Recognition of the need for evidence-based interventions to help to improve the effectiveness and efficiency of humanitarian responses has been increasing. However, little is known about the breadth and quality of evidence on health interventions in humanitarian crises. We describe the findings of a systematic review with the aim of examining the quantity and quality of evidence on public health interventions in humanitarian crises to identify key research gaps. We identified 345 studies published between 1980 and 2014 that met our inclusion criteria. The quantity of evidence varied substantially by health topic, from communicable diseases (n=131), nutrition (n=77), to non-communicable diseases (n=8), and water, sanitation, and hygiene (n=6). We observed common study design and weaknesses in the methods, which substantially the ability to determine causation and attribution of the interventions. Considering the major increase in health-related humanitarian activities in the past three decades and calls for a stronger evidence base, this paper highlights the limited quantity and quality of health intervention research in humanitarian contexts and supports calls to scale up this research.

Introduction
Worldwide, an estimated 172 million people are affected by armed conflict, including 59 million people who are forcibly displaced from their homes as internally displaced persons (IDPs) within their countries or refugees who have crossed an international border. This number is the highest forcibly displaced since World War 2. Additionally, natural disasters affect around 175 million people annually. The health effects for these populations can be enormous. Good information is needed. Recognition of the need for evidence-based interventions to help to improve the effectiveness and efficiency of humanitarian responses has been increasing. However, little is known about the breadth and quality of evidence on health interventions in humanitarian crises. We describe the findings of a systematic review with the aim of examining the quantity and quality of evidence on public health interventions in humanitarian crises to identify key research gaps. We identified 345 studies published between 1980 and 2014 that met our inclusion criteria. The quantity of evidence varied substantially by health topic, from communicable diseases (n=131), nutrition (n=77), to non-communicable diseases (n=8), and water, sanitation, and hygiene (n=6). We observed common study design and weaknesses in the methods, which substantially the ability to determine causation and attribution of the interventions. Considering the major increase in health-related humanitarian activities in the past three decades and calls for a stronger evidence base, this paper highlights the limited quantity and quality of health intervention research in humanitarian contexts and supports calls to scale up this research.

Key messages
- Evidence is important to guide more effective and efficient health responses in humanitarian contexts.
- On the basis of our systematic review, we found that evidence is limited both in quantity and quality.
- Most studies are able to show changes in health outcomes, but most are unable to attribute these changes to the intervention because of the study design used. Where logically and ethically possible, greater use of experimental and quasi-experimental study designs is needed.
- The findings support calls to scale up quality health research in humanitarian crises.
- Development of innovative integrated funding mechanisms to enable the combination of research projects with humanitarian assistance and create a global humanitarian evidence platform where data and evidence can be accessible to all communities (national authorities, donors, academics, and humanitarian agencies) are needed.
Panel: Methods for the systematic review

Inclusion criteria
The following health topics were included (based on topics commonly used in humanitarian guidelines such as the Sphere Project): communicable disease control; water, sanitation, and hygiene (WASH); nutrition; sexual and reproductive health (SRH), including gender-based violence (GBV); mental health and psychosocial support (MHPSS); non-communicable disease (NCD); and injury and physical rehabilitation.

Both armed conflicts and natural disasters were included because evidence from natural disasters can also be of value for humanitarian responses to armed conflict. We included acute and chronic humanitarian crises (including forced displacement) and early recovery periods. We only included studies from crises in low-income and middle-income countries because this is where most crises take place and preparedness and response resources are different when compared with high-income settings.

We followed a broad understanding of intervention effectiveness to gain a comprehensive understanding of the overall evidence base. Therefore, we included observational study designs that measured a change in health outcomes before, during, and after an intervention, as well as experimental and quasi-experimental study designs that compared against another intervention or control group.

Search strategy
We searched from Jan 1, 1980, to Dec 31, 2014, for studies in English or French in bibliographic databases of MEDLINE, Embase, Global Health, IBSS, and Web of Knowledge. We also used web-based grey literature sources. The search structure consisted of: (1) terms related to humanitarian crises or early recovery; (2) terms related to public health interventions and associated study designs; (3) terms related to lower-income and middle-income economies; and (4) terms related to each of the seven health topics above. Searches were supplemented by reviewing the reference lists (‘references of references’) of selected articles to find any other relevant papers.

