

An evidence review of research on health interventions in humanitarian crises



LONDON
SCHOOL of
HYGIENE
& TROPICAL
MEDICINE



23 MARCH 2014

Principal Investigators

Karl Blanchet and
Bayard Roberts

Authors

Karl Blanchet, Vera Sistenich,
Anita Ramesh, Severine Frison,
Emily Warren, James Smith,
Mazeda Hossain, Abigail Knight,
Chris Lewis, Nathan Post,
Aniek Woodward, Alexander Ruby,
Maysoon Dahab, Sara Pantuliano,
Bayard Roberts

Partners

The Harvard School of
Public Health and the Overseas
Development Institute

Funders

Department for International
Development (DFID) and
the Wellcome Trust

Commissioned by



Acknowledgements

We would like to thank the Wellcome Trust and the Department for International Development (DFID) for funding this study and Enhancing Learning and Research in Humanitarian Assistance (ELRHA) for managing it. We would also like to thank the study advisory committee members (listed in Annex 1) and the expert interviewees (listed in Annex 2).

Disclaimer

This is a collaborative report from the London School of Hygiene and Tropical Medicine, the Harvard School of Public Health and the Overseas Development Institute (ODI). Any opinions and recommendations contained therein are those of the report authors, not of ELRHA, DFID or the Wellcome Trust.



Executive Summary

Background:

The need for a stronger scientific evidence base for responses to humanitarian crises has been identified by various public health actors. To this end, the UK Department for International Development (DFID) and the Wellcome Trust commissioned a study to review the evidence base of public health interventions in humanitarian crises. The overall aim of the review is to provide a rigorous assessment of the current quality and depth of the evidence-base that informs humanitarian public health programming globally. The review therefore assesses the quantity and quality of intervention studies, rather than measuring the actual effectiveness of the intervention itself.

The review addresses evidence on interventions in humanitarian crises (including early recovery and forced displacement) for health topics of: communicable disease control; water, sanitation and hygiene (WASH); nutrition; sexual and reproductive health (SRH), including gender-based violence (GBV); mental health and psychosocial support; non-communicable disease (NCD); injury and physical rehabilitation; health services, and health systems. In addition, contextual factors influencing the delivery of health-related interventions are included in the review, consisting of: access to health services, health assessment methods, coordination, accountability, health worker security, and urbanisation.

For a selected number of health topics, additional in-depth reviews were conducted to record data on the actual effectiveness of public health interventions. The selected health topics were: communicable diseases of malaria, polio, and neglected tropical diseases; WASH; SRH; and NCDs. These topics were selected because no systematic review had previously extracted data on intervention effectiveness and they were considered key health topics of public health importance. The remaining health topics in the overall review (nutrition, various other communicable diseases, mental health and psychosocial support, injury and rehabilitation) had been previously reviewed (examples of these are listed in Table 4)

Methods:

The following two main methods were adopted:

- (i) A series of systematic literature reviews on evidence of humanitarian interventions related to the health topics and on the influence of contextual factors on the interventions. The review on evidence of interventions for the different health topics included quantitative evidence from published and grey literature. The review on the contextual factors included quantitative and qualitative evidence from published literature. Standard systematic review methodologies were used.
- (ii) Qualitative individual interviews with expert practitioners, policy makers and academics were conducted to identify critical weaknesses and gaps in the evidence base for humanitarian public health actions (including related to the contextual factors) and to recommend priority areas for further research. A series of more general consultations with humanitarian health experts took place through meetings in London, Geneva, Paris, and New York.

Results:

An overview of the main results is firstly presented, followed by the results of the individual health topics and contextual factors.

Overview:

- Research on the effectiveness of health interventions in humanitarian crises has significantly increased during the last decade, with 79% of the 696 studies selected in the systematic review published between 2000 and 2013. However, considering the diversity of humanitarian crises, contexts and health care needs, the volume of evidence available remains too limited – particularly for health topics of GBV, NCDs, and WASH.
- 65% of the studies reviewed in-depth were rated moderate to high quality, with the quality of research improving over the last decade.
- Interventions for some health topics require further evidence on their actual effectiveness (e.g. GBV and mental and psychosocial health) whereas other topics require evidence on the most effective way of delivering the health intervention (e.g. injury & rehabilitation, WASH, NCDs, SRH). For nutrition and communicable disease control, more evidence is needed on both the effectiveness of certain interventions, as well as on the most effective ways of delivering interventions.
- Common themes identified in all the research on health topics and contextual factors include:
 - Systems and delivery: more evidence is needed on the effectiveness and feasibility of inter-sectoral interventions, scaling-up, task-shifting, and supporting health system resilience.
 - Research methods: robust assessment methods need to be developed and validated; greater use should be made of certain research designs (particularly experimental/quasi-experimental for cost-effectiveness) and baseline and routine data; and high quality mixed methods studies.
 - Context: greater evidence is required on: dispersed, urban and rural populations; ensuring continuity of care – particularly for chronic conditions and NCDs; measuring and addressing health care needs in middle-income settings (particularly NCDs).

Communicable disease control:

One hundred and fifty one studies on communicable disease control interventions met the inclusion criteria and were reviewed in depth. Eighty-eight were graded as high quality. The following highlights the research needs identified from the systematic review and expert interviews:

- Research should be conducted to help standardise medical protocols and quality standards to direct interventions, and indicators to measure their impact.
- Specific evidence gaps exist around many issues related to communicable diseases: disease themselves (e.g. pertussis, hepatitis A and E, and measles), methods to measure them (e.g. Lot Quality Assurance Sampling (LQAS)), and standard measurements such as mortality (e.g. age and gender specific).
- Increasing urbanisation, and movement of people to coastal areas, means that more research is needed on populations living in these areas.
- More attention needs to be given to regional analysis amongst these populations, especially due to issues related to migration and importation of disease.
- More anthropological/sociological research is needed for communicable disease interventions (e.g. acceptability, uptake).
- Research could help validate syndromic diagnoses (e.g. diarrhoea) with laboratory confirmed outcomes for communicable disease interventions.

Water, Sanitation and Hygiene (WASH):

Only six studies on WASH interventions met the inclusion criteria. Of these 6, 5 were of high quality. Research needs identified from the systematic review and expert interviews include:

- While evidence exists on the effectiveness of WASH interventions in relation to water quality or other WASH indicators, there remain significant gaps in knowledge with regards to the impact of WASH in interventions in relation to health outcomes in humanitarian crises.
-

- More research expertise is needed to guide operational organisations on how WASH interventions can be linked to health outcomes, including on the use of different study designs.
- A review of Sphere indicators for the WASH sector is needed.
- More research is needed on behaviour change (e.g. acceptability of interventions, barriers to uptake).
- The evidence base on specific WASH interventions for health outcomes (e.g. hepatitis E, cholera) needs to be strengthened.
- Economic and anthropological research is needed. What level of success is acceptable to communities, governments, etc in relation to health effects seen as well as money spent?

Nutrition:

Seventy-seven studies on nutrition interventions met the inclusion criteria, and 18 were of high quality.

Research needs identified from the systematic review and expert interviews include:

- A better understanding of the aetiology of malnutrition and famines in different contexts.
- Evidence on the impact of contextual factors on famine and malnutrition (e.g. anthropological studies on the power of women in society).
- Evidence on how best to intervene in low Global Acute Malnutrition (GAM) prevalence settings and/or in middle income countries.
- Need to test different monitoring tools, techniques and new technologies to measure progress and impact of nutrition programmes, including better use of routine data and monitoring and evaluation data.
- More evidence on cost-effectiveness of nutrition interventions.
- More evidence required on the impact of Infant and Young Child Feeding interventions (IYCF).
- Research focus on infants, people with disabilities and elderly.
- Alternatives to Blanket Supplementary Feeding programmes (BSFP) (i.e. Cash transfer vs. Ready to Use Food (RUF) distribution; food security intervention vs. RUF).
- More research required on long term effects of interventions (i.e. long-term effects of blanket distribution of lipid based supplement).
- Further research required on stunting.
- Evidence required on the most effective way of delivering nutritional programmes - community health workers or health facilities?
- Long-term effect of RUF on anthropometric status, cognitive development, risk of relapse etc.

Sexual and reproductive health (SRH), including gender-based violence (GBV):

Fifteen studies on SRH (including GBV) interventions met the final inclusion criteria; only three were of high quality.

Research needs identified from the systematic review and expert interviews include the need for more evidence on:

- SRH interventions with particular populations' groups (e.g. people with disabilities, men, adolescents)
 - Different models of scaling up services (e.g. facility- or community-based care, task-shifting, greater involvement of community members).
 - Effectiveness and feasibility of new technologies.
 - Availability and use of SRH commodities in emergencies.
 - Behaviour, knowledge, attitude and barriers to long acting reversible contraception; and implications regarding availability of long-term care.
 - Provision of safe abortion services, and delivery services (particularly caesarean sections).
-

- More information is needed overall on the spectrum and context of GBV.
- Effectiveness and operational constraints of GBV targeted interventions (e.g. safe spaces, cash-transfers, livelihoods programmes).
- Appropriateness and use of GBV guidelines.
- New methodological approaches to overcome contextual and logistical constraints to GBV research.

Mental health and psychosocial support:

Sixty two studies of mental health and psychosocial support interventions met the inclusion criteria. The systematic review and expert interviews identified that more evidence is needed on:

- Effectiveness and feasibility of scaling-up low intensity and low cost psychological interventions.
- Effectiveness of psychosocial interventions.
- Effectiveness of group-based interventions as well as interventions for individuals.
- Effectiveness of interventions using parents, natural support systems, and schools.
- The use of inter-sectoral approaches (e.g. nutrition, protection, education).
- Using a modular transdiagnostic approach to treating mental disorders, including multiple disorders.
- Feasibility of e-mental health interventions.
- Effectiveness and feasibility of training interventions.
- Effectiveness of treating severe mental disorders, drug and harmful alcohol use, and functioning.
- Evidence from randomised control trials (RCTs) and also other study designs (including quasi-experimental) and the use of routine clinical outcome data. Studies should include mixed methods to improve acceptability and appropriateness of interventions and research.
- Feasibility of interventions, particularly economic feasibility and cost-effectiveness of interventions.
- Evidence on children, adolescents, older populations and survivors of sexual and intimate partner violence.
- The harmful effects of mental health and psychosocial support interventions.
- The quality of research needs to improve in order to ensure valid and reliable results.

Non-Communicable Diseases (NCDs)

Eight studies on NCD interventions met the inclusion criteria. The systematic review and expert interviews identified the need for:

- More evidence on interventions for a range of leading NCDs, particularly addressing longer-term outcomes, and in a greater range of country settings.
 - Interventions featuring disease-management protocols and/or cohort monitoring (particularly use of electronic patient records) demonstrated the strongest evidence of effectiveness.
 - Development and testing of standards and guidelines for the delivery of NCD care in crisis settings.
 - Studies on the feasibility and cost of NCD interventions, particularly over the longer-term.
-

Injury and Rehabilitation:

Forty seven studies on injury and rehabilitation interventions met the inclusion criteria and were reviewed in-depth, and only two were of a high quality. The research needs identified from the systematic review and expert interviews include:

- Greater quantity and quality of evidence on the effectiveness and cost-effectiveness of rehabilitative interventions, particularly rehabilitative interventions and over the longer-term – including measuring long-term health outcomes, functionality, and quality of life.
- Better understanding of the mechanisms that enable a continuum of care as programmes transition from the crisis to the development phase.
- Development of appropriate quality standards and measurements of service performance.
- More evidence following natural disasters.
- More evidence on rehabilitation interventions in camp contexts.
- More studies that evaluate rehabilitation interventions in the preparedness phase, and the subsequent impact they have on health outcomes.

Health Service Delivery

Thirty-two studies on health service delivery met the inclusion criteria but only four papers measured health outcomes and these were of a low quality. The research needs identified from the systematic review and expert interviews include:

- Improving the quantity and quality of the evidence base on health service interventions, particularly longitudinal studies of longer-term health service interventions and related health outcomes.
- Different service delivery models of health care.
- Content, delivery and health outcomes of different service delivery packages of care.
- Longitudinal study designs.
- Lack of consensus over the guidelines to be used, or evaluated, for health service delivery. Further studies looking specifically at this issue would enable practical suggestions for service delivery in crisis situations.

Health Systems

Fifty-six studies on health systems met the inclusion criteria. The research needs identified from the systematic review and expert interviews include:

- Measuring the impact crises can have on local health systems.
 - Effectiveness of different models of delivering health interventions during humanitarian crises: vertical versus integrated humanitarian interventions, facility-based versus community-based interventions, comprehensive package versus single interventions.
 - The resilience of health systems to absorb crises and on their capacities to continue the delivery of services (e.g. non communicable diseases) after the departure of humanitarian actors.
 - The impact of preparedness on a humanitarian crisis, and whether stronger and better prepared health systems have improved health outcomes following a humanitarian crisis.
 - Specific areas health systems, particularly the influence of health financing and access to essential medicines in a humanitarian crisis.
 - How interventions for sub-sectors health could take the opportunities that humanitarian crises offer to strengthen the systems.
-

Access to healthcare

Sixty-four studies on access to healthcare met the inclusion criteria. The research needs identified from the systematic review and expert interviews include:

- Evidence on the impact of physical, economic and political accessibility of health workers on public health interventions during crises.
- The influence of access on the impact of public health interventions.
- Development of standardised methods or indicators to measure the different aspects of both end-user and health worker access to healthcare.
- Impact of access to healthcare on health interventions during natural disasters and in the acute phase of crises.
- Real-time mapping of access to healthcare of end-users.
- Optimising healthcare access in crisis areas outside government control for both end-users and healthcare workers.
- Health disparities arising from access inequities between resident and transiting populations within a crisis location.
- Role of mobile phones and other digital technologies in improving health access for end-users.
- Mechanisms and policies which safeguard or improve access to healthcare during humanitarian crises.

Accountability to end-users

Thirty studies on accountability to end-users and health met the inclusion criteria. The research needs identified from the systematic review and expert interviews include:

- Influence of accountability on the impact of public health interventions is needed.
- Development of standardised methods or indicators to measure the different aspects of accountability in health interventions is required.
- High quality comparative studies to inform how accountability influences health interventions and outcomes.
- Role and methods of informed consent of end-users in crisis settings, to the perception of end-users regarding humanitarian healthcare delivery, and to the validation of assumptions concerning end-users.
- Impact of the asymmetry of power between end-users and humanitarian agencies on public health interventions.
- Populations needing increased research focus include IDP and refugee populations, adolescents, the disabled, the elderly, those with chronic disease, and the LGBT community.
- Mechanisms and policies which safeguard or improve accountability to end-users during humanitarian crises.
- Development of ethical guidelines for humanitarian research and programmatic development should be intensified.

Health Assessment Methods

Eighty-three studies on health assessment methods met the inclusion criteria. The research needs identified from the systematic review and expert interviews include:

- Development, comparison, testing and validation of health assessment methods.
 - Evidence-based consensus-building on the standardised health assessment methods that agencies will agree to use for recognised health topics.
 - Impact of different health assessment methodologies on the effectiveness of public health interventions during humanitarian crises.
-

- Humanitarian system's 'fitness-for-purpose' for addressing health needs within any crisis situation.
- Identification of appropriate indicators with which to measure humanitarian contextual factors in relation to health outcomes.
- Long-term impact assessment methodologies of the contextual factors in relation to health outcomes (e.g. coordination of communicable diseases and WASH in relation to cholera).
- Mechanisms and policies that safeguard or improve health assessment methods during humanitarian crises.

Coordination

Twenty-five studies on coordination and health met the inclusion criteria. The research needs identified from the systematic review and expert interviews include:

- The influence of coordination on public health interventions during humanitarian crises, including cost-benefit analysis.
- Non UN/OHCA-centric mechanisms of coordination, including those of local/domestic and non-cluster agencies.
- High quality comparative studies to inform how coordination influences public health interventions, including the role of different levels and aspects of coordination.
- Health impact of clusters as a coordination mechanism.
- Impact of integrated UN missions on healthcare delivery.
- How international actors coordinate with local government.
- Evaluation of the advantages and disadvantages for health of pooled funding within the UN structure.
- Role of generating competitive market forces between agencies in improving coordination and healthcare delivery efficiency.
- Mechanisms and policies which safeguard or improve coordination during humanitarian crises.

Security of healthcare workers

Only 16 studies on healthcare worker and health security met the inclusion criteria. The research needs identified from the systematic review and expert interviews include:

- Higher quantity and quality of evidence on the security of healthcare workers in the humanitarian sector.
 - How healthcare worker security influences the effectiveness of public health interventions in humanitarian crises.
 - High quality comparative studies to inform how security influences health interventions and outcomes.
 - Increased risks posed by integrated UN missions.
 - The impact of using foreign over local healthcare workers.
 - Identification of risk factors associated with security threats to healthcare workers.
 - Impact of asymmetry of power on the effectiveness of health interventions within a conflict setting on security.
 - Impact of healthcare worker security on public health interventions during natural disasters and in the acute phase and early recovery phases of crises.
-

Urbanisation

Twenty-seven studies on urbanisation and healthcare met the inclusion criteria. The research needs identified from the systematic review and expert interviews include:

- More comparative studies between rural, camp and urbanised environments to help adjust health interventions to be more effective for urban environments.
 - More research on the influence of the following aspects on public health interventions: opportunities for disaster preparedness and coordination; role of civil engineering and urban planning in disaster prevention and mitigation; use of social media and other forms of mass communication; control of infectious disease outbreaks, public health interventions.
 - Efficient methods of identification and targeted health interventions of IDP and refugee populations within non-camp urban settings.
 - Management of chronic disease in crisis-affected urban populations.
-

Table of content

1.	Introduction	16
1.1	Background	16
1.2	Conceptual framework	16
2.	Methods	18
2.1	Systematic literature review on health topics	18
2.2	Systematic literature review on contextual factors	23
2.3	Expert interviews	27
3.	Overview of Results	29
3.1	Quantity	29
3.2	Quality	30
3.3	Ranges of effectiveness	30
3.4	Common themes	31
4.	Results for Health Topics	33
4.1	Communicable disease control	33
4.2	Water, sanitation and hygiene	82
4.3	Nutrition	94
4.4	Sexual and Reproductive Health including Gender-based Violence	104
4.5	Mental health and psychosocial support	119
4.6	Non-communicable disease	129
4.7	Injury and physical rehabilitation	135
4.8	Health service delivery	145
4.9	Health systems	153
5.	Results for Contextual Factors	160
5.1	Access to healthcare	160
5.2	Accountability to end-users	167
5.3	Health assessment methods	172
5.4	Coordination	179
5.5	Security of healthcare workers	184
5.6	Urbanisation	188

Annex 1: List of key contributors to the project	194
Annex 2: List of expert interviewees	196
Annex 3: Search terms used for key bibliographic databases	200
Annex 4: Details for systematic review on communicable disease control	202
Annex 5: Details for systematic review on water, sanitation and hygiene	210
Annex 6: Details for systematic review on nutrition	212
Annex 7: Details for systematic review on sexual and reproductive health (including GBV)	221
Annex 8: Details for systematic review on mental health and psychosocial support	223
Annex 9: Details for systematic review on non-communicable disease	227
Annex 10: Details for systematic review on injury and physical rehabilitation	228
Annex 11: Details for systematic review on health service delivery	237
Annex 12: Details for systematic review on health systems	243
Annex 13: Details for systematic review on access to health care	247
Annex 14: Details for systematic review on accountability to end-users	254
Annex 15: Details for systematic review on health assessment methods	258
Annex 16: Details for systematic review on coordination	266
Annex 17: Details for systematic review on security of healthcare workers	269
Annex 18: Details for systematic review on urbanisation	272

LIST OF ACRONYMS

ACPR	Adequate Clinical and Parasitological Response	ITN	Insecticide Treated Nets
ACT	Artemisin Combination Therapy	ITPS	Insecticide Treated Polyethylene Sheeting
ALNAP	Active Learning Network for Accountability and Performance	ITTs	Insecticide Treated Tents
AR	Artemether (antimalarial)	IYCF	Infant and Young Child Feeding
AS	Artesunate (antimalarial)	IGRAC	International Groundwater Resources Assessment Centre
AT	Atovaquone (antimalarial)	IMC	International Medical Corps
BCG	Bacillus Calmette–Guérin	IWA	International Water Association
BF	Benflumetol (antimalarial)	IWRA	International Water Resources Association
CBT	Cognitive Behavioural Therapy	LF	Lumefantrine (antimalarial)
CD	Communicable Disease	LPF	Late Parasitological Failure
CDC	US Centers for Disease Control and Prevention	LSHTM	London School of Hygiene & Tropical Medicine
CMAM	Community-based Management of Acute Malnutrition	LTF	Late Treatment Failure
CPCR	Complete Parasitological Cure without Recrudescence	MAM	Moderate Acute Malnutrition
CONSORT	Consolidated Standards of Reporting Trials	MAS	Mefloquine-Artesunate (MAS)
CRED	Centre for Research on the Epidemiology of Disasters	MCH	Maternal and child health
CQ	Chloroquine (antimalarial)	MF	Mefloquine (antimalarial)
DA	Dihydroartemesin (antimalarial)	MSF	Médecins Sans Frontières
DAC	Development Assistance Committee	NCD	Non-communicable Disease
DALY	Disability-Adjusted Life Year	OCHA	Office for the Coordination of Humanitarian Affairs
DARE	Database of Abstracts of Reviews of Effectiveness	ODI	Overseas Development Institute
DFID	Department for International Development	OECD	Office for Economic Co-operation and Development
DOTS	Directly Observed Therapy Short course	PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
ETF	Early Treatment Failure	Q	Quinine (antimalarial)
GAM	Global Acute Malnutrition	RCT	Randomised Controlled Trial
GBV	Gender-Based Violence	RDT	Rapid Diagnostic Test
GWA	Gender and Water Alliance	RHRC	Rural Health Research Center
HF	Halofantrine (antimalarial)	RUSF	Ready to Use Supplementary Food
HSPH	Harvard School of Public Health	RUTF	Ready to Use Therapeutic Food
HERR	Humanitarian Emergency Response Review	SHARE	Sanitation and Hygiene Applied Research for Equity
IBSS	International Bibliography of the Social Sciences	SP	Sulphadoxine –Pyrimethamine (antimalarial)
ICPR	Incomplete Parasitological Cure without Recrudescence	SRH	Sexual and Reproductive Health
ICRC	International Committee of the Red Cross	STROBE	Strengthening the Reporting of Observational studies in Epidemiology
IDP	Internally Displaced Persons	UNHCR	United Nations High Commission for Refugees
IS/IRS	Insecticide Spraying / Indoor Residual Spraying	UNISDR	United Nations International Strategy for Disaster Reduction
ITCs	Insecticide Treated Cothes	WASH	Water, Sanitation and Hygiene
		WHO	World Health Organization

1. INTRODUCTION

1.1 Background

The need for a stronger scientific evidence base for responses to humanitarian crises has been identified by various public health actors, and was a key recommendation of the United Kingdom Humanitarian Emergency Response Review.¹ To this end, the UK Department for International Development (DFID) and the Wellcome Trust commissioned a review of the evidence base of public health interventions in humanitarian crises.²

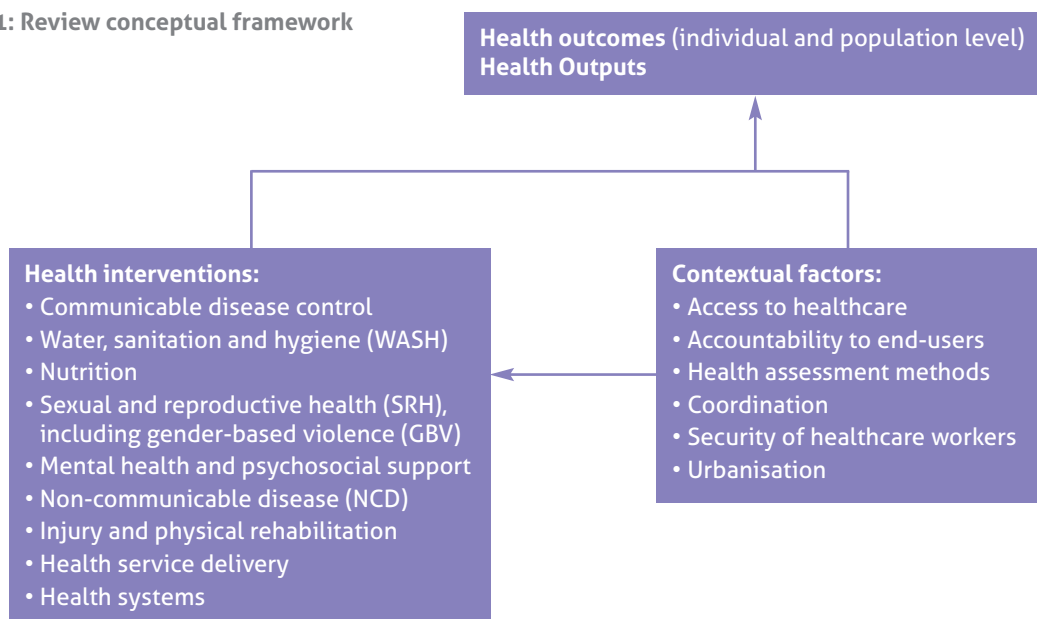
The overall aim of the review is to provide a rigorous assessment of the current quality and depth of the evidence-base that informs humanitarian public health programming globally. The specific objectives are:

- To present a thorough assessment of the current quality and depth of the available evidence-base for humanitarian public health actions.
- To present a clear and authoritative overview of the frameworks and assumptions which underpin key thematic areas within the humanitarian public health field.
- To identify critical weaknesses in the evidence base, where further research is required.
- Identify, through consultation with practitioners and policy makers, priority areas where further investment in the research and evidence base is most needed.

1.2 Conceptual framework

The conceptual framework used for this review is shown in Figure 1. The framework contains health interventions related to core health topics, and key contextual factors which influence the delivery of the core health interventions in humanitarian crises. The conceptual framework was adapted from Hoffman et al.³ and the selection of health topics, contextual factors and cross-cutting issues informed by Sphere Standards and discussions with key experts.⁴

Figure 1: Review conceptual framework



¹ HERR, Humanitarian Emergency Response Review, L.P. Ashdown, Editor 2011, Humanitarian Emergency Response Review.

² For the purposes of this review, humanitarian public health is defined as interventions that contribute collectively, in combination or singularly to saving lives, building resilience and promoting better health outcomes in humanitarian emergencies. In this approach public health interventions should be considered in their broadest scope including all relevant practice areas such as water and sanitation and nutrition.

³ Hofmann C, et al., Measuring the impact of humanitarian aid: A review of current practice. Overseas Development Institute, 2004.

⁴ Sphere Project, Sphere Handbook: Humanitarian Charter and Minimum Standards in Disaster Response, 2004.

2. Methods

The review consists of two main research methods. First, a systematic literature review of the evidence on health interventions and contextual factors, complemented by an in-depth analysis of studies in selected health topics (malaria, poliomyelitis, neglected tropical diseases, non-communicable diseases and sexual and reproductive health). Second, qualitative expert interviews with practitioners, policy makers and academics addressing the core health topics and contextual factors. The research for the health topics was conducted by staff at LSHTM, while the research on the contextual factors was led by staff at Harvard (see Annex 1 for further details on study structure and staffing).

2.1 Systematic literature review on health topics

This series of systematic reviews aims to provide a situational analysis of the existing evidence from humanitarian crises on public health interventions for the following health topics: communicable disease control; water, sanitation and hygiene (WASH); nutrition; sexual and reproductive health (SRH), including gender-based violence (GBV); mental health and psychosocial support; injury and physical rehabilitation; non-communicable disease (NCD); health services; and health systems⁵. The systematic review methodology adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.⁶

2.1.1 Key terms:

The following key terms and concepts relate to this systematic literature review, their definitions having been adapted from the World Health Organization (WHO) Humanitarian Health Action Dictionary.⁷

Public Health Intervention: Public health actions that seek to improve health outcomes.

Humanitarian crisis: A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources, necessitating a request to national or international level for external assistance. The disaster situation may either be manmade (e.g. armed conflict) or a natural phenomenon (e.g. drought).

Man-made humanitarian disasters: These include international armed conflicts; non-international armed conflicts; and other situations of violence.⁸

Natural disasters: These include hazardous natural phenomena leading to humanitarian crises such as earthquakes, volcanic activity, landslides, tsunamis, tropical cyclones and other severe storms, tornadoes and high winds, floods, and droughts.

Early Recovery: Early Recovery is defined as recovery that begins early in a humanitarian setting. It is a multi-dimensional process, guided by development principles. It aims to generate self-sustaining nationally owned and resilient processes for post-crisis recovery.

⁵The health systems literature review also included qualitative studies given the multi-faceted nature of health systems. The methodology for reviewing the qualitative studies is described in section 2.2.5.

⁶Moher, D., et al., Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ*, 2009. 339: p. b2535.

⁷World Health Organization (WHO). Humanitarian Health Action Dictionary. 2013 [cited August 29, 2013]; Available from: <http://www.who.int/hac/about/definitions/en/index.html>

⁸International Committee of the Red Cross (ICRC), 31st International Conference of the Red Cross and Red Crescent Report: International humanitarian law and the challenges of contemporary armed conflict, 2011

2.1.2 Search strategy and search terms

This literature review uses peer-reviewed literature, non-peer reviewed ('grey') literature, and expert consultation/review of selected references to ensure all key publications have been taken into account.

Peer reviewed literature was located using electronic bibliographic databases such as Medline, Embase, and Global Health (depending on the health topic). The search structure consisted of the following:

- terms related to humanitarian crises
- AND terms related to public health interventions
- AND terms related to lower and middle income economies
- AND terms related to each of the nine health topics above

The search terms used for the main bibliographic databases are given in Annex 3. The additional health topic specific search terms were then added on (see Annexes).

Grey literature was sought using databases, humanitarian agency websites and search engines such as Google, R4D, ReliefWeb, Desastres, Eldis, ALNAP, CRED, RHRC, MSF Field Research, WHO, UNICEF, UNFPA, UNHCR, and ICRC.

Searches were supplemented by reviewing the reference lists ('references of references') of selected articles to find any other relevant papers.

The databases and search terms used for each health topic are given in the Annexes.

2.1.3 Inclusion/exclusion criteria

The following seven key inclusion criteria were used in this review:

- **Types of studies:** Primary quantitative research studies. Study designs including randomised controlled trials (RCTs), non-randomised controlled trials, controlled before-after studies, controlled interrupted time series studies, economic studies (cost-effectiveness analysis, cost-utility analysis, cost-benefit analysis, economic modelling) of public health which the outcome is measured before and after the intervention or an intervention is studied against another intervention with baseline or control group.
 - **Populations of interest:** Populations affected by humanitarian crises and receiving humanitarian assistance in low and middle-income countries (based upon World Bank country classification).
 - **Health outcomes and outputs of interest:** Primary outcomes (e.g. morbidity, mortality, vaccination status), secondary outcomes (e.g. contraceptive prevalence rate), and primary outputs (e.g. malaria bed nets distributed, nutrition supplements provided etc).
 - **Crisis Phase:** Studies that occur in humanitarian crises including those that evaluate: i) the impact of preparedness and resilience on public health outcomes during a humanitarian crises and/or ii) studies that evaluate the impact of public health interventions during the acute, chronic, or early recovery phases of humanitarian crises.
 - **Data type(s):** Must include primary data.
 - **Date of intervention and publication:** January 1, 1980 – April 30, 2013.
 - **Publication language:** English, French.
-

The following criteria were used to exclude studies from this review:

- Studies with no specific health intervention and no outcomes or outputs (i.e., excluding studies that examine only health needs, prevalence, health risk-factors, co-ordination).
- Studies that examine preparedness and resilience not linked to health outcomes in humanitarian crises (e.g. studies on housing fortification before flooding).
- Review papers; only references listed in review papers were screened to find more primary data sources.

2.1.4 Study screening and data extraction

The systematic literature review for each health topic was conducted by one topic leader (see Annex 1 for further details). For quality assurance, a secondary peer reviewer corroborated study selection and data extraction at Stage Four.

Data were screened with the following five stages:

Stage One: electronic database search using terms; with results imported into reference management software, and duplicates removed.

Stage Two: title and abstract reviewed to remove studies not meeting the inclusion criteria (see above).

Stage Three: manuscript review to remove studies that did not meet inclusion criteria; paper selection.

Stage Four: review of references from selected papers (from Stage Three).

Stage Five: final paper selection, data extraction, and quality assessment.

Data was extracted based on the specific points noted below and input into a standardised Excel database:

- study authors or agency, year
 - study country
 - setting: urban or rural
 - population type (refugee, internally displaced, entrapped population, host population)
 - humanitarian crises type (armed conflict or natural disaster)
 - health outcome(s) addressed by the public health intervention
 - type(s) of public health intervention
 - study design
 - measurement outcomes (e.g. prevalence, odds, ratios etc)
 - target age group: i) infants: under 6 months, ii) infants and young children: under two years, iii) children under five: 6 months - 59 months, iv) school age children: 6 years - 15 years, v) adolescents: 10 years - 19 years,* vi) adults: 20 years - 49 years, vii) elderly: 50+ years.
 - quality of the evidence on specific interventions
 - change in quantity of evidence over time
 - change in quality of evidence over time
 - research strengths from the literature
 - research gaps from the literature
-

2.1.5 Data categorisation and analysis

Data analysis was conducted for each health topic separately, with findings organised in relation to the key issues of quantity and quality of the evidence base. To increase clarity of the final results, the studies selected at Stage Five were arranged into three main categories of evidence (Table 1):

Table 1: Categorisation of selected literature

Category A: Studies that measure statistical associations between intervention and health-related outcome
Category B: Studies that measure changes in health-related outcome, but do not report statistical associations
Category C: Outcomes not measured (e.g. outputs, processes, perceptions)

As indicated in Table 1, Categories A and B roughly correspond to evidence that is expected to be of high to moderate quality. Given the generally much weaker value of evidence in Category C, data extracted from studies classified as Category C was limited to the existence of the study alone.

The quality assessment of studies (Categories A and B) included in the systematic literature review was reviewed based upon criteria adapted from the STROBE and CONSORT standards for observational studies and clinical trials, respectively. The adaptations are outlined in Table 2 and scoring levels given in Table 3.

Table 2: Quality review criteria (adapted from STROBE and CONSORT)

STROBE Criteria for Observational Studies*	CONSORT Criteria for Clinical Trials*
Intervention: 1. Is the intervention clearly described? Selection of participants: 2. Is the target population defined? 3. Is there a comparison group (e.g. baseline, control)? 4. Are the inclusion and exclusion criteria defined? Statistical methods: 5. Is the sample size / method justified with statistical basis? 6. Is there a statistical test (p-value or confidence interval)? 7. Is there adjustment for confounding? Limitations: 8. Are study limitations explained (e.g. biases)?	Eligibility 1. Did study state # not meeting inclusion criteria? 2. Did study state # declined to participate? Once Randomised: Allocation: 3. Did study state # receiving intervention? 4. Did study state # not receiving intervention? Follow-Up: 5. Did study state # lost to follow-up? 6. Did study provide reasons for loss to follow-up? Analysis: 7. Did study state reasons participants were excluded from analysis? 8. Are limitations of the study explained (e.g. biases)

Table 3: Quality assessment corresponding to adapted STROBE and CONSORT criteria

Level of Quality	Rating of Evidence per STROBE / CONSORT
HIGH	7-8 criteria met = high quality evidence
MODERATE	4-6 criteria met = moderate quality evidence
LOW	1-3 criteria met = low quality evidence

2.1.6 Additional in-depth review of selected health topics

The main focus of the evidence review is to highlight gaps in the evidence rather than analysing the actual effectiveness of interventions. However, for a selected number of health topics, additional in-depth reviews were conducted to record data on the actual effectiveness of public health interventions. The health topics selected for this more in-depth review were: communicable diseases of malaria, polio, and neglected tropical diseases; WASH; SRH; and NCDs. These were selected for in-depth review as no systematic reviews had previously been conducted which had extracted data on intervention effectiveness, and they were considered key health topics of public health importance. The remaining health topics in the overall review (nutrition, various other communicable diseases, mental health and psychosocial support, injury and rehabilitation) had been previously reviewed (examples of these existing reviews are listed in Table 4).

Table 4: Examples of existing systematic reviews on health topics in humanitarian crises

Communicable disease	<p>SHARE Research Consortium, Evidence review and research priorities: water, sanitation, and hygiene for emergency response: Evidence Paper. 2012, UK Department for International Development (DfID): London, UK.</p> <p>Rowland, M., and F. Nosten, Malaria epidemiology and control in refugee camps and complex emergencies. <i>Ann Trop Med Parasitol.</i> 2001 95(8): p. 741-54.</p> <p>Checchi, F., The burden of tuberculosis in crisis-affected populations: a systematic review. <i>Lancet Infect Dis.</i>, 2012. 12(12): p. 950-65.</p> <p>Bellos, A., et al., The burden of acute respiratory infections in crisis-affected populations: a systematic review. <i>Confl Health.</i>, 2010. 4(3).</p> <p>Grais, R., et al., Measles vaccination in humanitarian emergencies: a review of recent practice. <i>Confl Health.</i>, 2011. 5(1): p. 21.</p>
Nutrition	<p>Haan, N., N. Majid, and e. al., A Review of Emergency Food Security Assessment Practice in Ethiopia. 2005, Overseas Development Institute: London.</p> <p>Young, H., et al., Public nutrition in complex emergencies. <i>Lancet</i>, 2004. 364(9448): p. 1899-909.</p> <p>Hall A and Blankson B, The impact and effectiveness of emergency nutrition and nutrition-related interventions: a review of published evidence 2004-2010. Emergency Nutrition Network: London.</p>
Mental health and psychosocial support	<p>Tol, W., et al., Mental health and psychosocial support in humanitarian settings: linking practice and research. <i>Lancet</i>, 2011. 378: p. 1581-91.</p>
Injury and rehabilitation	<p>Nickerson, J.W., et al., Surgical care during humanitarian crises: a systematic review of published surgical caseload data from foreign medical teams. <i>Prehosp Disaster Med</i>, 2012. 27(2): p. 184-9.</p>

2.2 Systematic literature review on contextual factors

The aim of this study was to conduct a systematic evidence review of the quantity and quality of evidence on the influence of contextual factors on public health interventions in humanitarian crises. Again, the methodology and reporting adheres to the PRISMA statement.⁹

Contextual factors are taken here to mean the physical, political and social characteristics of the environment that are related to the effectiveness of humanitarian intervention. The six contextual factors are given below:

Access to healthcare: This encompasses both the access that end-users have to healthcare as well as the access that healthcare workers have to end-users. Accessibility of healthcare to end-users will specifically include the four over-lapping dimensions of (i) Physical accessibility, (ii) Economic accessibility, (iii) Informational accessibility, and (iv) Non-discrimination. Accessibility for workers to provide healthcare to end-users will include the dimensions of (i) Physical accessibility, (ii) Economic accessibility, and (iii) Political accessibility.

Health assessment methods: This will look for studies specifically seeking to test, develop or validate measurement methods (e.g. mortality estimation, population estimation, nutritional assessment etc.).

Coordination: The quality of coordination and leadership in the implementation of public health interventions during humanitarian crises at the local, regional or international level via local or OCHA-led mechanisms influences their impact. In addition to the logistical aspects of coordination, the effects of competition among local and international agencies for funding and recognition, and the lack of consensus on which public health actions are considered humanitarian and which are considered developmental will also be included.

Accountability to end-users: The Humanitarian Charter emphasises the importance of accountability of agencies to crisis-affected populations. Accountability will include the following dimensions based on a human rights-based approach to health: (i) Availability of functioning public healthcare facilities, goods and services in sufficient quantity, with sufficient capabilities, and in a timely manner; (ii) Acceptability of public healthcare facilities, goods and services in terms of medical ethics and cultural appropriateness; and (iii) Quality of public healthcare facilities, goods and services that are scientifically and medically appropriate and of good quality, and using trained and skilled personnel adhering to accepted professional standards.

Security of healthcare workers: Closely related to contextual factor 1 above (in particular the political dimension influencing the access of healthcare providers to end-users), both the interest in and the corpus of literature available on the specific issue of security of healthcare workers in humanitarian crises call for the study of this as a distinct contextual factor in this review. It will include influences which secure the respect of healthcare interventions as off-limits to deliberate attack and disruption, and those which make it conducive to hold humanitarian health action hostage (e.g. attacks on polio workers in Pakistan and Nigeria). It will also include strategies used in humanitarian health diplomacy relevant to the security of healthcare workers.

Urbanisation: Rapid global urbanisation, particularly in low- and middle-income countries, means that humanitarian crises are increasing likely to affect populations in urbanised settings. At present, the similarities and differences between the strategies and processes leading to effective public health interventions in humanitarian crises occurring in rural and urbanised environments is grossly understudied. These will be included in the analysis of this contextual factor as well as the identification of characteristics that are particular to the urban environment in terms of the physical, mental and social health challenges this setting poses to crisis-affected populations.

⁹Moher, D., et al., Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ* 2009. 339: p. b2535

2.2.1 Key terms

The key terms are as given above in Section 2.1.1.

2.2.2 Search strategy and search terms:

This literature review focuses solely upon peer-reviewed literature. Relevant studies have been located using electronic bibliographic databases such as Medline, Embase, Global Health, International Bibliography of the Social Sciences (IBSS), PsychINFO, and Web of Science. The exact search terms depend on individual database but include:

- terms related to humanitarian crises
- AND terms related to lower and middle income economies
- AND terms related to each of the six contextual factors above

Peer reviewed literature research reports produced by the UN agencies were also included. These were sought from the relevant agency websites. In addition, expert consultation and a review of the reference lists ('references of references') of selected articles were used to locate other relevant papers.

2.2.3 Inclusion/exclusion criteria

The following seven inclusion criteria were used for this review:

- **Types of studies:** Primary quantitative and qualitative research published studies will be considered.¹⁰
- **Populations of interest:** Populations affected by humanitarian crises in low and middle-income receiving humanitarian assistance, as defined by The World Bank.
- **Health outcomes of interest:** Primary outcomes (e.g. morbidity, mortality, vaccination status), secondary outcomes (e.g. contraceptive prevalence rate), and primary outputs (e.g. malaria bed nets distributed, nutrition supplements provided etc).
- **Crisis Phase:** Studies that cover the acute or chronic humanitarian crises, or early recovery phases of humanitarian crises.
- **Data type(s):** Must include primary data collection.
- **Date of intervention / publication:** January 1, 1980 – December 31, 2012.
- **Publication language:** English, French.

The following four exclusion criteria were used for this review:

- Studies that do not directly link the specific contextual factor with health outcomes or outputs.
- Studies that examine preparedness and resilience not linked to health outcomes in humanitarian crises (e.g. studies on housing fortification before flooding).
- Studies that focus on post conflict and post disaster reconstruction.
- Review papers; only the references of review papers were screened to find more primary data sources.

¹⁰Except for the Health Service Delivery review which examined quantitative studies only.

2.2.4 Study screening and data extraction:

The evidence review of contextual factors was led by Vera Sistenich and colleagues at Harvard University. For quality assurance, a secondary peer reviewer corroborated paper screening and data extraction.

Data was screened per the following five stages:

Stage One: electronic database search using terms provided above and in Appendices 1-7; number of results to be recorded and downloaded into an Endnote file (one per contextual factor), and duplicates removed.

Stage Two: title and abstract review to remove studies not meeting the inclusion criteria (see above).

Stage Three: manuscript/report review to remove studies that do not meet inclusion criteria.

Stage Four: review of references (taken from papers reviewed in Stage Three)

Stage Five: final paper selection, data extraction, and quality assessment.

Data was extracted based on specific research points noted below and input into a standardised Excel data extraction form:

- study authors/agency, year
- study country
- study population type (refugee, internally displaced, entrapped population, host population)
- humanitarian crises type (armed conflict or natural disaster)
- humanitarian crises stage (i.e., preparedness, acute crises, stabilised, early recovery)
- type of public health interventions
- main aspect(s) of contextual factor influencing impact of health intervention
- interventions influenced by contextual factor
- character of contextual factor influence
- study design
- stratification (by age and/or gender)
- use of recognised guidelines for public health intervention
- quality of the evidence on specific interventions
- change in quantity of evidence over time
- change in quality of evidence over time
- research strengths from the literature
- research gaps from the literature

2.2.5 Data categorisation and analysis:

Data analysis was conducted for each contextual factor separately, with findings organised in relation to the key issues of quantity and quality of the evidence base.

As noted above, the quantitative studies selected at Stage Five were arranged into the three main categories of strength of evidence (A, B, C). The quality of the quantitative evidence on contextual factors was also assessed using the STROBE standards for observational studies (see Table 2) (as no clinical trials will have been conducted on these contextual factors). The quality assessment of qualitative studies on contextual factors was conducted using an adapted version of the RATS guidelines for qualitative research review.¹¹ The key quality criteria of RATS are shown in Table 5.

¹¹Clark JP, How to peer review a qualitative manuscript, in Peer Review in Health Sciences, Godlee F and Jefferson T, Editors. 2003, BMJ Books: London. p. 219-235.

Table 5: Quality review criteria (adapted from RATS)**Relevance of study question:**

1. Is the research question explicitly stated?

Appropriateness of qualitative method

2. Is the study designed, described and justified by the authors?

Transparency of procedures:

3. Are the characteristics of the study group and setting clearly described?

4. Was ethics approval cited?

Soundness of interpretative approach:

5. Was method of reliability check described and justified? For example, development of research instruments, translation, data analysis.

