: Interventions for improving access to sexual and reproductive health services, 2016. Available: https://www.unfpa.org/sites/default/files/pub-pdf/UNFPA-Adolescent_Girls_in_Disaster_Conflict-Web.pdf
- 214 Norwegian Refugee Council and Internal Displacement Monitoring Centre. 2018 Global Report on Internal Displacement - The Americas, 2018. Available: <https://www.refworld.org/country,,IDMC,,HND,,5b28b7250,0.html> [Accessed 26 Jun 2019].
- 215 Kouadio IK, Kamigaki T, Oshitani H. Measles outbreaks in displaced populations: a review of transmission, morbidity and mortality associated factors. *BMC Int Health Hum Rights* 2010;10:5.
- 216 Bellos A, Mulholland K, O'Brien KL, *et al*. The burden of acute respiratory infections in crisis-affected populations: a systematic review. *Confl Health* 2010;4:3.
- 217 Relman DA, Choffnes ER. *The causes and impacts of neglected tropical and zoonotic diseases: opportunities for integrated intervention strategies*. National Academies Press, 2011.
- 218 The Sphere Handbook. *Humanitarian charter and minimum standards in humanitarian response*. 4th edn. Geneva, Switzerland: Practical Action Publishing, 2018.
- 219 Castro FG, Barrera M, Martinez CR, *et al*. The cultural adaptation of prevention interventions: resolving tensions between fidelity and fit. *Prev Sci* 2004;5:41-5.