Data collection, analysis, and reporting
Returned citations were downloaded to EndNote software and a five-stage screening process was applied (appendix p 2). Data of the final selected studies were extracted using a standardised form. The quality of the final selected studies was assessed using a condensed version of STROBE and CONSORT standards for observational studies and clinical trials, respectively (appendix p 3). The score ranges for both instruments were 0–8, with a priori thresholds applied of scores of 0–3 rated as low quality, 4–6 as moderate quality, and 7–8 as high quality. The study selection, data extraction, and study quality assessment were independently done by two researchers.

Descriptive analysis was used because it was not possible to do a meta-analysis in view of the heterogeneity of study designs, interventions, and outcomes. The actual effectiveness of health interventions was not assessed in view of the wide range of health outcomes and interventions, and the main focus of the review was on the overall quantity, quality, and the gaps in the evidence. The systematic review methodology adheres to the PRISMA statement.

Limitations of the review
This review chose to concentrate only on English and French papers. However, consultation with experts suggested these papers would probably account for most of available literature. The review included only quantitative studies. It is recognised that qualitative and mixed methodologies are important in understanding factors influencing effectiveness, particularly the needs and perceptions of local communities towards the appropriateness, acceptability, and uptake of interventions. For the sake of brevity, we also did not include studies on health systems and broader contextual factors, which might influence the delivery and effectiveness of public health interventions, but these are covered in a broader evidence review from which this paper derives.

Methods

Gaps in evidence
From an initial retrieval of nearly 50000 papers, this systematic literature review yielded 345 papers published between Jan 1, 1980, and Dec 31, 2014, that met the inclusion criteria (appendix p 1). 131 studies were from communicable disease control, six from WASH, 77 from nutrition, 15 from sexual and reproductive health, 61 from MHPSS, eight from non-communicable diseases (NCD), and 47 from injury and rehabilitation (figure 1; see full list in the appendix p 4). Overall, the frequency of publication increased over time, with nearly 80% of all papers published between Jan 1, 1980, and Dec 31, 2014. Further information about types of health outcomes, intervention types, geographical distribution, crisis and population types, and study designs are shown in the table.

A number of major gaps remain in terms of the health topics and interventions. For communicable diseases, the range of diseases addressed in the evidence broadly reflects the burden of communicable diseases in crisis settings, but several notable gaps exist. No studies on the effectiveness of interventions for acute respiratory infections were identified, despite the high morbidity, mortality, and case fatality rates from acute respiratory infections during humanitarian crises and the well documented need for further research on acute
respiratory infections interventions such as short-course therapies. Similarly, only single studies were identified for yellow fever, leptospirosis, mumps, onchocerciasis, and schistosomiasis, despite their burden in crisis-affected populations. A recent systematic review in 22 fragile states identified the most common causes of communicable disease outbreaks over the past decade (2000–10) and highlighted the disconnect between the causes of outbreaks and the number of studies. For example, although seven outbreaks of yellow fever occurred during this time period, only one study on yellow fever met the inclusion criteria of this review.

For WASH, only six studies met the inclusion criteria, because much WASH-related research focuses on water quality outcomes (eg, reductions in levels of faecal coliform), which are commonly used as a proxy for health outcomes (eg, diarrhoea), rather than measuring health outcomes themselves. There is also a strong evidence base on WASH interventions from stable settings. However, further research on WASH, specifically in crisis settings, is still required—for example, on the effectiveness of interventions on behaviour change for WASH, such as use of soap.

For nutrition, although there was a greater quantity of studies than most of the other topics, they were mainly focused on acute malnutrition (53%) and children aged between 6 months and 59 months (61%). Very little was found on other vulnerable groups (eg, pregnant women, infants, elderly people, people with disabilities, etc) and other outcomes. Few studies examined the effectiveness of Infant and Young Child Feeding interventions or microfinance and voucher programme interventions.

For sexual and reproductive health, only 15 studies were identified. Of these, only two examined the effectiveness of family planning interventions and four of emergency obstetric care. No studies sought to address the effectiveness of interventions to address the outcome of gender-based violence (eg, prevention and reduction programmes). No papers addressed interventions for post-abortion care or safe abortion. Further, no studies targeted adolescents, a key vulnerable population. These same gaps were observed more than a decade ago by the Inter-Agency Working Group on Reproductive Health in Crises. Although process indicators have been developed as reliable proxy measures of intervention effectiveness—for example, for emergency obstetric care that reduces the need to measure maternal mortality, the evidence from sexual and reproductive health still seems to be extremely limited overall.