6. Are the strengths and limitations explicitly described and discussed?

The quality review of the qualitative studies was also graded based upon their overall quality. This grading is shown in Table 6.

Table 6: Study categories and their relative correspondence to quality criteria

Level of Quality	Rating of Evidence per RATS
Category A: Studies that address 5-6/6 of all RATS guidelines	High
Category B: Studies that address 3-4/6 of all RATS guidelines	Moderate
Category C: Studies that address 0–2/6 of all RATS guidelines	Low

2.3 Expert interviews

The aim of the expert interviews was to utilise expert opinion to identify critical weaknesses and gaps in the evidence base for humanitarian public health actions (including on contextual factors) in order to recommend priority areas for further research.

2.3.1 Design and implementation

The expert interviews were semi-structured in design. Participants were approached by email or telephone, with an information sheet and consent form provided in advance of the interview. The individual interviews were led by the individual study staff member leading the research on that particular health topic or contextual factor. They were conducted by telephone/Skype and were held in English or French. The interviews lasted between 30 and 60 minutes. In addition, a series of face-to-face individual or group expert interviews were held in London, Geneva, and Paris (with meetings in Washington and New York taking place in late May/early June). Written notes were taken during the interviews. The topic guide used for the interviews focused upon: (i) the use of research in their organisation, (ii) the main guidelines and frameworks that guide interventions and associated research, (iii) the main evidence gaps and research needs, and (iv) recommendations for future research questions.

In addition, to help validate and prioritise the study findings, the preliminary findings and recommendations from the expert interviews and systematic review were then shared by email with the experts, and they were asked to give their additional perspectives on the findings and their prioritisation of the recommendations.

2.3.2 Participant sampling

Participants for the semi-structured interviews were experts and practitioners in the field of humanitarian health. They were purposively selected based upon their expertise using a mapping exercise of key personnel and agencies in the humanitarian health field, based upon their own knowledge, contacts and also through the literature. Additional participants were selected based upon suggestions from participants.

The participants were practitioners, policy makers or researchers working in the field of humanitarian public health with humanitarian NGOs, United Nations agencies, donor agencies, government agencies, and research institutes and universities. Please see Annex 11 for details of the participants.

2.3.3 Data analysis

Data analysis was conducted for contextual factors separately, with the findings organised in relation to the structure of the topic guide. Thematic analysis was then used to identify the key themes emerging from the data. The analysis was then adjusted after feedback from the experts on the preliminary findings.

2.3.4 Ethical issues

All interviews were fully confidential and anonymous. All data are securely stored and password protected. Ethical approval for the study was provided by the Ethics Committee of the London School of Hygiene and Tropical Medicine.

3. Overview of results

3.1 Quantity

Research on the effectiveness of health interventions in humanitarian crises has significantly increased during the last decade, with 76% of the 696 studies selected in the systematic review published between 2000 and 2012 (Figure 2). However, considering the diversity of crises, contexts and health care needs where humanitarian actors intervene, the volume of evidence available remains globally too limited. Health topics of WASH, GBV, and NCDs had a particularly limited evidence base (Figure 3).

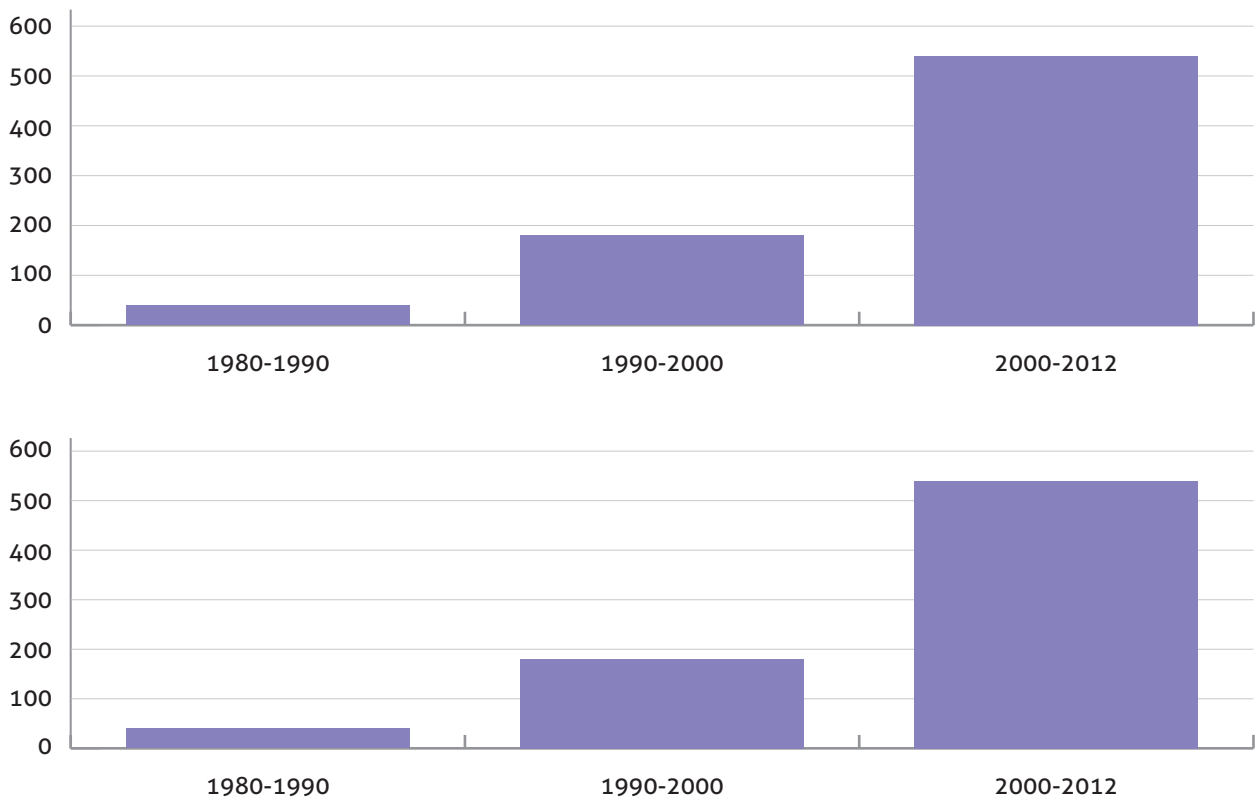


Figure 2: Total number of papers, by decade 1980-2012

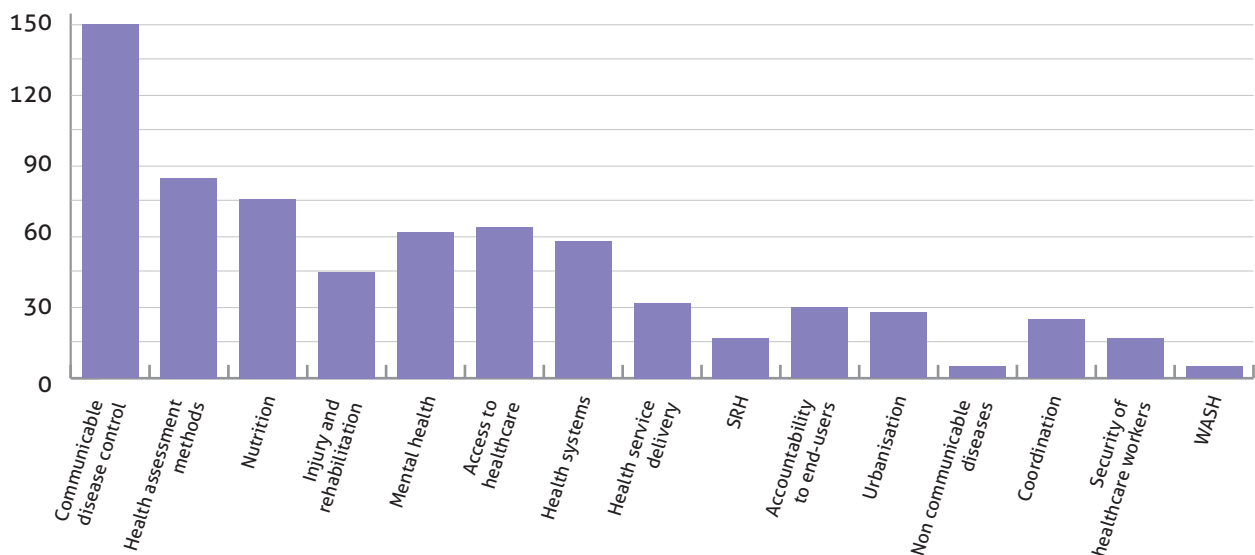


Figure 3: Total number of papers, by health and contextual topic

3.2 Quality

The quality of studies on the effectiveness of health interventions in humanitarian crises remain generally low to moderate with a very limited number of high quality studies in every field. Only 67% of the studies were rated moderate to high. However, the quality of research has significantly improved during the last decade with over 80% of the studies being of moderate to high quality. However, the quality of studies have remained relatively low between 2000 and 2012 for research on SRH, health service delivery, and health systems.

3.3 Ranges of effectiveness

The research gaps identified in every health topic can be classified in three different groups (Figure 4). In areas such as GBV and mental health and psychosocial support, more evidence is needed to understand the effectiveness of interventions (i.e. whether the intervention actually works). In a second group (injury and rehabilitation, WASH, NCD, SRH), evidence exists on what intervention work but research is needed on the most effective way of delivering the health intervention. In a third group composed of nutrition and communicable disease control, research needs to focus on both the effectiveness of some interventions and also the most effective way of delivering other types of interventions.

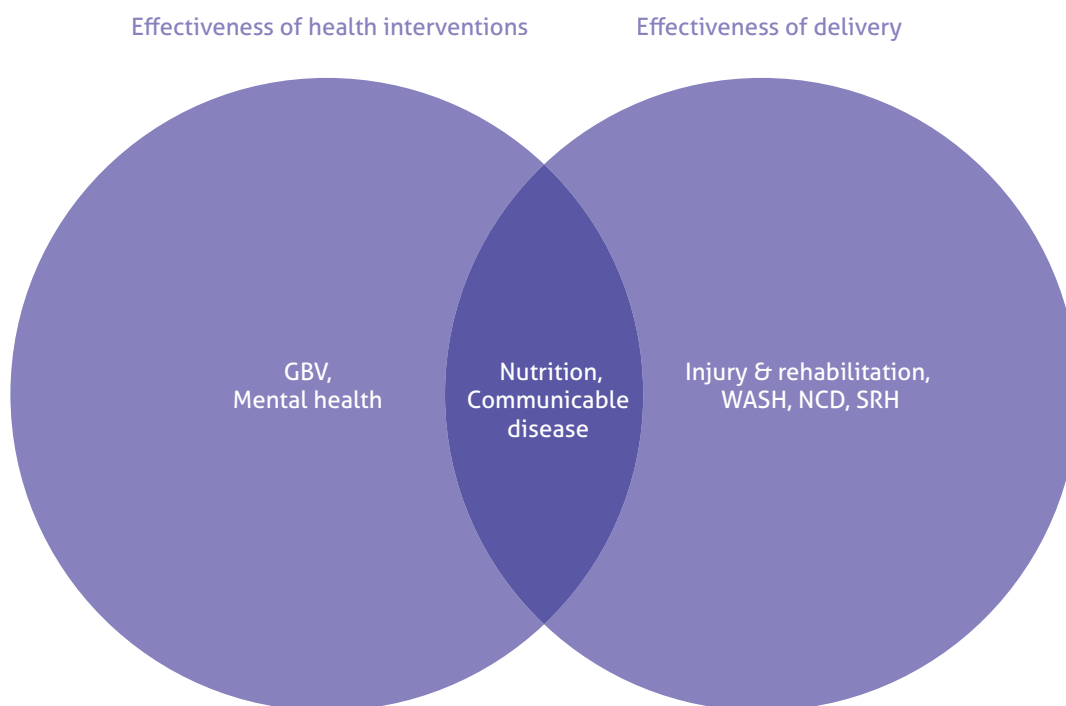


Figure 4: Range of effectiveness among health topics

3.4 Common themes

Cross-cutting issues were identified of: systems and delivery, research methods, and contexts for research (Figure 5).

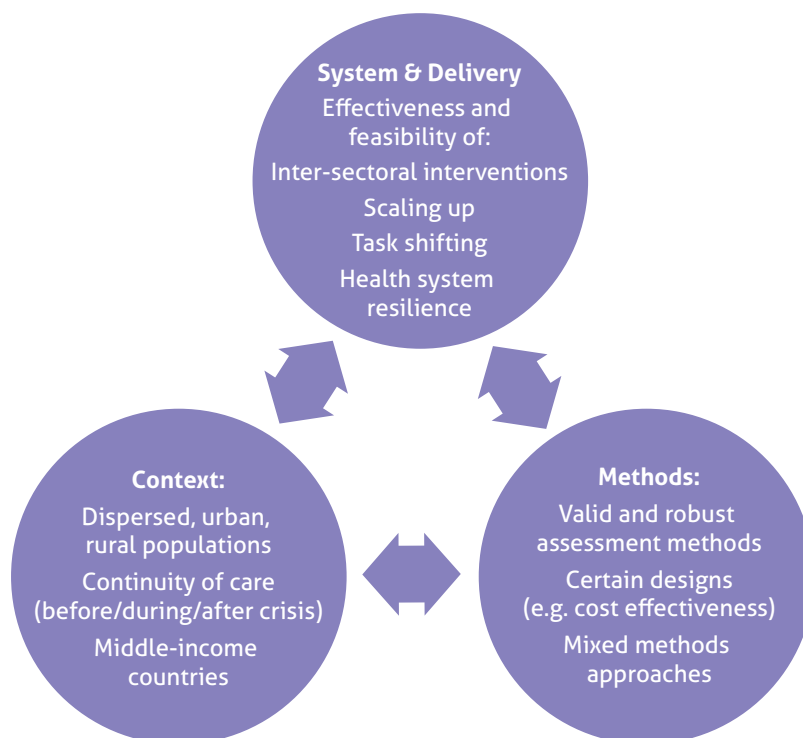


Figure 5: Common themes identified across health and contextual topics

3.4.1 Systems and delivery

- The model of delivering health interventions has been highlighted by most experts. Research is needed to test, measure and compare different models of health service delivery such as task shifting, community-based versus facility-based services.
- The fragmentation of humanitarian aid has created silos in the health sector and also with other sectors (e.g. education and protection). There is a need for interventions to create synergies between different health topics and with other sectors, and for researchers to then evaluate the health impacts of such interventions. Researchers should also initiate research that explores cross-cutting issues.
- More research is needed to understand the most effective ways of building the capacities of local health services during humanitarian crises.
- Health systems resilience has increasingly emerged as a new topic of investigation. Research needs to explore how humanitarian crises affect local health systems and how local health systems adapt to or absorb crises.

3.4.2 Context

- The effectiveness of health interventions in humanitarian crises relies on the appropriateness of health interventions to local contexts. More evidence is needed on the impact of contexts (e.g. country income levels, capacity within health systems, epidemiology, security, societal organisation, cultural values etc) on the effectiveness of health interventions.

- Continuity of care is a pressing issue that needs to be addressed by humanitarian organisations to ensure that patients who need long term treatment can get access to quality healthcare after the departure of humanitarian actors. This is increasingly prescient given the growing burden of chronic diseases and NCDs, particularly in middle-income settings.

3.4.3 Methods

- In most health topics, there is a lack of harmonisation of standards and medical protocols. Researchers could help test different protocols and standards. This in turn could contribute to improve coordination amongst humanitarian actors.
 - More research is needed to develop, test and validate existing and new assessment methods (e.g. mortality estimation, population estimation, needs assessments, health service coverage and access).
 - Greater research is required on cost-effectiveness of humanitarian public health interventions, including gaining a better understanding of the burden of disease within and between health topics.
 - Greater use of baseline and routine data to inform healthcare providers on the needs of populations and specific groups (e.g. children, elderly people or people with disabilities).
 - There is also a need for greater use of high quality mixed methods research. For example, to help guide quantitative research, to help interpret quantitative findings, and to gain better insight on issues such as access, acceptability, and appropriateness of health interventions and research.
-

4. Results for Health Topics

4.1 Communicable disease control

The review on communicable diseases consisted of a general systematic review of the evidence gaps in this health topic and a more in-depth systematic review on effectiveness of interventions in selected sub-topics: malaria, polio and neglected tropical diseases (NTDs).

4.1.1 General systematic review

- A total of 16,239 peer-reviewed articles related to communicable diseases (CD), of which the vast majority (16,153) either did not address humanitarian crises or the impact of an intervention. A total of 165 peer reviewed articles covering 192 interventions met the inclusion criteria.
- There was little available grey literature, of which none met the inclusion criteria.
- Slightly over half of the selected papers (92/165) included a test of statistical significance between CD interventions and health outcomes (category A). An additional 39 (39/165) papers measured CD interventions and health outcomes without a test of statistical significance (category B). A final 34 (34/165) papers simply reported interventions and only anecdotal relationships to outcomes (category C).
- The analysis presented below relates to the 131 category A and B papers.
- There has been increasing interest in CD interventions in humanitarian crises over the past two decades; 80 (53%) papers have been published since 2000. However, increased number of publications is not correlated with increased quality (Figure 6). Of the 131 category A and B papers, 72 out of 92 (73%) category A papers were deemed high quality and 20 (27%) were deemed moderate quality; no category A papers were deemed of low quality. Sixteen out of 39 (41%) category B papers were deemed to be of moderate quality, while 23 out of 39 (59%) papers were deemed to be of low quality; no category B papers were deemed high quality.
- Randomized controlled trials (59/131, 45%) were most commonly employed, followed by cohort (34/131, 26%), before and after cross-sectional (22/131, 17%), and non random trial (10/131, 8%) designs. Economic studies (5/131, 4%) were relatively uncommon in this sector. The majority of the study designs employed allowed for higher quality evidence, and for the ascertainment of outcomes over time (including response to the interventions under study).

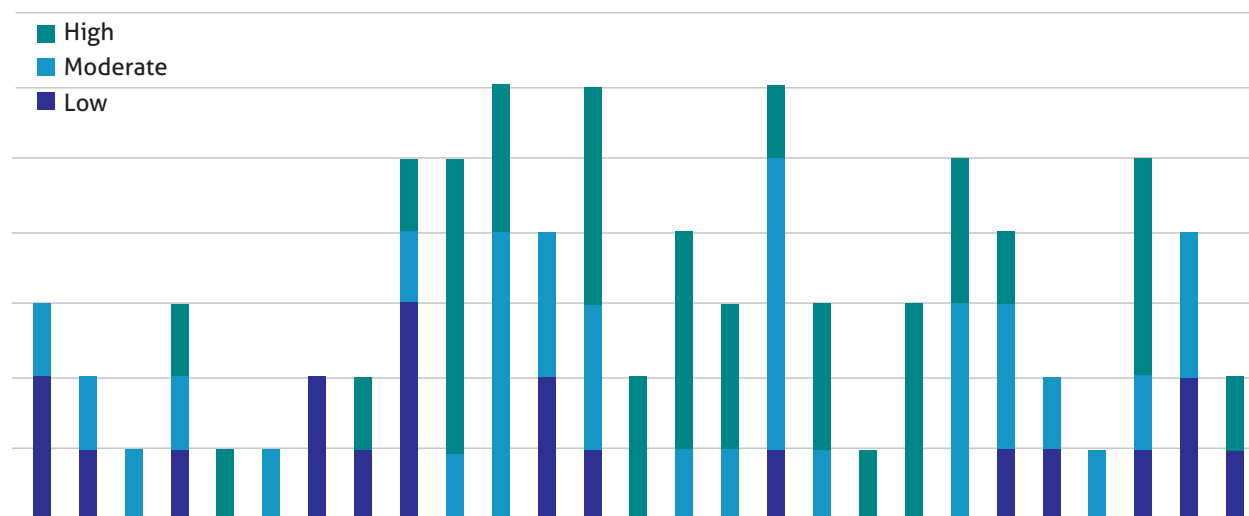


Figure 6: Quantity and quality of communicable disease publications over time

- Most studies occurred in Africa (49/131, 38%) and Southeast Asia (50/131, 39%), followed by South Asia (20%); only 4% of research occurred in Latin America (2%) and the Middle East (2%) (Figure 7).
- Most studies occurred in armed conflicts (118/131, 90%); only 10% (13/131) occurred in natural disasters (Figure 8). Of those in conflict zones, 64% (74/116) were with refugees, 12% (14/116) with IDPs and 24% (28/116) with the general population. Conversely, most (13/15, 87%) natural disaster studies were conducted with the general population, and 2 (2/15, 13%) were with refugees.
- Most (76/116, 65%) studies in conflict settings were conducted in camps, 20% (23/116) were in mixed urban/rural settings, 10% (12/116) in urban settings, and 5% (5/116) in rural settings. Of the 15 studies in natural disasters, 5 (33%) were in mixed urban/rural settings, 5 (33%) in rural settings, 3 (23%) in camps, and 2 (11%) in a rural setting.

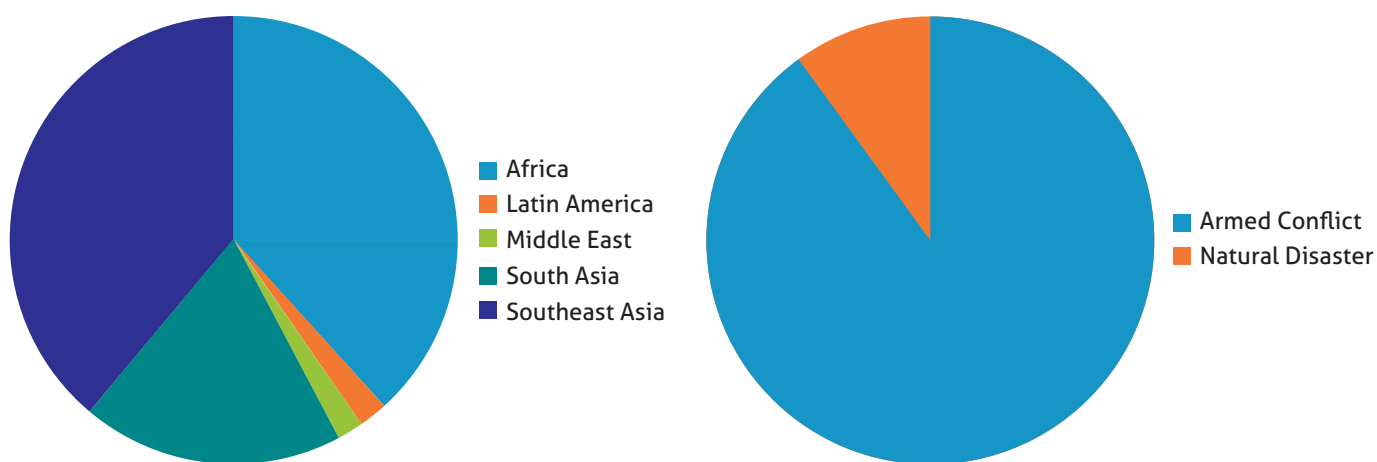


Figure 7: Communicable disease research, by geographic region Figure 8: Communicable disease research, by crisis type

- 18 different diseases were addressed (Figure 9). Malaria (62/131, 47%) accounted for nearly half of all communicable disease research, most of it high quality, in this setting. This was followed by diseases including tuberculosis (25/131, 19%), measles (17/131, 13%), cholera (6/131, 4%), diphtheria/tetanus/pertussis (6/131, 4%), polio (6/131, 4%), visceral leishmaniasis (5/131, 4%), and diarrhoea (4/131, 4%). Pneumonia is considered one of the most important contributors to morbidity and mortality in these settings and populations, but no paper explicitly addressed interventions against pneumonia.
- The 131 studies in categories A and B covered 192 interventions (Figure 10). Of these, the most common intervention was anti-malarial use (61/192, 32%). Vaccination – e.g., MMR, DPT, polio – was employed in nearly 20% of intervention studies in this setting, followed by vector control interventions (17%, 33/192), most often against malaria. Directly observed therapy short course (DOTS) was used in 16% (21/131) of the studies, with 5% of tuberculosis studies conducted in the pre-DOTS era (4/131). Other common interventions included anti-helminths (9%, 12/131), oral rehydration (7/131, 5%) and sodium stibobluconate (6/131, 4%).

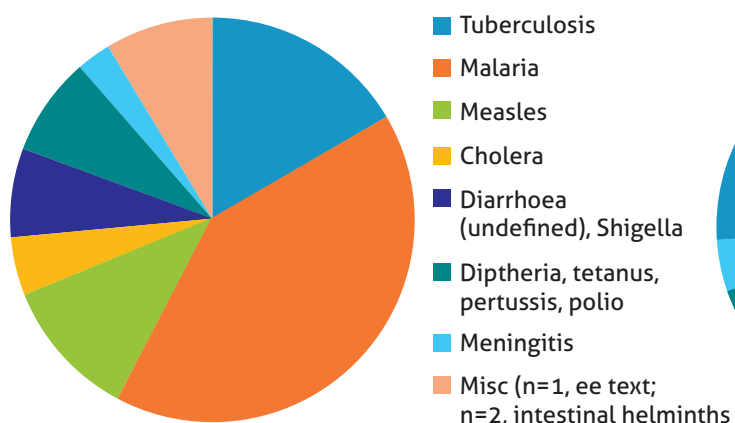


Figure 9: Communicable disease, by disease

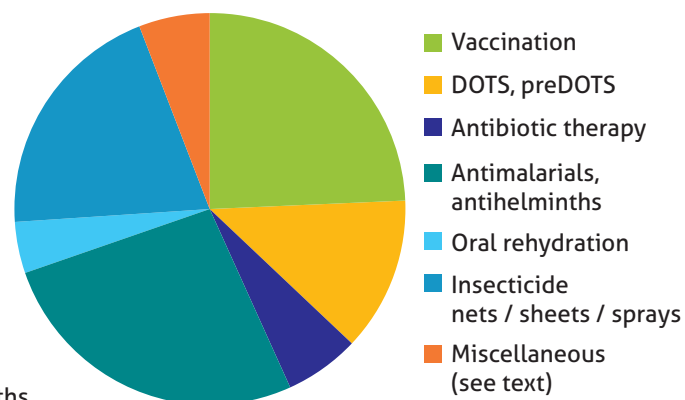


Figure 10: Communicable disease, by intervention

Most (104/131, 82%) of the studies were in the acute crisis stage, 21 (14%) were in the early recovery stage, and 6 (4%) in the stabilized stage (Figure 11). No studies were conducted during the preparedness stage.

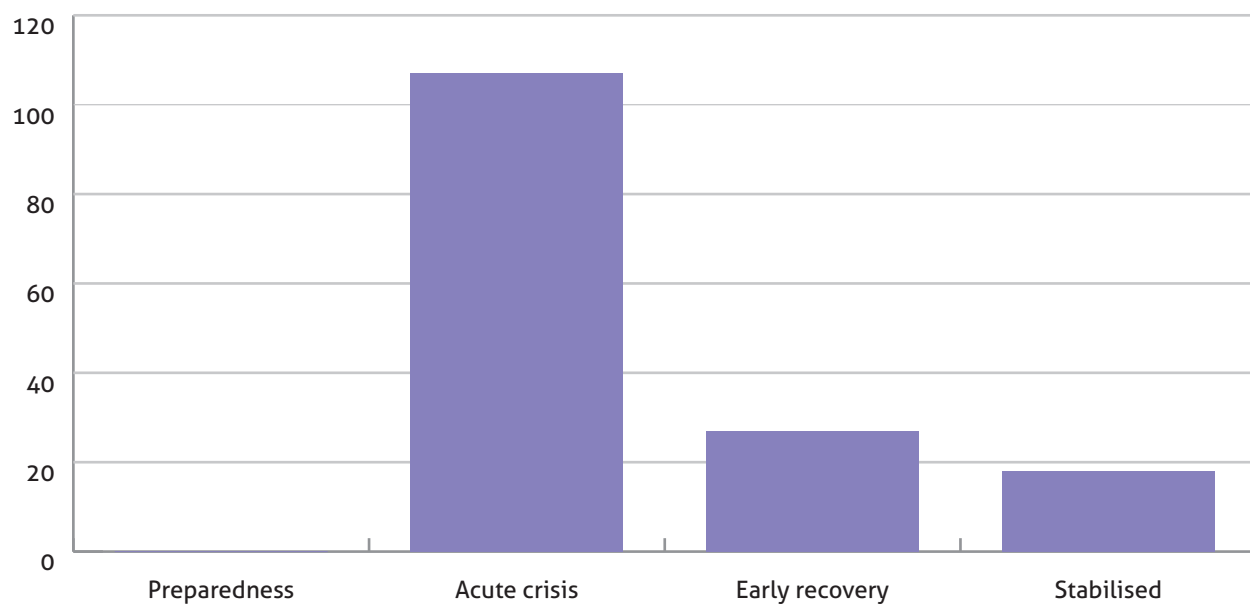


Figure 11: Communicable disease studies by stage of crisis

4.1.2 Malaria

- Over half (55%, 62/151) of the 151 CD interventions that met the inclusion criteria of this review were conducted against malaria.
- Nearly half (>45%) of these studies were randomized-controlled trials, most (>80%) of high quality, indicating a higher degree of confidence in their results compared to other less rigorous designs.
- All (100%) malarial interventions in this review occurred in populations displaced as a result of armed conflict.
- 20 vector control interventions met the inclusion criteria of this review.
- Insecticide-treated nets (ITNs) (N=7) were the most frequently studied intervention in these settings, followed by insecticide spraying (IS) and a variety of insecticide-treated surfaces (clothes, tents, sheeting, cattle).
- Nearly half of the vector control interventions (8/20, 40%) were conducted in northwestern Pakistan among Pakistani natives, Afghan residents, and Afghan refugees living in camp and non-camp settings; the remaining research was equally split between Southeast Asia (6/20) and Africa (6/20).
- Half (50%) of the 20 vector control interventions were RCTs, with the majority of these (80%) graded as high quality.
- 42 human-targeted interventions met the inclusion criteria of this review.
- Anti-malarials (N=61) were the most frequently studied intervention in these settings, although one study of a malaria vaccine was included.
- Three quarters of the human targeted interventions (32/42, 76%) were conducted in Southeast Asia, with over 90% (30/32) of research conducted in these areas by research groups on the Thai-Burmese or Thai-Cambodian borders.
- Three quarters (76%) of the 42 interventions were RCTs of some design, with the majority of these (75%) graded as high quality.
- In terms of effectiveness, insecticide treated nets, tents, and clothes were found to be significantly more effective than their untreated counterparts (See Malaria vector table). However, these findings varied by region and over time, likely related to changes in vector and host parasite patterns over the inclusion years of this review.
- This review included 14 studies that included some component of genetic testing for resistance genes to various therapies (e.g. chloroquine), the majority (75%) of which were conducted in Thailand. The majority of studies (65%) included supervised treatment, which provided significantly better ACPR outcomes than non-supervised treatment.

4.1.3 Poliomyelitis

- In total, 6 papers were included in the review. The intervention in each study was either oral polio vaccine (OPV) or inactivated polio vaccine (IPV).
 - 2/6 papers described vaccine delivery without any relation to health outcomes, while another significant body of literature focused on refugees in middle and high income countries.
 - Only six studies met the inclusion criteria of this review, three of these studies were graded as high quality (O'Reilly 2014, Aaby 2005, Aaby 2002).
 - The remaining three studies, while assessing coverage and not directly measuring health outcomes (e.g., virological markers of uptake), were included as the calculation of cost per child is also an outcome of interest (Sheikh 2014, MMWR 2014).
 - One high quality retrospective case-control analysis has provided the polio community with amongst its best estimates of how and where to target efforts in these settings (O'Reilly 2014).
 - In terms of effectiveness, this decade-long analysis of children <14 years in Afghanistan and Pakistan – indicated a significant reduction in polio and acute flaccid paralysis (AFP) incidence. It also demonstrated that mono- and bi-valent formulations of OPV work equally well in this population and setting.
-

- Two high quality papers from Guinea Bissau provided morbidity and mortality estimates in relation to measles and IPV; both vaccines were part of a RCT that had been severely interrupted due to civil war (Aaby 2002, 2005)

These studies, both presenting data gathered during interruptions due to war, demonstrated that OPV is associated with significantly less mortality and hospitalizations, particularly in children aged 6 months or younger. Further, studies indicate a difference in mortality between males and females but the results are inconclusive overall: one study found a higher mortality in females than males for IPV, while another found no difference between males and females for OPV.

4.1.4 Neglected Tropical Diseases

Of the current list of 17 diseases currently classified as NTDs by the WHO, four – lymphatic filariasis ('elephantiasis'), onchocerciasis ('river blindness'), guinea worm, and trachoma – have active global elimination programmes underway with the aim of elimination by 2020. An additional two NTDs – schistosomiasis and soil transmitted/intestinal helminthes (STHs) – have active control programmes underway with increasingly narrowing targets towards elimination in the near future.

- Of over 60 papers initially retrieved, the vast majority of research focused on infection or disease prevalence (usually via a one-time cross sectional survey) without any information on an intervention conducted.
- This review found nine research articles that evaluated the success of NTD interventions in humanitarian settings
- The interventions against NTDs included in this review include those against leishmaniasis (N=5), schistosomiasis (N=3), and trachoma (N=1).
- Five papers included an NTD evaluation with a refugee population in a host or originating country before being followed up in the United States; all five of these studies were on STHs.
- Of the 17 diseases currently classified as NTDs, only four were included in this review.
- Despite the fact that they are due for elimination by 2020, this review did not retrieve any intervention studies against lymphatic filariasis, onchocerciasis, or guinea worm and only one study on trachoma in these populations.

Leishmaniasis (Visceral):

- All five leishmaniasis intervention studies were against visceral leishmaniasis (VL).
- The one study graded as high quality demonstrated that VL treatment is amongst the most cost-effective public health interventions available (Griekspoor 1999). It is markedly more cost-effective, at USD \$18 saved / DALY averted than interventions in the USD\$20-25/DALY range such as measles, polio, or DPT vaccine.
- Three of these studies were graded medium and 1 low quality; none provided tests of statistical association or strength of magnitude of evidence in relation to VL treatment.
- All VL interventions included in this review occurred in Africa, and all with refugee populations who fled as a result of armed conflict. All studies evaluated treatment with sodium stibogluconate of varying dosages/regimens.
- Of these five studies, three were conducted 13-18 years ago (Boussery 2001, Griekspoor 1999, Seaman 1996) and two were conducted 23 years ago (Zijlstra 1991, De Beer 1991).
- The high quality economic study demonstrated that VL treatment is amongst the most cost-effective public health interventions. The medium and low quality, old studies conclude that sodium stibogluconate is safe and effective treatment for VL.

Schistosomiasis:

- Of the three schistosomiasis interventions included, two were against *S. japonica*, and one was against *S. mekongi*.
 - All of the schistosomiasis intervention studies were graded as low quality; none provided tests of statistical association or strength of magnitude of evidence.
-

- All schistosomiasis interventions included here occurred in Asia, two as the result of floods, one in population displaced by armed conflict.
- Two studies evaluated praziquantel and one study artemeter treatment.
- Of the three studies, two were conducted 15 years ago (Huang 1998, Song 1997) and one is 30 years old (Keittivuti 1984).
- These low quality, old studies conclude that praziquantel and artemeter are both effective at reducing parasite burden.

Trachoma:

- Only one intervention was found against trachoma (Javaloy 2003).
- This study was graded to be of medium quality; no tests of statistical association or strength of magnitude of evidence were conducted.
- This study from Africa, conducted in children who moved as a result of armed conflict, evaluated single-dose azithromycin and found it to be effective in clearing *Chlamydia trachomatis* infection via sequential PCR screening and testing.

Soil transmitted/intestinal helminthes (STHs):

- Five studies included interventions against STHs, but they are included as a separate category because while the intervention was conducted in the host/originating country, the follow-up was conducted in a high income country.
 - Of these five studies, all were graded high quality and two included statistical tests of association and strength of magnitude of evidence (Goswami 2009, Shah 2008).
 - One economic analysis of the pre-departure albendazole regimen concluded the programme was highly effective at reducing morbidity and mortality, as well as cost-saving (Muennig 1999).
-

Summary

In humanitarian crisis settings, there appears to be a polarization of the focus of intervention types, with evidence of vector control interventions (e.g., ITNs) largely derived from South Asia and Africa, while evidence on human-focused interventions (e.g., antimalarials) primarily originating from Southeast Asia. Given that humanitarian crises are so context-specific, with intervention targets varying by both human (e.g., cultural, behaviour) and environmental (e.g., availability of water) attributes, it would be advantageous to ensure that all pathways involved in malarial transmission are detailed in a given context. There is a clear gap in evidence of vector control interventions in Southeast Asian context/populations, while there is an even larger dearth of evidence of antimalarials in African and South Asian settings.

There are many gaps in the evidence on NTD interventions in humanitarian settings. This is particularly troubling in light of the fact that of the four NTDs slated for elimination by 2020, only one intervention (against trachoma) was conducted in these settings. In terms of global burden, schistosomiasis received more attention but research on soil-transmitted helminths was largely conducted in relation to patriation overseas (even if the initial antihelminths were administered in the crisis setting – i.e., these studies were largely conducted as a condition of ensuring entrance to the destination country). Perhaps due to its striking morbidity, visceral leishmaniasis received the vast majority of attention in these settings but it is worth noting that these studies were conducted nearly two decades ago.

Polio is of particular concern in humanitarian settings, as the distribution of wildtype polio is currently restricted to areas undergoing sustained and extreme pressures due to both armed conflict as well as natural disasters: Afghanistan, Northern Nigeria, and Pakistan. A recent high quality retrospective case-control analysis has provided the polio community with the most current estimates of how and where to target vaccination efforts in these settings (O'Reilly 2014). The utter dearth of literature on evidence of polio interventions in humanitarian settings is especially problematic since on May 5th 2013 WHO declared polio a Public Health Emergency of International Concern (Gulland 2013). Given that the final frontiers where WPV 1 and 3 are humanitarian crisis settings, it is critical that the humanitarian community do what it can to ensure successful implementation of the global programme's goals.

In terms of communicable diseases as a whole, the quantity and quality of existing evidence largely corresponds to the burden (prevalence) or severity of particular diseases. Thus it is perhaps unsurprising that the majority of evidence on interventions in these settings relates to tuberculosis or respiratory illnesses, diarrhoeal diseases, or vaccine preventable diseases (measles, DTP). A recent review on infectious disease outbreaks in fragile states highlighted the common occurrence of certain communicable diseases (e.g., yellow fever) for which there have been significant outbreaks but little corresponding research (Bruckner and Checchi, 2011). The inability to secure laboratory confirmation has also led to a dearth of high quality research in certain communicable diseases (e.g., diarrhoeal or vector borne diseases, apart from malaria) when a specific pathogen can definitively be identified.

4.1.2 Expert interviews

Key findings from the expert interviews were as follows:

- Compared to other sectors (e.g. WASH, nutrition), the CD sector is more diverse, leading to problems when CD practitioners try to coordinate interventions and research – particularly with other sectors.
- The two largest problems facing CD research in these settings are: i) lack of coordination in response, ii) lack of consensus on standards to employ for each situation.
- Context is very important and further research is needed, for example, on how vaccinations schedules should be reconsidered per each population and crisis type (by situation, partners on the ground).
- As a sector, CD follows norms and guidelines – most notably Sphere, but individual agencies have their own guidelines and protocols, causing problems, e.g. the NATO response in Afghanistan had joined forces from different countries, meaning over 10 different malaria protocols were being used at the same time, in the same region.
- Sphere's CD indicators are not easy to measure for those practicing in the field. This has also led to a divergence of indicators, with several organisations developing their own (e.g. CDC, NGOs).
- WHO agencies need to take more leadership in this sector, as there is currently no single authoritative body to which CD practitioners defer. Experts agree this was, in theory, supposed to be the responsibility of the WHO but there is little guidance, which leads to each agency working largely in isolation.

Evidence gaps identified by key informants included:

- The evidence base for CD interventions in crisis settings needs to be strengthened, starting with the development of agreed protocols and indicators, e.g. Sphere indicators must be reframed into something context-specific.
- Specific evidence gaps exist around many issues related to communicable disease, including: the diseases themselves (e.g. pertussis, hepatitis A and E, and measles), methods to measure them (e.g. Lot Quality Assurance Sampling (LQAS)), and standard measurements such as mortality (e.g. age and gender specific).
- Designs to conduct and assess immunisations are problematic, with LQAS being employed by many but debated by a few experts who question its appropriateness.
- CD is context, disease and crisis specific – e.g. currently there is almost no evidence on CD control in Syrian populations; age/gender specific information is needed, even on mortality.
- Surveillance must be enhanced across all settings, once indicators are agreed upon; current surveillance focuses on measles but target ages are changing and schedules being revised.
- There is no evidence on whether a coordinated humanitarian approach will improve targets; research could be done on current versus coordinated approaches.
- Huge gap in understanding of human side of CD control; more anthropological/sociological research is needed for CD intervention success (e.g. acceptability).
- Research could validate clinical versus laboratory confirmed outcomes for CD interventions.

4.1.3 Recommendations for future research

Disease-specific gaps

- Specific evidence gaps exist around many communicable diseases such as pertussis, hepatitis A and E, or measles.
 - Further review of the literature has highlighted that there is a particular need for research on interventions against NTDs (especially those with elimination targets for 2020) and polio in these settings.
 - Malaria has been extensively studied in these settings, but due to the fact that existing research is largely polarised this sector could focus on gathering more evidence for a given context on those areas in which there is currently little evidence for a particular setting/population (e.g. more vector control studies from Southeast Asia)
-

Indicators, standards, and guidelines

- The CD sector has felt a lack of uniform agreement in the area of using protocols to direct interventions, and indicators to measure their impact; research should be conducted on how to best standardise both of these for the CD community in crisis settings.
- The evidence base for CD interventions in crisis settings needs to be strengthened, starting with development of protocols and indicators on which everyone has consensus, e.g. Sphere indicators must be reframed into something context-specific.
- Better standard measurements are needed for mortality (e.g. age and gender specific) data.

Study design

- Research could help validate syndromic diagnoses versus laboratory confirmed outcomes for the majority of CD interventions (e.g., diarrhoeal and non-malarial vector borne diseases).
- New measurement methods should be considered, e.g. for assessing immunization coverage.
- More anthropological/sociological research is needed for CD intervention success (e.g. acceptability, accessibility).

Contextual factors

- Increasing urbanisation and movement to coastal areas means that more attention should be given to CD research in humanitarian contexts in these settings, including disease movement to and from these population areas.