In MHPSS, a comparatively high number of studies (n=61) were identified and 39 of these were experimental studies, which is encouraging. However, the evidence base for MHPSS interventions in stable settings is generally weaker than for the other topics and so it less possible to generalise findings to crisis-affected settings. Additionally, the cultural specificity of MHPSS combined with the particular risk factors (eg, trauma event exposure and acute daily stressors) and their mental health sequelae in crisis setting require very context-specific interventions. Therefore, a substantially greater number of MHPSS intervention studies are required from these settings, as also highlighted elsewhere. The studies identified in the review focused predominantly on psychological interventions for post-traumatic stress disorder [PTSD] in particular, and although several were on psychosocial interventions, these provided weaker evidence on effectiveness and were of a poorer methodological quality, despite them being the most commonly practiced MHPSS interventions. Particular disorders that seem to be neglected include alcohol and other substance use disorders (no studies identified), while there is also very little evidence on how interventions influence overall functioning (as opposed to specific mental disorders). Evidence on MHPSS interventions with certain vulnerable groups was also very lacking. For example, only two studies were identified on interventions addressing the MHPSS needs of survivors of gender-based violence. No studies were identified that specifically looked at older age populations, despite them commonly having an increased burden of mental health disorders.

The evidence base for NCDs was extremely limited, with only eight studies identified (addressing diabetes, cardiovascular disease, thalassaemia, arthritis, and chronic kidney disease), but no intervention studies on other major NCDs, such as cancers. No studies examined how chronic disease interventions implemented during the acute phase were maintained over time by the local health system. Also, no intervention studies investigated preventing NCDs, despite the potential to do so in longer-term chronic, stable, and early recovery phases. This absence of evidence on NCDs is clearly a major gap in view of the rise of NCDs in low-income and middle-income settings and the concern on how to most effectively address them in crisis-affected populations.
Almost all injury and rehabilitation research (40 of 47 studies) occurred in the general population (48%); and so refugees (31%), IDPs (9%), and entrapped populations (12%) are under-researched for this topic. Only seven studies measured the effectiveness of rehabilitation interventions. The other 40 studies focused on the effectiveness of surgery and other medical interventions. As a result, most studies (62%) took place during armed conflict settings and little research has been done in natural disaster contexts.

A major gap common to all the health topics was the absence of economic data. Only 12 of 345 studies included with NCDs being the major health issues in crises such as in Syria, Iraq, and Ukraine.43,53

(Tables continue on next page)
economic components in the study design (five on communicable disease, four on nutrition, one on sexual and reproductive health, one on MHPSS, and one on injury and rehabilitation). Therefore, crucial information about the costs, efficiencies, and cost-effectiveness to guide decision making on implementing health interventions in humanitarian crises is scarce, including on the potential to scale up interventions. Although evidence does exist from stable settings on cost-effectiveness for several relevant interventions, the ability of decision-makers to draw robust conclusions about comparative effectiveness and efficiency of a range of interventions for other topics remains restricted. For example, increasing concerns are arising over the costs of treating NCDs among conflict-affected populations, and yet no economic studies of NCD interventions were identified in our review.

The bulk of evidence relates to refugee populations. Generation of more evidence and guidelines for dispersed refugee and IDP populations is important, particularly those in urban areas (eg, refugee populations in dispersed areas in Lebanon). We were also not able to categorise the crisis phase due to inconsistent or incomplete information about this in the studies. Intersectoral intervention studies were lacking, despite the potential for improved effectiveness and efficiency for more integrated approaches between sectors such as protection, education, health, WASH, and nutrition. For example, although most studies of malaria assessing acute clinical and parasitological outcomes measured anaemia and haematocrit as part of routine malarial monitoring, none of these studies related to a nutrition intervention.

**Strength and quality of evidence**

The strength of evidence based on the range of study designs was generally quite weak. In terms of study design classifications, only 39% of studies used experimental designs of randomised controlled trials (RCTs) (n=89) or quasi-experimental study designs (n=45), which could show attribution of interventions to changes in health outcomes. Such studies were also predominantly for communicable diseases among refugee populations in sub-Saharan Africa, and so there is a deficit of experimental studies for other outcomes in other populations and regions. Of the observational study designs, 66 (19%) were cohort studies, 77 (22%) were uncontrolled longitudinal studies, 30 (9%) were uncontrolled before and after studies, eight (2%) were case-control studies, 19 (6%) were follow-up cross-sectional, and 11 (3%) were cross-sectional (figure 2). Evidence of attribution was particularly weak for the topics of sexual and reproductive health, NCDs, and injury and rehabilitation, with most studies in these health topics using preintervention and postintervention follow-up cross-sectional designs. The issue was further compounded with some authors claiming attribution of interventions on health outcomes, which could not be supported by the study designs, with little recognition given to the potential for bias and confounding in such study designs. The lack of comparison groups in most studies also means that secular trends cannot be discounted.