References (A and B categories): Communicable disease control

Malaria

1. Ambler, M.T., 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: p. 207.
 2. Bonnet, M., et al., Efficacy of antimalarial treatment in Guinea: in vivo study of two artemisinin combination therapies in Dabola and molecular markers of resistance to sulphadoxine-pyrimethamine in N'Zerekore. *Malar J*, 2007. 6: p. 54.
 3. Bouma, M.J., et al., Malaria control using permethrin applied to tents of nomadic Afghan refugees in northern Pakistan. *Bulletin of the World Health Organization*, 1996. 74(4): p. 413-21.
 4. Brockman, A., et al., *Plasmodium falciparum* antimalarial drug susceptibility on the north-western border of Thailand during five years of extensive use of artesunate-mefloquine. *Trans R Soc Trop Med Hyg*, 2000. 94(5): p. 537-44.
 5. Burns, M., et al., Efficacy of sulfadoxine-pyrimethamine in the treatment of uncomplicated *Plasmodium falciparum* malaria in East Timor. *Am J Trop Med Hyg*, 2006. 74(3): p. 361-6.
 6. Burns, M., 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. *American Journal of Tropical Medicine & Hygiene*, 2012. 87(2): p. 242-50.
 7. Carrara, V.I., et al., Deployment of early diagnosis and mefloquine-artesunate treatment of *falciparum* malaria in Thailand: the Tak Malaria Initiative. *PLoS Med*, 2006. 3(6): p. e183.
 8. Carrara, V.I., et al., Changes in the treatment responses to artesunate-mefloquine on the northwestern border of Thailand during 13 years of continuous deployment. *PLoS One*, 2009. 4(2): p. e4551.
 9. Chanda, E., et al., Scale-up of a programme for malaria vector control using long-lasting insecticide-treated nets: lessons from South Sudan. *Bull World Health Organ*, 2014. 92(4): p. 290-6.
 10. Charlwood, J.D., et al., The impact of indoor residual spraying with malathion on malaria in refugee camps in eastern Sudan. *Acta Trop*, 2001. 80(1): p. 1-8.
-

11. Depoortere, E., 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. *Tropical Medicine and International Health*, 2005. 10(2): p. 139-145.
 12. Dolan, G., et al., Bed nets for the prevention of malaria and anaemia in pregnancy. *Trans R Soc Trop Med Hyg*, 1993. 87(6): p. 620-6.
 13. Ezard, N., et al., Efficacy of chloroquine in the treatment of uncomplicated Plasmodium falciparum infection in East Timor, 2000. *Acta Trop*, 2003. 88(1): p. 87-90.
 14. Fontanet, A.L., et al., Falciparum malaria in eastern Thailand: a randomized trial of the efficacy of a single dose of mefloquine. *Bull World Health Organ*, 1994. 72(1): p. 73-8.
 15. Howard, N., et al., Clinical trial of extended-dose chloroquine for treatment of resistant falciparum malaria among Afghan refugees in Pakistan. *Malar J*, 2011. 10: p. 171.
 16. Kamolratanakul, P., et al., Cost-effectiveness and sustainability of lambda-cyhalothrin-treated mosquito nets in comparison to DDT spraying for malaria control in western Thailand. *Am J Trop Med Hyg*, 2001. 65(4): p. 279-84.
 17. Kimani, E.W., et al., Use of insecticide-treated clothes for personal protection against malaria: a community trial. *Malar J*, 2006. 5: p. 63.
 18. Kolaczinski, K., et al., Defining Plasmodium falciparum treatment in South West Asia: a randomized trial comparing artesunate or primaquine combined with chloroquine or SP. *PLoS One*, 2012. 7(1): p. e28957.
 19. Leslie, T., et al., Compliance with 14-day primaquine therapy for radical cure of vivax malaria--a randomized placebo-controlled trial comparing unsupervised with supervised treatment. *Trans R Soc Trop Med Hyg*, 2004. 98(3): p. 168-73.
 20. Luxemburger, C., et al., Oral artesunate in the treatment of uncomplicated hyperparasitemic falciparum malaria. *Am J Trop Med Hyg*, 1995. 53(5): p. 522-5.
 21. Luxemburger, C., et al., Permethrin-impregnated bed nets for the prevention of malaria in schoolchildren on the Thai-Burmese border. *Trans R Soc Trop Med Hyg*, 1994. 88(2): p. 155-9.
 22. Luxemburger, C., et al., Single day mefloquine-artesunate combination in the treatment of multi-drug resistant falciparum malaria. *Trans R Soc Trop Med Hyg*, 1994. 88(2): p. 213-7.
 23. Luxemburger, C., et al., Treatment of vivax malaria on the western border of Thailand. *Trans R Soc Trop Med Hyg*, 1999. 93(4): p. 433-8.
 24. McGready, R., 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(7): p. e40244.
 25. McGready, R., 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(6): p. 689-93.
 26. McGready, R., et al., Artemisinin derivatives in the treatment of falciparum malaria in pregnancy. *Trans R Soc Trop Med Hyg*, 1998. 92(4): p. 430-3.
 27. Nosten, F., et al., Randomised double-blind placebo-controlled trial of SPf66 malaria vaccine in children in northwestern Thailand. *Lancet*, 1996. 348(9029): p. 701-707.
 28. Nosten, F., et al., Treatment of multidrug-resistant Plasmodium falciparum malaria with 3-day artesunate-mefloquine combination. *J Infect Dis*, 1994. 170(4): p. 971-7.
 29. Nosten, F., et al., Mefloquine-resistant falciparum malaria on the Thai-Burmese border. *Lancet*, 1991. 337(8750): p. 1140-3.
 30. Nosten, F., et al., Effects of artesunate-mefloquine combination on incidence of Plasmodium falciparum malaria and mefloquine resistance in western Thailand: a prospective study. *Lancet*, 2000. 356(9226): p. 297-302.
 31. Pang, L.W., et al., Doxycycline prophylaxis for falciparum malaria. *Lancet*, 1987. 1(8543): p. 1161-4.
 32. Price, R., et al., Artesunate and mefloquine in the treatment of uncomplicated multidrug-resistant hyperparasitaemic falciparum malaria. *Trans R Soc Trop Med Hyg*, 1998. 92(2): p. 207-11.
-

33. Price, R., et al., Artesunate versus artemether for the treatment of recrudescing multidrug-resistant falciparum malaria. *Am J Trop Med Hyg*, 1998. 59(6): p. 883-8.
 34. Price, R., et al., Adverse effects in patients with acute falciparum malaria treated with artemisinin derivatives. *Am J Trop Med Hyg*, 1999. 60(4): p. 547-55.
 35. Price, R.N., 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(5): p. 523-7.
 36. Price, R.N., et al., Effects of artemisinin derivatives on malaria transmissibility. *Lancet*, 1996. 347(9016): p. 1654-8.
 37. Price, R.N., et al., Artesunate/mefloquine treatment of multi-drug resistant falciparum malaria. *Trans R Soc Trop Med Hyg*, 1997. 91(5): p. 574-7.
 38. Protopopoff, N., et al., Vector control in a malaria epidemic occurring within a complex emergency situation in Burundi: a case study. *Malar J*, 2007. 6: p. 93.
 39. Richards, A.K., 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(5): p. 512-21.
 40. Rowland, M., et al., Pyrethroid-impregnated bed nets for personal protection against malaria for Afghan refugees. *Transactions of the Royal Society of Tropical Medicine & Hygiene*, 1996. 90(4): p. 357-61.
 41. Rowland, M., et al., DEET mosquito repellent provides personal protection against malaria: a household randomized trial in an Afghan refugee camp in Pakistan. *Tropical Medicine and International Health*, 2004. 9(3): p. 335-342.
 42. Rowland, M. and N. Durrani, Randomized controlled trials of 5- and 14-days primaquine therapy against relapses of vivax malaria in an Afghan refugee settlement in Pakistan. *Transactions of the Royal Society of Tropical Medicine & Hygiene*, 1999. 93(6): p. 641-3.
 43. Rowland, M., et al., Permethrin-treated chaddars and top-sheets: appropriate technology for protection against malaria in Afghanistan and other complex emergencies. *Transactions of the Royal Society of Tropical Medicine & Hygiene*, 1999. 93(5): p. 465-72.
 44. Rowland, M., et al., Resistance of falciparum malaria to chloroquine and sulfadoxine-pyrimethamine in Afghan refugee settlements in western Pakistan: surveys by the general health services using a simplified in vivo test. *Tropical Medicine & International Health*, 1997. 2(11): p. 1049-56.
 45. Rowland, M., S. Hewitt, and N. Durrani, Prevalence of malaria in Afghan refugee villages in Pakistan sprayed with lambda-cyhalothrin or malathion. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1994. 88(4): p. 378-379.
 46. Rowland, M., et al., Transmission and control of vivax malaria in Afghan refugee settlements in Pakistan. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1997. 91(3): p. 252-255.
 47. Rowland, M., et al., Sustainability of pyrethroid-impregnated bednets for malaria control in Afghan communities. *Bulletin of the World Health Organization*, 1997. 75(1): p. 23-9.
 48. Rowland, M., et al., Control of malaria in Pakistan by applying deltamethrin insecticide to cattle: a community-randomised trial. *Lancet*, 2001. 357(9271): p. 1837-1841.
 49. Rowland, M., 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. *Tropical Medicine & International Health*, 2002. 7(10): p. 813-22.
 50. Saarinen, M., et al., Malaria prophylaxis with proguanil to Namibian refugee children in Angola. *Tropical Medicine & Parasitology*, 1988. 39(1): p. 40-2.
 51. Satti, G.M., S.H. Elhassan, and S.A. Ibrahim, The efficacy of artemether versus quinine in the treatment of cerebral malaria. *J Egypt Soc Parasitol*, 2002. 32(2): p. 611-23.
-

52. Smithuis, F.M., et al., The effect of insecticide-treated bed nets on the incidence and prevalence of malaria in children in an area of unstable seasonal transmission in western Myanmar. *Malar J*, 2013. 12: p. 363.
53. Smithuis, F.M., et al., Comparison of two mefloquine regimens for treatment of Plasmodium falciparum malaria on the northeastern Thai-Cambodian border. *Antimicrob Agents Chemother*, 1993. 37(9): p. 1977-81.
54. Spencer, S., et al., Malaria in camps for internally-displaced persons in Uganda: evaluation of an insecticide-treated bednet distribution programme. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 2004. 98(12): p. 719-727.
55. ter Kuile, F.O., et al., Halofantrine versus mefloquine in treatment of multidrug-resistant falciparum malaria. *Lancet*, 1993. 341(8852): p. 1044-9.
56. ter Kuile, F.O., et al., Mefloquine treatment of acute falciparum malaria: a prospective study of non-serious adverse effects in 3673 patients. *Bull World Health Organ*, 1995. 73(5): p. 631-42.
57. ter Kuile, F.O., et al., High-dose mefloquine in the treatment of multidrug-resistant falciparum malaria. *J Infect Dis*, 1992. 166(6): p. 1393-400.
58. Tomashek, K.M., et al., Randomized intervention study comparing several regimens for the treatment of moderate anemia among refugee children in Kigoma Region, Tanzania. *American Journal of Tropical Medicine & Hygiene*, 2001. 64(3-4): p. 164-71.
59. van Vugt, M., et al., Randomized comparison of artemether-benflumetol and artesunate-mefloquine in treatment of multidrug-resistant falciparum malaria. *Antimicrob Agents Chemother*, 1998. 42(1): p. 135-9.
60. van Vugt, M., et al., Artemether-lumefantrine for the treatment of multidrug-resistant falciparum malaria. *Trans R Soc Trop Med Hyg*, 2000. 94(5): p. 545-8.
61. Vugt, M.V., et al., Efficacy of six doses of artemether-lumefantrine (benflumetol) in multidrug-resistant Plasmodium falciparum malaria. *Am J Trop Med Hyg*, 1999. 60(6): p. 936-42.
62. Wolday, D., et al., Sensitivity of Plasmodium falciparum in vivo to chloroquine and pyrimethamine-sulfadoxine in Rwandan patients in a refugee camp in Zaire. *Transactions of the Royal Society of Tropical Medicine & Hygiene*, 1995. 89(6): p. 654-6.

Neglected Tropical Disease (NTDs)

1. Keittivuti, B., et al., Treatment of Schistosoma mekongi with praziquantel in Cambodian refugees in holding centres in Prachinburi Province, Thailand. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1984. 78(4): p. 477-479.
 2. De Beer, P., et al., A killing disease epidemic among displaced Sudanese population identified as visceral leishmaniasis. *American Journal of Tropical Medicine and Hygiene*, 1991. 44(3): p. 283-289.
 3. Zijlstra, E.E., et al., Kala-azar in displaced people from southern Sudan: epidemiological, clinical and therapeutic findings. *Trans R Soc Trop Med Hyg*, 1991. 85(3): p. 365-9.
 4. Seaman, J., et al., Epidemic visceral leishmaniasis in southern Sudan: treatment of severely debilitated patients under wartime conditions and with limited resources. *Ann Intern Med*, 1996. 124(7): p. 664-72.
 5. Song, Y., et al., The preventive effect of artemether in protection of people from schistosome infection during fighting against flood. *Chinese Journal of Parasitology & Parasitic Diseases*, 1997. 15(3): p. 133-137.
 6. Huang, Y., et al., Mass praziquantel chemoprophylaxis against acute schistosomiasis japonica in a flood. *Chinese Journal of Schistosomiasis Control*, 1998. 10(3): p. 138-140.
 7. Griekspoor, A., E. Sondorp, and T. Vos, Cost-effectiveness analysis of humanitarian relief interventions: visceral leishmaniasis treatment in the Sudan. *Health Policy Plan*, 1999. 14(1): p. 70-6.
 8. Muennig, P., et al., The cost effectiveness of strategies for the treatment of intestinal parasites in immigrants. *N Engl J Med*, 1999. 340(10): p. 773-9.
-

9. Boussery, G., et al., Visceral leishmaniasis (kala-azar) outbreak in Somali refugees and Kenyan shepherds, Kenya. *Emerg Infect Dis*, 2001. 7(3 Suppl): p. 603-4.
10. Geltman, P.L., J. Cochran, and C. Hedgecock, Intestinal parasites among African refugees resettled in Massachusetts and the impact of an overseas pre-departure treatment program. *Am J Trop Med Hyg*, 2003. 69(6): p. 657-62.
11. Javaloy, J., et al., Follicular conjunctivitis caused by *Chlamydia trachomatis* in an infant Saharan population: molecular and clinical diagnosis. *Br J Ophthalmol*, 2003. 87(2): p. 142-6.
12. Shah, J.J., et al., Evaluation of the impact of overseas pre-departure treatment for infection with intestinal parasites among Montagnard refugees migrating from Cambodia to North Carolina. *Am J Trop Med Hyg*, 2008. 78(5): p. 754-9.
13. Goswami, N.D., et al., Persistent eosinophilia and *Strongyloides* infection in Montagnard refugees after presumptive albendazole therapy. *Am J Trop Med Hyg*, 2009. 81(2): p. 302-4.
14. Swanson, S.J., et al., Albendazole therapy and enteric parasites in United States-bound refugees. *N Engl J Med*, 2012. 366(16): p. 1498-507.

Polio

1. Aaby, P., et al., Survival of previously measles-vaccinated and measles-unvaccinated children in an emergency situation: an unplanned study. *Pediatric Infectious Disease Journal*, 2003. 22(9): p. 798-805.
2. Aaby, P., et al., Childhood mortality after oral polio immunisation campaign in Guinea-Bissau. *Vaccine*, 2005. 23(14): p. 1746-51.
3. Aaby, P., et al., Routine vaccinations and child survival in a war situation with high mortality: effect of gender. *Vaccine*, 2002. 21(1-2): p. 15-20.
4. Centers for Disease, C. and Prevention, U.S.-incurred costs of wild poliovirus infections in a camp with U.S.-bound refugees--Kenya, 2006. *MMWR Morb Mortal Wkly Rep*, 2008. 57(9): p. 232-5.
5. O'Reilly, K.M., et al., The effect of mass immunisation campaigns and new oral poliovirus vaccines on the incidence of poliomyelitis in Pakistan and Afghanistan, 2001-11: a retrospective analysis. *Lancet*, 2012. 380(9840): p. 491-8.
6. Sheikh, M.A., et al., Combined use of inactivated and oral poliovirus vaccines in refugee camps and surrounding communities - Kenya, December 2013. *MMWR Morb Mortal Wkly Rep*, 2014. 63(11): p. 237-41.

Communicable Diseases (Excluding Malaria, NTDs, and Polio)

1. Aaby, P., et al., Survival of previously measles-vaccinated and measles-unvaccinated children in an emergency situation: an unplanned study. *Pediatric Infectious Disease Journal*, 2003. 22(9): p. 798-805.
 2. Aaby, P., et al., Childhood mortality after oral polio immunisation campaign in Guinea-Bissau. *Vaccine*, 2005. 23(14): p. 1746-51.
 3. Aaby, P., et al., Routine vaccinations and child survival in a war situation with high mortality: effect of gender. *Vaccine*, 2002. 21(1-2): p. 15-20.
 4. Ahmadzai, H., et al., Scaling up TB DOTS in a fragile state: post-conflict Afghanistan. *International Journal of Tuberculosis & Lung Disease*, 2008. 12(2): p. 180-5.
 5. Arumugam, M., et al., Measles transmission following the tsunami in a population with a high one-dose vaccination coverage, Tamil Nadu, India 2004-2005. *BMC Infectious Diseases*, 2006. 6(143).
 6. Bam, T.S., et al., High success rate of TB treatment among Bhutanese refugees in Nepal. *International Journal of Tuberculosis & Lung Disease*, 2007. 11(1): p. 54-8.
-

7. Bohler, M., S.A. Mustafaa, and O. Morkve, Tuberculosis treatment outcome and health services: a comparison of displaced and settled population groups in Khartoum, Sudan. *International Journal of Tuberculosis & Lung Disease*, 2005. 9(1): p. 32-6.
 8. Centers for Disease, C. and Prevention, Nationwide measles vaccination campaign for children aged 6 months-12 years--Afghanistan, 2002. *MMWR - Morbidity & Mortality Weekly Report*, 2003. 52(16): p. 363-6.
 9. Djeddah, C., et al., An outbreak of cholera in a refugee camp in Africa. *European Journal of Epidemiology*, 1988. 4(2): p. 227-30.
 10. Dorlencourt, F., et al., Effectiveness of mass vaccination with WC/rBS cholera vaccine during an epidemic in Adjumani district, Uganda. *Bulletin of the World Health Organization*, 1999. 77(11): p. 949-50.
 11. Elsayed, E.A., et al., Emergency measles control activities - Darfur, Sudan, 2004. *Morbidity and Mortality Weekly Report*, 2004. 53(38): p. 897-899.
 12. Garenne, M.L., R. Coninx, and C. Dupuy, Effects of the civil war in central Mozambique and evaluation of the intervention of the International Committee of the Red Cross. *Journal of Tropical Pediatrics*, 1997. 43(6): p. 318-23.
 13. Garly, M.L., et al., Prophylactic antibiotics to prevent pneumonia and other complications after measles: community based randomised double blind placebo controlled trial in Guinea-Bissau. *BMJ*, 2006. 333(7581): p. 1245.
 14. Goma Epidemiology Group, Public health impact of Rwandan refugee crisis: what happened in Goma, Zaire, in July, 1994? Goma Epidemiology Group. *Lancet*, 1995. 345(8946): p. 339-44.
 15. Gustafson, P., et al., Tuberculosis mortality during a civil war in Guinea-Bissau. *JAMA*, 2001. 286(5): p. 599-603.
 16. Habib, M.A., S.B. Soofi, and Z.A. Bhutta, Effect of zinc in tablet and suspension formulations in the treatment of acute diarrhoea among young children in an emergency setting of earthquake affected region of Pakistan. *Jcbsp, Journal of the College of Physicians & Surgeons - Pakistan*, 2010. 20(12): p. 837-8.
 17. Haelterman, E., et al., Impact of a mass vaccination campaign against a meningitis epidemic in a refugee camp. *Tropical Medicine and International Health*, 1996. 1(3): p. 385-392.
 18. Heldal, E., et al., Successful management of a national tuberculosis programme under conditions of war. *International Journal of Tuberculosis & Lung Disease*, 1997. 1(1): p. 16-24.
 19. Heyman, S.N., et al., Diarrheal epidemics among Rwandan refugees in 1994. Management and outcome in a field hospital. *Journal of Clinical Gastroenterology*, 1997. 25(4): p. 595-601.
 20. Hindiyeh, M.Y., et al., Characterization of large mumps outbreak among vaccinated Palestinian refugees. *Journal of Clinical Microbiology*, 2009. 47(3): p. 560-5.
 21. Huhn, G.D., et al., Vaccination coverage survey versus administrative data in the assessment of mass yellow fever immunization in internally displaced persons - Liberia, 2004. *Vaccine*, 2006. 24(6): p. 730-737.
 22. Isaza, P., et al., A diarrheal diseases control program among Nicaraguan refugee children in Campo Luna, Honduras. *Bulletin of the Pan American Health Organization*, 1980. 14(4): p. 337-342.
 23. Jacquet, V., et al., Impact of DOTS expansion on tuberculosis related outcomes and costs in Haiti. *BMC Public Health*, 2006. 6(209).
 24. Kamugisha, C., K.L. Cairns, and C. Akim, An outbreak of measles in Tanzanian refugee camps. (Special issue: Global measles mortality reduction and regional elimination: a status report.). *Journal of Infectious Diseases*, 2003. 187(1): p. S58-S62.
 25. Keus, K., 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. *Transactions of the Royal Society of Tropical Medicine & Hygiene*, 2003. 97(6): p. 614-8.
 26. Keus, K., et al., Treatment of a cohort of tuberculosis patients using the Manyatta regimen in a conflict zone in South Sudan. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 2003. 97(6): p. 614-618.
-

27. Legros, D., et al., Mass vaccination with a two-dose oral cholera vaccine in a refugee camp. *Bulletin of the World Health Organization*, 1999. 77(10): p. 837-842.
 28. Marfin, A.A., et al., Infectious disease surveillance during emergency relief to Bhutanese refugees in Nepal. *JAMA*, 1994. 272(5): p. 377-81.
 29. Martins, N., et al., Tuberculosis control in conflict-affected East Timor, 1996-2004. *International Journal of Tuberculosis & Lung Disease*, 2006. 10(9): p. 975-81.
 30. Mastro, T.D. and R. Coninx, The management of tuberculosis in refugees along the Thai-Kampuchean border. *Tubercle*, 1988. 69(2): p. 95-103.
 31. Mauch, V., et al., Structure and management of tuberculosis control programs in fragile states--Afghanistan, DR Congo, Haiti, Somalia. *Health Policy*, 2010. 96(2): p. 118-27.
 32. M'Boussa, J., et al., A flare-up of tuberculosis due to war in Congo Brazzaville. *International Journal of Tuberculosis & Lung Disease*, 2002. 6(6): p. 475-8.
 33. Miles, S.H. and R.B. Maat, A successful supervised outpatient short-course tuberculosis treatment program in an open refugee camp on the Thai-Cambodian border. *American Review of Respiratory Disease*, 1984. 130(5): p. 827-30.
 34. Minetti, A., et al., Tuberculosis treatment in a refugee and migrant population: 20 years of experience on the Thai-Burmese border. *International Journal of Tuberculosis & Lung Disease*, 2010. 14(12): p. 1589-95.
 35. Mupere, E., P. Onok, and H.M. Babikako, Impact of emergency mass immunisations on measles control in displaced populations in Gulu district, northern Uganda. *East African Medical Journal*, 2005. 82(8): p. 403-8.
 36. Myaux, J.A., et al., Flood control embankments contribute to the improvement of the health status of children in rural Bangladesh. *Bulletin of the World Health Organization*, 1997. 75(6): p. 533-9.
 37. Myint, N.W., et al., Are there any changes in burden and management of communicable diseases in areas affected by Cyclone Nargis? *Conflict and Health*, 2011. 5(9).
 38. Ndongosieme, A., et al., Collaboration between a TB control programme and NGOs during humanitarian crisis: Democratic Republic of the Congo. *Bulletin of the World Health Organization*, 2007. 85(8): p. 642-3.
 39. Norval, P.Y., et al., DOTS in Cambodia. Directly observed treatment with short-course chemotherapy. *International Journal of Tuberculosis & Lung Disease*, 1998. 2(1): p. 44-51.
 40. Paquet, C., et al., An outbreak of dysentery due to *Shigella dysenteriae* type 1 in a refugee camp in Rwanda. *Cahiers d'Etudes et de Recherches Francophones/Sante*, 1995. 5(3): p. 181-184.
 41. Porter, J.D., et al., Measles outbreaks in the Mozambican refugee camps in Malawi: the continued need for an effective vaccine. *International Journal of Epidemiology*, 1990. 19(4): p. 1072-7.
 42. Rieder, H.L., Tuberculosis in an Indochinese refugee camp: epidemiology, management and therapeutic results. *Tubercle*, 1985. 66(3): p. 179-86.
 43. Rutta, E., et al., Treatment outcome among Rwandan and Burundian refugees with sputum smear-positive tuberculosis in Ngara, Tanzania. *International Journal of Tuberculosis and Lung Disease*, 2001. 5(7): p. 628-632.
 44. Santaniello-Newton, A. and P.R. Hunter, Management of an outbreak of meningococcal meningitis in a Sudanese refugee camp in Northern Uganda. *Epidemiology & Infection*, 2000. 124(1): p. 75-81.
 45. Senessie, C., G.N. Gage, and E.v. Elm, Delays in childhood immunization in a conflict area: a study from Sierra Leone during civil war. *Conflict and Health*, 2007. 1(14).
 46. Siddique, A.K., et al., Why treatment centres failed to prevent cholera deaths among Rwandan refugees in Goma, Zaire. *Lancet*, 1995. 345(8946): p. 359-61.
 47. Sukrakanchana-Trikham, P., et al., 10-year assessment of treatment outcome among Cambodian refugees with sputum smear-positive tuberculosis in Khao-I-Dang, Thailand. *Tubercle & Lung Disease*, 1992. 73(6): p. 384-7.
 48. Talley, L. and P. Salama, Assessing field vaccine efficacy for measles in famine-affected rural Ethiopia. *American Journal of Tropical Medicine and Hygiene*, 2003. 68(5): p. 545-546.
 49. Wares, D.F., et al., Control of tuberculosis amongst the Tibetan refugee community in northern India. *Indian Journal of Tuberculosis*, 2000. 47(1): p. 35-41.
-

Table 7. Malaria: Vector-Focused Intervention Studies in Humanitarian Crisis Settings, 1980 – 2014

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
RBM Package (LLITNs, Other)						
Authors: Richards (2009)	<i>Refugee</i> (Burmese – IDP Karen?)	<i>Design:</i> RCT	<i>Period:</i> Feb 2003 – Jan 2005	<i>Intervention 1:</i> P falciparum RDT <i>Intervention 2:</i> MAS <i>Intervention 3:</i> ITNs (LLITNs) <i>Intervention 4:</i> educational messages <i>Intervention delivered and assessed as a package (RBM)</i>	Prevalence, <i>P. falciparum</i> and <i>P. vivax</i>	Prevalence significantly decreased after implementation of RBM interventions, with >95% of villagers surveyed, between the first and second screenings of villages implementing RBM in 2003 and 2004 (both years of the pilot). The RBM package of early diagnosis and treatment (RDTs, MAS), ITNs, and education significantly reduced malarial incidence in this population.
<i>Location:</i> Thai-Burmese border, Thailand	<i>Crisis Type:</i> Armed conflict	<i>Quality:</i> HIGH	<i>Enrolment:</i> 7 villages; all residents screened every 6 mo (>95% screened, total N=3400 persons)		<i>Incidence, P. falciparum and P. vivax</i>	Incidence of <i>P. falciparum</i> significantly declined each year of the 2-year pilot during implementation of RBM interventions.
Insecticide treated polyethylene sheets (ITPS)						
Authors: Burns et al (2012)	<i>Refugee</i> (Liberian)	Double blinded RCT	<i>Period:</i> 2003 - 04	<i>Intervention:</i> ITPS (insecticide not stated) on: (i) walls and ceiling or (ii) ceiling only in sample of huts & latrines per camp.	Incidence, children 4-36 mo.	ITPS demonstrated a protective efficacy of 15% within 3-5mo. and 60% within 5-9 mo. compared to UPS. ITPS were more effective in preventing new malaria cases than UPS in children aged 4-36 mo.
<i>Location:</i> Kenema District, Sierra Leone	<i>Crisis:</i> Armed conflict	<i>Quality:</i> HIGH	<i>Enrolment:</i> 2 camps, general pop. (total N=16,000 persons); children aged 4-36 mo. (N=222 children)	<i>Control:</i> Untreated polyethylene sheeting (UPS) on: (i) walls and ceiling or (ii) ceiling only in sample of huts & latrines per camp.	Prevalence, general pop. Anaemia, general pop.	ITPS significantly reduced malaria within 5-9 mo. compared to UPS in the general population. There was no significant difference between ITPS and UPS on reducing anaemia in the general population.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Insecticide-treated clothes (ITCs)						
Authors: Kimani et al (2006)	Refugee (Somali)	Design: Double-blinded (community) trial	Period: April - August, 2002	<i>Intervention:</i> ITCs - permethrin (Peripel EC55, 15mls permethrin / 4000mls water) via dipping of clothes and bedding, worn daily; [N=97 households]	Malaria infection rate	ITCs significantly reduced malarial infection rate (odds of malaria infection reduced by 70%).
Location: Dadaab (Ifo), Northeast Kenya	Crisis Type: Armed conflict	Quality: HIGH	Enrolment: 1 camp (pop. ~ 45,000); 198 (97 treatment, 101 control) participant households	<i>Control:</i> water-treated clothes and bedding; [N=101 households]	Incidence, <i>P. falciparum</i> , general pop. Incidence, <i>P. vivax</i> , general pop.	ITC families had significantly lower incidence of <i>P. falciparum</i> than than control arm from July - November. ITC families had significantly lower <i>P. vivax</i> than control arm from July - September (i.e., shorter period of protection).
Authors: Rowland et al (1999)	Refugee (Afghan)	Design: RCT	Period: July-November 1996	<i>Intervention:</i> ITCs - permethrin ('Imperator' 25% EC, 1g/m ²) treated chaddars (clothes and bedding); [N=51 households]	Incidence, <i>P. falciparum</i> , general pop. Incidence, <i>P. vivax</i> , general pop.	ITC families had significantly lower incidence of <i>P. falciparum</i> than than control arm from July - November. ITC families had significantly lower <i>P. vivax</i> than control arm from July - September (i.e., shorter period of protection).
Location: Northwest Frontier Province, Pakistan	Crisis Type: Armed conflict	Quality: HIGH	Enrolment: 20% of residents from 1 camp (pop. 3950 persons), N= 102 households (825 persons)	<i>Control:</i> Placebo (EC formula without permethrin) treated chaddars; [N=51 households]	Protective effect	ITCs were significantly protective against <i>P. falciparum</i> , but not <i>P. vivax</i>

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DEET Soap						
Authors: Rowland 2004	Refugee (Afghan)	Design: RCT	Period: Aug 1999 – February 2000	Intervention 1: DEET Soap DEET (Mosbar, 20% DEET, 0.5% permethrin); N=530 individuals	Incidence, <i>P. falciparum</i> , all ages	<i>P. falciparum</i> incidence was significantly lower in the DEET soap vs. control arms. Protective efficacy of DEET soap was 56%
Location: Pakistan	Crisis Type: Armed conflict	Quality: HIGH	Enrolment: 1 village; 25% of village population enrolled; N=127 families (N=1148 individuals).	Control: placebo lotion; N=618 individuals	Incidence, <i>P. vivax</i> , all ages	<i>P. vivax</i> incidence was not significantly different between DEET soap and control arms (i.e., no effect); this could have been due to high (>25%) proportions of enrollees with <i>P. vivax</i> infections in 9 months prior to trial.
Insecticide spraying (IS)						
Authors: Rowland et al (2001)	Refugee (Afghan)	Design: 3 way crossover	Period: 3 treatment rounds July-November, 1995-1997.	Intervention 1: IS (cattle) - deltamethrin (0.075g/L; 30mg deltamethrin/m ² from K-Othrine 2.5% suspension): group 1: years 1 (1995) and 3 (1997)	Incidence and prevalence, <i>P. falciparum</i> , general pop. Incidence and prevalence, <i>P. vivax</i> , general pop.	IS-cattle arms had a 56% reduction in <i>P. falciparum</i> incidence; similar decreases in prevalence observed. IS-cattle arms had a 31% reduction in <i>P. vivax</i> incidence; similar decreases in prevalence observed.
Location: Northwest Frontier Province, Pakistan	Crisis Type: Armed conflict	Quality: HIGH	Enrolment: 6 refugee settlements (pop. range 5900-25,000); divided into 2 groups of 3, 80 families/ group	Intervention 2: IS (cattle) - deltamethrin (same formula as above); group 2: year 2 (1996) only Control: no cattle IS	Incidence, <i>P. falciparum</i> , highly endemic pop. Cost efficacy	IS-cattle villages had a dramatically significant decrease in incidence (280/1000 person-yrs to 9/1000 person yrs). IS-cattle provided similar efficacy to indoor IS but cost 80% less.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Insecticide spraying (IS)						
Authors: Charlwood et al (2001)	Refugee (Ugandan?)	Design: Non random trial	Period: October - December 1997 (rainy season).	Intervention: IS - malathion (formula not stated) on interior walls; [N=5 camps]	Mortality rates malaria (age- adjusted)	IS-exposed children < 5 years had significantly lower mortality rates.
Location: Eastern Sudan	Crisis: Armed conflict	Quality: MEDIUM	Enrolment: 10 out of 23 camps; control (5 camps, N=25,263 persons), intervention (5 camps, N=23,452).	Control: no spraying; [N=5 camps]	Morbidity rates (age-adjusted)	There was no significant difference in morbidity rates between IS and control arms.
Authors: Rowland et al (1997)	Refugee (Afghan)	Design: Non random trial	Period: IS: July - Aug., 1994; surveys (children 5-15 yrs.): June, Nov., 1994.	Intervention 1: IS - lambdacyhalothrin (26mg of 10% WP/m2); [N=6 villages]	Incidence, <i>P.</i> <i>falciparum</i> , children 5-15 yrs.	Lambdacyhalothrin IS was significantly more effective than malathion IS in reducing <i>P.</i> <i>falciparum</i> prevalence.
Location: Northwest Frontier Province, Pakistan	Crisis Type: Armed conflict	Quality: MEDIUM	Enrolment: 14 refugee villages (area, pop., village selection not stated).	Intervention 2: IS - malathion (2.04g of 50% WP/m2); [N=7 villages; 1 unsprayed]	Incidence, <i>P.</i> <i>vivax</i> , children 5- 15 yrs.	There was no significant difference between lambdacyhalothrin IS or malathion IS in reducing <i>P. vivax</i> prevalence.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Insecticide spraying (IS)						
Authors: Rowland et al (1994)	Refugee (Afghan)	Design: Non-random trial	Period: IS: July - Aug., 1994; surveys (children 5-15 yrs.): June, Nov., 1994.	Intervention 1: IS - lambda-dacyhalothrin (2.6mg of 10% WP/m2); [N=6 villages]	Incidence, <i>P. falciparum</i> , children 5-15 yrs.	Lambda-dacyhalothrin IS was significantly more effective than malathion IS in reducing <i>P. falciparum</i> prevalence.
Location: Northwest Frontier Province, Pakistan	Crisis Type: Armed conflict	Quality: MEDIUM	Enrolment: 14 refugee villages (area, pop., village selection not stated).	Intervention 2: IS - malathion (2.04g of 50% WP/m2); [N=7 villages; 1 unsprayed]	Incidence, <i>P. vivax</i> , children 5-15 yrs.	There was no significant difference between lambda-dacyhalothrin IS or malathion IS in reducing <i>P. vivax</i> prevalence.
Insecticide-treated nets (ITNs)						
Authors: Smithius 2013	Refugee (Burmese)	Design: RCT (cluster)	Period: May 1998 – February 1999	Intervention: ITNs – deltamethrin (2.5g/m2); N=5000 ITNs distributed to intervention households (based on household size).	Incidence, <i>P. falciparum</i> / <i>P. vivax</i> , children <10 yrs. Prevalence, <i>P. falciparum</i> / <i>P. vivax</i> , children <10 yrs.	In aggregate, <i>P. falciparum</i> and <i>P. vivax</i> incidence did not significantly differ in ITN and non-ITN village pairs. In areas of higher incidence, there was some evidence of higher protective efficacy of ITNs In aggregate, <i>P. falciparum</i> and <i>P. vivax</i> prevalence did not significantly differ in ITN and non-ITN village pairs.
Location: Rhakine State, Western Myanmar	Crisis: Armed conflict	Quality: HIGH	Enrolment: 20 villages of 10 village-pairs, 420 children age <10 yrs / village; N=8175 total.	Control: (no ITN) No ITN provided during trial, all households received ITNs at trial conclusion in May 1999.	Anaemia (haematocrit) Height Spleen rates	In aggregate, anaemia did not significantly differ in ITN and non-ITN village pairs. In aggregate, height did not significantly differ in ITN and non-ITN village pairs. In aggregate, spleen rates did not significantly differ in ITN and non-ITN village pairs.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Insecticide-treated nets (ITNs)						
Authors: Spencer et al (2004)	IDPs	Design: Cross-sectional (post distribution)	Period: March 2001 – July 2002 (mass ITN distribution March – June 2001; survey July 2002)	Intervention 1: ITNs – Permanet (manufacturer, not formulation, provided); N = 25,552 ITNs distributed	Risk of <i>P. falciparum</i> parasitaemia	The risk of <i>P. falciparum</i> parasitaemia was significantly lower in ITN users than non-ITN users
Location: Uganda	Crisis Type: Armed conflict	Quality: MEDIUM	Enrolment: 22 camps; mass distribution of ITNs to 16,687 houses		<i>Mean haemoglobin level</i>	There was no statistically significant difference in mean haemoglobin levels between ITN and non-ITN users.
Authors: Chanda et al (2001)	<i>Refugee</i> (South Sudan)	Design: Cross sectional?	Period: 2006-2012	Intervention: ITNs – long-lasting insecticide nets (LLINs)	Incidence, malaria, general pop.	ITN/LLIN impact on malaria not reported; malaria incidence increased from 2006 (~72,000 cases) to 2012 (~ 198,000 cases).
Location: South Sudan	Crisis Type: Armed conflict	Quality: LOW	Enrolment: (countrywide assessment)			

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Insecticide-treated nets (ITNs)						
Authors: Rowland et al (1997)	Refugee (Afghan)	Design: Non random trial	Period: 1991 - 94 (173 ITNs provided for trial June 1991; 271 ITNs subsidised 1992)	Intervention: ITNs - permethrin (25% EC, 0.5g/m ²) dipped bednets [N=173 ('91), 271 ('92)]	Incidence, <i>P. falciparum</i> and <i>P. vivax</i> , 1991-1994, general pop.	ITN use and annual IS (malathion) resulted in an 87% reduction in malaria incidence;
Location: Northwest Frontier Province, Pakistan	Crisis Type: Armed conflict	Quality: HIGH	Enrolment: 10% from 2 villages (total pop. ~13,500). Families: 1991 trial (N=173 ITN, 186 control); 1992 subsidized ITNs (N=271)	Control: water-dipped bednets; [N=186 ('91)]		ITNs were significantly more protective against <i>P. falciparum</i> than <i>P. vivax</i> . ITN regular use significantly decreased odds of <i>P. falciparum</i> and <i>P. vivax</i>
Authors: Rowland et al (1996)	Refugee (Afghan)	Design: RCT	Period: May 1991 – February 1992 (ITNs issued June 1991)	Intervention: ITNs - permethrin (25% EC, 0.5g/m ²) dipped bednets; [N=96 households]	Incidence, <i>P. falciparum</i> , general pop. Incidence, <i>P. vivax</i> , general pop.	ITNs significantly reduced <i>P. falciparum</i> incidence, with a protective efficacy of 58%. ITNs significantly reduced <i>P. vivax</i> incidence, with a protective efficacy of 42%.
Location: Northwest Frontier Province, Pakistan	Crisis Type: Armed conflict	Quality: HIGH	Enrolment: 20% of families from 2 villages (total pop. ~13,500. N=192 households (2792 people)	Control: I water-dipped bednets; [N=96 households and surrounding village]	Prevalence, general pop. Anaemia, general pop.	ITN villages had significantly lower prevalence of <i>P. falciparum</i> than control arms; there was no significant difference in <i>P. vivax</i> prevalence between study arms. ITNs did not significantly reduce (i.e., were not protective against) anaemia

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Insecticide-treated nets (ITNs)						
Authors: Dolan et al (1993)	Refugee (Burmese)	Design: RCT	Period: Oct 1990 – Sept 1992	Intervention 1: ITNs – permethrin impregnated bednets (PIBs)	Incidence, malaria, pregnant women.	ITNs (PIBs) and FNIBs significantly reduced incidence of malaria in 1 of 3 sites from 56% to 33%.
Location: Thai-Burmese border, Thailand	Crisis Type: Armed conflict	Quality: HIGH	Enrolment: 341 pregnant women	Intervention 2: non impregnated bednets (NIBs) vs.	Parasite density, pregnant women.	ITNs (PIBs) significantly reduced parasite densities in 1 of 3 sites.
				Control: no bednet or family NIB (FNIB)	Incidence, anaemia, general pop.	ITNs (PIBs) and FNIBs reduced incidence of maternal anaemia at delivery: PIBs (2.1%) and FIBs(27%) vs NIBs (4.1%) and no bednets (56%)
Authors: Luxem-burger et al (1993)	Refugee (Burmese)	Design: RCT	Period: Aug 1990 – Feb 1991	Intervention 1: ITNs – permethrin (Peripel, 0.5g/m ²); N=175	Incidence, malaria, pregnant women.	ITNs (PIBs) and FNIBs significantly reduced incidence of malaria in 1 of 3 sites from 56% to 33%.
Location: Thai-Burmese border, Thailand	Crisis Type: Armed conflict	Quality: MEDIUM	Enrolment: 350 schoolchildren age 4-15 yrs.	Control: untreated net; N=175	Incidence, <i>P. falciparum</i> and <i>P. vivax</i> , children 4-15 yrs.	ITNs significantly decreased <i>P. falciparum</i> incidence by 4.2%; similar but slightly less reductions observed for <i>P. vivax</i> .

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
ITTs or ITNs v IS						
Authors: Bouma et al (1996)	Refugee (Afghan residents [AR], nomads [AN]); local (Pakistani Pathans [PP])	Non Random Trial	Period: 1989, 1990; 23/6-14/7, 1990	Intervention 1: ITTs -permethrin (0.5% emulsion, target dose 0.5g/m ²) on inside of fly-sheeted ridge pole tents; 23/6 – 14/7/90; [AN only]	Prevalence (<i>P. falciparum</i>), general pop.	ITTs (permethrin) were more effective in preventing malaria than annual malathion IS in the general population. Seasonal prevalence was significantly lower in ITT-exposed AN than in annual IS-exposed local PP and AR.
Location: South Waziristan Agency (Wana / environs), Pakistan	Crisis Type: Armed conflict	Quality: HIGH	Enrolment: Annual IS: number tents unstated (~100,000 Pakistani / Afghan refugees); ITTs: 5600 tents (~26,000 nomadic Afghans).	Intervention 2: Annual IS - malathion (50% water soluble powder, 2 g/m ²), July-August (1989, 1990); [PP / AR]	Prevalence (<i>P. falciparum</i>), primary schoolchildren (ages not provided)	ITTs (permethrin) were more effective in preventing malaria than annual malathion IS in schoolchildren. Annual prevalence was significantly lower in ITT-exposed AN children than IS-exposed local PP and AR.
Authors: Kamolrat-anakul et al (1993)	Refugee (Burmese)	Design: Cost effectiveness	Period: Feb 1993 – Jan 1994	Intervention 1: ITNs – lambdaacyhalothrin (20mg/m ² of 20% EC), N = 948 persons	Cost effectiveness	ITNs were more cost-effective than IS or no intervention. IS (DDT) was more cost-effective than no intervention (surveillance alone)
Location: Thai-Burmese border, Thailand	Crisis Type: Armed conflict	Quality: MEDIUM	Enrolment: 243 houses (N=948 persons) ITNs; 294 houses (1315 persons) DDT; 171 houses (695 persons) control	Intervention 2: IS – DDT Control: no intervention / malaria surveillance only		

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
ITTs or ITNs v IS						
Authors: Proto-popoff et al (1993)	Refugee (Burundi)	Design: RCT	Period: Aug 1990 – Feb 1991	Intervention 1: ITNs –	Prevalence, malaria, general pop.	IS alone did not significantly reduce prevalence of malaria. In some areas ITNs were associated with lower prevalence.
Location: highland region, Burundi	Crisis Type: Armed conflict	Quality: MEDIUM	Enrolment: 29 hills sprayed	Intervention 2: IS -		

ITN: insecticide-treated net; ITC: insecticide-treated clothes; ITPS: insecticide-treated polyethylene sheeting;

ITT: insecticide-treated tents; IS: insecticide spraying; IRS: indoor residual spraying; EC: emulsifiable concentrate; WP: wettable powder

Table 8. Malaria: Human-Focused Intervention Studies in Humanitarian Crisis Settings in Southeast Asia, 1980 – 2014.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Southeast Asia						
DRUG THERAPY						
Authors: McGready et al (2012)	Refugee (Burmese) Karen	Design: Longitudinal cohort (?)	Period: May 1986 – December 2010	Intervention: EDT Early detection and treatment (methods varied over study inclusion years), as verified by frequency of antenatal clinic visits	Maternal Mortality Rate (MMR)	Maternal mortality from <i>P. falciparum</i> significantly declined during study inclusion period, attributed to early detection and treatment via antenatal clinic visits. MMR significantly declined six-fold during the study period within IDP camps.
Location: Thai-Burmese border, Thailand	Crisis Type: Armed conflict	Quality: MEDIUM	Enrolment: 1 camp clinic; all female medical records from inclusion years reviewed; [N=50,981 records reviewed]			
Authors: Ambler et al (2009)	Refugee (Burmese) Karen	Design: RCT	Period: Dec 1994 – July 1997	Intervention 1: AS – AS monotherapy for 7 days [N=45]	ACPR: Incidence (<i>P. falciparum</i>)	MAS combination therapy patients were less likely to have recurrent <i>P. falciparum</i> malaria than those treated with AS alone.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: 1 camp - symptomatic children aged 3 mo. – 5 yrs. [N=91]; non-febrile controls [n=36]	Intervention 2: MAS - AS for 7 days, MF on days 7,8 [N=46]	ACPR: Neurologic indicators	AS and MF did not appear to significantly influence behaviour or coordination.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DRUG THERAPY						
Authors: Carrarra et al (2009)	Refugee (Burmese) Karen; local (Thai); migrant workers (Thai and foreign national)	Design: Cross-sectional	Period: 1995 - 2007	Intervention 1: MAS3 AS + MF for three days Intervention 2: Vector IRS - dieldethrin (2x/yr); ITN - treatment (2x/yr)	ACPR: Prevalence, <i>P. falciparum</i> , cases ACPR: Prevalence, <i>P. falciparum</i> , hospitalizations ACPR: Mortality, all malaria	Prevalence of <i>P. falciparum</i> cases significantly declined by 3.4% Prevalence of <i>P. falciparum</i> hospitalizations significantly declined by 39% Mortality significantly declined during and after the interventions (by > 50% compared with the 3 years pre-intervention).
Location: Thai-Burmese border, Thailand	Crisis Type: Armed conflict	Quality: MEDIUM	Enrolment: 3264 patients in prospective treatment trials	Intervention 3: Drugs Uncomplicated <i>P. falciparum</i> – MAS; severe malaria – AS only	ACPR: Prevalence, <i>P. falciparum</i> , in refugees (7 yrs. Interventions)	<i>P. falciparum</i> incidence remained low MAS in-vivo efficacy remained high <i>P. falciparum</i> transmission remained low
Authors: Nosten et al (2009)	Refugee (Burmese) Karen	Design: RCTs (N=2)	Period: January 1992 – June 1993	RCT1: N=304 Intervention 1: MF (25mg) Intervention 2: MF – AS MF (d1=25mg) + AS (d1,2,3=10mg)	ACPR (fever/parasite clearance) / Other Morbidity ETF/LTF: Treatment failure at 7 and 28 days	ACPR were faster in MAS than single-dose MF arms. There was no significant difference in anaemia, hepatomegaly, or splenomegaly between treatment arms. There was no significant difference in ETF or LTF between study arms.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: Number of camps unspecified; 652 adults and children enrolled	RCT1: N=348 Intervention 1: MF (25mg) Intervention 2: MF – AS MF (d2=25mg) + AS (d1,2,3=10mg)	ACPR (fever/parasite clearance) / Other Morbidity ETF(7)/LTF (28/63): Treatment failure at 7, 28, 63 days	ACPR were faster in MAS than single-dose MF arms. There was no significant difference in anaemia, hepatomegaly, or splenomegaly between arms. MAS reduced time to fever clearance by half. ETF rates at day 7 were higher in single-dose MF than MAS arms; LTF rates at days 28 and 63 were significantly higher in single-dose MF than MAS arms.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DRUG THERAPY						
Authors: Carrarra et al (2006)	Refugee (Burmese) Karen; local (Thai); migrant workers (Thai and foreign national)	Design: Cross-sectional	Period: 1996 - 2003	<i>Intervention 1:</i> community health workers for health education, enhanced case-finding, and increased use of RDTs to identify and more rapidly treat malaria <i>Intervention 2:</i> Vector IRS - dieldethrin (2x/yr); ITN - treatment (2x/yr)	ACPR: Prevalence, <i>P. falciparum</i> , cases ACPR: Prevalence, <i>P. falciparum</i> , hospitalizations ACPR: Mortality, all malaria	Prevalence of <i>P. falciparum</i> cases significantly declined by 3.4% Prevalence of <i>P. falciparum</i> hospitalizations significantly declined by 39% Mortality significantly declined during and after the interventions (by >50% compared with the 3 years pre-intervention).
Location: Thai-Burmese border, Thailand	Crisis Type: Armed conflict	Quality: MEDIUM	Enrolment: 9 districts (Tak) of: (i) general pop. (ii) migrant workers (iii) refugees [~420,000 persons]	<i>Intervention 3:</i> Drugs Uncomplicated <i>P. falciparum</i> – MAS; severe malaria – AS only	ACPR: Prevalence, <i>P. falciparum</i> , in refugees (7 yrs. Interventions)	<i>P. falciparum</i> incidence remained low MAS in-vivo efficacy remained high <i>P. falciparum</i> transmission remained low
Authors: Burns et al (2006)	General Pop. (East Timor)	Efficacy Trial & Resistance Study	Period: March-August, 2001	<i>Intervention:</i> SP 38 patients treated for uncomplicated <i>P. falciparum</i> , monitored 28 days for LTF	LTF: Treatment failure after 28 days	LTF occurred within 28 days in nearly 10% of the patients monitored, suggesting SP was still efficacious at publication time.
Location: East Timor, Indonesia	Crisis: Armed conflict	Quality: HIGH	Enrolment: 38 patients recruited from 1 health clinic	<i>Genotyping study:</i> probed mutations, S108N and C59R, associated with SP resistance; [N=160]	Resistance: S108N and C59R mutations	However, >80% of participants possessed double S108N and C59R mutations, suggesting that SP resistance may have been increasing in East Timor.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DRUG THERAPY						
Authors: Pang et al (2006)	Refugee (Burmese)	Design: Cross-sectional	Period: 1996 - 2003	Intervention 1: DX Doxycycline	ACPR: Incidence, <i>P. falciparum</i> , cases	DX was significantly more effective at reducing malarial incidence than CQ.
Location: Thai-Burmese border, Thailand	Crisis Type: Armed conflict	Quality: MEDIUM	Enrolment: 188 schoolchildren aged 10-15 yrs	Intervention 2: CQ Chloroquine	ACPR: Side effects	DX and CQ were both well tolerated, and there was no significant difference in side effects between study arms.
Authors: Ezard et al (2003)	Refugee (?)	Design: Longitudinal cohort (prospective)	Period: March-June, 2002	Intervention: CQ 38 patients treated for uncomplicated <i>P. falciparum</i> , monitored 28 days for LTF	LTF: Treatment failure after 28 days	LTF (corrected) was observed in 58.3% of patients, which provides evidence of CQ resistance in this region.
Location: East Timor	Crisis: Armed conflict	Quality: LOW	Enrolment: 1 rural clinic; all patients aged 8 mo – 29 yrs, presenting with fever			

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DRUG THERAPY						
Authors: van Vugt et al (2000)	IDP (Burmese) Karen	Design: RCT (open)	Period: November 1997 – March 1998	Intervention: ART - LF ART + LF given (median [N=150])	ACPR: Fever and Parasitaemia Clearance	There was no significant difference in time to fever and parasitaemia clearance between treatment arms.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: MEDIUM	Enrolment: 2 health centres, 1 camp and a hospital in Bangkok [N=200 patients]; exclusions: pregnant, age <2 yrs, concomitant disease.	Intervention 2: MAS - AS (12mg over 3d), MF (25mg) split d2, 3. [N=50]	LTF: Cure Rate at Day 63 Toxicity: Side Effects	The 28-day cure rates for both ART-LF (98%) and MAS (100%) were high; both artemesin derivatives effectively cleared <i>P. falciparum</i> . ART-LF was better tolerated than MAS, with significantly less side effects.
Authors: Brockman et al (2000)	Refugee (Burmese) Karen	Design: Cross-sectional	Period: 1995 - 1997	Evaluation: samples tested for susceptibility and sensitivity to the following anti-malarial drugs: DH, AS, AR, AT,	Susceptibility (multiple drugs)	AS, MF, and HF were the only drugs to which <i>P. falciparum</i> was susceptible. The low levels of susceptibility indicated strong and continued resistance to many anti-malarial drugs in this region.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: 2 camps - Method (apart from clinic enrolment) and participant details (e.g., age) not provided	LF, CQ, Q, MF, HF [N=168 patients]	Sensitivity (multiple drugs)	Despite increased AS and MF use (due to resistance of other drugs), AS and MF sensitivity have increased over time, in line with in vivo studies indicating that combined MF-AS therapy (MAS3) has reversed the previous decline in sensitivity of MF.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DRUG THERAPY						
Authors: McGready et al (2000)	Refugee (Burmese) Karen	Design: RCT	Period: October 1995 – July 1997	<i>Intervention 1: Q, Supervised</i> Quinine sulphate (3 times daily=10 mg salt/kg ea 8h) for 7d [N=42]	ACPR: Time to parasite clearance ACPR: <i>Gametocyte</i> <i>carriage</i>	Significantly more women were aparasitaemic within 48 hours in the MAS than Q arms. Gametocyte carriage was significantly lower following MAS compared to Q treatment.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	<i>Enrolment: 2</i> camps (population=30, 000); inclusion: women in 2nd or 3rd trimester of pregnancy [N=108]	<i>Intervention 2: MF - AS,</i> Supervised MF (d1=25mg, d2=10mg), AS (D0, 1, 2=12 mg/kg as 4mg/kg doses); [N=66]	LTF: Cure rates/ treatment efficacy	At day 63, cure rates were significantly greater for MAS (98%) vs. Q (67%).
Authors: Nosten et al (2000)	Refugee (Burmese) Karen	Design: Longitudinal cohort (?)	Period: 1986 - 1999	<i>Intervention: MF</i> (dosage increased over time of study (largely 1985 – 1994)	ACPR: Incidence, <i>P. falciparum</i>	Over 13 years, MF and MF-SP (MSP) initially controlled malaria, but as resistance developed they became less effective (cure rate 98% in 1985 and 71% by 1990); similar pattern observed 1990–1994.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	<i>Enrolment: 2</i> large camps; (population estimates varied over time, total numbers enrolled not stated)	<i>Intervention 2:</i> MF+AS (largely 1994 -)	ACPR: Incidence, <i>P. falciparum</i>	MAS has reduced malarial incidence since 1994; since its 1994 introduction, cure rates have increased to nearly 100%.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DRUG THERAPY						
Authors: van Vugt et al (1999)	Refugee (Burmese) Karen	Design: Cross-sectional	Period: November 1997 – March 1998	Intervention 1: ART - LF ART + LF as six-dose schedule (median [N=120])	ACPR: Fever and Parasitaemia Clearance	There was no significant difference in time to fever and parasitaemia clearance between treatment arms.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: 2 health centres, 1 camp and a hospital in Bangkok [N=359 patients]	Intervention 2: ART - LF ART + LF as six-dose schedule (median [N=118]) Intervention 3: ART - LF ART + LF given as 1 four-dose schedule (median [N=121])	LTF: Cure Rate at Day 28 Toxicity: Side Effects	Two six-dose ART-LF schedules produced significantly higher cure rates than the single four-dose ART-LF schedule . There was no significant difference in side effects between treatment arms.
Authors: van Vugt et al (1998)	IDP (Burmese) Karen	Design: RCT	Period: Dec 1995 – September 1996	Intervention 1: ART - BF ART + BF given in combined 20mg pill of between 1-4 doses per weight; [N=45]	ACPR: Fever and Parasitaemia Clearance LTF: Cure Rate at Day 63	There was no significant difference in time to fever and parasitaemia clearance between treatment arms The 63-day cure rate was significantly higher for MAS (94%) than ART-BF (81%)
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: 1 camp – adults and children [N=617 total; 128 children < 13 yrs];	Intervention 2: MAS - AS (12mg over 3d), MF (25mg) split d2, 3. [N=46]	Toxicity: Side Effects	The MAS treatment arm had significantly more side effects such as nausea, vomiting, dizziness, sleep and other neurological disorders

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DRUG THERAPY						
Authors: Price et al (1998)	Refugee (Burmese) Karen	Design: RCT (open)	Period: 1995 - 2007	Intervention 1: MAS AS (12mg) 5d + MF (25mg) on d1; [N=50] Intervention 2: AS AS (12mg) 5d; [N=50]	ACPR: Parasite clearance, <i>P. falciparum</i> LTF: Treatment Failure at 42 Days	Both treatment arms effectively cleared <i>P. falciparum</i> within 48 hours. The MAS arm had significantly lower LTF rates by day 42 than the AS arm
Location: Thai-Burmese border, Thailand	Crisis Type: Armed conflict	Quality: HIGH	Enrolment: 1 camp; RCT: N=100 adults and children; Efficacy study: 178 adults	Efficacy Study: AS v MAS: AS (7d) with or without MF (1d); N=178	LTF: Treatment Failure at 42 Days	LTF rates were significantly lower in those treated with MAS than AS alone.
Authors: Price et al (1998)	Refugee (Burmese) Karen	Design: RCT (open)	Period: July 1993 – August 1995	Intervention 1: AS AS (12mg); [N=50]	ACPR: Parasite / Fever Clearance, <i>P. falciparum</i>	<i>P. falciparum</i> and fever clearance was similar between arms within 48 hours.
Location: Thai-Burmese border, Thailand	Crisis Type: Armed conflict	Quality: HIGH	Enrolment: 2 camps (began in 1, transferred to second camp for security) – 443 patients enrolled with recrudescence malaria within 63 days treatment	Intervention 2: ART Artemether (12mg); [N=50]	ACPR: Symptom / Hepatomegaly / Splenomegaly / Anaemia Resolution	Symptom and hepatomegaly resolution were slower in the AS arm, but there was no difference in times to resolution of anaemia or splenomegaly between arms.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DRUG THERAPY						
Authors: Price et al (1998)	Refugee (Burmese) Karen	Design: Non Random Trial	<i>Period:</i> July 1991 – December 1995	<i>Intervention 1:</i> Artemesin derivatives + MF RCT N=1041; N=2826	ACPR: Side Effects	Combined artemesin and MF treatment was associated with significantly more adverse effects than artemesin (alone) treatment.
<i>Location:</i> Thai-Burmese border, Thailand	<i>Crisis Type:</i> Armed conflict	Quality: HIGH	<i>Enrolment:</i> RCT: N=2593 Not in RCT, treated same so included in analysis: N=2372. [Total N=4965]	<i>Intervention 2:</i> AS, ART alone: RCT N=461; N=836 <i>Intervention 3:</i> MF RCT N=1091; N=1303	ACPR: Side Effects	Adverse effects that were significantly higher in combined treatment arms included acute nausea, vomiting, anorexia, and dizziness.
Authors: Price et al (1997)	Refugee (Burmese) Karen	Design: Non Random Trial	<i>Period:</i> 1992-1995	<i>Intervention 1:</i> MF + AS (MAS): AS (12mg/kg) 3d, MF (2.5mg/kg).	ACPR: Cure Rate	Corrected for re-infection, the cure rate by day 42 was 89%,
<i>Location:</i> Thai-Burmese border, Thailand	<i>Crisis Type:</i> Armed conflict	Quality: HIGH	<i>Enrolment:</i> N camps unspecified, all patients, all ages with P. falciparum to research centre or MSF clinics; [N=1967]		ACPR: Fever Clearance, Parasitaemia	After MAS, 96% of patients were aparasitaemic and 94% were afebrile within 48h. Patients with high parasitaemia who were treated with MF upon admission were three times as likely to experience recrudescence infections than those treated in combination with artemesin derivatives.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DRUG THERAPY						
Authors: Price et al (1996)	Refugee (Burmese) Karen	Design: Non Random Trials	Period: 1990-1995	Intervention 1: AS (12mg); Intervention 2: ART (12mg); Intervention 3: MF	ACPR: Gametocyte Carriage	<i>P. falciparum</i> gametocyte carriage was significantly higher in after treatment with MF than artemesin derivatives (AS, ART)
Location: Thai-Burmese border, Thailand	Crisis Type: Armed conflict	Quality: HIGH	Enrolment: 2 camps (began in 1, transferred to second camp for security) – 443 patients enrolled with recrudescence malaria within 63 days treatment) N=5193 adults/children	MF (25g/variable schedules); Intervention 4: MF (25g/variable schedules); Intervention 5: Q (variable); Intervention 6: HF (25g/variable schedules)	ACPR: Gametocyte Carriage ACPR: Incidence (P. falciparum)	Retreatment with artemesin derivatives significantly reduced gametocyte carriage 18-fold compared to MF and 6-fold compared to Q. This study coincided with MAS introduction in Thailand; study authors suggest this and study treatment has led to a 4.7% reduction in malarial incidence at this site.
Authors: Smithius et al (1995)	Refugee (Burmese) Karen	Design: RCT	Period: 1991- 1992	Intervention 1: MF (high) MF (25mg) [N=68]	ACPR: Fever clearance	Resolution of fever was faster with high-dose 25mg MF than low-dose 15mg MF.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: 1 camp clinic; included: age > 2 yrs with acute P. falciparum, excluded: pregnant, concomitant disease.	Intervention 2: MF (low) MF (15mg) [N=71]	ETF: Treatment Failure at 7 Days LTF: Treatment Failure at 28, 42 Days	There were no ETF in the 25mg MF group but 5 in the 15mg MF group, indicating a significant difference between schedules. There were significantly less LTF in the 25mg than 15mg groups, indicating a significant difference between schedules.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DRUG THERAPY						
Authors: Price et al (1995)	Refugee (Burmese) Karen	Design: RCT	Period: July 1993 – August 1995	Intervention 1: AS + MF: AS (12mg/kg, 4mg/3d), MF (25mg);	ACPR: Parasite / Fever Clearance, <i>P. falciparum</i>	Both AS and ART provided similar ACPR; with both providing better parasite clearance than MF alone.
Location: Thai-Burmese border, Thailand	Crisis Type: Armed conflict	Quality: HIGH	Enrolment: 1 camp –all ages with slide-confirmed <i>P. falciparum</i> if no anti-malarials within pas 63 days; exclusions: pregnant, concomitant disease, mixed infections.	Intervention 2: ART + MF: ART (12mg, 4mg/3d) MF (25mg); Intervention 3: MF MF (25g/variable schedules) N=550 patients total	ACPR: Parasite / Fever Clearance, <i>P. falciparum</i> LTF: Treatment failure at 42 days	Parasite and fever clearance times were significantly longer in the MF than artesinin derivative arms. MF was associated with significantly greater LTF than the AS or ART arms; authors suggest MF should no longer be used alone for <i>P. falciparum</i> malaria.
Authors: McGready et al (1995)	Refugee (Burmese) Karen	Design: Longitudinal cohort (?)	Period: 1992 - 1996	Intervention: AS, AS-MF, Artemether AS (d0, 1, 2=4mg/kg); or if new infection and no	ACPR: Time to parasite clearance	94% of women were aparasitaemic by day 3 after artesinin derivative treatment.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: MEDIUM	Enrolment: 1 camp, several clinics; 24% of pregnant women had 1 malarial episode in pregnancy; [N=83]	previous MF then AS (d0, 1, 2=4mg/kg) and MF (2.5mg/kg split d5, 6); or artemether (12mg/kg for 3-5d in combo with MF); [N=83]	LTF: Treatment failure at day 42	By day 42, the cumulative treatment failure rate for artesinin derivatives was 16%; in those treated for recrudescant malaria the cumulative failure rate was 9.4%.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DRUG THERAPY						
Authors: Luxemburger et al (1995)	Refugee (Burmese) Karen	Design: RCT (open paired)	Period: January-December, 1993.	Intervention1: AS + MF AS (4mg) 3d, MF (2.5mg) d2, observed [N=30]	ACPR: Fever clearance ACPR: Parasite clearance ACPR: Hospital discharge	AS (MF-AS) provided shorter time to fever clearance than Q. AS (MF-AS) provided shorter time to parasite clearance than Q. AS (MF-AS) provided shorter time to hospital discharge than Q.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: 1 camp clinic; included: age>2 yrs with acute P. falciparum, excluded: pregnant, concomitant disease.	Intervention 2: Q (IV) + MF Intravenous salt loading dose over 4 hrs, Q at 8h, 16h, and MF at 24h; [N=30]	LTF: Treatment failure after 28 days Toxicity	AS (MF-AS) provided significantly better cure rates than Q (70% vs .39%); Q was associated with significantly higher LTF. AS (MF-AS) was not associated with significant side effects.
Authors: Luxemburger et al (1995)	Refugee (Burmese) Karen	Design: Longitudinal cohort (observational)?	Period: July 1995- 1996.	Intervention1: CQ (2.5mg) 3d, supervised [N=342] Intervention 2: (retreatment CQ) [N=70]	ACPR: Fever reduction, parasite clearance LTF: at 28 and 63 days	ACPR: Fever reduction, parasite clearance LTF: at 28 and 63 days
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: 2 camps; patients w/ P. vivax from all clinics; excluded: pregnant, mixed infections, concomitant disease; [N=342]	Intervention 2: (retreatment CQ + PQ) CQ + PQ (0.25mg) given with instructions for 14d home treatment [N=43]	ACPR: Retreatment / Recrudescence ACPR: Haematocrit	Addition of PQ reduced risk of third P. vivax infection within 2 months by 96% Addition of PQ lowered haematocrit in first week but produced significantly higher haematocrit by day 42.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DRUG THERAPY						
Authors: ter Kuile et al (1995)	Refugee (Burmese) Karen	Design: Non Random Trial	Period: 1990 - 1995	<i>Intervention 1:</i> MF (high) MF (2.5mg) [N=68]	ACPR: Early Vomiting	Nearly 7% of patients enrolled in both trials vomited within 1 hour; risk factors included having taken high dose (25mg) MF.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: Multiple camps; patients aged 6 mo – 88 yrs. [N=3673]	<i>Intervention 2:</i> MF (low) MF (1.5mg) [N=71]	ACPR: Early Vomiting	Vomiting was significantly reduced by splitting the high-dose MF and by administering the high-dose MF along with AS on the second day (conducted on a subset).
Authors: Luxemburger et al (1994)	Refugee (Burmese) Karen	Design: RCT	Period: July-December, 1991	<i>Intervention 1:</i> MF + AS MF (1.5mg) AS (10mg) in 3 doses every 8 hrs, observed [N=87]	ACPR Treatment failure, by time.	MF-AS provided significantly faster ACPR than single-dose MF. MF-AS was significantly more effective than single-dose MF. In re-treated patients, MF-AS was significantly more effective than single-dose MF. Treatment failure were associated with single dose MF in the previous month.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: 2 camps; exclusions: children <6kg, pregnancy, mixed infections / concomitant disease; [N=552]	<i>Intervention 2:</i> MF MF (2.5mg) single dose, observed [N=87]	ETF (at day 7) / LTF (at day 28) Toxicity	MF-AS provided significantly lower ETF rates than single-dose MF; MF-AS and single-dose MF did not provide significantly different LTF rates. Single-dose MF was associated with significantly more gastro-intestinal effects and dizziness.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DRUG THERAPY						
Authors: Fontanet et al (1994)	Refugee (Cambodian)	Design: RCT	Period: Sept-Nov, 1991	<i>Intervention 1:</i> MF Single-dose MF (15mg); [N=57] <i>Intervention 2:</i> MF Single-dose MF, second dose MF within 15 min (25mg), 42 day follow-up; [N=53]	LTF: Treatment failure after 28 days	LTF (corrected) was observed in 50% for 15mg MF and 43% for 25mg arms at day 28, corroborating other studies in this region conducted in this time
Location: Eastern Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: All adults in IDP presenting with malaria treated (N=110),		LTF: Treatment failure after 42 days	LTF (corrected) was observed in 62% for 15mg MF and 56% for 25mg arms at day 42, corroborating other studies in this region conducted in this time
Authors: ter Kuile et al (1993)	Refugee (Burmese) Karen	Design: RCTs (N=2, 1 year each)	Period: July 1995- 1996.	<i>RCT 1:</i> N=198 patients <i>Intervention 1:</i> HF HF (24mg)] <i>Intervention 2:</i> MF MF (25mg)	ETF/LTF: Cumulative failure rates ETF/LTF: Cumulative failure rates	Cumulative failure rates were significantly lower in HF (35%) than MF (10%) arms. Cumulative failure rates were significantly lower in high dose HF (1-3%) than MF (6-8%) arms, including when adjusted for possible reinfections.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: 2 camps; patients w/ P. vivax at all clinics; excluded: pregnant, mixed infections, concomitant disease; [N=342]	<i>RCT 1:</i> N=347 patients <i>Intervention 1:</i> HF HF (72mg over 3d) <i>Intervention 2:</i> MF MF (25mg)	ACPR: Retreatment / Recrudescence Toxicity	Among recrudescing infections, high dose (72mg) HF was significantly more effective than MF at clearing <i>P. falciparum</i> . High dose HF was better tolerated in terms of side effects than MF.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
DRUG THERAPY						
Authors: ter Kuile et al (1992)	Refugee (Burmese) Karen	Design: Non Random Trial	Period: July-December, 1990	Intervention 1: MF (high) MF (2.5mg) [N=100]	ACPR: Parasitaemia, Fever Clearance	Reduction of parasitaemia and fever was more rapid in the high dose (2.5mg) MF than low dose (15mg) MF arms.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: 2 camps; patients (all ages) with confirmed P. falciparum, exclusions: pregnancy, Q treatment in previous week [N=199]	Intervention 2: MF (low) MF (15mg) [N=99]	ETF: Treatment Failure at 7 -9 Days LTF: Treatment Failure at 28	The incidence of ETF by days 7-9 was significantly lower in the high dose (2.5mg) than low dose (15mg) MF arm. The incidence of LTFs by day 28 was significantly lower in the high dose (2.5mg) than low dose (15mg) MF arm.
Authors: Nosten et al (1991)	Refugee (Burmese) Karen	Design: Longitudi nal cohort (?)	Period: January – June 1990	Intervention: MSP MF + SP (15/10/1.5mg/kg)	ACPR (fever/parasite clearance) / Other Morbidity	ACPR were faster in MAS than single-dose MF arms. There was no significant difference in anaemia, hepatomegaly, or splenomegaly between arms. MAS reduced time to fever clearance by half.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: 1 camp clinic; N=395 patients		ETF/LTF: Treatment failure at 7 and 28 days	ETF rates rose significantly during the study. Cure rates at 28 days (LTF) were 70%. Failure rates decreased with age.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
VACCINE						
Authors: Nosten et al (1996)	Refugee (Burmese) Karen	Design: RCT (double-blinded)	Period: October 1993 – July 1995	<i>Intervention: Vaccine (malaria) – SPf66 vaccine</i> [N=610]	ACPR: Incidence (<i>P. falciparum</i>)	There was no significant difference in the malarial incidence between SPf66 vaccine and control arms; this malaria vaccine was not effective in reducing incidence.
Location: Thai-Burmese border, Thailand	Crisis: Armed conflict	Quality: HIGH	Enrolment: 1 camp – children aged 2-15 yrs; [N=1348; 1221 primary efficacy analysis]	Control: <i>Hepatitis B vaccine</i> [N=611]	ACPR: parasite density Malarial Morbidity (Other)	There was no significant difference in the parasite densities of SPf66 vaccine and control arms. There was no significant difference in standard malarial morbidity indicators between SPf66 vaccine and control arms.

Malaria drugs: artesunate (AS); artemether (AR); atovaquone (AT); benflumetol (BF); chloroquine (CQ); dihydroartemesin (DA); halofantrine (HF); lumefantrine (LF); mefloquine (MF); quinine (Q); sulphadoxine –pyrimethamine (SP); artemisin combination therapy (ACT) mefloquine-artesunate (MAS);

Malaria drug efficacy outcomes: Adequate Clinical and Parasitological Response (ACPR); Early treatment failure (ETF); Late treatment failure (LTF); Late Parasitological Failure (LPF); Complete parasitological cure without recrudescence (CPCR); Incomplete parasitological cure without recrudescence (ICPCR)

Table 9. Malaria: Human-Focused Intervention Studies in Humanitarian Crisis Settings in Africa, the Middle East, and South Asia, 1980 – 2014.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Africa						
Authors: Bonnet et al (2007)	Refugee (Liberian)	Design: RCT (Efficacy) & Resistance	<i>Period:</i> 2003 - 04	<i>Intervention:</i> AS-AQ AS/amoquinidine (AS-AQ) <i>Intervention 2:</i> AS – SP AS-SP	<i>LTF:</i> Treatment failure after 28 days	LTF rates were the same for AS-AQ and AS-SP among the general population; this supported continued national policy of AS/AQ.
<i>Location:</i> Laine, South Guinea	<i>Crisis:</i> Armed conflict	Quality: HIGH	<i>Enrolment:</i> 1 camp - in vivo (resistance); surrounding region - trial due to camp instability	Genotyping study: probed 2 genes, <i>dhfr</i> and <i>dhps</i> , associated with SP resistance; [N=160]	Resistance: <i>dhfr</i> and <i>dhps</i> mutations.	SP resistance was established in Laine refugee camp, with >85% of participants possessing 3 <i>dhfr</i> and 10% possessing 5 <i>dhps</i> mutations.
Authors: Deaporortere et al (2005)	Refugee (Described elsewhere)	Design: RCT (Efficacy) & Resistance	<i>Period:</i> March-June, 2002	<i>Intervention 1:</i> AS-SP, Supervised (efficacy) children supervised for AS-SP day 1 at hospital, observed days 2 and 3 SP at clinic [N=85] <i>Intervention 2:</i> AS – SP, Unsupervised (effectiveness) children given AS-SP to collect at pharmacy with instructions for home use. [N=85]	Efficacy & Effectiveness	Efficacy (AS-SP) was 83.5%, effectiveness was 63.4%. Reduced efficacy of AS/SP possibly due to high SP resistance (per genotyping, below).
<i>Location:</i> Zambia	<i>Crisis:</i> Armed conflict	Quality: HIGH	<i>Enrolment:</i> 1 camp – all children under 5 yrs (age 6-59 months)	Genotyping study: probed 2 genes, <i>dhfr</i> and <i>dhps</i> , associated with SP resistance; [N=545]	Resistance: <i>dhfr</i> and <i>dhps</i> mutations.	Nearly all (92%) patients had <i>dhfr</i> and nearly half (44%) had <i>dhps</i> mutations.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Africa						
Authors: Wolday et al (1995)	General Pop. (Rwandan)	Sensitivity Study (in vivo)	Period: November – December 1994	Intervention 1: CQ (2.5mg over 3d); [N=39]	ACPR: Reduction of parasitaemia	The majority of patients on both therapies (CQ=87%, SP=95%) experienced parasite reductions of at least 25%.
Location: Democratic Republic of Congo	Crisis: Armed conflict	Quality: HIGH	Enrolment: 1 camp, <i>P falciparum</i> patients with no antimalarial treatment in previous 2 wks; [N=38 patients; N=421 baseline prevalence]	Intervention 2: SP (2.5mg as single dose); [N=38]	Resistance: CQ and SP	Among those on CQ therapy, 62% of <i>P. falciparum</i> infections were resistant. Among those on SP therapy, 58% of falciparum malaria was resistant.
Authors: Tomashek et al (2001)	Refugee (Burundian)	Design: RCT (double-blinded)	Period: July-December, 1991	Intervention 1: CQ (2.5mg) + placebo Intervention 2: SP (2.5mg) monthly + placebo	ACPR: Haemoglobin levels	Mean haemoglobin levels did not significantly differ between study arms.
Location: Kigoma Region, Tanzania	Crisis: Armed conflict	Quality: HIGH	Enrolment: 1 camp; children <5 yrs; [N=215 children]	Intervention 3: SP + VAC (2.5mg) monthly + Vitamin A and C (VAC) 3x/wk.	ACPR: Iron stores	Those receiving SP and vitamins A and C had significantly more normal iron stores than those in the non VAC CQ and SP arms.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Middle East and South Asia						
Authors: Kolaczinski et al (2012)	Refugee (Afghan)	Design: RCT	<i>Period:</i> 2001-3 (3 malarial periods)	Intervention 1: CQ: CQ (2.5mg) 3d; [N=76]; Intervention 2: CQ PQ: CQ 3d; PQ (0.5mg) d3; [N=76] Intervention 3: CQ AS: CQ 3d; AS (4mg) 3d; [N=74]	CPCR LTF: Treatment failure after 28 days	CPCR was suboptimal with CQ. CQ is no longer appropriate alone or in combination. LTF included CQ (81%), CQ-AS (28%), SP (9.8%), SP-AS (2.4%). Adding PQ to CQ or SP did not affect LTF rates.
<i>Location:</i> Pakistan	<i>Crisis:</i> Armed conflict	Quality: HIGH	<i>Enrolment:</i> 5 camp clinics (80km radii); included: age>2 yrs, not pregnant, no severe malaria; allocated yrs 2,3 to either CQ or SP arms; [N=308 total]	Intervention 4: SP: SP (2.5mg) 1d (0); [N=45]; Intervention 5: SP PQ: SP 1d (0) PQ d1 (0); [N=40]; Intervention 6: SP PQ: SP 1d (0) AS 3d; [N=44];	Effect on gametocyte clearance	PQ was more effective at clearing older gametocytes but AS was more effective at preventing mature gametocytes (except in recrudescence cases).
Authors: Howard et al (2011)	Refugee (Afghan)	Design: RCT	<i>Period:</i> 1998 (2 trials)	Intervention 1: CQ Single-dose CQ (2.5mg); [N=83] Intervention 2: MF Single-dose CQ (40mg); [N=80]	LTF: Treatment failure after 28 days CPCR / ICPCR	LTF was observed to be significantly higher among CQ-25 (77%) than CQ-40 (43%) patients CQ-40 provided better 1st line treatment success. Among 1st line treatment failures, both arms were increasingly protective with age (CQ-40 had higher CPCR) and gender (CQ-40 protected both better than CQ-25)
<i>Location:</i> Pakistan	<i>Crisis:</i> Armed conflict	Quality: HIGH	<i>Enrolment:</i> 3 IDP camps, recruited from 3 trials (N=163)	Genotyping study: probed CQ resistance genes, <i>pfprt</i> 76T, <i>pfmdr1</i> 86Y, <i>pfmdr1</i> 184Y;	Resistance	All isolates (100%) had <i>pfprt</i> 76T mutations, while 18% had <i>pfmdr1</i> 86Y and 37% had <i>pfmdr1</i> 184Y mutations, indicating CQ resistance.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Middle East and South Asia						
Authors: Leslie et al (2004)	Refugee (Afghan)	Design: RCT	<i>Period:</i> June-August, 2001, (June-November 2000 with 9 month follow-up)	<i>Intervention 1:</i> PQ, Supervised PQ (25mg) directly observed 14d [N=105] <i>Intervention 2:</i> PQ, Unsupervised PQ (25mg) with instructions for 14d home treatment [N=87]	Efficacy & Effectiveness	PQ was equally effective against P. vivax in supervised and unsupervised groups. There was no difference in PQ protection by age between supervised and unsupervised arms For PQ supervised and unsupervised arms, risk of relapse decreased with age
<i>Location:</i> Pakistan	<i>Crisis:</i> Armed conflict	Quality: MEDIUM	<i>Enrolment:</i> 1 camp clinic; excluded: age < 3 yrs, pregnancy, severe anaemia, mixed infections.	<i>Placebo:</i> (placebo), Unsupervised Placebo with instructions for 14d home treatment [N=98]		
Authors: Rowland et al (2004)	Refugee (Afghan)	Design: RCTs (N=2, 1 year each)	<i>Period:</i> 1996-1998: RCT1: 1996 – 1997; RCT2: 1997 – 1998.	<i>RCT1</i> [N=500] <i>Intervention 1:</i> CQ, CQ (2.5mg) <i>Intervention 2:</i> CQ + PQ, CQ (2.5mg) + PQ (25mg over 3d) 5d	ACPR: Recrudescence infections	In the first RCT on 5-day PQ therapy, there was no significant difference between CQ and combined CQ+PQ arms in patients experiencing second and third recrudescence infections. There is no value to the 5-day PQ therapy.
<i>Location:</i> North western Pakistan	<i>Crisis:</i> Armed conflict	Quality: HIGH	<i>Enrolment:</i> 1 camp clinic; exclusion: age < 3 yrs, pregnancy, severe anaemia, mixed infections.	<i>RCT1</i> [N=200] <i>Intervention 1:</i> CQ, CQ (2.5mg) <i>Intervention 2:</i> CQ + PQ, CQ (2.5mg) + PQ (25mg over 14d) 5d	ACPR: Recrudescence infections	In the second RCT on 14-day PQ therapy, those on combined CQ+PQ (14d) therapy experienced significantly less second and third recrudescence infections. There may be some value

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Middle East and South Asia						
Authors: Rowland et al (1994)	Refugee (Afghan)	Design: Cross-sectional	Period: July-December, 1991	Intervention1: CQ, CQ (10mg); patients enrolled in CQ trial given extra 15 mg CQ (40mg total) [N=471]	Resistance	Nearly half (46%) of infections were CQ resistant, but frequencies of the 7 villages included ranged from 18-62%.
Location: North western Pakistan	Crisis: Armed conflict	Quality: HIGH	Enrolment: 7 refugee villages; in-vivo resistance study in 2 villages.	Intervention2: SP, SP (2.5mg); patients enrolled in SP trial not given extra SP; [N=258]	Resistance	Fewer (12%) of infections were SP resistant, but frequencies of the 7 villages included ranged from 4-25%.

Malaria drugs: artesunate (AS); artemether (AR); atovaquone (AT); benflumetol (BF); chloroquine (CQ); dihydroartemesin (DA); halofantrine (HF); lumefantrine (LF); mefloquine (MF); quinine (Q); sulphadoxine-pyrimethamine (SP); artemisin combination therapy (ACT) mefloquine-artesunate (MAS);

Malaria drug efficacy outcomes: Adequate Clinical and Parasitological Response (ACPR); Early treatment failure (ETF); Late treatment failure (LTF); Late Parasitological Failure (LPF); Complete parasitological cure without recrudescence (CPCR); Incomplete parasitological cure without recrudescence (ICPCR)

Table 10. Poliomyelitis Intervention Studies in Humanitarian Crisis Settings, 1980 – 2014.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Authors: Sheikh et al (2014)	Refugee (Somali)	<i>Design:</i>	<i>Period:</i> April – December, 2013	<i>Intervention 1:</i> IPV <i>Intervention 2:</i> OPV OPV/IPV given to refugees in 5 camps and borders in response to polio outbreak originating from Nigeria involving 217 people in 3 countries	Vaccination Coverage Origin of Outbreak	From April – July, 14 WPV-1 (AFP) cases originating from Nigeria were reported, after which Kenya achieved <i>The majority of WPV-1 infections</i>
<i>Location:</i> Dadaab (Ifo), Northeast Kenya	<i>Crisis Type:</i> Armed conflict	Quality: LOW	<i>Enrolment:</i> 5 camps, 5 bordering areas (pop. ~ 126,000) households	<i>Control:</i> water-treated clothes and bedding; [N=101 households	Operational Costs Adverse Effects	The combined IPV/OPV campaign was \$2.09 IPV and \$0.14 OPV per child, or \$1.04 vs \$0.36 for OPV only campaigns. There were no adverse effects of OPV in one within one week post-vaccine monitoring.
Authors: O'Reilly (2012)	Refugee	<i>Design:</i> Matched Case Control	<i>Period:</i> Jan 1, 2001 – December 31, 2011	<i>Intervention 1:</i> OPV Analysis: Vaccination history of children with OPV compared with AFP from other causes	Incidence, polio	In the last decade, 833 (710 Pakistan, 173 Afghanistan) WPV-1 cases and 272 (216 Pakistan, 56 Afghanistan) WPV-3 cases were reported in this region.
<i>Location:</i> Afghanistan and Pakistan	<i>Crisis Type:</i> Armed conflict	Quality: HIGH	<i>Enrolment:</i> N=46977 children aged 0-14 yrs with acute flaccid paralysis (AFP)	Vaccine coverage; Serotype specific vaccine induced immunity, children 0-2yrs	Clinical Effectiveness, OPV OPV Coverage	Monovalent was significantly more effective than trivalent OPV (34% v 12.5%, respectively) against WPV-1; there was no difference between bivalent and monovalent so either can be used in vaccination campaigns, with the added benefit that bivalent OPV may help protect against WPV-3 outbreaks. OPV coverage decreased from 2006-1.1, resulting in lower vaccine-induced population immunity to WPV-1 in certain districts. Reductions in coverage have limited the effectiveness of OPV in Pakistan and Southern Afghanistan.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Authors: <i>Centers for Disease Control & Prevention, (2008)</i>	Refugee (Somali)	Cross-sectional	Period: 2006	<i>Intervention:</i> OPV, trivalent OPV given to US-bound refugees at Dadaab refugee camp. 1 group (N=163) who were not already in US) given OPV in Kenya	Adverse Effects Incidence of Polio	There were no adverse effects of OPV in one within one week post-vaccine monitoring. There were no cases of polio in this vaccinated population (statistics not provided).
Location: Dadaab (Ifo), Northeast Kenya	Crisis: Armed conflict	Quality: LOW	Enrolment: N=944 from 1 camp; US-bound refugees screened after AFP outbreak, OPV in Kenya and US		Operational Costs	The entire operation (to identify, quarantine, treat, and follow refugees in Kenya and US) was estimated to cost over \$300,000
Authors: <i>Aaby et al, (2005)</i>	<i>General Population and Refugee</i>	Longitudinal Cohort	Period: March 1998 – December 1999; June 7 – Aug 28, 1995 *war	<i>Intervention:</i> OPV 2 national OPV immunisation days: effect of OPV on survival estimated for 6103 children 5 or younger in study area	Mortality Rate, Age 0-5 yrs with OPV Mortality Rate, Age <6 mo. with OPV	OPV was associated with slightly lower mortality, but was not significantly for all children aged 5 or younger. However, OPV was associated with a significantly beneficial effect among children aged 6 months or younger.
Location: Guinea Bissau	Crisis: Armed conflict	Quality: HIGH	Enrolment: 4 districts in capital; all children aged < 5yrs [N=6103]	82% of children received 1-2 doses OPV in this cohort.	Hospitalizations, age 0-5 mo.	There were significantly fewer hospitalizations in those age 0-5 months that received OPV than those who did not. This study calls for more research on non-specific effects of OPV before it is withdrawn, also stating it does not have a negative effect on infant survival.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Authors: Aaby et al, (2003)	General Population and Refugee	Longitudinal Cohort (incl 2 different RCTs)	Period: June 1997 – August 1997 – December, 1997 trial; mortality estimated June 7 – Aug 28, 1998 *war	Intervention 1: IPV given at age 6 months to half children in measles vaccine RCT [N=219]	Mortality, females who received IPV/DPT vs measles vaccine	The mortality in females receiving measles vaccine compared to IPV was 0.2; this was a statistically significant finding.
Location: Guinea Bissau	Crisis: Armed conflict	Quality: MEDIUM	Enrolment: 4 districts in capital; all children aged 0-3 years enrolled; at 6 months RCT children given measles or IPV; at 9 months children given both.[N=613]	Intervention 1: Measles vaccine Measles vaccine given at age 6 months to half children in measles vaccine RCT; also included children from earlier two-dose measles trial [N=214] Effect of measles vaccine estimated for children not receiving vaccine	Mortality, males who received IPV/DPT vs measles vaccine	The mortality in males receiving measles vaccine compared to IPV was 0.73; however, this was not a statistically significant finding. Note: This study was actually conducted to study the effects of measles vaccine but used IPV as a comparator.
Authors: Aaby et al, (2002)	General Population and Refugee	RCT (interrupted)	Period: 1995 – 1998; RCT started 1995, war 1998; mortality estimated June 7 – Aug 28, 1998 *war	Intervention 1: IPV given at age 6 months to half children in measles vaccine RCT Effect of DTP/polio vaccine estimated for children not receiving vaccine	Mortality, children with vs without IPV/DPT vaccine	There were no significant differences in mortality between children who received IPV and DPT vaccine and those who did not receive either or both vaccines
Location: Guinea Bissau	Crisis: Armed conflict	Quality: HIGH	Enrolment: 4 urban districts; all children aged 0-3 years enrolled; at 6 months RCT children given measles or IPV; at 9 months children given both. [N=1491]	Intervention 1: Measles vaccine Measles vaccine given at age 6 months to half children in measles vaccine RCT Effect of measles vaccine estimated for children not receiving vaccine	Mortality, males vs females who received IPV/DPT vaccine	Among children receiving IPV and DPT vaccine, the female-male mortality rate was 3.08 (females were significantly more likely to die than males). This difference in male and female mortality rates due to IPV and DPT vaccines is speculated to be possibly due to disruption from war, but authors also note an inversion of the mortality ratio in unpublished data. Thus, although this is a statistically significant finding, the authors mention unpublished data that may contradict it.