Understanding whether interventions were associated with changes in health outcomes was further inhibited by the absence of statistical data. Of the 345 studies, only 218 studies (63%) provided some statistical measure of differences between intervention and outcome. This absence of statistical data also meant that, where appropriate, insufficient adjustment for potential confounders took place. The topics of injury and rehabilitation and sexual and reproductive health were particularly weak on this matter. In injury and rehabilitation studies, little is reported on the dropout

<table>
<thead>
<tr>
<th>Population type</th>
<th>Conflict</th>
<th>Disaster</th>
<th>Both</th>
<th>Total N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrapped</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>41</td>
</tr>
<tr>
<td>General population</td>
<td>41 (32%)</td>
<td>0</td>
<td>50 (59%)</td>
<td>165</td>
</tr>
<tr>
<td>IDP</td>
<td>12 (9%)</td>
<td>4 (67%)</td>
<td>14 (17%)</td>
<td>32</td>
</tr>
<tr>
<td>Refugee</td>
<td>77 (59%)</td>
<td>2 (33%)</td>
<td>20 (24%)</td>
<td>106</td>
</tr>
<tr>
<td>Multiple</td>
<td>0</td>
<td>0</td>
<td>1 (1%)</td>
<td>1</td>
</tr>
</tbody>
</table>

Table: Selected results per health topic

<table>
<thead>
<tr>
<th>Crisis type</th>
<th>Communicable disease</th>
<th>WASH</th>
<th>Nutrition</th>
<th>SRH</th>
<th>MHPSS</th>
<th>NCD</th>
<th>Injury and rehabilitation</th>
<th>Total N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conflict</td>
<td>117 (90%)</td>
<td>5 (7%)</td>
<td>41 (48%)</td>
<td>10 (74%)</td>
<td>45 (74%)</td>
<td>4 (80%)</td>
<td>27 (62%)</td>
<td>248</td>
</tr>
<tr>
<td>Disaster</td>
<td>13 (10%)</td>
<td>1 (29%)</td>
<td>30 (35%)</td>
<td>2 (12%)</td>
<td>11 (18%)</td>
<td>1 (20%)</td>
<td>17 (38%)</td>
<td>78</td>
</tr>
<tr>
<td>Both</td>
<td>0</td>
<td>0</td>
<td>14 (17%)</td>
<td>2 (13%)</td>
<td>5 (8%)</td>
<td>0</td>
<td>0</td>
<td>19</td>
</tr>
</tbody>
</table>

Percentages are proportion of papers for each health topic. WASH=water, sanitation, and hygiene. SRH=sexual and reproductive health. MHPSS=mental health and psychosocial support. NCD=non-communicable diseases. STI=sexually transmitted infections. CVD=cardiovascular disease. DOTS=directly observed treatment, short course. SAM=severe acute malnutrition. TSFP=targeted supplementary feeding programme. BSFP=blanket supplementary feeding programme. RCT=randomised controlled trial. IDP=internally displaced populations.
rate and the characteristics of cases (eg, type and severity of injury, socioeconomic status), which could not be followed up and outcome measures are not defined with accuracy and details (eg, infection rates without describing the type of infection and degree). Even with nutrition, which generally had a higher quantity and quality of studies than most other topics, only 27 of the 77 studies presented adjusted analysis (mainly for age and sex). Studies were also weak at describing the limitations of the methods. For example, only 22 nutrition studies presented limitations.

Overall, 35% of the studies selected were graded as high quality, 35% as moderate quality, and 30% as low quality (figure 3). The health topics with the highest proportion of studies rated as high quality were communicable diseases, MHPSS, and NCDs (albeit of only eight studies). Injury and rehabilitation results were graded to be of the poorest quality, with 4% (two of 47 studies) being graded high and 57% being graded low quality. Several commonly recurring weaknesses in the methods were noted. These weaknesses included that blinding was rarely used, including in most RCTs, which risks reporting bias of health outcomes (although it is recognised that for several interventions and contexts blinding is not possible or appropriate). There was also little use of stratification—eg, by sex or age (with the exception of studies on nutrition and communicable disease), and so potentially differing health outcomes in more vulnerable groups is missing. For example, conflict-affected women and older populations commonly reported high levels of mental disorders, but there was only limited stratification of results by sex or age in the MHPSS research. Other key quality weaknesses concerned the absence of reporting on sampling methods, randomisation procedures, addressing for potential confounding factors, and possible biases through sampling and statistical procedures. Reporting of missing data was weak, and although loss to follow-up is to be expected in the transient and volatile settings of humanitarian crisis, the absence of clear reporting and attempts to adjust for missing data was problematic. Similar weaknesses in the methods have also been shown in other recent reviews of health research in humanitarian crises.12,14,25,47,54