Table 11. Neglected Tropical Disease (NTD) Intervention Studies in Humanitarian Crisis Settings, 1980 – 2014.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Leishmaniasis (Visceral)						
Authors: Boussery (2001)	Refugee (Somali)	Longitudinal	<i>Period:</i> March 1999- March 2000 (antimonials); April – August 2000 (stibogluconate)	<i>Intervention 1:</i> Antimonials (pre-April 2000) testing / treatment of VL with formol-gel test (FGT) and antimonials	Incidence, VL pre-outbreak.	From March 1999 – March 2000 (pre-outbreak), camp clinics had 8 suspected (via FGT) VL cases, of which 3 were lab confirmed; all responded well to antimonials.
<i>Location:</i> Dadaab, Northeast Kenya	<i>Crisis:</i> Armed conflict	Quality: LOW	<i>Enrolment:</i> 3 Camps; visceral leishmaniasis (VL) outbreak first suspected April 2000; retrospective review showed first VL case March 1999	<i>Intervention:</i> Stibogluconate (April – August 2000) VL-specific surveillance via direct agglutination test (DAT), splenic aspirates, and stibogluconate, 20mg/kg/d 28d.	Incidence, VL post-treatment. Case-Fatality Rate	From April – August 2000, camp clinics saw 26 probable (via DAT) VL cases, 1/3 (N=8) lab confirmed; all responded well to stibogluconate. 6 deaths pre-treatment; overall case-fatality rate was 10 of 34 patients (29.4%). From outbreak (N=26), 62% of patients arrived at camps after symptoms appeared.
Authors: Griekspoor (1999)	General Population, Refugees	Design: Cost Effectiveness	<i>Period:</i> 1990 – 1995 transmission seasons	<i>Intervention:</i> Stibogluconate (July 1990 – August 1991) VL-specific surveillance via direct agglutination test (DAT), splenic aspirates, and stibogluconate, 20mg/kg/d 28d.	DALYs, disease and death averted	At least 66% of VL patients are estimated to have survived, calculated to be 366,416 DALYs averted.
<i>Location:</i> Sudan	<i>Crisis:</i> Armed conflict	Quality: HIGH	<i>Enrolment:</i> 1 MSF programme to treat VL [N=3067 patients August 1990- July 1991; data extrapolated for subsequent years	<i>Disability-adjusted life years (DALYs) in terms of disease averted and cost of hospitalization averted</i>	DALYs, cost of hospitalization averted Overall Findings	Cost per patient treated was USD \$394 (marginal cost \$209). This study found that VL treatment was amongst the most cost-effective health interventions (< \$18/DALY) – more cost effective than TB treatment or DPT/polio/measles immunisation.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Leishmaniaiasis (Visceral)						
Authors: Seaman (1996)	Refugee (Somali)	Longitudinal Cohort	<i>Period:</i> 1990 – 1995 transmission seasons	<i>Intervention:</i> Stiboclugonate (July 1990 – August 1991)	Mortality	Slightly over 10% VL patients died on first admission.
<i>Location:</i> Dadaab, Northeast Kenya	<i>Crisis:</i> Armed conflict	<i>Quality:</i> MEDIUM	<i>Enrolment:</i> 1 MSF programme to treat VL [N=3076 patients August 1990- July 1991		Treatment Success Treatment Failure	Nearly all (83%) of patients were successfully treated during the 1 year monitoring and follow-up However, 3% of the patients treated relapsed.
Authors: Zijlstra (1991)	Refugee (Nuer Tribe)	Non Random Trial	<i>Period:</i> January 1989 – February 1990	<i>Intervention 1:</i> Stiboclugonate Sodium stibogluconate (10mg/kg/30d)	Treatment Failure Mortality Rate	Treatment failure/relapse occurred in 4% of those on the 10mg/kg/30d regimen Mortality rate was 12% among those on the 10mg/kg/30d regimen
<i>Location:</i> Southern Sudan	<i>Crisis:</i> Armed conflict	<i>Quality:</i> MEDIUM	<i>Enrolment:</i> IDPs from south flooded Karthoum hospital due to mass migration / civil war; {N=623 VL patients treated}	<i>Intervention 2:</i> Stiboclugonate Sodium stibogluconate (2 x 10mg/kg/15d)	Treatment Failure Mortality Rate	Treatment failure/relapse occurred in 6% of those on the 2x10mg/kg/15d regimen Mortality rate was 6% among those on the 2x10mg/kg/15d regime

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Leishmaniaiasis (Visceral)						
Authors: De Beer (1991)	Refugee (Sudanese, Nuer Tribe)	Longitudinal	Period: October 1988 (outbreak detected)	Intervention: Stibocluconate; VL-specific surveillance via direct agglutination test (DAT),	Prevalence, VL pre-outbreak.	Nearly 45% (1195/2714) of refugees had clinical symptoms for VL; of 24% screened nearly 50% (325/654) were parasitologically confirmed.
Location: Southern Sudan	Crisis: Armed conflict	Quality: MEDIUM	Enrolment: Mass migration post epidemic; 53 severe patients screened via ELISA or improved DAT; 39/53 screened positive for Leishmania donovani	Splenic aspirates, and stibocluconate, 10mg/kg for adults; 400–600 mg for children; expected regimen 30 days. [N=513 of 663 diagnosed were treated]	Mortality Rate Treatment Response Fever / Spleen Size Reduction; Increase in Leukocytes	42 patients died before or during treatment; for overall mortality rate of 6.4%. All but one patient (99.4%) responded well to stibogluconate All patients (513/513) cleared fever within one week. Average spleen size reduction was 4.4cm following treatment. Average total leukocyte count increased from 2500 – 12900 cells/mm2
Schistosomiasis						
Authors: Huang et al, (1998)	General Population	Design: Cross sectional surveys pre-post treatment	Period: 1995, summer months following floods and proliferation of snail population	Intervention: Praziquantel General Population 50,320 exposed to water (unspecified days), 48,668 given praziquantel (dose not provided) 5 weeks later. Intervention: 'control' No treatment / refusal from 'Boat men' – [N untreated unspecified]	Incidence, acute Schistosomiasis japonica Incidence, acute Schistosomiasis japonica	None of the nearly 50,000 residents of this area who were treated with praziquantel developed acute schistosomiasis The majority (75%) of 'boat men' who refused treatment developed acute schistosomiasis 1-3 months post-intervention in surrounding areas.
Location: Jiangsu Province, China	Crisis Type: Natural Disaster (Flood)	Quality: LOW	Enrolment: All residents on riverbanks (distance not specified) [N=48,488 treated]; soldiers in nearby province [2250]	Intervention: Praziquantel Soldiers – exposed to dirty water for 3 days, given praziquantel (dose not provided) 1 month later. [n=2250]	Incidence, acute Schistosomiasis japonica	None of the nearly 2500 soldiers on the neighbouring banks who were treated with praziquantel developed acute schistosomiasis

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Schistosomiasis						
Authors: Song et al, (1997)	General Population	Design: RCT	Period: 1995, summer months	Intervention: Artemeter Artemeter 6mg/kg given 11-15 days within floodwater contact; dose repeated every 15 days until no contact with flood water;	Post-treatment Prevalence (Patients Treated)	Of the 99 treated, 4% were egg-positive 50 days post-artemeter treatment, none developed acute schistosomiasis
Location: Jiangxi Province, China	Crisis Type: Natural Disaster (Flood)	Quality: LOW	Enrolment: All residents on riverbanks (distance not specified) [N=48,488 treated]; soldiers in nearby province [2250]	water; final treatment given 7-15 days after last contact with floodwater [N=99 given 3 rounds] Intervention: Control Placebo given (not treated) [N=110 given 3 rounds]1 month later. [n=2250]	Post-placebo Prevalence (Controls)	Of the 110 given placebo pills, 40% were egg-positive 50 days post-artemeter treatment, and 29 developed acute schistosomiasis
Authors: Keittivuti et al, (1984)	Refugee (Cambodian)	Design: Non Random Trial	Period: 1983	Intervention: Praziquantel Praziquantel (30mg/kg) given 2x/1d; spaced 6hr for patients testing positive for	Prevalence (Patients Treated)	Of the 79 cases treated, 3% (2/79) were egg-positive 30 days post-praziquantel treatment; by day 90 these patients also cleared eggs.
Location: Prachinburi Province, Thailand	Crisis Type: Armed Conflict	Quality: LOW	Enrolment: 84 patients testing positive S. mekongi enrolled and followed 30 and 90 days post-treatment	Schistosoma mekongi [N=84 treated, 79 followed up]	Side Effects	No serious side effects were noted.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
Trachoma						
Authors: Javaloy et al, (2003)	Refugee (Saharan)	Design: Non Random Trial	Period: October 2001 -	Intervention: Azithromycin Azithromycin (single dose) evaluated October 2001, PCR tested and treated, and	Prevalence post-treatment (30d)	C. trachomatis was suspected in 2.47% of patients, PCR confirmed in 2.27% (12/527). 30 days post-treatment, 21 samples taken from which 9 positive in first round were negative (12 negative in first round negative)
Location: Tindouf, Algeria	Crisis Type: Armed Conflict	Quality: MEDIUM	Enrolment: Camp schools (number unspecified); 527 children aged 3-17 yrs	PCR tested 30d later; treatment failures retreated and tested 30d later.	Prevalence post-treatment (30d, 30d)	The 3 children positive for C. trachomatis were treated and re-tested via PCR 30 days later (i.e., 2 single-dose treatments each 30 days); all were negative with the second dose of azithromycin.
****Soil Transmitted (Intestinal) Helminths (STH) – Refugees Treated In-country, Evaluated Post-treatment in the United States of America						
Authors: Swanson et al, (2012)	Refugee (Multiple Countries)	Design: Retrospective Cohort	Period: 1993-2007 [1993- 1999 (1st half) no albendazole; 1999 (2nd half) – 2007: presumptive albendazole]	Intervention: Albendazole (Presumptive) Albendazole (5 days pre-departure)	Prevalence (Patients Treated vs Untreated) Upon Arrival	Upon arrival, 4.7% of 22,586 refugees given presumptive albendazole treatment in overseas refugee camps/holding centres had at least one STH; of these 3.9% had trichurias. Upon arrival, 21% of 4,370 untreated refugees had at least one STH; of these 9.2% had hookworm
Location: Africa, Southeast Asia to the United States	Crisis Type: Armed Conflict	Quality: HIGH	Enrolment: All Minnesota, US- bound refugees from Africa and Southeast Asia during study period [N=26,956]	Control: No albendazole [N=4370]	Risk for Nematode Infection (Treated v Untreated) Other Pathogens	Albendazole-treated refugees were less likely to have any nematodes, hookworm acaris, or trichurias than non-treated refugees; however they were not less likely (no difference observed) to have giardia or entamoeba. Schistosomiasis only found in African refugees; post-albendazole the only prevalent infection in Southeast Asian refugees was giardia.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
***Soil Transmitted (Intestinal) Helminths (STH) – Refugees Treated In-country, Evaluated Post-treatment in the United States of America						
Authors: Goswami et al, (2009)	Refugee (Multiple Countries)	Design: Cross Sectional	Period: June 2002 - September 2003	Intervention: Albendazole (Presumptive) Albendazole (5 days pre-departure)	Eosinophilia (Patients Treated) Upon Arrival	Of 471 refugees treated with albendazole (5 days pre-departure), eosinophilia was present in 27% of refugees (47/171) at first blood draw upon arrival; only 1 refugee had STH infection via stool (microscopy).
Location: Cambodia to the United States	Crisis Type: Armed Conflict	Quality: HIGH	Enrolment: Sample of North Carolina, US-bound refugees from Cambodia during study period [N=172]	Intervention: Ivermectin (Post-settlement in US) For those patients testing positive for Strongyloides [N=24]	Eosinophilia in Strongyloides patients, post-ivermectin	Of 24 patients testing positive (serology) for Strongyloides upon arrival, eosinophilia decreased significantly (p=0.039) with ivermectin treatment.
Authors: Shah et al, (2008)	Refugee (Multiple Countries)	Design: Cross Sectional	Period: 2002-2003	Intervention: Albendazole (Presumptive) Albendazole (5 days pre-departure)	Prevalence (Patients Treated) Upon Arrival	Albendazole treatment (5 days pre-departure) was associated with significantly lower STH infection rates(p<0.0001)
Location: Cambodia to the United States	Crisis Type: Armed Conflict	Quality: HIGH	Enrolment: Sample of North Carolina, US-bound refugees from Cambodia during study period [N=815]	Control: No albendazole [N=4370]	Risk for Nematode Infection (Treated v Untreated)	Albendazole treatment (5 days pre-departure) was not significantly associated with lower protozoan infection rates.

Study Details	Population / Crisis	Design, Quality:	Study Details	Intervention(s)	Outcome(s)	Results:
***Soil Transmitted (Intestinal) Helminths (STH) – Refugees Treated In-country, Evaluated Post-treatment in the United States of America						
Authors: Geltman et al, (2003)	Refugee (Multiple Countries)	Design: Cross-Sectional	<i>Period:</i> July 1995 – March 2001	<i>Intervention: Albendazole (Presumptive) Albendazole (5 days pre- departure) versus period before presumptive treatment (pre May 1, 1999)</i>	Prevalence (Patients Treated) Upon Arrival	Overall, refugees who arrived after the presumptive treatment (albendazole, 5 days pre-departure) programme was initiated were significantly less likely to have any parasites or intestinal parasites than those who were not pre-treated.
<i>Location:</i> Multiple African Countries to the United States	<i>Crisis Type:</i> Armed Conflict	Quality: HIGH	<i>Enrolment:</i> Convenience sample of Massachusetts, US-bound refugees from African countries; [N=1,254 of 1,779 total refugee arrivals]	<i>Refugees screened, treated, and followed at 16 clinics</i>	Prevalence (Patients Treated) Upon Arrival	Specifically, refugees who arrived after the presumptive treatment (albendazole, 5 days pre-departure) programme was initiated were significantly less likely to have hookworm, <i>Trichuris</i> , <i>Ascaris</i> , and <i>Entamoeba histolytica</i> than those who were not pre-treated.
Authors: Muennig et al, (1999)	Refugee (Multiple Countries)	Design: Cost Effectiveness	<i>Period:</i> 1990 - 1996	<i>Intervention: Albendazole (Presumptive) Albendazole (5 days pre- departure) versus 'watchful waiting' (control/no treatment)</i>	DALYs, disease and death averted	Presumptive albendazole treatment in refugee camps would avert 870 DALYs in this population, and prevent 33 deaths per year.
<i>Location:</i> Multiple Countries to the United States	<i>Crisis Type:</i> Armed Conflict	Quality: HIGH	<i>Enrolment:</i> Sample of North Carolina, US- bound refugees from Cambodia during study period [N=698,552]	<i>Disability-adjusted life years (DALYs) in terms of disease averted and cost of hospitalization averted</i>	DALYs, cost of hospitalization averted Overall Findings	Presumptive albendazole treatment in refugee camps would prevent 374 hospitalizations and save USD \$4.2million (1999) per year. Presumptive albendazole would prevent illness, saves lives, and ultimately save money.

Table 12. Communicable Diseases (Excluding Malaria, Polio and NTDs) – Summary Data Extraction Table

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health intervention	Study design	Target age group	Evidence category
Aaby (2002)	Guinea Bissau	Urban	General	Armed conflict	Early recovery	Diphtheria, tetanus, pertussis	Vaccination	Cohort	Children < 6 months	A
Aaby (2002)	Guinea Bissau	Urban	General	Armed conflict	Early recovery	Measles	Vaccination	Cohort	Children < 6 months	A
Aaby (2003)	Guinea Bissau	Urban	General	Armed conflict	Early recovery	Diphtheria, tetanus, pertussis	Vaccination	Cohort	Children < 6 months	A
Aaby (2003)	Guinea Bissau	Urban	General	Armed conflict	Early recovery	Measles	Vaccination	Cohort	Children < 6 months	A
Aaby (2005)	Guinea Bissau	Urban	General	Armed conflict	Early recovery	Diphtheria, tetanus, pertussis	Vaccination	Cohort	Children < 6 months	A
Aaby (2005)	Guinea Bissau	Urban	General	Armed conflict	Early recovery	Measles	Vaccination	Cohort	Children < 6 months	A
Ahmadzai (2008)	Afghanistan	Rural	General	Armed conflict	Acute crisis	Tuberculosis	DOTS	Cohort	All ages	B
Arumugam (2006)	India	Rural	General	Natural disaster	Acute crisis	Measles	Vaccination	Before/after	All ages	A
Bam (2007)	Nepal	Camp	Refugee	Armed conflict	Stabilized	Tuberculosis	DOTS	Cohort	All ages	A
Bohler (2005)	Sudan	Urban	IDP	Armed conflict	Acute crisis	Tuberculosis	DOTS	Before/after	All ages	A
Centers for Disease Control and Prevention (2003)	Afghanistan	Both	General	Armed conflict	Acute crisis	Measles	Vaccination	Before/after	Children < 1	B
Djeddah (1988)	Africa' (camp A, B)	Camp	Refugee	Armed conflict	Natural disaster	Cholera	Oral rehydration; antibiotic	Before/after	All ages	A
Dorelencourt (1999)	Uganda	Camp	Refugee	Armed conflict	Early recovery	Cholera	Vaccination	Before/after	All ages	A

Table 12. Communicable Diseases (Excluding Malaria, Polio and NTDs) – Summary Data Extraction Table

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health intervention	Study design	Target age group	Evidence category
Elsayed (2004)	Sudan	Both	Refugee	Armed conflict	Acute crisis	Measles	Vaccination	Cross sectional	Children < 5 years	B
Garenne (1997)	Mozambique	Both	General	Armed conflict	Stabilised	Diarrhoea_general	Vaccination	Cohort	Children < 5 years	A
Garenne (1997)	Mozambique	Both	General	Armed conflict	Stabilised	Diphtheria, tetanus, pertussis	Vaccination	Cohort	Children < 5 years	A
Garenne (1997)	Mozambique	Both	General	Armed conflict	Stabilised	Measles	Vaccination	Cohort	Children < 5 years	A
Garly (2006)	Guinea Bissau	Urban	General	Armed conflict	Early recovery	Diarrhoea	Antibiotic therapy	RCT	All ages	A
Garly (2006)	Guinea Bissau	Urban	General	Armed conflict	Early recovery	Respiratory infections	Antibiotic therapy	RCT	All ages	A
Goma Epidemiology Group (1995)	Zaire	Camp	Refugee	Armed conflict	Acute crisis	Cholera	WASH (point of use)	Before/after	All ages	B
Goma Epidemiology Group (1995)	Zaire	Camp	Refugee	Armed conflict	Acute crisis	Meningitis	Antibiotic therapy	Before/after	All ages	B
Goma Epidemiology Group (1995)	Zaire	Camp	Refugee	Armed conflict	Acute crisis	Shigella	Vaccination	Before/after	All ages	B
Gustafson (2001)	Guinea Bissau	Urban	General	Armed conflict	Acute crisis	Tuberculosis	Directly Observed Therapy Short course (DOTS)	Before/after	All ages	A
Habib (2010)	Pakistan	Camp	General	Natural disaster	Acute crisis	Diarrhoea_general	Zinc provision	Cohort	All ages	A

Table 12. Communicable Diseases (Excluding Malaria, Polio and NTDs) – Summary Data Extraction Table

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health intervention	Study design	Target age group	Evidence category
Haelterman (1996)	Democratic Republic of Congo	Camp	IDP	Armed conflict	Acute crisis	Meningitis	Vaccination	Before/after	All ages	A
Heldal (1997)	Nicaragua	Urban	General	Armed conflict		Tuberculosis	TB treatment (pre DOTS)	Before/after	All ages	B
Heyman et al (1997)	Zaire	Camp	Refugee	Armed conflict	Acute crisis	Cholera	Fluid therapy	Before/after	All ages	A
Heyman et al (1997)	Zaire	Camp	Refugee	Armed conflict	Acute crisis	Shigella	Antibiotic therapy	Before/after	All ages	A
Hindiyeih (2009)	Palestine	Camp	Refugee	Armed conflict	Acute crisis	Mumps	Vaccination	Before/after	Children <15	B
Huhn (2006)	Liberia	Camp	IDP	Armed conflict	Acute crisis	Yellow fever	Vaccination	Before/after	All ages	B
Isaza (1980)	Honduras	Camp	Refugee	Natural disaster	Acute crisis	Diarrhoea_general	Rehydration	Before/after	Children < 2 years	A
Jacquet (2006)	Haiti	Both	General	Natural disaster	Acute crisis	Tuberculosis	Directly Observed Therapy Short course (DOTS)	Before/after	All ages	A
Kamugisha (2003)	Tanzania	Camp	Refugee	Armed conflict	Acute crisis	Measles	Vaccination	Cross sectional	Children <15 years	B
Keus (2003)	South Sudan		General	Armed conflict	Acute crisis	Tuberculosis	TB treatment_HRZE	Before/after	All ages	B
Legros (1999)	Sudan	Rural	Refugee	Armed conflict	Acute crisis	Cholera	Vaccination	Economic study	All ages	B
Marfin (1994)	Nepal	Camp	Refugee	Armed conflict	Stabilised	Cholera	Rehydration	Before/after	All ages	B

Table 12. Communicable Diseases (Excluding Malaria, Polio and NTDs) – Summary Data Extraction Table

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health intervention	Study design	Target age group	Evidence category
Marfin (1994)	Nepal	Camp	Refugee	Armed conflict	Stabilised	Measles	Vaccination	Before/after	All ages	B
Marfin (1994)	Nepal	Camp	Refugee	Armed conflict	Stabilised	Meningitis	Vaccination	Before/after	All ages	B
Marfin (1994)	Nepal	Camp	Refugee	Armed conflict	Stabilised	Shigella	Antibiotic therapy	Before/after	All ages	B
Martins (2006)	East Timor	Both	General	Armed conflict	Acute crisis	Tuberculosis	Directly Observed Therapy Short course (DOTS)	Before/after	All ages	B
Mastro (1988)	Thailand	Camp	Refugee	Armed conflict	Acute crisis	Tuberculosis	TB treatment (pre DOTS)	Before/after	All ages	B
Mauch (2010)	Afghanistan	Both	General	Armed conflict	Acute crisis	Tuberculosis	Directly Observed Therapy Short course (DOTS)	Before/after	All ages	A
Mauch (2010)	Democratic Republic of Congo	Both	General	Armed conflict	Acute crisis	Tuberculosis	Directly Observed Therapy Short course (DOTS)	Before/after	All ages	A
Mauch (2010)	Haiti	Both	General	Armed conflict	Acute crisis	Tuberculosis	Directly Observed Therapy Short course (DOTS)	Before/after	All ages	A
Mauch (2010)	Somalia	Both	General	Armed conflict	Acute crisis	Tuberculosis	Directly Observed Therapy Short course (DOTS)	Cohort	All ages	A
M'Boussa (2002)	Democratic Republic of Congo	Both	General	Armed conflict	Acute crisis	Tuberculosis	Directly Observed Therapy Short course (DOTS)	Cohort	All ages	A
Miles (1984)	Cambodia	Camp	Refugee	Armed conflict	Acute crisis	Tuberculosis	TB treatment (pre DOTS)	Cohort	All ages	B

Table 12. Communicable Diseases (Excluding Malaria, Polio and NTDs) – Summary Data Extraction Table

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health intervention	Study design	Target age group	Evidence category
Minetti (2010)	Thailand	Camp	Refugee	Armed conflict	Acute crisis	Tuberculosis	TB treatment (pre DOTS)	Cohort	All ages	A
Mupere (2005)	Myanmar	Camp	IDP	Armed conflict	Acute crisis	Measles	Vaccination	Before/after	All ages	A
Myint (2011)	Myanmar	Both	General	Natural disaster	Acute crisis	Diarrhoea	Rehydration	Before/after	All ages	B
Myint (2011)	Myanmar	Both	General	Natural disaster	Acute crisis	Diphtheria, tetanus, pertussis	Vaccination	Before/after	All ages	B
Myint (2011)	Myanmar	Both	General	Natural disaster	Acute crisis	Measles	Vaccination	Before/after	All ages	B
Myint (2011)	Myanmar	Both	General	Natural disaster	Acute crisis	Tuberculosis	TB treatment	Before/after	All ages	B
Ndongosiem (2007)	Democratic Republic of Congo	Both	General	Armed conflict	Acute crisis	Tuberculosis	DOTS	Before/after	All ages	B
Norval (1998)	Cambodia	Both	General	Armed conflict	Stabilised	Tuberculosis	Directly Observed Therapy Short course (DOTS)	Before/after	All ages	A
Paquet (1995)	Rwanda	Camp	Refugee	Armed conflict	Acute crisis	Shigella	Antibiotic therapy	Before/after	All ages	A
Porter (1990)	Malawi	Camp	Refugee	Armed conflict	Acute crisis	Measles	Vaccination	Before/after	Children < 5 years	A
Rieder (1985)	Thailand	Both	General	Armed conflict	Acute crisis	Tuberculosis	TB treatment (pre DOTS)	Before/after	All ages	B
Rutta (2001)	Tanzania	Camp	Refugee	Armed conflict	Acute crisis	Tuberculosis	Directly Observed Therapy Short course (DOTS)	Before/after	All ages	A

Table 12. Communicable Diseases (Excluding Malaria, Polio and NTDs) – Summary Data Extraction Table

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health intervention	Study design	Target age group	Evidence category
Santaniello-Newton (2000)	Uganda	Camp	Refugee	Armed conflict	Acute crisis	Meningitis	Vaccination	Before/after	All ages	A
Senessie (2007)	Sierra Leone	Urban	General	Armed conflict	Acute crisis	Diphtheria, tetanus, pertussis	Vaccination	Before/after	Children <5 years	B
Senessie (2007)	Sierra Leone	Urban	General	Armed conflict	Acute crisis	Measles	Vaccination	Before/after	Children <5 years	B
Senessie (2007)	Sierra Leone	Urban	General	Armed conflict	Acute crisis	Tuberculosis	BCG vaccination	Before/after	Children <5 years	B
Siddique (1995)	Zaire	Urban	General	Armed conflict	Acute crisis	Cholera	Rehydration, antibiotic therapy	Before/after	All ages	B
Sukrakanchana-Trikkham (1992)	Thailand	Both	General	Armed conflict	Acute crisis	Tuberculosis	TB treatment (pre DOTS)	Before/after	All ages	B
Talley (2003)	Ethiopia	Rural	General	Natural disaster	Acute crisis	Measles	Vaccination	Cohort	Children < 5 years	B
Wares (2000)	India	Camp	Refugee	Armed conflict	Acute crisis	Tuberculosis	TB treatment	Cohort	All ages	A

4.2 Water, Sanitation and Hygiene (WASH)

This section describes: (i) the evidence available on the effectiveness of WASH interventions in relation to health outcomes in humanitarian settings generated through a systematic review of published and grey literature; (ii) findings from a series of interviews and consultation meetings with WASH experts; and (iii) recommendations for future WASH research in humanitarian settings based on these findings. Details on the methodology for the systematic review and expert interviews/meetings are described in Section 2 (Methods).

4.2.1 Systematic review

- Of the returned 3963 articles related to Water, Sanitation and Hygiene (WASH), the vast majority (N=3957) either did not occur in humanitarian crises or did not measure the impact of WASH interventions on health outcomes. Although water quality/purity (e.g. faecal coliform or residual chlorine levels) outcomes have been commonly used as a proxy for health outcomes (e.g. diarrhoea) in humanitarian settings, this review exclusively focused on studies that directly measured the effectiveness of WASH interventions on health outcomes.
- Only 7 peer reviewed papers met the inclusion criteria. Of these, 6 were category A and B papers and these are the focus of the review [1-6].
- Five of the 6 category A and B papers conducted a test of statistical significance between WASH interventions and health outcomes (category A). One reported WASH interventions and health outcomes but without a test of significance (category B).
- Three of the 5 category A papers were deemed high quality and 2 were deemed moderate quality. The category B paper was deemed low quality.
- There has been increasing interest in WASH interventions in humanitarian crises over the past two decades, with all six papers published since 2000, but quality remains mixed over time.
- Uncontrolled longitudinal designs were most common (3/6), followed by randomised controlled trials (RCTs) (2/6), and non-random trial (1/6) designs.
- Five of the six studies occurred in armed conflicts and one in natural disasters. Of the conflict studies, 3 were with IDPs and 2 with refugees. The natural disaster study was with the general population.
- Most of the studies occurred in the acute crisis stage (4/6), followed by early recovery (2/6); one study was conducted during both the acute crisis and early recovery stages.
- Five of the 6 studies were conducted in Africa and 1 occurred in Latin America.
- All 6 WASH intervention studies assessed the impact on the health outcome of diarrhoeal diseases, with 5 evaluating effectiveness against general diarrhoea and one evaluating suspected – although not laboratory confirmed – Shigella.
- All 6 studies used self-reported diarrhoea outcomes, 2 studies also reported laboratory-confirmed outcomes, and 2 studies reported health treatment outcomes (e.g. clinical admissions).
- One study measured WASH intervention success in relation to both health and water quality outcomes; 1 study recorded uptake (use of soap) as well as health outcomes.
- The 6 WASH studies covered multiple types and combinations of interventions. All 6 studies focussed on point of use interventions, with the two most popular intervention types being safe water storage (N=4) and household water treatment (e.g. flocculant disinfectant). Other interventions included WASH education (N=2), hand washing (including soap distribution) (N=1), latrine provision (N=1), and point of source disinfection (N=1).
- No study investigated the feasibility and cost effectiveness of WASH interventions in humanitarian crises.

Table 13 presents the details of the 6 category A and B papers, including a narrative analysis of the effectiveness of the interventions in the 6 studies.

Summary

The main findings on the effectiveness of WASH interventions in addressing health outcomes in humanitarian settings include:

- The current evidence base on WASH interventions in relation to health outcomes in humanitarian crises is extremely limited (only 6 studies retrieved).
- Numerous methodological limitations (e.g. the use of self-reported diarrhoea and the associated biases, difficulty in blinding study participants, etc.) limit the ability to determine associative, let alone causal, relationships.

There is clearly substantial evidence on the effectiveness of WASH interventions in stable and development contexts. It is also clear that studies on WASH interventions in stable settings help inform future research and practice in humanitarian contexts. Reviews of such studies are available on water (Dangour 2013; Esrey 1991), sanitation (Wolf 2014; Cairncross 2010) and hygiene (Curtis 2003; Freeman 2014), WASH as a whole (DFID 2013), and WASH in complex emergencies (SHARE 2012) (further details are given at the end of this section). However, further studies are required in humanitarian crises given their unique contexts, particularly for supporting the feasibility and cost-effectiveness of WASH interventions in improving health outcomes in these settings.

4.2.2 Expert interviews

General comments

- Compared to other humanitarian sectors, WASH is fairly well organised within its sector and the perception is that there is strong cooperation and coordination across the various actors (NGOs, extra-governmental, and governmental agencies).
- The WASH sector has a concentration of engineers and non-health professionals, who typically have measured water quality outcomes to evaluate interventions. The direct link with health outcomes is currently weak and there is a lack of guidance regarding how WASH can link with other sectors (notably infectious diseases and nutrition).
- Uptake is extremely important to characterise; it is not sufficient to report distribution of a given WASH product (e.g., soap) and effect on a health outcome; if studies are not measuring uptake this could leave to severe biases or misrepresentation of true effect sizes of intervention success.

Study design

- WASH is typically first or second line response in a disaster, leaving little time to plan how to design methodologically strong studies (and there is little guidance to do so).
 - The majority of current WASH interventions have been weak in terms of design and evaluation – future interventions should be reproducible, rigorous, and have clear objectives.
 - WASH as a sector does not tend to conduct RCTs. Some question whether RCTs are necessary given that many WASH activities (e.g. hand washing, proper waste disposal) are considered good practice via years of published evidence and programmatic experience. Additionally, the use of RCTs to measure the effectiveness of WASH interventions requiring hardware (e.g., latrines) are logistically and practically problematic in humanitarian settings. However, RCTs would be useful in comparing the effectiveness and cost-effectiveness of different WASH interventions on health outcomes.
 - Economic studies are also needed because they are currently non-existent in this sector, and experts suggest there is likely a great difference in cost and benefit of various WASH interventions (e.g. latrine construction vs. soap provision).
-

Indicators, standards, and guidelines

- As a sector, WASH follows norms and guidelines – most notably Sphere. However, Sphere’s WASH indicators are not easy to measure for those practising in the field, which has led to a divergence of indicators, with several organisations developing their own.
- Furthermore, as many WASH professionals have engineering backgrounds, WASH interventions are typically evaluated against water quality/treatment indicators (e.g. residual chlorine) because to date WASH actors have more consensus and acceptance of the robustness of water quality outcomes.
- There is a belief amongst some WASH professionals that water quality outcomes (with their agreed-upon standards) are more reliable and therefore a better measure of intervention success than many health outcomes (e.g. self-reported diarrhoea).
- Future work in this sector must incorporate both public health and measures of use outcomes to provide evidence that interventions are impacting all routes of disease transmission.

Importance of intersectoral and multidisciplinary research

- Certain types of WASH responses (e.g. latrine provision) are costly and require massive planning. Given the unstable nature of many crisis-affected environments (e.g. shifting water tables during floods), experts concede that designing methodologically strong studies is challenging. Still, there is a definite desire to quantify how well such interventions work – both alone and alongside interventions of other sectors (e.g. communicable diseases).
- In the early 2000s, WASH as a sector realised it could not simply focus on distributing and installing goods (e.g. latrines) without considering cultural, behavioural, and contextual factors. This led to an increasing recognition that qualitative and behavioural research is needed to better understand issues such as acceptability and to create context-specific approaches.
- There may be great potential to draw lessons from stable settings and other sectors (e.g. development) where longer-term approaches have been implemented and tested.

Evidence gaps identified by key informants included:

Specific research gaps

- The evidence base for WASH interventions needs to be strengthened; for instance, the evidence on interventions for some health outcomes is extremely limited (e.g. hepatitis E) or lacking in evidence compared to that of other sectors (e.g. the communicable disease sector has evaluated interventions against cholera more often than WASH).
 - In addition to further research on transmission and risk factors for certain diseases (e.g. hepatitis E), and intervention effectiveness (e.g. using health, not just water quality, outcomes), experts concur that economic studies could help establish which interventions to prioritise, depending on concurrent factors (e.g. rate of migration) across settings.
 - More evidence is needed regarding how WASH, communicable diseases, and nutrition relate and may work together; it is difficult for WASH interventions to show impact without linking to health outcomes and better coordination with these sectors could benefit both humanitarian actors and more importantly those receiving health interventions in complex emergencies.
-

Operationalising research

- It is unclear who should be charged with evaluating WASH interventions – e.g. the UN, a consortium, or an independent research body? There is often a lack of leadership and coordination in crisis settings, making impact evaluation very difficult– especially when multiple interventions across many sectors are targeting the same populations.
- While WASH interventions are often first or second line responses, little has been established about their added benefit alongside other types of interventions (e.g. vaccination, nutritional supplementation).

4.2.3 Recommendations for future research

General comments

- This systematic literature review found a lack of high quality evidence for the effectiveness of WASH interventions to address public health outcomes in humanitarian crises. While there is clearly a considerable amount of instructive evidence on WASH interventions in stable and development settings, further evidence specifically in humanitarian settings is required – particularly on feasibility and cost-effectiveness.
- While evidence exists on the effectiveness of WASH interventions in relation to water quality or other WASH indicators, there remain significant gaps in knowledge with regards to the impact of WASH in interventions in relation to health outcomes in humanitarian crises.
- Considering the limited number of studies and the methodological shortcomings of the evidence retrieved, the use of more rigorous and confirmatory study designs (e.g. RCTs) could greatly strengthen the evidence base in the WASH sector.
- Greater collaboration between WASH professionals and their health and medical counterparts could yield considerable benefits.
- The WASH sector has felt a lack of guidance in the area of measuring the impact of interventions. More assistance (e.g. epidemiological) and coordination must occur, particularly to support WASH interventions being linked to health outcomes.

Study design

- In order to increase the evidence base of what works well in WASH to improve health outcomes, studies in the future should consider: (i) to include both public health and water quality as outcomes; (ii) to increase the number of humanitarian evaluations studying the effects of WASH interventions on non-diarrhoeal diseases (e.g., trachoma, vector-borne disease); (iii) to characterise uptake and/or behaviour change, not just distribution, of an intervention (including use of direct observation rather than self-reported where possible); (iv) to incorporate methodologically stronger study designs, statistical reporting, and addressing confounding; and (v) to include data on feasibility, acceptability, cost-effectiveness and sustainability.
 - More research is needed on WASH behaviour change interventions, particularly with less studied populations (e.g. emerging crises in Syria and Middle-East).
 - Research is needed on what study designs (other than RCTs) may provide useful data for WASH and health professionals, including economic studies.
 - The methodological rigour of WASH studies needs to be improved so that WASH actors can draw conclusions about comparative effectiveness and efficiency of interventions based on robust findings.
 - Economic and anthropological research is needed; what is most cost-effective; what is most feasible; what level of success is acceptable to communities, governments and other actors in relation to health effects seen, as well as money spent?
 - Priority should be given to the reported lack of coordination between WASH and health implementing agencies during humanitarian interventions.
-

Indicators, standards, guidelines

- Sphere indicators are important but difficult to measure in practice. A review of Sphere indicators in the WASH sector is needed.

References of final selected studies (A and B categories):

1. Doocy, S. and G. Burnham, Point-of-use water treatment and diarrhoea reduction in the emergency context: An effectiveness trial in Liberia. *Tropical Medicine and International Health*, 2006. 11(10): p. 1542-1552.
2. Elsanousi, S., et al., A study of the use and impacts of LifeStraw in a settlement camp in southern Gezira, Sudan. *Journal of Water & Health*, 2009. 7(3): p. 478-83.
3. Moll, D.M., et al., Health impact of water and sanitation infrastructure reconstruction programmes in eight Central American communities affected by Hurricane Mitch. *Journal of Water and Health*, 2007. 5(1): p. 51-65.
4. Peterson, E.A., et al., The effect of soap distribution on diarrhoea: Nyamithuthu Refugee Camp. *International Journal of Epidemiology*, 1998. 27(3): p. 520-524.
5. Roberts, L., et al., Keeping clean water clean in a Malawi refugee camp: a randomized intervention trial. *Bulletin of the World Health Organization*, 2001. 79(4): p. 280-287.
6. Walden, V.M., E.A. Lamond, and S.A. Field, Container contamination as a possible source of a diarrhoea outbreak in Abou Shouk camp, Darfur province, Sudan. *Disasters*, 2005. 29(3): p. 213-221.

References of other reviews on health outcome-related WASH studies:

Reports and commissioned reviews:

1. SHARE Research Consortium (2012). Evidence review and research priorities: water, sanitation, and hygiene for emergency response. Evidence Paper. UK Department for International Development (DfID), Editor. 2012: London, UK.
2. Department for International Development (DfID) (2013). Water, Sanitation, and Hygiene. Evidence Paper. SHARE Research Consortium and the London School of Hygiene & Tropical Medicine.

Water:

1. Dangour AD, Watson L, Cumming O, Boisson S, Che Y, Velleman Y, Cavill S, Allen E, Uauy R. Interventions to improve water quality and supply, sanitation and hygiene practices, and their effects on the nutritional status of children. *Cochrane Database Syst Rev*. 2013 Aug 1; 8:CD009382.
2. Esrey SA, Potash JB, Roberts L, Shiff C. Effects of improved water supply and sanitation on ascariasis, diarrhoea, dracunculiasis, hookworm infection, schistosomiasis, and trachoma. *Bull World Health Organ*. 1991; 69(5):609-21.

Sanitation:

1. Wolf J1, Prüss-Ustün A, Cumming O, Bartram J, Bonjour S, Cairncross S, Clasen T, Colford JM Jr, Curtis V, De France J, Fewtrell L, Freeman MC, Gordon B, Hunter PR, Jeandron A, Johnston RB, Mäusezahl D, Mathers C, Neira M, Higgins JP. Systematic review: Assessing the impact of drinking water and sanitation on diarrhoeal disease in low- and middle-income settings: systematic review and meta-regression. *Trop Med Int Health*. 2014 Aug; 19(8):928-42.
2. Cairncross S, Hunt C, Boisson S, Bostoen K, Curtis V, Fung IC, Schmidt WP. Water, sanitation and hygiene for the prevention of diarrhoea. *Int J Epidemiol*. 2010 Apr; 39 Suppl 1:i193-205.

Hygiene:

1. Curtis V, Cairncross S. Effect of washing hands with soap on diarrhoea risk in the community: a systematic review. *Lancet Infect Dis*. 2003 May; 3(5):275-81.
 2. Freeman MC, Stocks ME, Cumming O, Jeandron A, Higgins JP, Wolf J, Prüss-Ustün A, Bonjour S, Hunter PR, Fewtrell L, Curtis V. Systematic review: Hygiene and health: systematic review of handwashing practices worldwide and update of health effects. *Trop Med Int Health*. 2014 Aug; 19(8):906-16.
-

Table 13: WASH Intervention Studies in Humanitarian Crisis Settings, 1980 – 2014

Publication (Author, Country)	Population and Crisis	WASH Intervention	Health Outcome	Methods	Results and Quality Rating	Conclusion
Doocy et al (2006), Liberia	<p>Population: IDP</p> <p>Crisis type: Armed conflict</p> <p>Crisis stage: Acute</p>	<p>Point of use: Safe water storage; flocculant disinfectant (FD); 200 houses received FD.</p> <p>Measurements: Distribution: Yes Uptake: No Behaviour change: No Impact: Yes</p>	<p>Health outcome: Diarrhoea (non-specific)</p> <p>Definition: 3 or more loose stools in 24hr period</p> <p>How assessed: Self reported diarrhoea via weekly surveys over 12 weeks</p>	<p>Design: RCT (unblinded).</p> <p>Sampling: 2 arms. 3 blocks each arm (3/7 blocks Camp II; all blocks Camp II). Sample size of 400 households (200 per group) selected to detect 15% difference in diarrhoea rate (intervention v control) with statistical assumptions: power=80%, CI=95% (alpha=0.05) and 10% potential loss to follow-up.</p> <p>Population enrolled: 2215 individuals in 400 households (from 2 camps of a total of 22,800 residents); only households with children under 5 were eligible.</p> <p>Statistics: Change in incidence, prevalence, adjusted risk ratio; 95% CI; p-values.</p>	<p>Diarrhoea incidence: 2.8% of weeks in FD houses vs 28.7% of weeks in control houses (P < 0.001). Diarrhoea prevalence: 38.7% of weeks in control vs 3.5% of weeks in FD houses (P < 0.001). FD houses averaged 0.3 incident weeks and 0.4 prevalent weeks vs 3.2 incident and 4.7 prevalent weeks in control houses (P < 0.001 for both comparisons) over 12 week monitoring period. Adjusted risk ratios for diarrhoea incidence and prevalence: control vs FD households, incidence: 3.0 (2.7–3.3) and prevalence: 4.4 (4.0–4.8).</p> <p>Quality: High</p>	<p>Diarrhoeal incidence decreased after FD. Diarrhoeal prevalence decreased after FD. Flocculant disinfectant appears to be a successful POI intervention in these settings.</p>
Elsanousi et al (2009), Sudan	<p>Population: IDP</p> <p>Crisis type: Armed conflict</p> <p>Crisis stage: Acute</p>	<p>Point of use: Household iodinated water filter (IWF); each participant received IWF.</p> <p>Measurements: Distribution: Yes Uptake: No Behaviour change: No Impact: Yes</p>	<p>Health outcome: Diarrhoea (non-specific)</p> <p>Definition: 3 or more loose stools in 24hr period</p> <p>How assessed: Self report (primary); laboratory testing (limited); clinic diarrhoea admissions (variable) over 4 mo. study period and 4 mo post IWF</p>	<p>Design: Uncontrolled longitudinal study.</p> <p>Sampling: Convenience sample; all eligible residents given IWF.</p> <p>Population enrolled: 647 of 713 camp residents (66 residents were aged <2 years) enrolled; 603 remained at study conclusion; clinic admissions for diarrhoea 4 months before and after IWF provision.</p> <p>Statistics: Change in incidence (adjusted), cumulative incidence (attack rate); correlation (uncorrected chi square); 95% CI; p value.</p> <p>Stratification: Age</p>	<p>Diarrhoeal prevalence: Pre-IWF survey prevalence: 15%; post-IWF survey prevalence: 2.3%. Diarrhoeal incidence: four months prior to IWF: 58 people presented in two weeks; four months post IWF: 6 people presented in two weeks. Decline in clinic attendance post IWF compared to regional hospitals: uncorrected X2: 30.71 p<0.0001</p> <p>Additional indicators: Of 647 eligible adult patients, 27 stool samples were submitted: 7 (+) Giardia lamblia cysts (giardiasis), 2 (+) Entamoeba histolytica cysts, 4 (+) Schistosoma mansoni ova (schistosomiasis), and 2 (+) Taenia saginata ova (pinworm).</p> <p>Compliance: Final survey post IWF of 531 participants indicated 86% always used the IWF, 10% occasionally used it, and 4% never used it.</p> <p>Quality: Moderate</p>	<p>Diarrhoeal prevalence decreased after IWF. Diarrhoeal incidence decreased after IWF. Iodinated water filtration appears to be a successful POI intervention in this setting.</p>

Publication (Author, Country)	Population and Crisis	WASH Intervention	Health Outcome	Methods	Results and Quality Rating	Conclusion
Moll et al (2007), El Salvador, Guatemala, Honduras, Nicaragua	Population: IDP Crisis type: Natural disaster (hurricane) Crisis stage: Acute / early recovery	Point of use: Safe water storage (provision, upgrades); Latrines (pour, flush, VIP, or composting) WASH education; participants received different interventions and to different degrees, depending on location. Measurements: Distribution: Yes Uptake: No Behaviour change: No Impact: Yes	Health outcome: Diarrhoea (non-specific) Definition: Not provided. How assessed: Self report	Design: Uncontrolled longitudinal study. Sampling: Evaluation conducted in 2 areas of each of the 4 countries (n=8 study areas); sample size calculated to detect 25% decrease in diarrhoea in children <3 years after WASH interventions (assuming diarrhoeal prevalence = 25% pre-intervention); sample size calculated with statistical assumptions of power=80% and CI=95% (alpha=0.05) estimated 717 households (800 to account for refusals). Sample size deemed too large, so pooled calculation based on hand-washing (needing largest sample size of all WASH indicators) was used, giving 91 households; to account for refusals, 100 households were enrolled from each site. Population enrolled: 800 households (100 from each site that were then pooled for the global diarrhoea indicator). Statistics: Change in prevalence; 95% CI; p value. Stratification: None	Change in diarrhoeal prevalence in children <3 years of age: in 2000, diarrhoeal prevalences ranged from 25-48%; by 2002, diarrhoeal prevalences ranged from 1.1-4.4%. Six of eight (75%) communities met or greatly exceeded their 2002 goal of reducing diarrhoeal disease in children <3. Association between select WASH indicators and diarrhoea in children<3 years (univariate): improved water access [OR=0.61; 95% CI = 0.47, 0.78; (p<0.0001)]; improved sanitation access [OR=0.73; 95% CI = 0.57, 0.94; (p=0.015)]; food preparer hand washing [OR=0.68; 95% CI = 0.53, 0.90; (p=0.006)]; child carer hand washing [OR=0.67; 95% CI = 0.52, 0.87; (p=0.002)]; E coli in stored water [OR=0.32; 95% CI = 0.11, 0.93; (p=0.03)]; stored household water covered [OR=0.58; 95% CI = 0.43, 0.78; (p=0.0004)]; hand soap available [OR=0.70; 95% CI = 0.52, 0.94; (p=0.02)]. The following indicators were found to be associated with diarrhoeal disease: increasing number of latrine users [OR=1.08; 95% CI = 1.01, 1.15; (p=0.03)]; animals having access to water/pumps [OR=1.48; 95% CI = 1.15, 1.90; (p=0.002)]. None of these interventions were found to be independently associated with lower diarrhoeal prevalence. Quality: High	Diarrhoeal prevalences decreased post- intervention rollout. Safe water storage, improved water access, and improved sanitation measures appear protective for childhood diarrhoea. There is insufficient data from each study to determine if any intervention in this study was independently successful in reducing childhood diarrhoea.

Publication (Author, Country)	Population and Crisis	WASH Intervention	Health Outcome	Methods	Results and Quality Rating	Conclusion
Peterson et al (1998), Malawi (Mozambique refugees)	<p>Population: Refugee</p> <p>Crisis type: Armed conflict</p> <p>Crisis stage: Early recovery</p>	<p>Point of use: Soap distribution; each participant received soap.</p> <p>Measurement: Distribution: Yes</p> <p>Uptake: Yes</p> <p>Behaviour change: Yes</p> <p>Impact: Yes</p>	<p>Health outcome: Diarrhoea (non-specific)</p> <p>Definition: new diarrhoea – 3 watery stools in 24h by female HoH with no family member having diarrhoea in previous 48 hrs; soap presence – soap in any form on the day of interview</p> <p>How assessed: Self report of diarrhoea (2 visits/week over 4 month study period)</p>	<p>Design: Uncontrolled longitudinal study.</p> <p>Sampling: Every fourth house eligible, excluded if not home after 2 visits.</p> <p>Population enrolled: 402 houses (represented by 402 female head of households, HoH); 356 households remained enrolled over entire study period.</p> <p>Statistics: Change in incidence, Mantel Haenszel relative risk and chi square; 95% CIs</p> <p>Stratification: Household</p>	<p>Diarrhoea incidence: Houses with soap on visit days had 27% reduced risk of houses without soap (RR = 0.73, 95% CI: 0.54-0.98). Houses that used soap on the previous interview day (4 days earlier) had 25% reduced risk of diarrhoea than houses without soap (RR = 0.75, 95% CI: 0.51-1.1).</p> <p>Compliance: of 402 households, 356 (87%) participated in second survey and 322 (80%) participated in final survey.</p> <p>Quality: Moderate</p>	Diarrhoeal risk decreased in households when soap was used. This study demonstrates that soap provision can significantly reduce diarrhoeal disease incidence.
Roberts et al (2001), Malawi	<p>Population: Refugee</p> <p>Crisis type: Armed conflict</p> <p>Crisis stage: Early recovery</p>	<p>Point of use: Safe water storage (bucket provision); WASH education; 310 houses received buckets.</p> <p>Measurements</p> <ul style="list-style-type: none"> • Distribution: Yes Uptake: No Behaviour change: No Impact: Yes 	<p>Health outcome: Diarrhoea (non-specific)</p> <p>Definition: 3 or more loose stools in 24hr period</p> <p>How assessed: Self report over 4 month study period</p>	<p>Design: RCT (unblinded).</p> <p>Sampling: Simple random sampling of every fourth hut in village.</p> <p>Population enrolled: 310 individuals selected for intervention; 850 controls enrolled throughout end of study.</p> <p>Statistics: Cumulative incidence (attack rate, relative risk); p value;</p> <p>Stratification: Age</p>	<p>Diarrhoeal Risk: The 310 houses receiving buckets had 60 diarrhoeal episodes (AR= 44.5/1000/month) vs 207 diarrhoeal episodes in 850 control houses (AR=48.6/1000/week); i.e, 8.4% less diarrhoea (not statistically significant). The 51 children <5 years in houses with buckets had 18 diarrhoeal episodes (AR=84.3/1000/month) vs. 82 episodes in the 157 children in control houses (AR=122.4/1000/month); buckets were associated with a 31.1% diarrhoeal reduction (P = 0.06).</p> <p>Diarrhoeal Association: Poisson regression indicated buckets in the household (RR=0.85; p=0.021) and latrines (RR=0.87; p=0.051) were associated with less diarrhoea among all age groups. Among children <5, having buckets in the house (RR=0.57, p=0.040) was protective against diarrhoea.</p> <p>Quality: High</p>	Diarrhoeal incidence decreased in households receiving buckets. This study suggests safe water storage can reduce diarrhoeal incidence but the results are borderline significant. More research is needed on this type of intervention.

Publication (Author, Country)	Population and Crisis	WASH Intervention	Health Outcome	Methods	Results and Quality Rating	Conclusion
Walden et al (2005), Sudan	Population: IDP Crisis type: Armed conflict Crisis stage: Acute	Point of use: Mass (water) container disinfection (MCD) via chlorination Measurements: Distribution: Yes Uptake: No Behaviour change: No Impact: Yes	Health outcome: Diarrhoea and bloody diarrhoea (suspected Shigella) Definition: Not provided. How assessed: Clinical cases of watery / bloody diarrhoea	Design: Uncontrolled longitudinal study. Sampling: Entire camp was selected for MCD (ie, no sampling). Population enrolled: 7000 households estimated in camp; each estimated to have >2 containers. All houses enrolled for MCD. Statistics: Incidence Stratification: None	Results: Outbreak of suspected Shigella began early May, MCD occurred last week of June (13,224 containers, an estimated 88% of total, disinfected); watery and bloody diarrhoea cases decreased within 5 days post MCD. Cases watery/bloody per week: May Wk 1: 200-210 watery / 90-100 bloody; June Wk 1: 500-510 watery / 210-220 bloody; July Wk 1: 180-190 watery / 180-190 bloody; July Wk 4: 80-90 watery / 0-10 bloody. Statistical associations were not provided. Quality: Low	Decreased diarrhoeal incidence corresponded to MCD. However, it is impossible to establish a causal relationship as statistical associations were not provided.

4.3 Nutrition

4.3.1 Systematic review

- Seventy-seven papers were selected out of 2535 published papers searched; twenty-two papers were included from grey literature¹².
- Nearly half (35 papers) of papers were from the 'A' category of evidence, 24 papers were category B, 18 papers were category C¹³.
- There is increasing interest in evidence-based intervention in humanitarian crises, with 70% of all studies conducted since 1980 being published in the last decade. Furthermore, the proportion of high quality papers increases over time (Figure 12). Most papers¹⁴ were of moderate quality (34/77), a quarter were of high quality (18/77) and a third of low quality (25/77). In category A, 18 papers were of high quality, 27 were moderate and 1 out of 46 was of low quality, whereas no paper was of high quality in category B, eight were moderate and 23 out of 31 were of low quality.

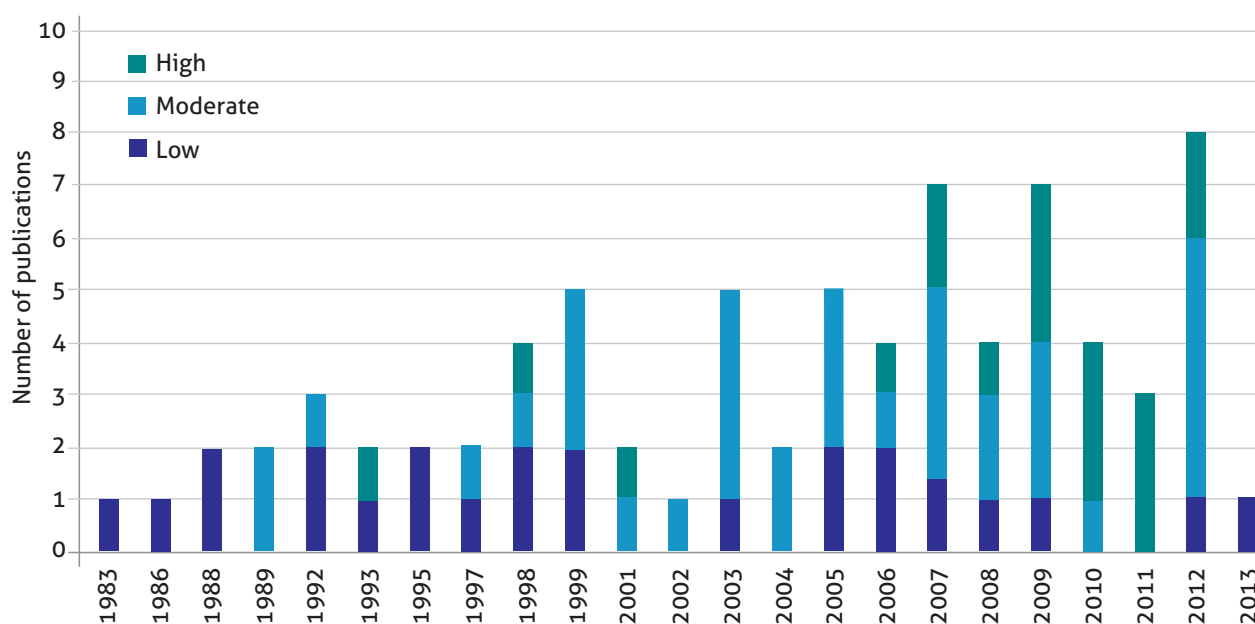


Figure 12: Quantity and quality of nutrition publications over time

- The majority of studies employed a cross-sectional design (29 papers), a third used follow-up/monitoring data of beneficiaries enrolled in programmes (27 papers), several studies were of cohort¹⁵ and RCT design (nine and six papers respectively), and the rest were cost-effectiveness, mix-method and case control studies (3%, 4% and 1% respectively).

¹² Initially selected: two not retrieved; one was qualitative, one was published and is included in the published literature.

¹³ Need assessments and surveys alone were excluded.

¹⁴ The level of quality of studies was assessed for category A and B papers (77 out of 100).

¹⁵ Including two prospective cohorts, and one study using both retrospective and prospective cohorts.

- The majority of studies were conducted in Africa (72%), a fifth in Asia (18%) and few in Europe, Middle-East and Caribbean (4%, 3% and 1% respectively) (Figure 13).
- Half (37 papers) of the studies assessed were during an armed conflict, a third (26 papers) responded to a natural disaster and a fifth (15 papers) were in zones affected by both type of emergencies (Figure 14).
- Half (40 papers) of the studies were conducted during acute humanitarian crises, more than a third (30 papers) in stabilised context, 5 (6.5%) where in place before emergency (preparedness) and 2 (2.6%) were including different stages of emergencies.

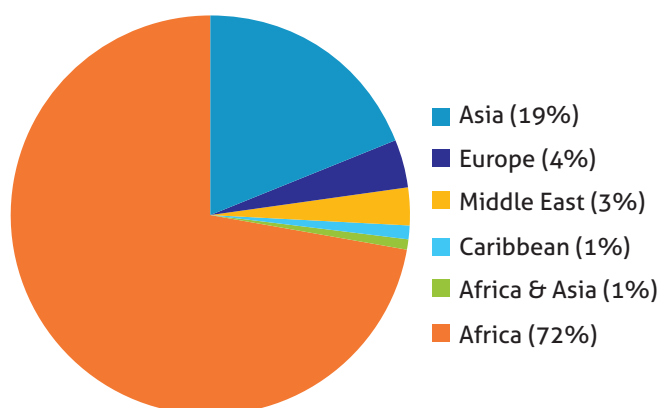


Figure 13: Geographic regions of nutrition research

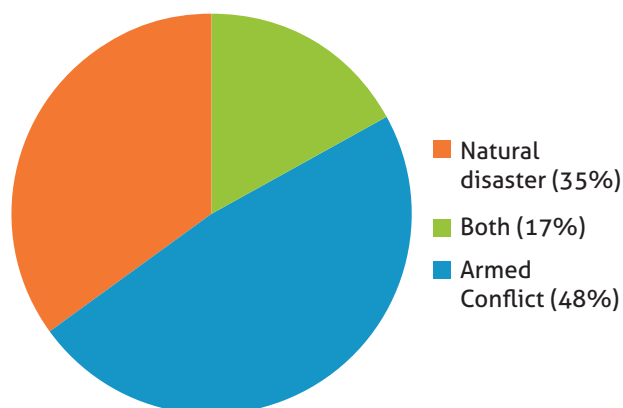


Figure 14: Nutrition studies by emergency type

- The interventions assessed were mainly addressing micro-nutrient deficiencies and the treatment of Severe Acute Malnutrition (SAM) (18 and 16 papers respectively). Several were Targeted Supplementary Feeding Programmes (TSFP), Blanket Supplementary Feeding Programmes (BSFP) and General Food Distributions (GFD) interventions (11, 8 and 8 papers respectively). Only four studies examined Infant and Young Child Feeding (IYCF) practices (Figure 15).
- The health outcome of more than half the studies (41 papers) was acute malnutrition followed by micro-nutrient deficiencies (24.7%)¹⁶, of which anaemia was mainly examined (76.5%). Several studies examined chronic malnutrition¹⁷ (15.6%) (Figure 16).

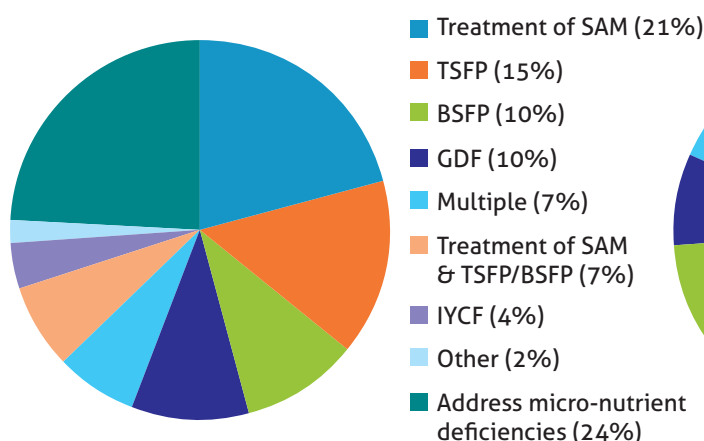


Figure 15: Nutrition interventions

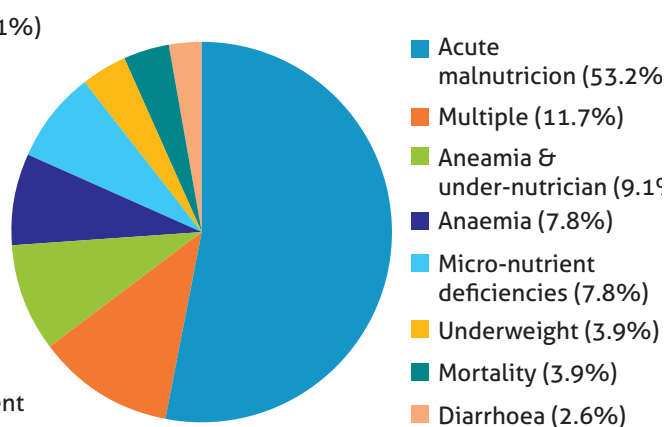


Figure 16: Nutrition outcomes

¹⁶ Micro-nutrient deficiency category includes: two studies on Vitamin B3, one on Vitamin B1, one on vitamin C, one on iodine and one on multiple micronutrients (Iron, Vit A, Thiamin, Zinc). Anaemia is excluded from this category

¹⁷ Included in "multiple" and "anaemia and under-nutrition" categories. Under-nutrition in this case includes acute and chronic malnutrition, underweight (no micronutrient deficiencies)

- Interventions addressing micro-nutrient deficiencies, GFD, TSFP and the treatment of SAM have been assessed since the end of the 1980s/early 1990s. The diversity of interventions studied has increased over time. Only since 2003 have studies about IYCF interventions been published and only since 2005 have studies on micro-finance and voucher schemes (in "other" category) been published. All preparedness interventions were BSFP and their assessments were published after 2008 (Figure 17).

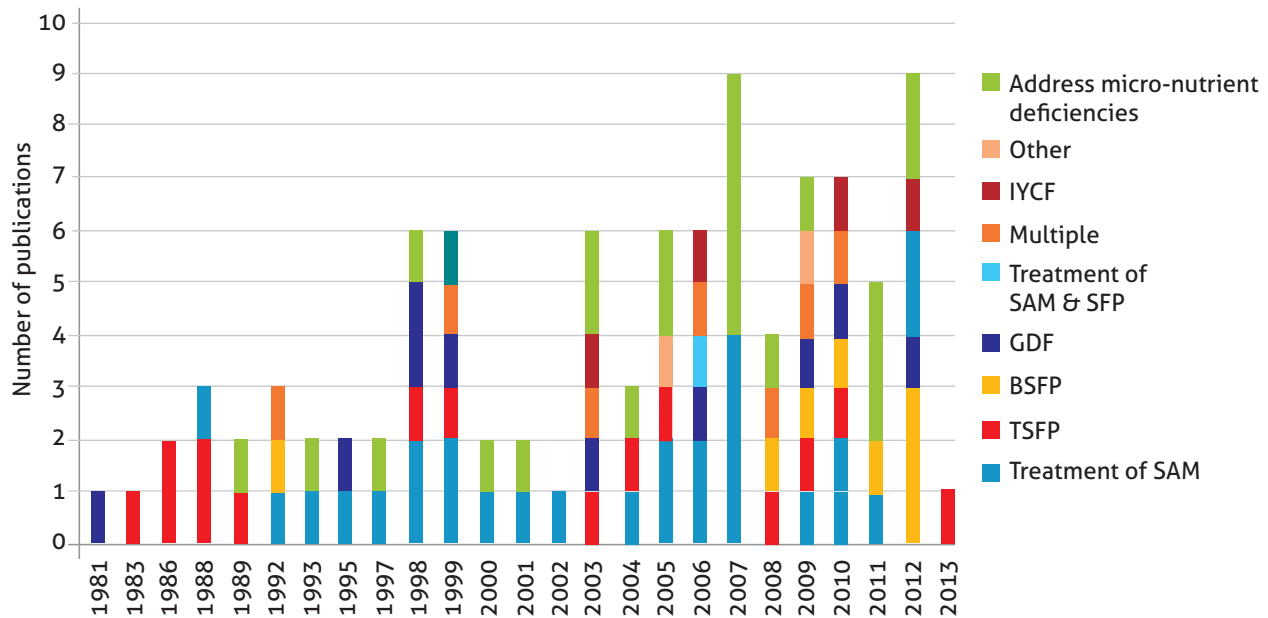


Figure 17: Nutrition intervention types of over time

Summary

This review found that the majority of studies on nutrition interventions in these settings and populations were of moderate quality, and that these were largely confined to African settings. Further high quality studies are required in humanitarian crises given their unique contexts, particularly in other regions of the world than Africa, in order to be able to demonstrate a significant improvement in health outcomes as a result of nutritional interventions in settings and populations. There is substantial evidence on the effectiveness of nutrition interventions in stable and development contexts. Reviews of such studies are available on malnutrition, vitamin deficiencies – primarily anaemia - as well as general effects on standard anthropometric indicators.

4.3.2 Expert interviews

4.3.2.1 Priority gaps

Impact assessment and Monitoring and Evaluation (M&E):

- Gaps exist in how sensitive and effective assessment methods are, how well surveillance methods perform, and on the impact of interventions.
- Better monitoring and evaluation (and better use of related data) is needed to improve the quality of nutrition programmes.
- A considerable amount of data exists but is not analysed and is poorly managed. In many organisations, data collected is not centralised or organised.

Targeting specific groups:

- Some vulnerable groups are left out: infants-under six months, the elderly and people with disabilities. Little is done to i) identify/detect these groups, ii) design appropriate protocols/interventions, and iii) integrate within other routine programmes.

Infant and Young Child Feeding (IYCF):

- There are huge gaps in IYCF research although there are more emphases today with Scaling Up Nutrition (SUN) movement.

Prevention/management of Moderate Acute Malnutrition (MAM):

- Information to support the prevention and management of moderate acute malnutrition should be prioritised.
- There is too much focus on acute malnutrition and not enough on stunting.

Treatment of SAM:

- Coverage and early detection should be prioritised.
- Little is known about long-term effects of Ready to Use Foods (RUF).

4.3.2.2 Issues related to context and type of crisis

- More information is needed on nutritional needs in urban areas/slums (including support on methods given the challenges of sampling and conducting surveys).
- Aetiology of malnutrition is different in urban areas (social context, access to care).
- Emergencies in middle-income countries and/or where Global Acute Malnutrition (GAM) prevalence is low are very different and require different approaches.

4.3.2.3 Type of study needed

- All designs, including mix-methods approaches, should be used.
-

4.3.2.4 Use of guidelines and standards

- Sphere guidelines are used to assess nutrition programme performances. Most organisations refer to best practices research method such as CONSORT or STROBE. However many organisations have their own technical research policy and guidelines.

4.3.2.5 Is there consensus on research gaps?

- Although most experts have their specific agenda (i.e. particular target group) there seems to be a consensus on the evidence gaps: i) IYCF interventions, ii) MAM and stunting, iii) tools for M&E and more M&E, and iv) context specific intervention.

4.3.3 Summary of recommendations for future research

Context:

- Need to better understand the aetiology of malnutrition and famines in different contexts (e.g. urban areas).
- Need more analysis of the impact of contextual factors on famine and malnutrition (e.g. anthropological studies on the power of women in society).
- Need evidence to guide how to intervene in low GAM prevalence settings and/or in middle income countries.

Impact assessment:

- Need to test different monitoring tools, techniques, and new technologies to measure progress and impact of nutrition programmes.
- Need evidence on cost-effectiveness of nutrition interventions.
- Need evidence on impact of IYCF interventions.

Targeting specific groups:

- Focus on infants, people with disabilities, and the elderly.

Prevention/management of Moderate Acute Malnutrition (MAM):

- Search alternatives to BSFP (i.e. Cash transfer vs. RUF distribution, food security intervention vs. RUF). Is it appropriate in all contexts?
- Research on long-term effects of interventions (i.e. long-term effects of blanket distribution of lipid based supplement); need to think about the double burden of malnutrition
- Research focusing on stunting.

Treatment of SAM:

- Health service delivery: what is the most effective way of delivering nutritional programmes? For example, community health workers or health facilities (i.e. research on Community Case Management (CCM))?
- Long-term effect of RUF on anthropometric status, cognitive development, risk of relapse etc.

Note: These recommendations are also in line with some of the recommendations identified by the authors of the Lancet series on Maternal and Child Nutrition in June 2013 (although non emergency context specific) such as the need for evidence: i) on long-term benefits of breastfeeding on nutritional and developmental outcomes, ii) on the effectiveness of complementary feeding strategies, iii) for prevention and management strategies for moderate acute malnutrition in population settings, especially in infants younger than six months, iv) and on innovative delivery strategies.

References (A and B categories): Nutrition

1. Aaby, P., et al., Nutritional status and mortality of refugee and resident children in a non-camp setting during conflict: Follow up study in Guinea-Bissau. *British Medical Journal*, 1999. 319(7214): p. 878-881.
 2. Adhisivam, B., et al., Feeding of infants and young children in tsunami affected villages in Pondicherry. *Indian Pediatrics*, 2006. 43(8): p. 724-7.
 3. Amthor, R.E., S.M. Cole, and M.J. Manary, The Use of Home-Based Therapy with Ready-to-Use Therapeutic Food to Treat Malnutrition in a Rural Area during a Food Crisis. *Journal of the American Dietetic Association*, 2009. 109(3): p. 464-467.
 4. Andersson, N., et al., Breast-feeding in a complex emergency: four linked cross-sectional studies during the Bosnian conflict. *Public health nutrition*, 2010. 13(12): p. 2097-2104.
 5. Bilukha, O., et al., Effects of multimicronutrient home fortification on anemia and growth in Bhutanese refugee children. *Food and Nutrition Bulletin*, 2011. 32(3): p. 264-276.
 6. Briend, A., et al., Ready-to-use therapeutic food for treatment of marasmus. *Lancet*, 1999. 353(9166): p. 1767-1768.
 7. Bush, J., The role of food aid in drought and recovery: Oxfam's North Turkana (Kenya) drought relief programme, 1992-94. *Disasters*, 1995. 19(3): p. 247-259.
 8. Collins, S., The need for adult therapeutic care in emergency feeding programs: Lessons from Somalia. *Journal of the American Medical Association*, 1993. 270(5): p. 637-638.
 9. Collins, S., M. Myatt, and B. Golden, Dietary treatment of severe malnutrition in adults. *American Journal of Clinical Nutrition*, 1998. 68(1): p. 193-199.
 10. Collins, S. and K. Sadler, Outpatient care for severely malnourished children in emergency relief programmes: a retrospective cohort study. *Lancet*, 2002. 360(9348): p. 1824-30.
 11. Collins, S., et al., Key issues in the success of community-based management of severe malnutrition. *Food and Nutrition Bulletin*, 2006. 27(3): p. S49-S82.
 12. Colombatti, R., et al., A short-term intervention for the treatment of severe malnutrition in a post-conflict country: Results of a survey in Guinea Bissau. *Public Health Nutrition*, 2008. 11(12): p. 1357-1364.
 13. De Waal, A., A. Taffesse, and L. Carruth, Child survival during the 2002-2003 drought in Ethiopia. *Glob Public Health*, 2006. 1(2): p. 125-32.
 14. Defourny, I., et al., A Large-Scale Distribution of Milk-Based Fortified Spreads: Evidence for a New Approach in Regions with High Burden of Acute Malnutrition. *Plos One*, 2009. 4(5).
 15. Desenclos, J.C., et al., Epidemiological patterns of scurvy among Ethiopian refugees. *Bulletin of the World Health Organization*, 1989. 67(3): p. 309-316.
 16. Desjeux, J.F., et al., Definition and evaluation of therapeutic food for severely malnourished children in situations of humanitarian emergencies. [French] Definition et evaluation d'un aliment therapeutique pour les enfants severement malnutris, en situation d'urgence humanitaire. *Bulletin de l'Academie nationale de medecine*, 1998. 182(8): p. 1679-1690; discussion 1691-1695.
 17. Donnen, P., et al., Vitamin A supplementation but not deworming improves growth of malnourished preschool children in eastern Zaire. *Journal of Nutrition*, 1998. 128(8): p. 1320-1327.
 18. Doocy, S., et al., Credit program outcomes: coping capacity and nutritional status in the food insecure context of Ethiopia. *Social Science & Medicine*, 2005. 60(10): p. 2371-2382.
 19. Dubray, C., et al., Treatment of severe malnutrition with 2-day intramuscular ceftriaxone vs 5-day amoxicillin. *Annals of Tropical Paediatrics*, 2008. 28(1): p. 13-22.
 20. Dzumhur, Z., et al., Therapeutic feeding in Sarajevo during the war. *European Journal of Clinical Nutrition*, 1995. 49 Suppl 2: p. S40-2.
-

21. Fawzi, W.W., et al., The effect of vitamin A supplementation on the growth of preschool children in the Sudan. *American Journal of Public Health*, 1997. 87(8): p. 1359-1362.
 22. Gaboulaud, V., et al., Could nutritional rehabilitation at home complement or replace centre-based therapeutic feeding programmes for severe malnutrition? *Journal of Tropical Pediatrics*, 2007. 53(1): p. 49-51.
 23. Gibb, C., A review of feeding programmes in refugee reception centres in Eastern Sudan, October 1985. *Disasters*, 1986. 10(1): p. 17-24.
 24. Greco, L., et al., Effect of a low-cost food on the recovery and death rate of malnourished children. *Journal of Pediatric Gastroenterology and Nutrition*, 2006. 43(4): p. 512-517.
 25. Grellety, E., et al., Effect of Mass Supplementation with Ready-to-Use Supplementary Food during an Anticipated Nutritional Emergency. *Plos One*, 2012. 7(9).
 26. Hipgrave, D.B., et al., Donated breast milk substitutes and incidence of diarrhoea among infants and young children after the May 2006 earthquake in Yogyakarta and Central Java. *Public health nutrition*, 2012. 15(2): p. 307-315.
 27. Hossain, S.M. and P. Kolsteren, The 1998 flood in Bangladesh: is different targeting needed during emergencies and recovery to tackle malnutrition? *Disasters*, 2003. 27(2): p. 172-84.
 28. Hossain, S.M., D.M. Maggio, and K.M. Sullivan, Relationship between food aid and acute malnutrition following an earthquake. *Food & Nutrition Bulletin*, 2009. 30(4): p. 336-9.
 29. Huybregts, L., et al., The Effect of Adding Ready-to-Use Supplementary Food to a General Food Distribution on Child Nutritional Status and Morbidity: A Cluster-Randomized Controlled Trial. *Plos Medicine*, 2012. 9(9).
 30. Isanaka, S., et al., Effect of Preventive Supplementation With Ready-to-Use Therapeutic Food on the Nutritional Status, Mortality, and Morbidity of Children Aged 6 to 60 Months in Niger A Cluster Randomized Trial. *Journal of the American Medical Association*, 2009. 301(3): p. 277-285.
 31. Isanaka, S., et al., Reducing Wasting in Young Children With Preventive Supplementation: A Cohort Study in Niger. *Pediatrics*, 2010. 126(2): p. E442-E450.
 32. Jakobsen, M., et al., Breastfeeding status as a predictor of mortality among refugee children in an emergency situation in Guinea-Bissau. *Tropical Medicine and International Health*, 2003. 8(11): p. 992-996.
 33. Jayatissa, R., et al., Community-based management of severe and moderate acute malnutrition during emergencies in Sri Lanka: Challenges of implementation. *Food and Nutrition Bulletin*, 2012. 33(4): p. 251-260.
 34. Kassim, I.A., et al., Excessive iodine intake during pregnancy in Somali refugees. *Maternal and Child Nutrition*, 2012. 8(1): p. 49-56.
 35. Khatib, I.M., S.M. Samrah, and F.M. Zghol, Nutritional interventions in refugee camps on Jordan's eastern border: Assessment of status of vulnerable groups. *Eastern Mediterranean Health Journal*, 2010. 16(2): p. 187-193.
 36. Kumar, S. and L. Bhawani, Managing child malnutrition in a drought affected district of Rajasthan--a case study. *Indian journal of public health*, 2005. 49(4): p. 198-206.
 37. Lopriore, C., et al., Spread fortified with vitamins and minerals induces catch-up growth and eradicates severe anemia in stunted refugee children aged 3-6 y. *The American journal of clinical nutrition*, 2004. 80(4): p. 973-981.
 38. Luxemburger, C., et al., Beri-beri: the major cause of infant mortality in Karen refugees. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 2003. 97(2): p. 251-255.
 39. Magoni, M., M. Jaber, and R. Piera, Fighting anaemia and malnutrition in Hebron (Palestine): Impact evaluation of a humanitarian project. *Acta Tropica*, 2008. 105(3): p. 242-248.
 40. Malfait, P., A. Moren, and J.C. Dillon, An outbreak of pellagra related to changes in dietary niacin among Mozambican refugees in Malawi. *International Journal of Epidemiology*, 1993. 22(3): p. 504-511.
 41. Mange, V., Nutrition strategies and preventive health strategies in the Cambodian refugee camp, site 2, Thailand. *Journal of Refugee Studies*, 1992. 5(3): p. 343-358.
-

42. Menon, P., et al., Micronutrient sprinkles reduce anemia among 9-to 24-mo-old children when delivered through an integrated health and nutrition program in rural Haiti. *Journal of Nutrition*, 2007. 137(4): p. 1023-1030.
 43. Morikawa, M., A. Polanc, and S. Becker, Continuous weight and height gain among at-risk children discharged from a supplementary feeding center in Kabul, Afghanistan. *Infant, Child & Adolescent Nutrition* 2013. 5(2): p. 97-99.
 44. Nackers, F., et al., Effectiveness of ready-to-use therapeutic food compared to a corn/soy-blend-based pre-mix for the treatment of childhood moderate acute malnutrition in Niger. *Journal of Tropical Pediatrics*, 2010. 56(6): p. 407-413.
 45. Ndemwa, P., et al., Relationship of the availability of micronutrient powder with iron status and hemoglobin among women and children in the Kakuma Refugee Camp, Kenya. *Food and Nutrition Bulletin*, 2011. 32(3): p. 286-291.
 46. Nielsen, J., et al., Vitamin A supplementation during war-emergency in Guinea-Bissau 1998-1999. *Acta Tropica*, 2005. 93(3): p. 275-82.
 47. Nielsen, J., et al., Malnourished children and supplementary feeding during the war emergency in Guinea-Bissau in 1998-1999. *The American journal of clinical nutrition*, 2004. 80(4): p. 1036-1042.
 48. Pecoul, B., et al., Efficacy of a Therapeutic Feeding Center Evaluated during Hospitalization and a Follow-up Period, Tahoua, Niger, 1987-1988. *Annals of Tropical Paediatrics*, 1992. 12(1): p. 47-54.
 49. Rah, J.H., et al., Provision of micronutrient powder in response to the cyclone sidr emergency in Bangladesh: Cross-sectional assessment at the end of the intervention. *Food and Nutrition Bulletin*, 2011. 32(3): p. 277-285.
 50. Roesel, C., From relief to development: supplementary feeding among Khmer refugees. *Health Policy and Planning*, 1988. 3(3): p. 227-236.
 51. Rossi, L., D. Verna, and S.L. Villeneuve, The humanitarian emergency in Burundi: Evaluation of the operational strategy for management of nutritional crisis. *Public Health Nutrition*, 2008. 11(7): p. 699-705.
 52. Sadler, K., et al., A comparison of the programme coverage of two therapeutic feeding interventions implemented in neighbouring districts of Malawi. *Public Health Nutrition*, 2007. 10(9): p. 907-13.
 53. Seal, A., et al., Maize meal fortification is associated with improved vitamin A and iron status in adolescents and reduced childhood anaemia in a food aid-dependent refugee population. *Public Health Nutrition*, 2008. 11(7): p. 720-8.
 54. Seal, A.J., et al., Low and deficient niacin status and pellagra are endemic in postwar Angola. *American Journal of Clinical Nutrition*, 2007. 85(1): p. 218-224.
 55. Stefanak, M.A. and D. Jarjoura, Weight-Gain in Supervised and Take-Home Feeding Programs in Chad. *Journal of Tropical Pediatrics*, 1989. 35(5): p. 214-217.
 56. Stuetz, W., et al., Micronutrient status in lactating mothers before and after introduction of fortified flour: Cross-sectional surveys in Maela refugee camp. *European Journal of Nutrition*, 2012. 51(4): p. 425-434.
 57. Talley, L., et al., Evaluation of the effectiveness of stainless steel cooking pots in reducing iron-deficiency anaemia in food aid-dependent populations. *Public health nutrition*, 2010. 13(1): p. 107-115.
 58. Taylor, W.R., An evaluation of supplementary feeding in Somali refugee camps. *International Journal of Epidemiology*, 1983. 12(4): p. 433-6.
 59. Tekeste, A., et al., Cost effectiveness of community-based and inpatient therapeutic feeding programmes to treat SAM in Ethiopia. *Field Exchange Emergency Nutrition Network ENN*, 2011. 41: p. 21-22.
 60. Tomashek, K.M., et al., Randomized intervention study comparing several regimens for the treatment of moderate anemia among refugee children in kigoma region, Tanzania. *American Journal of Tropical Medicine and Hygiene*, 2001. 64(3-4): p. 164-171.
 61. Toole, M.J. and R. Bhatia, A case study of Somali refugees in Hartisheik A Camp, Eastern Ethiopia: health and nutrition profile, July 1988-June 1990. *Journal of Refugee Studies*, 1992. 5(3): p. 313-326.
-

62. Toole, M.J., P. Nieburg, and R.J. Waldman, The association between inadequate rations, undernutrition prevalence, and mortality in refugee camps: Case studies of refugee populations in Eastern Thailand, 1970-1980, and Eastern Sudan, 1984-1985. *Journal of Tropical Pediatrics*, 1988. 34(5): p. 218-224.
63. Vautier, F., et al., Dry supplementary feeding programmes: an effective short-term strategy in food crisis situations. *Tropical Medicine and International Health*, 1999. 4(12): p. 875-879.
64. Vincent, J.E. and A.M. Menefee, Vitamin A supplementation including older children: a refugee population on the Thailand-Burma border. *Sight and Life Magazine*, 2007. 2(2007): p. 16-19.

References of other systematic reviews in nutrition (examples):

1. Haan, N., N. Majid, and e. al., A Review of Emergency Food Security Assessment Practice in Ethiopia. 2005, Overseas Development Institute: London.
 2. Young, H., et al., Public nutrition in complex emergencies. *Lancet*, 2004. 364(9448): p. 1899-909.
 3. Hall A and Blankson B, The impact and effectiveness of emergency nutrition and nutrition-related interventions: a review of published evidence 2004-2010. Emergency Nutrition Network: London.
-

Table 13: WASH Intervention Studies in Humanitarian Crisis Settings, 1980 – 2014

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health interventions	Study design	Target age group 1	Target age group 2	Evidence category
Aaby et al (1999)	Guinea-Bissau	Rural & urban	IDP & general	Armed conflict	Acute Crises	Acute malnutrition, Mortality	GFD	Follow-up	9 to 24 months		A
Adhisivam et al (2006)	India	Rural	General	Natural disaster	Stabilised/early recovery	Diarrhoea	IYCF	Cross-sectional	< 6 months	6 to 59 months	A
Amthor et al (2009)	Malawi	Rural	General	Natural disaster	Acute Crises	Acute malnutrition	Treatment of SAM	Follow-up	6 to 59 months		A
Andersson et al (2010)	Federation of Bosnia and Herzegovina & Republica Srpska	Rural & urban	General	Armed conflict	Acute Crises	Acute malnutrition	IYCF	Cross-sectional	<1 year	6 to 59 months	A
Bilukha et al (2011)	Nepal	Camps	Refugee	Armed conflict	Stabilised/early recovery	Anaemia, Acute malnutrition, Chronic malnutrition, Underweight	Address micro-nutrient deficiencies	Cross-sectional	6 to 59 months		A
Briend et al (1999)	Chad	Urban	General	Armed conflict	Stabilised/early recovery	Acute malnutrition	Treatment of SAM	Follow-up	12-59 months		A
Brown (1997)	Kenya	Rural & urban	General	Natural disaster	Acute Crises	Acute malnutrition	BSFP & Treatment of SAM & TSFP	Follow-up	6 to 59 months	PLW	B
Buchanan-Smith et al (1999)	Kenya	Rural	General	Natural disaster	Acute Crises	Acute malnutrition	GFD & TSFP	Cross sectional	6 to 59 months, elderly	all	B
Bush (1995)	Kenya	Rural	General	Natural disaster	Acute Crises	Acute malnutrition	GFD	Cross sectional	6 to 59 months		B
CDC, 2012	Kenya	Rural & urban	General	Natural disaster	Acute Crises	Acute malnutrition	BSFP	Prospective cohort	6 to 36 months	PLW	A

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health interventions	Study design	Target age group 1	Target age group 2	Evidence category
Collins et al (1998)	Somalia	Urban	General	Both	Acute crises	Acute malnutrition	Treatment of SAM	Follow-up	Adults		A
Collins et al (2002)	Ethiopia	Rural	General	Natural disaster	Acute crises	Acute malnutrition	Treatment of SAM	Prospective cohort	6-120 months		B
Collins et al (2006)	Multiple (Malawi, Ethiopia, North & South Sudan)	Rural & urban	Multiple	Both	Multiple	Acute malnutrition	Treatment of SAM	Follow-up	Adults		B
Collins (1993)	Somalia	Urban	General	Armed conflict	Acute Crises	Acute malnutrition	Treatment of SAM	Follow-up	Adults		B
Colombatti et al (2008)	Guinea-Bissau	Urban	General	Armed conflict	Stabilised/early recovery	Underweight	TSFP	Follow-up	1m to 17 years		B
De Waal et al (2006)	Ethiopia	Rural & urban	General	Natural disaster	Stabilised/early recovery	Mortality	GFD	Cross sectional	6 to 59 months		A
Defourmy et al (2009)	Niger	Rural	General	Natural disaster	Preparedness	Acute malnutrition	BSFP	Cross sectional & Follow-up	6 to 36 months		A
Desenclos et al (1989)	Somalia & Sudan		Refugee	Both	Acute crises	Scurvy	Address micro-nutrient deficiencies	Cross sectional	All		A
Desjeux et al (1998)	Multiple (Angola, Chad, Burundi, Tanzania)		Refugee	Both	Multiple	Acute malnutrition	Treatment of SAM	Follow-up	6 to 59 months		B
Donnen et al (1998)	DRC	Rural & urban	General	Armed conflict	Acute crises	Growth (MUAC, Weight, Height)	Address micro-nutrient deficiencies	RCT	0-72months		A

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health interventions	Study design	Target age group 1	Target age group 2	Evidence category
Doocy et al (2005)	Ethiopia	Rural & urban	General	Natural disaster	Acute crises	Acute malnutrition	Microfinance program	Cross sectional	Adults	6 to 59 months	A
Dubray et al (2007)	Sudan	Urban	IDP	Armed conflict	Stabilised/early recovery	Acute malnutrition	Treatment of SAM	RCT	6 to 59 months	6 to 59 months	A
Dzumhur et al (1995)	Bosnia and Herzegovina	Urban	General	Armed conflict	Acute crises	Underweight	Treatment of SAM	Follow-up	1 to 14 years		B
Fawzi et al (1997)	Sudan	Rural	General	Both	Stabilised/early recovery	Growth (Weight, Height, Acute malnutrition, Chronic Malnutrition)	Address micro-nutrient deficiencies	Follow-up	6-72 months		A
Gaboulaud et al (2007)	Niger	Rural & urban	General	Natural disaster	Stabilised/early recovery	Acute malnutrition	Treatment of SAM	Follow-up	6 to 59 months		AB
Gibb (1986)	Sudan		Refugee	Armed conflict	Stabilised/early recovery	Acute malnutrition	TSFP	Follow-up	6 to 59 months		B
Greco et al (2006)	Uganda	Rural & urban	General	Armed conflict	Stabilised/early recovery	Acute malnutrition	Treatment of SAM	Follow-up	6 to 59 months		A
Grellety et al (2012)	Niger	Rural	General	Natural disaster	Preparedness	Acute malnutrition, Chronic Malnutrition, Mortality	BSFP	Cohort	6 to 24 months		A
Hamad et al (2009)	Palestine	Urban	General	Armed conflict	Acute crises	Anaemia, Acute malnutrition, Chronic malnutrition, Underweight	Address micro-nutrient deficiencies & TSFP	Follow-up	6 to 36 months		B
Hipgrave et al (2012)	Indonesia	Rural & urban	General	Natural disaster	Acute crises	Diarrhoea	IYCF	Cross sectional	<24 months		A

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health interventions	Study design	Target age group 1	Target age group 2	Evidence category
Hossain et al (2003)	Bangladesh	Rural	General	Natural disaster	Acute crises	Acute malnutrition	GFD	Cross sectional	6 to 59 months		A
Hossain et al (2009)	Pakistan	Rural	General	Natural disaster	Acute crises	Acute malnutrition	GFD	Cross sectional	6 to 59 months		A
Huybregts et al (2012)	Chad	Urban	General	Both	Preparedness	Anaemia, Acute malnutrition, Chronic malnutrition, Malaria/fever, Diarrhoea, ARI/Cough	BSFP	RCT	6 to 36 months		A
Isanaka et al (2009)	Niger	Rural	General	Natural disaster	Preparedness	Acute Malnutrition, Chronic Malnutrition, Mortality, Malaria/fever, Diarrhoea, ARI/Cough.	BSFP	RCT	6 to 59 months		A
Isanaka et al (2010)	Niger	Rural	General	Natural disaster	Preparedness	Acute Malnutrition, Chronic Malnutrition, Mortality, Malaria, Diarrhoea, and ARI.	BSFP	Cohort	6 to 36 months		A
Jakobsen et al (2003)	Guinea Bissau	Urban	General	Armed conflict	Acute Crises	Mortality	IYCF	Cohort	9-35 months		A
Jayatissa et al (2012)	Sri Lanka	Rural & urban	IDP & general	Both	Stabilised/early recovery	Acute malnutrition	Treatment of SAM & TSFP	Cross sectional	6 to 59 months		B
Kassim et al (2012)	Kenya	Rural	Refugee	Armed conflict	Acute Crises	Iodine deficiency/excess	Address micro-nutrient deficiencies	Cross sectional	Pregnant women		A

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health interventions	Study design	Target age group 1	Target age group 2	Evidence category
Koplow (2003)	Afghanistan	Rural	General	Both	Acute crises	Acute malnutrition	TSFP	Cross sectional	6 to 59 months	15 years +	B
Kumar et al (2005)	India	Rural	General	Natural disaster	Acute crises	Underweight	TSFP	Cross sectional	6 to 59 months		B
Lopriore et al (1999)	Algeria	Rural	Refugee	Armed conflict	Stabilised/early recovery	Anaemia, Chronic Malnutrition	Address micro-nutrient deficiencies	Cross sectional	6 to 59 months		A
Lopriore et al (2004)	Algeria	Rural	Refugee	Armed conflict	Stabilised/early recovery	Anaemia, Growth (Weight, Height, Acute malnutrition, Chronic Malnutrition, Underweight)	Address micro-nutrient deficiencies	RCT	3 to 6 years old		A
Luxemburger et al (2003)	Thailand	Rural	Refugee	Armed conflict	Acute Crises	Vitamin B1 deficiency	Address micro-nutrient deficiencies	Cohort	1		A
Magoni et al (2008)	Palestine	Urban	General	Armed conflict	Acute crises	Anaemia, Acute malnutrition, Chronic malnutrition, Underweight	Address micro-nutrient deficiencies & TSFP	Cross sectional	6 to 59 months		A
Malfait et al (1993)	Malawi	Rural	Refugee	Armed conflict	Acute Crises	Niacin deficiency	Address micro-nutrient deficiencies	Case-Control	All		A
Mange et al (1992)	Thailand	Rural	Refugee	Armed conflict	Acute Crises	Acute malnutrition	GFD & TSFP	Cross sectional	6 to 59 months		B
Mattinen (2008)	Sudan	Rural	IDP	Armed conflict	Acute crises	Acute malnutrition	BSFP	Cross sectional	6 to 59 months		B

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health interventions	Study design	Target age group 1	Target age group 2	Evidence category
Matunga et al (2012)	Somalia	Rural & urban	IDP & general	Both	Acute crises	Acute malnutrition	Treatment of SAM & TSFP	Follow-up	6 to 59 months		B
Menon et al (2007)	Haiti	Rural	General	Natural disaster	Stabilised/early recovery	Anaemia	Address micro-nutrient deficiencies	RCT	9-23 months		A
Morikawa et al (2013)	Afghanistan		General	Armed conflict	Stabilised/early recovery	Acute malnutrition	TSFP	Cohort	6 to 59 months		B
Nackers et al (2010)	Niger		General	Natural disaster	Stabilised/early recovery	Acute malnutrition	TSFP	RCT	6 to 59 months		A
Navarro-Colorado et al (2005)	Sierra Leone	Urban	I IDP & general	Armed conflict	Acute crises	Acute malnutrition	Treatment of SAM	Follow-up	12 to 59 months		A
Ndemwa et al (2011)	Kenya	Camp	Refugee	Armed conflict	Acute Crises	Anaemia	Address micro-nutrient deficiencies	Cohort	6 to 59 months	18 to 49 years	A
Nielsen et al (2004)	Guinea-Bissau	Urban	IDP & general	Armed conflict	Acute crises	Acute malnutrition, Mortality	TSFP	Follow-up	6 to 59 months		B
Nielsen et al (2005)	Guinea-Bissau	Urban	IDP & general	Armed conflict	Acute crises	Mortality	Address micro-nutrient deficiencies	Follow-up	6 to 59 months		A
Pecoul et al (1992)	Niger	Urban	General	Natural disaster	Stabilised/early recovery	Acute malnutrition	Treatment of SAM	Retrospective and prospective cohorts	6 to 59 months		B
Quisumbing (2003)	Ethiopia	Rural	General	Natural disaster	Stabilised/early recovery	Acute malnutrition, Chronic malnutrition	GFD & Food for work	Cross sectional	0 to 10 years	15 to 65 years	A

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health interventions	Study design	Target age group 1	Target age group 2	Evidence category
Rah et al (2011)	Bangladesh	Rural	General	Natural disaster	Stabilised/early recovery	Anaemia, Acute malnutrition, Chronic malnutrition, Underweight, Diarrhoea	Address micro-nutrient deficiencies	Mix-methods	6 to 59 months	Adult and 13 to 18 years	A
Roesel et al (1988)	Thailand	Rural	Refugee	Armed conflict	Stabilised/early recovery	Stabilised/early recovery	TSFP	Follow-up	6 to 59 months	women	B
Sadler (2001)	Ethiopia	Rural	General	Natural disaster	Acute crises	Acute malnutrition	Treatment of SAM & TSFP	Cross sectional	6 to 59 months	PLW	B
Sadler et al (2007)	Malawi	Rural & urban	General	Natural disaster	Stabilised/early recovery	Acute malnutrition	Treatment of SAM	Cross sectional	6 to 59 months		B
Seal et al (2007)	Angola	Rural & urban	General	Armed conflict	Stabilised/early recovery	Niacin deficiency	Address micro-nutrient deficiencies	Cross-sectional	6 to 59 months	non pregnant women (ages 15–49 y)	A
Seal et al (2008)	Zambia	Rural	Refugee	Armed conflict	Stabilised/early recovery	Vitamin A and iron status	Address micro-nutrient deficiencies	Cohort	5	women (20–49 years)	A
Skau et al (2009)	Ethiopia	Rural	General	Natural disaster	Stabilised/early recovery	Acute malnutrition	TSFP	Cohort	6 to 59 months	PLW	A
Stefanak et al (1989)	Chad		IDP	Armed conflict	Acute crises	Acute malnutrition	TSFP	Follow-up	6 to 59 months		A
Stuetz et al (2012)	Thailand	Rural	Refugee	Armed conflict	Stabilised/early recovery	Iron, Vit A, Thiamin, Zinc deficiencies	Address micro-nutrient deficiencies	Cross sectional			A
Talley et al (2009)	Tanzania	Rural	Refugee	Armed conflict	Stabilised/early recovery	Anaemia	Address micro-nutrient deficiencies	Cross sectional	6 to 59 months		A

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health interventions	Study design	Target age group 1	Target age group 2	Evidence category
Tansey et al (2007)	Sudan	Rural	IDP	Armed conflict	Acute Crises	Anaemia	Address micro-nutrient deficiencies	Follow-up	6 to 59 months		A
Taylor (1983)	Somalia	?	IDP	Both	Acute crises	Acute malnutrition	TSFP	Follow-up	6 to 59 months	PLW + TB/ill people	B
Tekeste et al (2011)	Ethiopia	Rural & urban	General	Natural disaster	Stabilised/early recovery	Acute malnutrition	Treatment of SAM	Cost effectiveness	6 to 59 months		A
Therry (2005)	Afghanistan	Urban	General	Armed conflict	Stabilised/early recovery	Acute malnutrition	Treatment of SAM	Follow-up	6 to 59 months		B
Tomashek et al (2001)	Tanzania	Rural	Refugee	Armed conflict	Stabilised/early recovery	Anaemia	Address micro-nutrient deficiencies	RCT	6 to 59 months		A
Toole et al (1988)	Sudan & Thailand	Rural	Refugee	Both	Acute crises	Acute malnutrition, Mortality	BSFP & Treatment of SAM & TSFP	Mix-methods	6 to 59 months	ALL	B
Toole et al (1992)	Ethiopia	Rural	Refugee	Armed conflict	Acute crises	Acute malnutrition, Mortality	BSFP	Cross sectional	6 to 59 months		B
Vautier et al (1999)	Liberia, Burundi, DRC	Rural & urban	IDP & general	Armed conflict	Acute crises	Acute malnutrition	TSFP	Follow-up	6 to 59 months		B
Vazquez-Garcia (1998)	Kenya	Rural & urban	IDP & general	Natural disaster	Acute crises	Acute malnutrition	TSFP	Follow-up	6 to 59 months		B

Note: Empty cells are for C grade papers (low evidences category) as these were not evaluated in detail

4.4 Sexual and Reproductive Health including Gender-based Violence

This section describes: (i) the available evidence on the effectiveness of sexual and reproductive health (SRH) including gender-based violence (GBV) interventions used in humanitarian settings gathered through a systematic review of both peer-reviewed and grey literature; (ii) findings from a series of expert interviews; and (iii) based on these findings, recommendations for future research.