Taken alone, these weaknesses might not substantially affect the ability to assess the impact of a given intervention, but in combination these weaknesses have the potential to greatly undermine the interpretation of results.

**What might explain this limited evidence base?**

This systematic review highlights major gaps in the evidence, with only 345 studies identified since 1980 meeting the inclusion criteria for assessing the effectiveness of health interventions in humanitarian crises. Clearly, other important sources of information are available on effectiveness, such as mortality and nutritional surveys, routine surveillance data, case-fatality, and attack rates,55,56 and the use of reliable proxy process indicators.6 Similarly, evidence on effectiveness of interventions and treatments from stable settings has been successfully applied in crisis settings, such as vaccination programmes, vitamin A supplementation, insecticide-treated nets, exclusive breastfeeding, oral rehydration, antibiotics for pneumonia, and WASH activities.46,47,48,57 However, many questions remain on how evidence generated in stable settings can really be generalised to emergency situations.68 Humanitarian interventions take place in very specific situations where populations are in a state of distress and flux, health workers are in situations of insecurity, and financial and
other resources are often limited. All these contextual elements affect the way health interventions are implemented (eg, limited use of usual standard guidelines in emergency obstetrics\(^8\)) and can create selection biases because populations in need are often hard to reach.\(^9\)

What is perhaps most frustrating is that many of the gaps identified, such as the limited use of experimental and quasi-experimental data, cohort data, and economic data, had already been identified more than 30 years ago and have been regularly highlighted since then.\(^{5,15-17}\)

What might explain the persistence of such gaps?

First, and most obviously, are the barriers to doing research in crisis-affected settings such as insecurity, and logistical, time, and resource constraints.\(^{51-53}\)

The combination of frequent population movement, potentially overlapping health services, and fluid range of other potential determinants of effectiveness further restrict the methodological ability to isolate and measure the effects of individual health interventions. Uncertain funding patterns might also lead to interventions being added to existing services at unpredictable times, which reduces the ability to establish studies and attribute causation. However, as shown in this review, there are numerous examples of rigorous research using RCTs in humanitarian settings and their value in such settings has been recognised.\(^{64-67}\)

There are clearly also time pressures to collect operationally useful data in such settings in view of the need for prompt humanitarian responses and opportunity costs to collecting more robust data. However, alternative designs could be applied. For example, where standard RCTs are not operationally or ethically possible, adjusted approaches such as stepped wedge designs could be used more widely to establish a counterfactual through the use of a control group while still being operationally and ethically acceptable.\(^{68-70}\)

Greater use of longitudinal data and routine health service data could be made, as successfully applied with antiretroviral treatment for HIV/AIDS in conflict-affected areas,\(^{71}\) and capitalising on statistical methods such as interrupted time series analysis. More recently, studies also provided methodological guidance on how to do cohort studies for NCD interventions in fragile settings.\(^72\)

Although not being able to show attribution, these types of studies can at least show changes in health outcomes over time and avoid reliance on input and output measures. Additionally, important studies have been done using case study designs or surveillance data that had a positive effect on international policies and practice such as measles vaccination during humanitarian crises,\(^73\) mass campaign of meningitis vaccination in refugee camps,\(^74\) nutritional requirements for refugee populations,\(^75\) and understanding mortality patterns.\(^76\)

In each of these examples, quasi-experimental or experimental studies such as RCTs would have been inappropriate.

Many ethical challenges require consideration when doing research in humanitarian crises in view of the added vulnerability of populations affected by humanitarian crises.\(^77-79\)

In addition, obtaining ethical approval for health research studies from national authorities that, in time of distress, are often disorganised or have other priorities is challenging. Further ethical approval challenges to evaluating new interventions that have not yet been formally approved by WHO or national protocols such as new vaccines or vaccine regimens exist. However, ethical imperative to collect good data in such settings to ensure the most effective interventions are being delivered and best possible health outcomes achieved within the constraints of those settings is strong.\(^80\)

Additionally, funds earmarked for displaced people often cannot be used for surrounding national populations and further evidence is needed on both displaced and surrounding nationals.