4.4.1 Systematic review

- Fifteen papers were included out of a total of 7149 papers searched. No papers were from grey literature.
- Quality of evidence: the majority of studies provided low/moderate strength evidence, with four (40%) low, eight (53%) moderate, and three (20%) high quality.
- Evidence categories: only seven (47%) of the studies reported a test of statistical significance between SRH intervention and health outcomes (category A). The remaining eight (53%) did not. Among the seven category A papers two were scored as high, five as moderate. Among the eight category B papers, one scored as high quality, three as moderate quality, and four as low quality.
- Study types: seven cross-sectional (47%), six uncontrolled before/after (40%), one randomised controlled trial (RCT) (7%) and one economic analysis (7%)
- Regions: nine (60%) studies based in Africa and six (40%) from the Asian region
- Setting and stages of crisis: the majority of studies (fourteen) took place in armed conflict settings (93%), and one in a natural disaster (7%). Two studies occurred in the acute stage of the crisis (13%), eight from stabilised settings (53%) and five from the early recovery stage (33%)
- Interventions: most interventions (eight) were in the health systems strengthening and/or capacity building category. Of the remainder, three addressed maternal and newborn health improvement services, two were specifically HIV/AIDS and STI prevention treatment and care, one provided a literacy based intervention and one directly addressed family planning provision
- Health outcomes: a wide range of outcomes were addressed under three main categories with some overlap. Nine primarily considered improved maternal and newborn health including obstetric care, four addressed prevention, treatment and care for HIV/AIDS and STIs and only two addressed solely family planning outcomes.
- Table 15 presents the details of the 15 papers, including a narrative analysis of the effectiveness of the interventions.

4.4.2 Expert interviews

General comments

SRH

- Research is being used by INGOS and multilateral organizations to inform the design of interventions, yet staff, particularly those involved with programme implementation and design face many barriers including limited access to peer-reviewed publications and prohibitively high costs for obtaining articles.
- Not enough is known about how to best provide and scale up services in the transitional phases from acute to chronic and chronic to protracted crises.

GBV

- Research on primary and secondary GBV prevention programming is needed at all phases of a crisis. There is limited research at protracted/early recovery stages and even less at the acute and chronic stages.
 - Evidence on health service needs for survivors of violence exist but there is no evidence on the impact in emergencies of other prevention and response interventions (i.e. case management for survivors of violence, psychosocial interventions, or risk reduction through interventions such as cash transfers, or community based medical care). All of these interventions are based on evidence from stable settings.
-

Indicators, standards, and guidelines

SRH

- The most commonly cited guidelines in use included Sphere, the MISIP, and the IAWG Field Manual. Some organisations developed their own guidance based on their organisational experience, the aforementioned guidelines, and the WHO guidance.

GBV

- Current guidelines for GBV related interventions are based on programmatic experience and evidence from developed and stable country settings. Numerous guidelines exist but are not systematically implemented and none have been evaluated.
- Current guidelines for emergency settings are based on programmatic experiences and development contexts, yet their effectiveness (and potential harmfulness) at preventing violence is unknown.
- Some experts expressed concerns about how IASC GBV guidelines are being implemented and whether they are effective.

Research Gaps

Evidence gaps identified by key informants included:

SRH

- What is the effectiveness of interventions that target previously excluded populations (e.g. people with disabilities, men, adolescents, elderly, urban refugees)?
- Profiling people and SRH needs in emergencies: what are the SRH needs of people in emergencies? Are they the same for the host population or global profile? Do services offered match needs?
- Technological use and development: how effective are new technologies (e.g. non-pneumatic anti-shock garments) at improving health and survival, how are they being used, and how should they be used? How often and how frequently are currently available commodities being used in emergencies? (e.g. how frequently is each component of safe birthing kits being used? How can they be made more efficient?)
- Family planning: how is long acting reversible contraception (LARC) used in humanitarian settings? What are the behaviours, attitudes and logistical barriers to family planning use? What are the implications for future reproductive health (e.g. removal of IUS/IUD/implant) in the absence of availability of long-term health care?
- Pregnancy and management of complicating conditions: what is the best way to manage conditions such as (pre-) eclampsia or cholera to improve maternal and/or neonatal health outcomes?
- Safe abortion services: how do we effectively address abortion practices in emergency settings, including the provision of safe abortion and post-abortive care? How is Misoprostol being used in non-controlled settings and what are the associated changes in health? Is the existence of an underground/informal economy creating conditions where women are likely to take too much or too little Misoprostol, and therefore suffer ill-health?

GBV

- Spectrum and context of violence: what is the spectrum of violence against women, girls, men, and boys during a crisis (e.g. sexual violence by a combatant, intimate partner violence, trafficking, and forced marriage)? How does each phase of the crisis impact on each sub-populations' unique vulnerabilities to different types of violence? Do other forms of GBV increase as a result of conflict-related violence? For example, does intimate partner violence or child abuse increase in recovery phase?
-

Operationalising research

SRH

- Service delivery and scaling-up interventions: what are the mechanisms through which effective services and interventions can be scaled up? What are effective delivery models (e.g. facility or community-based care) for emergency settings? How is task shifting being used to increase service delivery? How can we effectively involve community members in these interventions?
- Delivery: in facility settings, how common are manual deliveries, episiotomies, vacuum assisted deliveries, and C-sections? Are C-sections being over utilised and/or conservative methods of assisted delivery under-utilised? What are the implications for future pregnancies or deliveries? How can programmes be adapted to address the different forms of violence and corresponding health needs?

GBV

- Targeted interventions and operational constraints: how can programmes be adapted to address the different forms of violence and corresponding health needs? Medical provision can be implemented through various humanitarian actors but most do not have the resource capacity to deliver comprehensive care for survivors. What are the best ways to deliver and strengthen GBV and medical services in crisis settings? Does the provision of GBV interventions lead to increases in other health and social services? How can safe abortion, emergency contraception, family planning and STI treatment be provided safely and effectively to survivors? There is no evidence base to understand the effectiveness and long-term impact of interventions for sexual violence survivors in the early crisis stage. What programming is feasible and effective? What is the optimal timing for early intervention for improved long-term physical and mental health outcomes?

Summary

This review found only fifteen studies that focused on SRH in humanitarian settings, and none that explicitly focused on GBV. Only two of the fifteen studies addressed STIs/HIV, with the majority of research focusing on overall maternal and child health. As more than half of these studies were graded moderate to low quality, further high quality studies are needed on SRH interventions in these settings and populations. This literature review has highlighted the absence of evidence on any intervention against GBV in these settings or populations – this enormous gap should be addressed in future intervention research. There is substantial evidence on the effectiveness of sexual and reproductive health interventions and gender-based violence in stable and development contexts as indicated by past reviews (Brace et al., 2004, Hayman et al., 2011; Mason-Jones et al. 2012; Dhana et al. 2014) but more research is required specifically in humanitarian crises contexts.

4.4.3 Recommendations for future research

General comments

SRH

- Research, including the use of trials, is needed which can show causation and direct impact of an intervention on a given health outcome.
- In a crisis setting, research needs to focus on the most effective means of service delivery rather than on the efficacy of interventions themselves when they have been proven in other resource constrained settings.

GBV

- Overall, there is no strong evidence on what interventions (stand alone/short-term or comprehensive GBV service provision) effectively address the immediate and long-term impact of violence on physical and mental health of survivors. Importantly, evidence on successful primary and secondary prevention programming is lacking throughout all crisis phases.
-

- Numerous promising interventions are being implemented but their impact on preventing GBV has not been evaluated, including the role of safe spaces for women/children, the effect of cash transfer or livelihood interventions on preventing GBV, mechanisms to reduce unaccompanied children and provide protection, the impact of the placement of a GBV specialist advisor in acute crisis settings on the delivery of GBV services across the humanitarian clusters.

Study design

SRH

- Most organisations in crisis settings do not appear to have the research capacity or the funding to design, collect, analyse and disseminate research findings. Operational data and research from local NGOs is useful for service planning but are not designed or powered to assess impact. Rigorous research designs are needed which are implemented from an early stage.

GBV

- Methodological development: the collection of GBV prevalence data in the acute stage of a crisis is not always ethical or logistically feasible. Therefore alternative methodological approaches need to be explored to better understand the experiences of GBV in the early crisis stages.
-

References of reviewed studies (A and B categories):

1. Casey, S.E., et al., Availability of long-acting and permanent family-planning methods leads to increase in use in conflict-affected northern Uganda: Evidence from cross-sectional baseline and endline cluster surveys. *Global public health*, 2013. 8(3): p. 284-297.
2. Dolan, G., et al., Bed nets for the prevention of malaria and anaemia in pregnancy. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1993. 87(6): p. 620-626.
3. Larsen, M.M., et al., Changes in HIV/AIDS/STI knowledge, attitudes and practices among commercial sex workers and military forces in Port Loko, Sierra Leone. *Disasters*, 2004. 28(3): p. 239-254.
4. Leigh, B., et al., Improving emergency obstetric care at a district hospital, Makeni, Sierra Leone. *International Journal of Gynecology & Obstetrics*, 1997. 59: p. S55-S65.
5. Mayaud, P., The challenge of sexually transmitted infections control for HIV prevention in refugee settings: Rwandan refugees in Tanzania. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 2001. 95(2): p. 121-124.
6. McGinn, T. and K. Allen, Improving refugees' reproductive health through literacy in Guinea. *Global public health*, 2006. 1(3): p. 229-248.
7. McPherson, R.A., et al., Are birth-preparedness programmes effective? Results from a field trial in Siraha district, Nepal. *Journal of health, population, and nutrition*, 2006. 24(4): p. 479.
8. Mullany, L.C., et al., Impact of community-based maternal health workers on coverage of essential maternal health interventions among internally displaced communities in Eastern Burma: the MOM project. *PLoS medicine*, 2010. 7(8): p. e1000317.
9. Orach, C.G., D. Dubourg, and V. De Brouwere, Costs and coverage of reproductive health interventions in three rural refugee affected districts, Uganda. *Tropical Medicine & International Health*, 2007. 12(3): p. 459-469.
10. Purdin, S., T. Khan, and R. Saucier, Reducing maternal mortality among Afghan refugees in Pakistan. *International Journal of Gynecology & Obstetrics*, 2009. 105(1): p. 82-85.
11. Raheel, H., et al., Knowledge, Attitudes and Practices of Contraception among Afghan Refugee Women in Pakistan: A Cross-Sectional Study. *PloS one*, 2012. 7(11): p. e48760.
12. Reid, T., et al., Providing HIV care in the aftermath of Kenya's post-election violence Medecins Sans Frontieres' lessons learned January–March. *Conflict and health*, 2008. 2: p. 15.
13. Samai, O. and P. Sengeh, Facilitating emergency obstetric care through transportation and communication, Bo, Sierra Leone. *International Journal of Gynecology & Obstetrics*, 1997. 59: p. S157-S164.
14. Viswanathan, K., et al., Can community health workers increase coverage of reproductive health services? *Journal of epidemiology and community health*, 2012. 66(10): p. 894-900.
15. Woodward, A., et al., Reproductive health for refugees by refugees in Guinea IV: Peer education and HIV knowledge, attitudes, and reported practices. *Conflict and health*, 2011. 5(1): p. 1-10.

Examples of references of other SRH reviews:

- Brace, V., et al. (2004). "Quantifying severe maternal morbidity: a Scottish population study." *BJOG* 111: 481 - 484.
 - Hayman, R., et al. (2011). *The impact of aid on maternal and reproductive health: A systematic review to evaluate the effect of aid on the outcomes of Millennium Development Goal 5*. London, EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.
 - Dhana, A., et al. (2014). "Systematic review of facility-based sexual and reproductive health services for female sex workers in Africa." *Globalization and Health* 10(1): 46.
 - Mason-Jones, A., et al. (2012). "A systematic review of the role of school-based healthcare in adolescent sexual, reproductive, and mental health." *Syst Rev* 1(1): 49.
-

Table 15: SRH Intervention Studies in Humanitarian Crisis Settings, 1980 – 2014. (A & B studies only)

Publication	Population, Country and Crisis	SRH Intervention	Health Outcome*	Methods	Results and Quality Rating	Conclusion
Casey et al (2013)	<p>Population: IDP and general population</p> <p>Country: Uganda</p> <p>Crisis Type: Armed conflict</p> <p>Stage: Early recovery</p>	<p>Intervention Category: Health system strengthening and/or capacity building</p> <p>Intervention Type: Mobile outreach, public health centre strengthening for family planning (FP) services</p>	<p>Health Outcome Category: Family Planning</p> <p>Measurement: Self reported knowledge and use of modern FP methods; unmet contraceptive need</p> <p>Definition: Unmet contraceptive need - proportion of women wanting no more children or to wait two years or more for next child, or current or recently delivered pregnancy unwanted or mistimed; and not using modern FP nor when pregnant</p>	<p>Design: uncontrolled before/after surveys</p> <p>Sampling: multi-stage sampling of 4.5 clusters selected according to PPS over four catchment areas, 25 households systematically selected in each. One woman of reproductive age selected in each household using Kish table</p> <p>Population Enrolled: 1005 households at baseline with total of 905 respondents. 880 households selected at endline with total of 873 respondents</p> <p>Statistics: Logistic regression to calculate odds ratios (OR), adjusted for population demographic variables</p>	<p>Knowledge of modern FP: increased from 83.3% to 94.0% (adjusted OR 3.00 [95%CI 1.92-4.67])</p> <p>Current use of modern FP methods: increased from 7.1% to 22.6% (adjusted OR 3.34 [95%CI 2.27-4.92])</p> <p>Unmet contraceptive need: decreased from 52.1% to 35.7% (adjusted OR 0.47 [95%CI 0.3- 0.60])</p> <p>Quality: Moderate</p>	<p>This study identified statistically significant improvements in knowledge and use of modern FP, after adjustments for age, marital status, number of children and education; this study identified statistically significant decreased unmet contraceptive need</p> <p>This appears to be a useful intervention for improving FP provision, although no causative inference can be drawn</p>
Dolan et al (1993)	<p>Population: IDP</p> <p>Country: Thailand</p> <p>Crisis Type: Armed conflict</p> <p>Stage: Stabilised</p>	<p>Intervention Category: Maternal and infant health improvement services</p> <p>Intervention Type: Permethrin impregnated bed net provision in pregnancy</p>	<p>Health Outcome Category: Improving maternal/ newborn health including obstetric care</p> <p>Measurement: Incidence of malaria; incidence of anaemia; pregnancy outcomes (still birth; prematurity; low birth weight; placenta weight; infant death at 3 and 12 months)</p> <p>Definitions: Incidence of anaemia - proportion of women with haematocrits <30%, 25% and 20% for respective categories</p> <p>Incidence of malaria - proportion of women with at least one episode of falciparum or vivax malaria or falciparum episodes per 1000 person weeks of exposure to risk</p>	<p>Design: Randomised controlled trial</p> <p>Sampling: Sample size to detect reduction in malaria incidence from 37% in control group to 15% in the permethrin impregnated bed net group with 90% power and 95% confidence. Pregnant women enrolled attending antenatal visits in three camps. Random allocation to one of the three groups</p> <p>Population Enrolled: 341 pregnant women enrolled. 34 delivered within 2 weeks or lost to follow up. 103 given impregnated bed net; 100 given non-impregnated bed net; 104 in control group</p> <p>Statistics: Relative risk; one-way analysis of variance or Student's t-test; Kruskal Wallis one-way analysis of variance and Mann Whitney U Test</p>	<p>Incidence of malaria: in one camp, relative risk of malaria was 1.67 (95% CI 1.07- 2.61;p=0.03) times higher for women who did not use permethrin impregnated net (from study) or their own impregnated net; in other camps there was no statistically significant difference</p> <p>Incidence of anaemia: relative risk of anaemia in no net groups versus permethrin impregnated bed net group was 2.00 (95% CI 1.18-3.42;p=0.03)</p> <p>Pregnancy outcomes: no statistically significant difference between any groups</p> <p>Quality: Moderate</p>	<p>This intervention achieved statistically significant decreases in incidence of malaria and anaemia in pregnant women using impregnated bed nets suggesting a causative association</p> <p>This intervention did not achieve statistically significant improvements in pregnancy outcomes</p>

Publication	Population, Country and Crisis	SRH Intervention	Health Outcome*	Methods	Results and Quality Rating	Conclusion
Larsen et al (2004)	<p>Population: General population</p> <p>Country: Sierra Leone</p> <p>Crisis Type: Armed conflict</p> <p>Stage: Early recovery</p>	<p>Intervention Category: HIV/AIDS and/or STI prevention and/or management</p> <p>Intervention Type: HIV/AIDS prevention amongst high risk populations (Commercial sex workers (CSW)/military personnel)</p>	<p>Health Outcome: Prevention, treatment and care for HIV/AIDS and STIs</p> <p>Measurement: Self reported condom use</p> <p>Definition: Condom use - used a condom at last sexual intercourse</p>	<p>Design: Uncontrolled before/after surveys</p> <p>Sampling: Purposive quota-sampling for 200 CSW and 200 military participants at each stage; participants informally identified by appearance and location</p> <p>Population Enrolled: 201 CSW at baseline; 205 at endline; 202 military personnel at baseline; 205 at endline</p> <p>Statistics: Proportions</p>	<p>Condom use: CSW condom use at last sexual intercourse increased from 38% to 68% (no statistical association); Military personnel condom use at last sexual intercourse increased from 39% to 68% (no statistical association)</p> <p>Quality: Low</p>	<p>This study identified increased condom use amongst CSW and military personnel following the intervention</p> <p>No statistical association can be identified</p> <p>This appears to be a useful intervention for improving condom use amongst CSW and military personnel although no causal inference can be drawn</p>
Leigh et al (1997)	<p>Population: General population</p> <p>Country: Sierra Leone</p> <p>Crisis Type: Armed conflict</p> <p>Stage: Early recovery</p>	<p>Intervention Category: Health system strengthening and/or capacity building</p> <p>Intervention Type: Public hospital facility recruitment, training, equipment upgrade, waiver of up-front payments, incentivisation</p>	<p>Health Outcome: Improving maternal/newborn health including obstetric care</p> <p>Measurement: Case fatality rate (CFR)</p> <p>Definition: CFR - incidence of maternal death per incidence of major obstetric complication (haemorrhage, obstructed labour, ruptured uterus, sepsis, pre-eclampsia/eclampsia, complications of induced abortion and ectopic pregnancy)</p>	<p>Design: Cross-sectional analysis of admission records</p> <p>Sampling: All records included for all obstetric patients in study unit in study time period</p> <p>Population Enrolled: 140 admissions in year 2, 296 admissions in year 6</p> <p>Statistics: Proportions, ratios</p>	<p>CFR: Decrease from 32% (year 2) to 5% (year 6)</p> <p>Quality: Low</p>	<p>This study identified a decrease in CFR during the study period</p> <p>No statistical association can be identified</p> <p>The range of interventions appear to have been useful for improving maternal mortality although no causal inference can be drawn</p>

Publication	Population, Country and Crisis	SRH Intervention	Health Outcome*	Methods	Results and Quality Rating	Conclusion
Mayaud (2001)	<p>Population: Refugee</p> <p>Country: Tanzania</p> <p>Crisis Type: Natural Disaster</p> <p>Stage: Stabilised</p>	<p>Intervention Category: HIV/AIDS and/or STI prevention and/or management</p> <p>Intervention Type: HIV/AIDS information, education and communication campaign; peer education; condom distribution; provision of STI treatment services</p>	<p>Health Outcome: Prevention, treatment and care for HIV/AIDS and STIs</p> <p>Measurement: Condom demand; STI syndrome treatment rates; prevalence of reproductive tract infections (RTI); changes in sexual behaviour</p> <p>Definitions: STI syndrome - WHO syndromic approach</p>	<p>Design: Uncontrolled before/after surveys, clinical examinations and analysis of biological samples</p> <p>Sampling: Random samples of female antenatal clinic (ANC) attenders, men attending outpatient clinics, and men in the community were interviewed, examined and they provided samples. Cluster sampling techniques used to identify representative samples of men and women in the community for surveys. Detailed methods reported elsewhere.</p> <p>Population Enrolled: Not detailed</p> <p>Statistics: Proportions, absolute numbers</p>	<p>Condom demand: increased (not quantified) STI syndrome treatment rates: > 11,000 STI syndromes treated in first 12 months; > 18,000 by end of programme (no baseline given)</p> <p>Prevalence of RTI: decreased overall from 60% to 4.5%</p> <p>Changes in sexual behaviour: no apparent change (not quantified)</p> <p>Quality: Low</p>	<p>This study identified an increase in condom demand, decreased prevalence of RTI and a substantial rate of treatment of STIs</p> <p>This study did not identify any changes in sexual behaviour</p> <p>No statistical association can be identified</p> <p>This intervention appears to have increased demand for and utilisation of STI services, although no causative inferences can be drawn</p>
McGinn and Allen (2006)	<p>Population: Refugee</p> <p>Country: Guinea</p> <p>Crisis Type: Armed conflict</p> <p>Stage: Early recovery</p>	<p>Intervention Category: Literacy and health education</p> <p>Intervention Type: Reproductive health based literacy classes</p>	<p>Health Outcome: Improving maternal/newborn health including obstetric care</p> <p>Measurement: Self-reported modern FP and condom use; safe motherhood behaviours; self-reported 'boldness'</p> <p>Definition: Safe motherhood behaviours - at least three antenatal visits</p>	<p>Design: Cross-sectional interviews</p> <p>Sampling: All women who undertook the intervention course over a three year period</p> <p>Population Enrolled: 549 women</p> <p>Statistics: Proportions, Pearsons/McNemar chi-square, stratification by prior schooling</p>	<p>FP and condom use: 40% of current FP users (50% of sample population) new since intervention; 24% reported using condom at last sexual intercourse (no statistical association) Safe motherhood behaviour: 92% of those who had been pregnant since the intervention made at least 3 antenatal visits (no statistical association) Boldness: 81% reported being more bold than other women (McNemar chi square $p < 0.001$)</p> <p>Quality: Low</p>	<p>This study identified increased use of modern FP since intervention without statistical association</p> <p>Other outcomes were not successfully compared to a baseline</p> <p>This intervention appears to have increased literacy, health knowledge and behaviours although no causal inferences can be drawn</p>

Publication	Population, Country and Crisis	SRH Intervention	Health Outcome**	Methods	Results and Quality Rating	Conclusion
McPherson et al (2006)	<p>Population: General population</p> <p>Country: Nepal</p> <p>Crisis Type: Armed conflict</p> <p>Stage: Early recovery</p>	<p>Intervention Category: Maternal and infant health improvement services</p> <p>Intervention Type: Provision of birth preparedness package</p>	<p>Health Outcome: Improving maternal/newborn health including obstetric care</p> <p>Measurement: Self-reported pregnancy and newborn care practices; birth preparedness index (BPI)</p> <p>Definition: BPI - percentage of components regarding most recent pregnancy/delivery: received antenatal care at least once from trained provider; names prolonged labour as danger sign; names excessive bleeding as danger sign; made financial preparations for emergencies; made preparations for emergency transportation; delivery attended by SBA; received postpartum care from trained provider within 6 weeks of delivery</p>	<p>Design: Uncontrolled before/after surveys</p> <p>Sampling: Multistage cluster sampling identified 30 clusters (wards) using PPS (estimated) for 300 participants; identical at baseline and endline. Households divided into segments and starting point randomly sampled according to constructed frame, then next closest household until 10 eligible respondents were identified</p> <p>Population Enrolled: 300 mothers of live infants aged <1</p> <p>Statistics: Odds ratios (OR) and confidence intervals calculated from logistic regression, Pearson chi-square, stratified by exposure and various demographic factors</p>	<p>Pregnancy and newborn care practices: breastfeeding within 1 hour after birth increased from 2.1% to 40% (non-significant except for those exposed to messages [OR 4.2, p=<0.001]); placed nothing on cord, wiped immediately, wrapped immediately and bathed immediately all; increased significantly (p<0.05); > 2 antenatal care visits increased from 49% to 73% (p=0.001); use of postnatal care within 1 week increased from 1.1% to 25% (p=0.01) within 6 weeks from 17% to 34% (p=0.02); use of iron, postpartum vitamin A and tetanus toxoid vaccine did not change significantly; use of health facilities in emergencies did not change significantly</p> <p>Birth preparedness index: Increased from 33% to 54% (statistically significant (p=<0.05) in 6 of 7 domains - p=0.55 in use of skilled birth attendant)</p> <p>Quality: High</p>	<p>This study identified statistically significant improvements in newborn care practices; obstetric health behaviours; and birth preparedness following the intervention. It did not identify statistically significant improvements in immediate breastfeeding; use of iron, postpartum vitamin A or tetanus toxoid vaccine; or use of health facilities in emergencies</p> <p>This intervention appears to have improved maternal and newborn care practices although no causal inference can be drawn</p>
Mullaney et al (2010)	<p>Population: IDP</p> <p>Country: Burma</p> <p>Crisis Type: Armed conflict</p> <p>Stage: Stabilised</p>	<p>Intervention Category: Health system strengthening and/or capacity building</p> <p>Intervention Type: Implementation of MOM project - tiered system of community health provision and training</p>	<p>Health Outcome: Improving maternal/newborn health including obstetric care</p> <p>Measurement: Use of antenatal care; labour, delivery and post-natal care; unmet contraceptive need</p> <p>Definition: Use of antenatal care - women receiving > 1 antenatal visit during last pregnancy. Labour, delivery and post-natal care - skilled birth attendance (doctor or maternal health worker). Unmet contraceptive need - number of non-pregnant women not using modern FP method to delay conception and did not want more children or wanted to delay beyond 2 years or women who desired current pregnancy was avoided/delayed</p>	<p>Design: Uncontrolled before/after surveys</p> <p>Sampling: Combined methods - in two states; two stage cluster sampling of 2000 village based clusters according to PPS, followed by proximate sampling of 10 households in each cluster with at least one eligible participant. In other states, simple interval sampling used based on total population divided by required sample size. Total sample size calculated as 2,800</p> <p>Population Enrolled: 2,889 ever-married women of reproductive age (15-45 years) at baseline; 2,442 at endline</p> <p>Statistics: Proportions, chi-square or binomial regression, prevalence rate ratio (PRR)</p>	<p>Use of antenatal care: proportion of women receiving > 1 antenatal visit increased from 39.3% to 71.8% (PRR=1.83 [95% CI 1.64-2.04])</p> <p>Labour, delivery and post-natal care: 48.7% reported skilled birth attendant (PRR = 9.55 [95% CI 7.21-12.64])</p> <p>Unmet contraceptive need: decreased from 61.7% to 40.5%, a relative reduction of 35% (95%CI 28%-40%).</p> <p>Quality: Moderate</p>	<p>This study identified improvements in antenatal care use (with associated increases in coverage of various interventions); skilled birth attendants; and decreased unmet contraceptive need</p> <p>This intervention appears to have improved maternal health and FP, although no causal inference can be drawn</p>

Publication	Population, Country and Crisis	SRH Intervention	Health Outcome*	Methods	Results and Quality Rating	Conclusion
Orach et al (2007)	<p>Population: Refugee and General population</p> <p>Country: Uganda</p> <p>Crisis Type: Armed conflict</p> <p>Stage: Stabilised</p>	<p>Intervention Category: Health system strengthening and/or capacity building</p> <p>Intervention Type: Refugee and host population reproductive health services</p>	<p>Health Outcome: Improving maternal/newborn health including obstetric care</p> <p>Measurement: Costs of reproductive health interventions; rate of major obstetric intervention (MOI) for absolute maternal indication (AMI)</p> <p>Definition: Cost of reproductive health interventions - average unit cost for antenatal care, vaginal delivery, provision of condoms, Depo-Provera, oral pills, STI syndromic treatment, syphilis treatment in refugee and host population level II and III health centres</p>	<p>Design: Economic study of interviews and patient records</p> <p>Sampling: Combined purposive and random sampling. All public hospitals in the region were purposively sampled, 3 of 7 level IV HC were selected, 12 of 28 public level III HC were selected using PPS, 12 of 38 public level II HC were selected using PPS, all 4 refugee level III HC were purposively selected and 4 of 20 refugee level II HC were randomly selected. Clients who had clinical consultations were systematically sampled (every 2nd client) for exit interview, all who had family planning consultation and received modern contraception were included, hospital records were systematically sampled for 10 patients, 5-10 in HC</p> <p>Statistics: Proportions, chi-square test</p>	<p>Cost of reproductive health interventions: from 2003-2004 average cost per reproductive health intervention was US\$3.02 for refugees compared to US\$2.73 for host population</p> <p>Rate of MOI for AMI: from 2003-2004 significantly higher for refugees than hosts during 2003-2004, 1.02% (95%CI 0.79-1.25) compared to 0.85% (95%CI 0.80-0.90) $p < 0.05$</p> <p>Quality: Moderate</p>	<p>This study identified costs of reproductive health interventions were on average greater than those for host populations; rates of MOI for AMI were higher for refugees than for hosts</p>
Purdin et al (2007)	<p>Population: Refugee</p> <p>Country: Pakistan</p> <p>Crisis Type: Armed conflict</p> <p>Stage: Stabilised</p>	<p>Intervention Category: Maternal and infant health improvement services</p> <p>Intervention Type: Community awareness raising of emergency obstetric care and training</p>	<p>Health Outcome: Improving maternal/newborn health including obstetric care</p> <p>Measurement: Maternal mortality ratio (MMR); neonatal mortality rate</p> <p>Definition: MMR - mortality per 100,000 live births. Neonatal mortality rate - neonate mortality per 1,000 births</p>	<p>Design: Uncontrolled before/after analysis of health information system</p> <p>Sampling: All patients recorded in emergency obstetric care unit in study period on health information system</p> <p>Population Enrolled: Not detailed</p> <p>Statistics: Ratios, confidence intervals</p>	<p>Maternal mortality ratio: decreased from 291 per 100,000 live births to 102 per 100,000 live births from year 1 to year 5 (95% CI, 181-400)</p> <p>Neonatal mortality rate: decreased from 2.5 per 1,000 to 20.7 per 1,000 from year 1 to year 7 (no statistical association)</p> <p>Quality: Moderate</p>	<p>This study identified decreased maternal mortality ratio and neonatal mortality rate during the study period</p> <p>The range of interventions appear to have been useful for improving maternal and newborn mortality, although no causal inference can be drawn</p>

Publication	Population, Country and Crisis	SRH Intervention	Health Outcome*	Methods	Results and Quality Rating	Conclusion
Raheel et al (2012)	<p>Population: Refugee</p> <p>Country: Pakistan</p> <p>Crisis Type: Armed conflict</p> <p>Stage: Stabilised</p>	<p>Intervention Category: Family planning and abortion access</p> <p>Intervention Type: Subsidised health care services</p>	<p>Health Outcome: Family planning</p> <p>Measurement: Use of family planning</p> <p>Definition: Use of family planning - current use of any of: pill, IUD, condoms, injections, tubal ligation, traditional methods</p>	<p>Design: Cross-sectional survey comparison of subsidised and non-subsidised groups</p> <p>Sampling: Systematic random sampling to identify households from pre-determined list, every 6th or 5th (subsidised or non-subsidised) household selected and one eligible women selected from each household for interview (otherwise used first right household)</p> <p>Population Enrolled: 650 currently married women aged 15-49 with at least one previous pregnancy (325 in subsidised group; 325 in non-subsidised group)</p> <p>Statistics: Means, proportions, binary logistic regression, independent variables with $p < 0.025$ retained in multivariate analysis, adjusted odds ratios (OR)</p>	<p>Use of family planning: 54.5% of women in subsidised group compared to 24.9% in non-subsidised group ($p < 0.001$); significant OR for greater education, nuclear family type, heard of FP, approved of FP, friends approve of FP; intends future use, has discussed no of children with husband, husband approves, but not age under 25 or over 35</p> <p>Quality: High</p>	<p>This study identified a significant increase in use of family planning methods (modern and traditional) in the group receiving subsidised health care compared to those receiving non-subsidised health care</p> <p>This intervention appears to have been useful for improving family planning, although no causal inference can be drawn</p>
Reid et al (2008)	<p>Population: General population</p> <p>Country: Kenya</p> <p>Crisis Type: Armed conflict</p> <p>Stage: Acute</p>	<p>Intervention Category: Health system strengthening and/or capacity building</p> <p>Intervention Type: HIV/AIDS emergency preparedness plan</p>	<p>Health Outcome: Prevention, treatment and care for HIV/AIDS and STIs</p> <p>Measurement: Rate of delayed or lost to follow up HIV/AIDS care</p> <p>Definition: Delayed follow up - missing an assigned appointment by more than 7 days Lost to follow up - missing an appointment by more than one month</p>	<p>Design: Cross-sectional analysis of patient records compared retrospectively</p> <p>Sampling: Records of all HAART consultations conducted during the study period were included</p> <p>Population Enrolled: Not detailed</p> <p>Statistics: Absolute numbers, proportions</p>	<p>Delayed or lost to follow up HIV/AIDS care: proportion of delayed appointments increased from 6.4% at retrospective baseline (1 year previously) to 13.1% in first month of intervention, 7.2% in second month and 4.2% in third month (no statistical association); lost to follow up appointments did not change substantially</p> <p>Quality: Moderate</p>	<p>This study identified a substantial increase in delayed appointments despite the intervention</p> <p>There is insufficient data or statistical analysis to determine the impact of the intervention</p>

Publication	Population, Country and Crisis	SRH Intervention	Health Outcome*	Methods	Results and Quality Rating	Conclusion
Samai and Sengeh (1997)	<p>Population: General population</p> <p>Country: Sierra Leone</p> <p>Crisis Type: Armed conflict</p> <p>Stage: Acute</p>	<p>Intervention Category: Health system strengthening and/or capacity building</p> <p>Intervention Type: Motorised referral system for obstetric emergencies</p>	<p>Health Outcome: Improving maternal/newborn health including obstetric care</p> <p>Measurement: Case fatality rate (CFR)</p> <p>Definition: CFR - incidence of maternal death per incidence of major obstetric complication (anti and post partum haemorrhage, obstructed/prolonged labour, pre-eclampsia/eclampsia, post partum sepsis, complications of induced abortion, ruptured uterus and ectopic pregnancy)</p>	<p>Design: Cross-sectional analysis of patient records</p> <p>Sampling: All patients who used referral vehicle during study period and all admissions to emergency obstetric care unit with major obstetric complications or maternal death</p> <p>Population Enrolled: 15 women admitted in 16 month pre-intervention period; 41 admitted in 16 month post-intervention period (21 with referral vehicle, 20 without)</p> <p>Statistics: Proportions, ratios</p>	<p>CFR: decreased from 20% in pre-intervention period to 10% in post intervention period (no statistical association)</p> <p>Quality: Moderate</p>	<p>This study identified a decrease in CFR during the study period</p> <p>No statistical association can be identified</p> <p>The intervention appears to have been useful for improving access to emergency obstetric care and improving maternal health although no causal inference can be drawn</p>
Viswanathan et al (2012)	<p>Population: Entrapped and General population</p> <p>Country: Afghanistan</p> <p>Crisis Type: Armed conflict</p> <p>Stage: Stabilised</p>	<p>Intervention Category: Health system strengthening and/or capacity building</p> <p>Intervention Type: Community health worker (CHW) presence</p>	<p>Health Outcome: Improving maternal/newborn health including obstetric care</p> <p>Measurement: Use of modern contraceptive; use of antenatal care; use of skilled birth attendant</p> <p>Definition: Use of modern contraceptive - use of female sterilisation, intra-uterine device, contraceptive pill, contraceptive injection and condom amongst currently married non-pregnant women</p> <p>Use of antenatal care - receipt ≥ 1 visit by doctor, nurse, midwife or CHW during most recent delivery for women aged 10-49 who delivered live birth in 2 years before survey</p> <p>Use of skilled birth attendant - last delivery assisted by doctor, nurse or midwife</p>	<p>Design: Case control surveys</p> <p>Sampling: Two stage cluster sampling, 425 clusters selected from over 45,000 using PPS, compact segment method used to select compound and all households in a compound were sampled with a response rate of 99% giving 8,278 households, all ever married women aged 10-49 were surveyed</p> <p>Population Enrolled: 8281 ever married women aged 10-49 women</p> <p>Statistics: Proportions, two level logistic regression model for individual, household and community level variables</p>	<p>Use of modern contraceptive: increased in presence of female CHW OR 1.61 (95%CI 1.21-2.15; $p<0.01$) non-significant compared to male CHW modelled for all levels of variables</p> <p>Use of antenatal care: increased in presence of female CHW compared to no CHW OR 2.71 (95%CI 1.87-3.92); $p<0.001$) non-significant compared to male CHW modelled for all levels of variables</p> <p>Use of skilled birth attendant: increased in presence of female CHW compared to no CHW OR 1.75 (95%CI 1.18-2.58; $p<0.01$) non-significant compared to male CHW modelled for all levels of variables</p> <p>Quality: High</p>	<p>This study identified a statistical association between presence of a female CHW in the community and increased use of modern contraceptive, antenatal care and skilled birth attendants; presence of a male CHW is not associated</p> <p>The intervention appears to have improved maternal health behaviours compared to control (no CHW present) although no causal inference can be drawn</p>

Publication	Population, Country and Crisis	SRH Intervention	Health Outcome*	Methods	Results and Quality Rating	Conclusion
Woodward et al (2011)	<p>Population: Refugee</p> <p>Country: Guinea</p> <p>Crisis Type: Armed conflict</p> <p>Stage: Stabilised</p>	<p>Intervention Category: Health system strengthening and/or capacity building</p> <p>Intervention Type: Reproductive health peer-education program</p>	<p>Health Outcome: Prevention, treatment and care for HIV/AIDS and STIs</p> <p>Measurement: Self-reported HIV/AIDS related practices</p> <p>Definition: HIV/AIDS related practices - avoidant changes: staying faithful; having fewer sexual partners; using condoms with casual partners; abstaining; always using condoms</p>	<p>Design: Cross-sectional survey (with comparison between self-reported exposure/non-exposure)</p> <p>Sampling: 45 clusters of households randomly selected from 23 camps using PPS, stratified sample of 10 men and 10 women randomly selected from cluster using random sampling from household lists, sample size was calculated to detect a difference of 10% versus 20% between strata of equal size with 80% power and 95% confidence interval accounting for clustering</p> <p>Population Enrolled: 839 (445 men; 444 women) participants aged 15-49 from 23 camps</p> <p>Statistics: Proportions, logistic regression to calculate odds ratios (OR), confounders retained in multivariate model based on chi-square association tests and if they changed ORs by 10% or more</p>	<p>HIV/AIDS related practices: Self-reported exposed compared to unexposed: staying faithful to one partner decreased OR 0.59 (95%CI 0.4-0.87; $p \leq 0.05$); having fewer sexual partners increased OR 1.73 (95%CI 1.05-2.85; $p < 0.05$); using condoms with casual partners; abstaining and always using condoms did not change significantly</p> <p>Quality: Moderate</p>	<p>This study identified one increase in HIV-avoidant behaviour; many did not change significantly and one decreased</p> <p>This intervention appears to have limited use, although no causal inference can be drawn</p>

* Categorized according to the majority of health outcomes assessed by the study - where outcomes overlap categories, all are included in the results narrative

4.5 Mental Health and Psychosocial Support

4.5.1 Systematic review

- The search strategy yielded 8740 results, with 61 meeting the inclusion criteria (all A and B categories).
- The earliest identified study that met the inclusion criteria was from 1997 and the number of studies has increased steadily since then (Figure 18).
- Twenty-one studies were with populations affected by natural disasters (earthquakes (N=11), Tsunami (N=8), floods (N=2)). Forty studies were with populations affected by armed conflict (5 with refugees, 8 with IDPs, and 27 with general populations). Of these 40 studies, 10 were in the acute crisis stage and the remainder in more stable and early recovery stages.
- Of the 61 studies, 10 were in urban settings, 11 in rural settings, 29 in both urban and rural, and 11 in refugee/IDP camp settings.
- Twenty-nine of the studies were with adults and 32 with children and adolescents.
- There is some indication that quality may have improved over the past four years or so (Figure 18).
- Twenty two of the studies were controlled before/after studies, 19 non-randomised trials, and 19 randomised control trails. One of the studies examined cost data.