Another explanation might lie in the culture of humanitarianism. Arguably, before the 1990s, questioning the effectiveness of humanitarian action in the humanitarian field was almost considered as inappropriate, and that effectiveness research somehow questioned the noble foundations of humanitarian aid in saving lives and providing immediate assistance to victims.\(^81-83\)

As a result, measurement of evidence on the effect of humanitarian interventions was therefore not integrated into humanitarian organisations’ practice.\(^84-86\)

Instead, they primarily focused on reporting to their donors process indicators relating to inputs and outputs rather than measuring the actual effectiveness of their activities on health outcomes.\(^87,88,89\)

The limited evidence base could also reflect little financial and technical capacity to do research in such settings. In a climate of shrinking resources relative to the burgeoning emergencies, undertaking research in these settings is not possible without resources dedicated to undertaking such studies. Too often researchers do not have sufficient funds to undertake the proposed research, and thus rely on the operational agencies to provide logistics as well as much of their precious time to understand the situation and put it in context.

Therefore, the operational agencies might need funding specifically to ensure that they have sufficient resources to undertake research with academics. Research skills, particularly epidemiological skills, of national and international health professionals working in humanitarian crises need to be improved,\(^90\) particularly for using alternative approaches such as stepped wedge designs and interrupted time series analysis. Systems in place to coordinate and share data for effectiveness and the research methods to collect such data are often limited.\(^91,92\)

The research community has also failed to adequately engage with the humanitarian sector and to collect, disseminate, and share operationally useful data with practitioners and policy makers in an accessible format. As a result, research and evidence have had little effect on decisions made by humanitarian professionals.\(^93-95\)

Integrating evidence into practice...
Series

will require not only a change in perspective from within the humanitarian community, but also how researchers and academics engage in research to ensure that research is perceived to be of value to the humanitarian community and that findings are taken up and incorporated into humanitarian practice.56,83,84

Signs of progress?

Despite the findings from this review suggesting some major gaps in the evidence base on health interventions in humanitarian crises, there are positive developments. Our review found that the quantity and quality of evidence has substantially increased over time, with 79% of the high quality literature being produced since 2000. Several reasons could explain this increase. The high profile failures in humanitarian responses to crises in Rwanda, Darfur, Sri Lanka, and Haiti have focused efforts to improve the quality and accountability of humanitarian activities.19–22 The related development and use of key guidelines and minimum standards such as the Sphere Standards, Inter-Agency Standing Committee guidelines, and Health Cluster Guides have provided more evidence-informed approaches to healthcare delivery, although some standards are not based on evidence (eg, the recommended 15 L of clean drinking water in the SPHERE Handbook).12–95 Several open access platform initiatives (eg, Twine by UNHCR and Humanitarian Data Exchange by OCHA) and guidelines to improve the quality of epidemiological data collected in humanitarian settings have been initiated.13,54,55 These initiatives have been supported by developments in methods and software in medical statistics that have facilitated their application in resource-poor settings.16 The implementation of the Global Cluster approach also sought to improve accountability and coordination in the humanitarian sector. The establishment of agencies such as Active Learning Network on Accountability and Performance and International Initiative for Impact Evaluation (3iE) that seek to promote learning, accountability, and performance in the humanitarian sector has also encouraged demand for evidence-based decision making.24,52–56 But these developments need to be supported by a greater range of openly accessible data specifically on the effectiveness and cost-effectiveness of health interventions. More work analysing how evidence can be most effectively used to help to inform and change practice needs to be done.

Conclusion

The need for robust, high quality, useable evidence to inform, shape, and adapt health interventions in humanitarian crises is increasingly recognised. However, although the number of studies on public health interventions in humanitarian crises has grown, substantial gaps in the quantity and quality of evidence remain. Development of innovative integrated funding mechanisms to enable the combination of research projects with humanitarian assistance and create a global humanitarian evidence platform where data and evidence can be accessible to all communities (national authorities, donors, academics, and humanitarian agencies) are needed. Although there is usually a trade-off between the need to act quickly and the need to act well in humanitarian crises, humanitarian action can substantially benefit from the greater application of rigorous research to better understand how effectively public health interventions are working.

Contributors

BR and KB led the study. All authors participated in the study design, data searching, and data analysis. KB and BR led the writing up of the paper. All authors contributed to the paper.

Declaration of interests

We declare no competing interests.

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