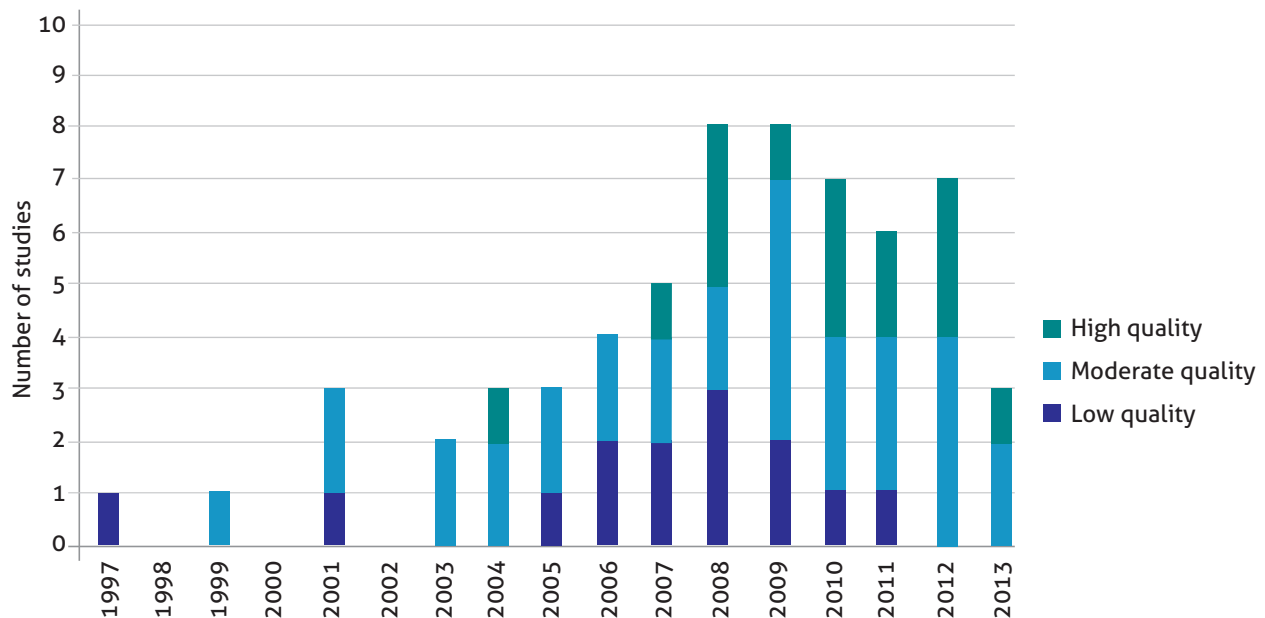


Figure 18: Quantity and quality of mental health and psychosocial support publications over time

- Post-traumatic stress disorder (PTSD) was the most common outcome measured, followed by depression, non-condition specific 'general mental health' and then functioning (Figure 19). There were no studies on more severe conditions or on addiction and substance misuse.
- Sixteen main types of interventions were evaluated in the studies (Figure 20). The most common interventions were school-based psychosocial interventions (N=11), cognitive behavioural therapy (CBT) (N=10), psychotherapy (N=10) and psychosocial (N=7). Seventeen studies included more than one main type of intervention.

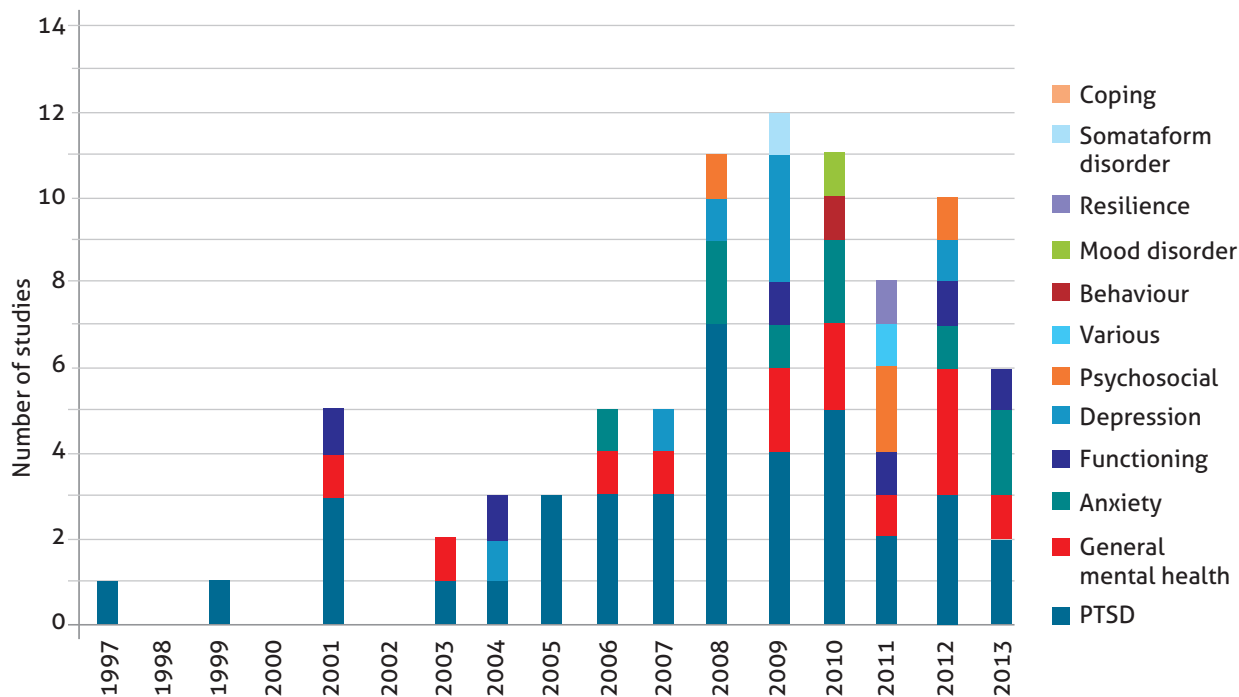


Figure 19: Mental health and psychosocial support outcomes measured (includes multiple outcomes)

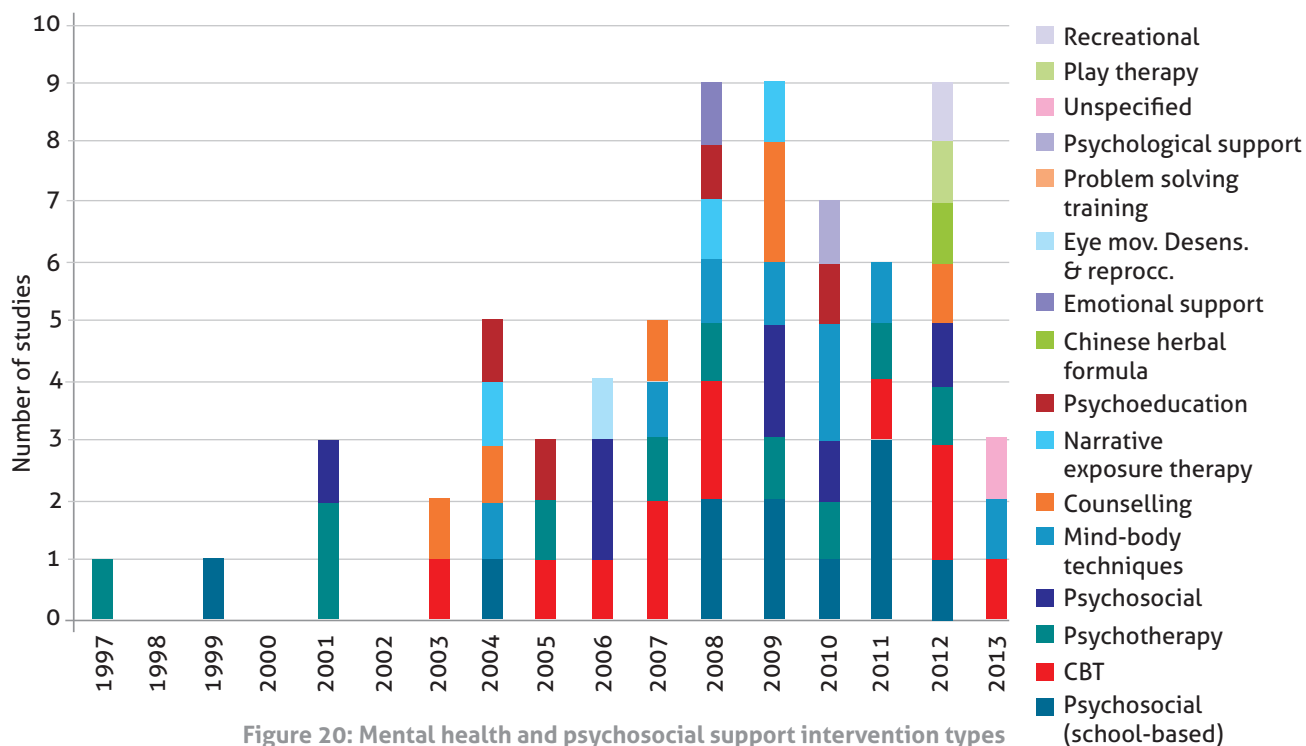


Figure 20: Mental health and psychosocial support intervention types

Summary

The mental health and psychosocial support field is characterised by a fair amount of studies and increasing quality over the years. Post-traumatic stress disorder (PTSD) was the main focus of these studies and no evidence was available on addiction and substance misuse. A systematic review conducted in 2011 provides further detail on the scope of evidence in this field (Tol et al. 2011a) and the main research priorities defined by international actors (Tol et al. 2011b).

4.5.2 Expert interviews

4.5.2.1 Intervention approaches

Scaling up: There is a need for more evidence on the effectiveness of low intensity and low cost interventions in non-specialised health care and community settings. Research on the following was suggested:

- The effectiveness and feasibility of delivering care through different cadres of health workers, including with intermediate training (e.g. BSc level or less) and community health workers. This should include potential risks and trade-offs.
- Evidence on how services can be most effectively integrated through existing health services/systems, particularly at the primary health care level.
- Effectiveness of different training methods, particularly how much supervision is needed to achieve effective task shifting.
- Effectiveness and feasibility of interventions for groups, in addition to individuals.
- Effectiveness and feasibility of e-mental health interventions.
- Effectiveness and feasibility of interventions addressing issues underlying multiple disorders, rather than specialist interventions on a single disorder (e.g. PTSD). Such an approach could be maximised by applying components from different treatments methods to address co-morbidity (i.e. component- or module-based therapy, see below).

User and community-orientated services: Mental health users, family members and communities can be involved more in preventive and treatment interventions. Research on the effectiveness of the following interventions was suggested:

- Evidence for interventions aimed at strengthening participation of affected communities in humanitarian settings, a key principle in current guidelines.
- Where appropriate, using parents and natural support systems (rather than external counsellors), including parent management training.
- Strengthening social support and coping mechanisms at family and community levels.
- School-based interventions for improving pupil mental health outcomes, including looking at the the burden on teachers (if teachers are involved).

Interventions with other sectors: There is a need for more evidence on how mental health and psychosocial support interventions can be better integrated with other sectors. Examples include evidence on the effectiveness of mental health and psychosocial support interventions with the following sectors:

- Research on preventive interventions that address major determinants of mental health in humanitarian settings, including interventions targeting ongoing violence (particularly against women), poverty, and social exclusion.
 - The education sector (e.g. school-based interventions to improve pupil mental health outcomes).
 - The nutrition sector (e.g. mental health interventions with mothers to also improve maternal and infant nutritional outcomes).
-

- Protection and welfare (e.g. to prevent punitive parental violence against children to improve child mental health and behaviour outcomes; e.g. to improve parental mental health to reduce parental violence against children; e.g. improve mental health outcomes among survivors of sexual violence).
- Communicable disease (e.g. how improved mental health (e.g. reducing harmful alcohol use) may reduce risky behaviour and communicable disease transmission).

4.5.2.2 Types of intervention to be researched

The following two complementary approaches were highlighted.

- **Psychosocial interventions:** The lack of evidence on the effectiveness of psychosocial (preventive) interventions in particular was frequently reported (although the additional complexities of evaluating such interventions were recognised). Cited examples include stronger evidence needed on psychological interventions such as psychological first aid, generic counselling, psycho-education, social interventions such as addressing violence and social exclusion, and childhood interventions.
- **Modular transdiagnostic approaches for psychological interventions:** For people with mental disorders, it was suggested that rather than providing a single treatment for a specific disorder (e.g. those with a more proven evidence base such as CBT and IPT), it could be beneficial to apply simplified individual modules from within these different treatments in order to simultaneously respond to a range of symptoms and disorders (rather than just a single disorder). Evidence would therefore be required on the effectiveness of this modular approach.

4.5.2.3 Mental health and psychosocial support outcomes to be researched

- **Multiple outcomes:** It was widely recognised that evidence on the effectiveness of interventions treating a range of different outcomes (e.g. PTSD, depression, anxiety or alcohol disorder) was required given the variety of disorders commonly observed with crisis-affected populations, the high levels of co-morbidity, and the greater cost-effectiveness of treating multiple disorders.
 - **Severe disorders:** There remains a clear need to strengthen the evidence-base of common mental disorders, but in addition there is a need for a much stronger evidence-base on treating severe mental disorders (e.g. psychosis, schizophrenia, severe depression) given their increased burden and that they commonly take up the majority of clinic load (albeit context specific). It was noted that while the efficacy of some interventions for severe disorders is well proven from more stable settings (e.g. use of specific drugs), the broader effectiveness of such interventions in emergency settings has not been proven. In addition, the use of supplementary psychosocial interventions for severe disorders has not been adequately tested or proven (e.g. the use of anti-stigma campaigns in communities, community-based rehabilitation and inclusion approaches).
 - **Functioning:** The need for more measurement of functioning as an outcome for mental health interventions was frequently noted. The additional need to ensure that functioning measures were culturally appropriate was also raised.
 - **Substance misuse:** The need for further research on interventions addressing harmful alcohol use and drug taking was frequently raised, including brief interventions.
 - **Determinants of mental health:** given that humanitarian settings are often chronic, it is key that interventions also address the ongoing determinants of mental health (e.g. violence against women and children, socio-economic adversity, social exclusion). These interventions are popular in practice, but have not been rigorously evaluated.
-

4.5.2.4 Study designs to be used

- **Randomised control trials (RCTs):** Despite the obvious challenges of conducting RCTs in humanitarian settings, the need for RCTs was widely recognised, but also that RCTs (and other study designs such as quasi-experimental designs with comparison groups) should collect data over a much longer period than has previously been the case in order to be able to track longer-term intervention effects (where ethically appropriate).
- **Mixed-methods studies:** The need for combined quantitative and qualitative studies was commonly reported. For example, to better understand local explanations for mental health disorders and causes, issues of access, the cultural acceptability and appropriateness of interventions and their implementation, and study measures.
- **Greater use of routine data:** Greater analysis and publication of high quality routine facility-based data on mental disorder outcomes over time, including the use of clinical audit data and also case-study approaches to observe treatment effects and review service delivery models. This includes incorporating mental health in routine surveillance systems as soon as possible in humanitarian crises.
- **Feasibility studies:** The need for greater evidence on feasibility of interventions was frequently raised, particularly in comparing different interventions (e.g. by being linked to an RCT) and in scaling-up interventions and for task-shifting interventions. Aspects of feasibility should include economic (see below), social and cultural (e.g. how acceptable), political, technical and operational.
- **Economic studies:** There was a widely expressed need for more studies on economic aspects of interventions, in particular for cost-effectiveness analysis to be included in intervention studies. Other research related to the need to understand the overall economic costs and benefits in interventions involving scaling-up services through the health system. Gaining a better understanding of the economic costs of poor mental health (and subsequent potential gains through improved mental health) was also highlighted.

4.5.2.5 Particular study populations of interest

- **Children and adolescents:** The need for evidence on interventions for child mental health, behavioural problems and development was raised, including the use of brief family interventions, peer education, and appropriate community mechanism and resources.
- **Older populations:** Particular evidence on interventions addressing dementia and old age problems.
- **Survivors of sexual and other forms of gender-based violence:** For example, evidence on the effectiveness of mental health interventions for survivors of sexual and gender-based violence (e.g. intimate partner violence); evidence on interventions to reduce anger and violence among men.

4.5.2.6 Key ethical issues:

- **Adverse effects:** More evidence is required on the adverse effects of mental health interventions. For example, culturally insensitive interventions; lack of sustainability; poor or (unintentionally) abusive practice due to limited training, capacity, monitoring and supervision.
 - **Independent RCTs:** There is a need for more independently led trials, rather than being led by proponents of the particular mental health intervention being trailed.
 - **Quality:** There is a need to improve the quality of research in order to ensure its appropriateness, and the accuracy, validity and reliability of results of the interventions.
-

4.5.3 Recommendations for future research

- Evidence is required on effectiveness and feasibility of scaling-up low intensity and low cost psychological interventions.
 - Substantially more evidence is required on the effectiveness of psychosocial interventions.
 - Evidence on the effectiveness of group-based interventions as well as interventions for individuals.
 - Effectiveness of interventions using parents, peers, natural support systems, and schools.
 - Evidence on the use of inter-sectoral approaches (e.g. nutrition, protection, education).
 - Evidence on using a modular transdiagnostic approach to treating mental disorders, including multiple disorders.
 - Evidence on the effectiveness and feasibility of e-mental health interventions.
 - Evidence on the effectiveness and feasibility of training interventions.
 - The effectiveness of interventions that address common issues underlying multiple disorders.
 - Effectiveness of different training methods.
 - Evidence on the effectiveness of treating common mental disorders but also severe mental disorders, drug and harmful alcohol use, and having a focus on functioning as a key outcome.
 - Evidence from RCTs and quasi experimental studies is required. However, use of other study designs is of value, including the use routine clinical outcome data. More evidence using mixed methods is required to improve acceptability and appropriateness of interventions and associated research.
 - Substantially more evidence is required on the feasibility of rolling out interventions into practice settings, particularly economic feasibility and cost-effectiveness of interventions.
 - Evidence is particularly required for interventions that focus on the needs of children, adolescents, older populations and survivors of sexual and other forms of gender-based violence.
 - Greater evidence on potentially harmful effects of mental health interventions is required.
 - The quality of research needs to improve in order to ensure valid and reliable results.
-

Table 16. Mental Health and Psychosocial Support Intervention Studies in Humanitarian Crisis Settings, 1980 – 2014

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Health outcome(s)	Intervention type (1)	Intervention type (2)	Intervention type (3)	Age group	Evidence category
Ager A et al, 2001	Uganda	Camp	IDPs	Armed conflict	Resilience	Play therapy	Recreational		School children	A
Ayoughi S, 2009	Afghanistan	Urban	General	Armed conflict	Depression, anxiety	Counselling			adults	A
Basoglu M et al, 2005	Turkey	Urban & rural	General	Natural disaster	PTSD	Behaviour therapy			adults	A
Basoglu M et al, 2003	Turkey	Urban & rural	General	Natural disaster	PTSD, depression	CBT			adults	A
Bass et al, 2013	DRC	Rural	General	Armed conflict	PTSD, depression/anxiety, functioning	CPT			adults	A
Bass J et al, 2012	Indonesia	Rural	General	Armed conflict	General mental health, functioning	Counselling			adults	A
Bastin P et al, 2013	Lebanon	Camp	Refugees	Armed conflict	General mental health, functioning	Various (unspecified)			adults	B
Becker et al, 2009	India	Rural	General	Natural disaster	Distress, functioning	Mixed psychosocial			adults	A
Berger R et al, 2009	Sri Lanka	Rural	General	Natural disaster	PTSD, depression, somatic, functioning problems	School-based psychosocial			School children	A
Betancourt TS et al, 2012	Uganda	Camp	IDPs	Armed conflict	Depression	Psychotherapy	Play therapy	Recreational	adolescents	A
Bolton P et al, 2007	Uganda	Camp	IDPs	Armed conflict	Depression, anxiety	Psychotherapy	Activity-based		adolescents	A
Catani C, 2009	Sri Lanka	Rural	IDPs	Natural disaster	PTSD	Narrative exposure therapy	Mind-body techniques		School children	A
Constandinides et al 2011	Palestine	Urban & rural	General	Armed conflict	Psychosocial	Mixed psychosocial			adolescents	B
Descilo T et al, 2010	India	Urban & rural	General	Natural disaster	PTSD, depression	Yoga			adults	A

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Health outcome(s)	Intervention type (1)	Intervention type (2)	Intervention type (3)	Age group	Evidence category
Dybdahl R, 2001	Bosnia and Herzegovina	Urban & rural	IDPs	Armed conflict	General mental health, functioning	Counselling			adults	A
Ferdos G et al, 2007	Iran	Urban & rural	General	Natural disaster	PTSD, coping	Problem solving training			adults	A
Gaboloud V et al, 2010	Palestine	Urban & rural	General	Armed conflict	PTSD, anxiety, mood disorder	Psychotherapy			School children	A
Goenjian AK et al, 1997	Armenia	Urban	General	Natural disaster	PTSD, depression	Psychotherapy			adolescents	A
Goenjian AK et al, 2005	Armenia	Urban	General	Natural disaster	PTSD, depression	Psychotherapy			adolescents	A
Gordon et al, 2004	Kosovo	Urban & rural	General	Armed conflict	PTSD	Mind-body techniques			adolescents	B
Gordon JS et al, 2008	Kosovo	Urban & rural	General	Armed conflict	PTSD	Mind-body techniques			adolescents	A
Gupta L et al, 2008	Sierra Leone	Camp	IDPs	Armed conflict	PTSD	Psychoeducation	Play therapy		School children	A
Hasonovic M et al, 2009	Bosnia and Herzegovina	Urban & rural	General	Armed conflict	PTSD	School-based psychosocial			School children	A
Hustache S et al, 2009	Republic of Congo	Urban	General	Armed conflict	PTSD, functioning, anxiety	Psychological support			adults	A
Jordans et al, 2010	Nepal	Rural	General	Armed conflict	PTSD, depression, anxiety	School-based psychosocial			School children	A
Jordans et al, 2011	Burundi, Indonesia, Sudan, Sri Lanka	Urban & rural	General	Armed conflict	Various, cost	School-based psychosocial			School children	B
Karam EG et al, 2008	Lebanon	Rural	General	Armed conflict	PTSD, depression, anxiety	Mixed psychosocial			School children	A

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Health outcome(s)	Intervention type (1)	Intervention type (2)	Intervention type (3)	Age group	Evidence category
Khamis V et al, 2004	Palestine	Urban & rural	General	Armed conflict	Functioning	School-based psychosocial			School children	B
Konuk E et al, 2006	Turkey	Urban & rural	General	Natural disaster	PTSD	Eye movement de-sensitisation & reprocessing			adults	A
Layne CM et al, 2001	Bosnia and Herzegovina	Urban & rural	General	Armed conflict	PTSD, depression, functioning	Psychotherapy			School children	B
Layne CM et al, 2008	Bosnia and Herzegovina	Urban & rural	General	Armed conflict	PTSD	Psychoeducation	psychotherapy		adolescents	A
Loughry M et al, 2006	Palestine	Urban & rural	General	Armed conflict	Behaviour, hopefulness, parental support	Recreational	Play therapy		School children	A
Madfis J et al, 2010	Haiti and Solomon Islands	Camp	IDPs	Natural disaster	Behaviour	Safe spaces			School children	B
Mahmoudi-Gharaei J et al, 2006	Iran	Urban	General	Natural disaster	PTSD	CBT			adolescents	A
Meng X et al, 2012	China	Urban & rural	General	Natural disaster	General mental health, functioning	Chinese herbal formula			adults	A
Mooren TT et al, 2003	Bosnia and Herzegovina	Urban & rural	General	Armed conflict	General mental health	Counselling			adults	B
Morris et al, 2012	Uganda	Camp	IDPs	Armed conflict	Maternal mood	Psychoeducation			adults	A
Mueller Y et al, 2011	Philippines	Urban & rural	IDPs	Armed conflict	General mental health, functioning	psychological first aid	psychotherapy		adults	A
Neuner F et al, 2004	Uganda	Camp	Refugees	Armed conflict	PTSD	Narrative exposure therapy	Counselling	Psychoeducation	adults	A
Neuner F et al, 2008	Uganda	Camp	Refugees	Armed conflict	PTSD	Narrative exposure therapy			adults	A

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Health outcome(s)	Intervention type (1)	Intervention type (2)	Intervention type (3)	Age group	Evidence category
Pityaratstian et al, 2007	Thailand	Rural	General	Natural disaster	PTSD	CBT			School children	A
Priebe S et al, 2010	Serbia and Croatia	Urban & rural	General	Armed conflict	PTSD, functioning, costs	Psychological support			adults	B
Qouta SR et al, 2012	Palestine	Urban	General	Armed conflict	PTSD	Recovery techniques			School children	A
Salcioglu E, 2007	Turkey	Urban & rural	General	Natural disaster	PTSD	CBT			adults	A
Selimbasic Z et al, 2001	Bosnia and Herzegovina	Urban & rural	Refugees	Armed conflict	PTSD	Psychotherapy			School children	B
Shooshtrary MH et al, 2008	Iran	Urban	General	Natural disaster	PTSD	CBT			adolescents	A
Sonderegger R et al, 2011	Uganda	Camp	IDPs	Armed conflict	Functioning	CBT			adults	A
Staples JK et al, 2011	Palestine	Urban & rural	General	Armed conflict	PTSD, depression, hopelessness	Mind-body techniques			adolescents	A
Telles S et al, 2007	Andaman Islands	Rural	General	Natural disaster	Distress	Yoga			adults	A
Telles S et al, 2010	India	Rural	General	Natural disaster	Distress	Yoga			adults	A
Thabet AA et al, 2005	Palestine	Camp	Refugees	Armed conflict	PTSD, depression	Play therapy	Psychoeducation		School children	A
Tol W et al, 2008	Indonesia	Urban & rural	General	Armed conflict	PTSD, depression, anxiety	School-based psychosocial			School children	A
Tol W et al, 2009	Nepal	Urban & rural	IDP and general	Armed conflict	Various	Mixed psychosocial			adults	A
Tol W et al, 2012	Sri Lanka	Urban & rural	General	Armed conflict	PTSD, depression, anxiety	CBT	Play therapy	Recreational	adolescents	A

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Health outcome(s)	Intervention type (1)	Intervention type (2)	Intervention type (3)	Age group	Evidence category
Urrago Z et al, 2009	Colombia	Urban & rural	General	Armed conflict	Depression, general mental health	Psychotherapy			adults	B
Vijayakumar L et al, 2006	India	Urban	General	Natural disaster	Various	Mixed psychosocial			School children	A
Vijayakumar L et al, 2008	India	Urban	General	Natural disaster	PTSD, depression, general mental health	Emotional support			adults	A
Wagner B et al, 2012	Iraq	Urban & rural	General	Armed conflict	PTSD, depression, functioning	Internet-based CBT			adults	A
Woodside D et al, 1999	Croatia	Urban	General	Armed conflict	PTSD	Psychoeducation			School children	B
Yeomans PD et al, 2010	Burundi	Rural	General	Armed conflict	PTSD	Psychoeducation			adults	B
Zang Y et al, 2013	China	Urban & rural	General	Natural disaster	PTSD, depression, anxiety	Narrative exposure therapy	Mind-body techniques		adults	A

References (A and B categories): Mental health and psychosocial support

1. Ager A, Akesson B, Stark L, Flouri E, Okot B, McCollister F, et al. The impact of the school-based Psychosocial Structured Activities (PSSA) program on conflict-affected children in Northern Uganda. *J Child Psychol Psychiatry*. 2011;52(11):1124-33.
 2. Ayoughi S, Missmahl I, Weierstall R, Elbert T. Provision of mental health services in resource-poor settings: a randomised trial comparing counselling with routine medical treatment in North Afghanistan (Mazar-e-Sharif). *BMC psychiatry*. 2012;12:14.
 3. Basoglu M, Livanou M, Salcioglu E, Kalender D. A brief behavioural treatment of chronic post-traumatic stress disorder in earthquake survivors: Results from an open clinical trial. *Psychological Medicine*. 2003;33(4):647-54.
 4. Basoglu M, Salcioglu E, Livanou M, Kalender D, Acar G. Single-session behavioral treatment of earthquake-related posttraumatic stress disorder: a randomized waiting list controlled trial. *J Trauma Stress*. 2005;18(1):1-11.
 5. Bass J, Poudyal B, Tol W, Murray L, Nadison M, Bolton P. A controlled trial of problem-solving counseling for war-affected adults in Aceh, Indonesia. *Social psychiatry and psychiatric epidemiology*. 2012;47(2):279-91.
 6. Bass JK, Annan J, Mclvor Murray S, Kaysen D, Griffiths S, Cetinoglu T, et al. Controlled trial of psychotherapy for Congolese survivors of sexual violence. *N Engl J Med*. 2013;368(23):2182-91.
 7. Bastin P, Bastard M, Rossel L, Melgar P, Jones A, Antierens A. Description and Predictive Factors of Individual Outcomes in a Refugee Camp Based Mental Health Intervention (Beirut, Lebanon). *PLoS ONE*. 2013;8(1).
 8. Becker SM. Psychosocial care for women survivors of the tsunami disaster in India. *American Journal of Public Health*. 2009;99(4):654-8.
 9. Berger R, Gekopf M. School-based intervention for the treatment of tsunami-related distress in children: a quasi-randomized controlled trial. *Psychotherapy & Psychosomatics*. 2009;78(6):364-71.
 10. Betancourt TS, Newnham EA, Brennan RT, Verdelli H, Borisova I, Neugebauer R, et al. Moderators of treatment effectiveness for war-affected youth with depression in northern Uganda. *J Adolesc Health*. 2012;51(6):544-50.
 11. Bolton P, Bass J, Betancourt T, Speelman L, Onyango G, Clougherty KF, et al. Interventions for depression symptoms among adolescent survivors of war and displacement in northern Uganda: a randomized controlled trial. *JAMA : the journal of the American Medical Association*. 2007;298(5):519-27.
 12. Catani C, Kohiladevy M, Ruf M, Schauer E, Elbert T, Neuner F. Treating children traumatized by war and Tsunami: a comparison between exposure therapy and meditation-relaxation in North-East Sri Lanka. *BMC psychiatry*. 2009;9:22.
 13. Constandinides D, Kamens S, Marshoud B, Flefel F. Research in ongoing conflict zones: Effects of a school-based intervention for Palestinian children. *Peace and Conflict: Journal of Peace Psychology*. 2011;17(3):270-302.
 14. Descilo T, Vedamurtachar A, Gerbarg PL, Nagaraja D, Gangadhar BN, Damodaran B, et al. Effects of a yoga breath intervention alone and in combination with an exposure therapy for post-traumatic stress disorder and depression in survivors of the 2004 South-East Asia tsunami. *Acta Psychiatrica Scandinavica*. 2010;121(4):289-300.
 15. Dybdahl R. Children and mothers in war: an outcome study of a psychosocial intervention program. *Child development*. 2001;72(4):1214-30.
 16. Ferdos G, Seyed-Hosseini S. The effectiveness of problem solving skills in decreasing PTSD symptoms in survivors of Bam earthquake. *Pakistan Journal of Medical Sciences*. 2007;23(5):736-40.
 17. Gabouloud V, et al. Psychological support for Palestinian children and adults: an analysis of data from people referred to the Me' decins Sans Frontie`res programme for behavioural and emotional disorders in the occupied Palestinian territory. *Intervention*. 2010;8(2):131-42.
 18. Goenjian AK, Karayan I, Pynoos RS, Minassian D, Najarian LM, Steinberg AM, et al. Outcome of psychotherapy among early adolescents after trauma. *American Journal of Psychiatry*. 1997;154(4):536-42.
-

19. Goenjian AK, Walling D, Steinberg AM, Karayan I, Najarian LM, Pynoos R. A prospective study of posttraumatic stress and depressive reactions among treated and untreated adolescents 5 years after a catastrophic disaster. *American Journal of Psychiatry*. 2005; 162(12):2302-8.
 20. Gordon JS, Staples JK, Blyta A, Bytyqi M. Treatment of posttraumatic stress disorder in postwar Kosovo high school students using mind-body skills groups: a pilot study. *J Trauma Stress*. 2004;17(2):143-7.
 21. Gordon JS, Staples JK, Blyta A, Bytyqi M, Wilson AT. Treatment of posttraumatic stress disorder in postwar Kosovar adolescents using mind-body skills groups: a randomized controlled trial. *Journal of Clinical Psychiatry*. 2008; 69(9):1469-76.
 22. Gupta L, Zimmer C. Psychosocial intervention for war-affected children in Sierra Leone. *British Journal of Psychiatry*. 2008; 192(3):212-6.
 23. Hasanovic M, Srabovic S, Rasidovic M, Sehovic M, Hasanbasic E, Husanovic J, et al. Psychosocial assistance to students with posttraumatic stress disorder in primary and secondary schools in post-war Bosnia Herzegovina. *Psychiatria Danubina*. 2009; 21(4):463-73.
 24. Hustache S, Moro MR, Roptin J, Souza R, Gansou GM, Mbemba A, et al. Evaluation of psychological support for victims of sexual violence in a conflict setting: Results from Brazzaville, Congo. *International Journal of Mental Health Systems*. 2009; 3(7).
 25. Jordans MJ, Komproe IH, Tol WA, Kohrt BA, Luitel NP, Macy RD, et al. Evaluation of a classroom-based psychosocial intervention in conflict-affected Nepal: a cluster randomized controlled trial. *Journal of child psychology and psychiatry, and allied disciplines*. 2010;51(7):818-26.
 26. Jordans MJ, Komproe IH, Tol WA, Susanty D, Vallipuram A, Ntamatumba P, et al. Practice-driven evaluation of a multi-layered psychosocial care package for children in areas of armed conflict. *Community Ment Health J*. 2011;47(3):267-77.
 27. Karam EG, Fayyad J, Karam AN, Tabet CC, Melhem N, Mneimneh Z, et al. Effectiveness and specificity of a classroom-based group intervention in children and adolescents exposed to war in Lebanon. *World Psychiatry*. 2008;7(2):103-9.
 28. Khamis V. The Impact of the Classroom/Community/Camp-Based Intervention Program on Palestinian Children 2004. Available from: http://pdf.usaid.gov/pdf_docs/PNADJ085.pdf.
 29. Konuk E, Knipe J, Eke I, Yuksek H, Yurtsever A, Ostep S. The effects of eye movement desensitization and reprocessing (EMDR) therapy on posttraumatic stress disorder in survivors of the 1999 Marmara, Turkey, earthquake. *International Journal of Stress Management*. 2006; 13(3):291-308.
 30. Layne CM, Saltzman WR, Poppleton L, Burlingame GM, Pasalic A, Durakovic E, et al. Effectiveness of a school-based group psychotherapy program for war-exposed adolescents: A randomized controlled trial. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2008;47(9):1048-62.
 31. Layne CM, Saltzman WR, Savjak N, Popovic T, Music M, Djapo N, et al. Trauma/grief-focused group psychotherapy: School-based postwar intervention with traumatized Bosnian adolescents. *Group Dynamics*. 2001;5(4):277-90.
 32. Loughry M, Ager A, Flouri E, Khamis V, Afana AH, Qouta S. The impact of structured activities among Palestinian children in a time of conflict. *Journal of Child Psychology and Psychiatry and Allied Disciplines*. 2006;47(12):1211-8.
 33. Madfis J, Martyris D, Triplehorn C. Emergency safe spaces in Haiti and the Solomon Islands. *Disasters*. 2010;34(3):845-64.
 34. Mahmoudi-Gharaei J, Mohammadi M, Yasami M, Alirezaei N, Naderi F, Moftakhari O. The Effects of a Short-term Cognitive Behavioral Group Intervention on Bam Earthquake Related PTSD Symptoms in Adolescents. *Iranian Journal of Psychiatry*. 2009;4:79-84.
-

35. Meng X, Wu F, Wei P, Xiu L, Shi J, Pang B, et al. A Chinese herbal formula to improve general psychological status in posttraumatic stress disorder: a randomized placebo-controlled trial on Sichuan earthquake survivors. *Evidence based Complementary and Alternative Medicine*. 2012;691258(89).
 36. Mooren TT, de Jong K, Kleber RJ, Ruvic J. The efficacy of a mental health program in Bosnia-Herzegovina: impact on coping and general health. *Journal of Clinical Psychology*. 2003;59(1):57-69.
 37. Morris J, Jones L, Berrino A, Jordans MJ, Okema L, Crow C. Does combining infant stimulation with emergency feeding improve psychosocial outcomes for displaced mothers and babies? A controlled evaluation from northern Uganda. *Am J Orthopsychiatry*. 2012;82(3):349-57.
 38. Mueller Y, Cristofani S, Rodriguez C, Malaguio RT, Gil T, Grais RF, et al. Integrating mental health into primary care for displaced populations: the experience of Mindanao, Philippines. *Conflict and Health*. 2011;5(3).
 39. Neuner F, Onyut PL, Ertl V, Odenwald M, Schauer E, Elbert T. Treatment of Posttraumatic Stress Disorder by Trained Lay Counselors in an African Refugee Settlement: A Randomized Controlled Trial. *Journal of Consulting and Clinical Psychology*. 2008;76(4):686-94.
 40. Neuner F, Schauer M, Klaschik C, Karunakara U, Elbert T. A comparison of narrative exposure therapy, supportive counseling, and psychoeducation for treating posttraumatic stress disorder in an African refugee settlement. *Journal of Consulting and Clinical Psychology*. 2004;72(4):579-87.
 41. Pityaratstian N, Liamwanich K, Ngamsamut N, Narkpongphun A, Chinajitphant N, Burapakajornpong N, et al. Cognitive-behavioral intervention for young tsunami victims. *Journal of the Medical Association of Thailand*. 2007;90(3):518-23.
 42. Priebe S, Gavrilovic JJ, Matanov A, Franciskovic T, Knezevic G, Ljubotina D, et al. Treatment outcomes and costs at specialized centers for the treatment of PTSD after the war in former Yugoslavia. *Psychiatric Services*. 2010;61(6):598-604.
 43. Qouta SR, Palosaari E, Diab M, Punamaki RL. Intervention effectiveness among war-affected children: a cluster randomized controlled trial on improving mental health. *Journal of traumatic stress*. 2012;25(3):288-98.
 44. Salcioglu E, Basoglu M, Livanou M. Effects of live exposure on symptoms of posttraumatic stress disorder: The role of reduced behavioral avoidance in improvement. *Behaviour Research and Therapy*. 2007;45(10):2268-79.
 45. Selimbasic Z, Pavlovic S, Sinanovic O, Vesnic S, Petrovic M, Ferkovic V, et al. Posttraumatic stress disorder--effects of psychosocial treatment in children. *Medicinski arhiv*. 2001;55(1 Suppl 1):25-9.
 46. Shooshtary MH, Panaghi L, Moghadam JA. Outcome of Cognitive Behavioral Therapy in Adolescents After Natural Disaster. *Journal of Adolescent Health*. 2008;42(5):466-72.
 47. Sonderegger R, Rombouts S, Ocen B, McKeever RS. Trauma rehabilitation for war-affected persons in northern Uganda: a pilot evaluation of the EMPOWER programme. *British Journal of Clinical Psychology*. 2011;50(3):234-49.
 48. Staples JK, Abdel Attai JA, Gordon JS. Mind-body skills groups for posttraumatic stress disorder and depression symptoms in Palestinian children and adolescents in Gaza. *International Journal of Stress Management*. 2011;18(3):246-62.
 49. Telles S, Naveen KV, Dash M. Yoga reduces symptoms of distress in tsunami survivors in the Andaman Islands. *Evidence based Complementary and Alternative Medicine*. 2007;4(4):503-9.
 50. Telles S, Singh N, Joshi M, Balkrishna A. Post traumatic stress symptoms and heart rate variability in Bihar flood survivors following yoga: A randomized controlled study. *BMC Psychiatry*. 2010;10(18).
 51. Thabet AA, Vostanis P, Karim K. Group crisis intervention for children during ongoing war conflict. *European Child & Adolescent Psychiatry*. 2005;14(5):262-9.
 52. Tol WA, Komproe IH, Jordans MJ, Thapa SB, Sharma B, De Jong JT. Brief multi-disciplinary treatment for torture survivors in Nepal: a naturalistic comparative study. *International Journal of Social Psychiatry*. 2009;55(1):39-56.
 53. Tol WA, Komproe IH, Jordans MJD, Vallipuram A, Sipsma H, Sivayokan S, et al. Outcomes and moderators of a preventive school-based mental health intervention for children affected by war in Sri Lanka: A cluster randomized trial. *World Psychiatry*. 2012;11(2):114-22.
-

54. Tol WA, Komproe IH, Susanty D, Jordans MJ, Macy RD, De Jong JT. School-based mental health intervention for children affected by political violence in Indonesia: a cluster randomized trial. *JAMA*. 2008;300(6):655-62.
55. Urrego Z. Evaluation of results from a single-session psychotherapeutic intervention in population affected by the colombian internal armed conflict. Bogota: MSF, 2009.
56. Vijayakumar L, Kannan GK, Ganesh Kumar B, Devarajan P. Do all children need intervention after exposure to tsunami? *International Review of Psychiatry*. 2006;18(6):515-22.
57. Vijayakumar L, Kumar MS. Trained volunteer-delivered mental health support to those bereaved by Asian Tsunami - An evaluation. *International Journal of Social Psychiatry*. 2008;54(4):293-302.
58. Wagner B, Schulz W, Knaevelsrud C. Efficacy of an Internet-based intervention for posttraumatic stress disorder in Iraq: A pilot study. *Psychiatry Research*. 2012;195(1-2):85-8.
59. Woodside D, Santa Barbara J, Benner DG. Psychological trauma and social healing in Croatia. *Medicine, conflict, and survival*. 1999;15(4):355-67; discussion 91-93.
60. Yeomans PD, Forman EM, Herbert JD, Yuen E. A randomized trial of a reconciliation workshop with and without PTSD psychoeducation in Burundian sample. *Journal of traumatic stress*. 2010;23(3):305-12.
61. Zang Y, Hunt N, Cox T. A randomised controlled pilot study: The effectiveness of narrative exposure therapy with adult survivors of the Sichuan earthquake. *BMC Psychiatry*. 2013;13(41).

References of other reviews in mental health and psychosocial support

1. Tol, W., et al., Mental health and psychosocial support in humanitarian settings: linking practice and research. *Lancet*, 2011. 378: p. 1581-91.
2. Tol WA, Patel V, Tomlinson M, Baingana F, Galappatti A, et al. (2011) Research Priorities for Mental Health and Psychosocial Support in Humanitarian Settings. *PLoS Med* 8(9): e1001096. doi: 10.1371/journal.pmed.1001096

4.6 Non-communicable disease

4.6.1 Systematic review

- The search strategy captured a total of 6107 papers. The vast majority did not discuss humanitarian crises, did not consider the impact of an intervention, or were related to injuries. Eight studies met the inclusion criteria.
 - The 8 studies were published between 1997 and 2014, with 6 of 8 published within the past five years.
 - Seven of the studies were with populations affected by armed conflict, and 1 study was with a population affected by an earthquake.
 - The studies were conducted in Jordan (N=4), Turkey, Afghanistan, Georgia, and India.
 - Five studies used cohort studies, 1 a case series design, 1 an interrupted time series design, and 1 was an RCT. Most papers were moderate or weak in quality
 - NCD outcomes addressed were heart failure, hypertension, diabetes, chronic kidney disease, arthritis, and thalassaemia.
 - Interventions featuring disease-management protocols and/or cohort monitoring (particularly use of electronic patient records) demonstrated the strongest evidence of effectiveness.
 - No studies examined intervention costs.
 - There were no studies on NCD prevention activities.
 - Further details on the 8 studies are provided in Table 17, including data on the outcomes from the interventions.
-

Summary

Considering the global burden of NCDs, this review found a dearth of evidence on interventions against the most prevalent NCDs of cardiovascular/pulmonary disease and cancer. Additionally, nearly all of these studies were conducted in the Middle East. This could be due to prolific disease-specific groups concentrated in these areas, but geographic over-representation is a lesser concern than the absence of evidence on the majority of NCDs in these settings and populations. Thus, high quality studies are required on NCD interventions in humanitarian crises settings in order to be able to demonstrate a significant improvement in health outcomes as a result of the delivery of NCD interventions in complex emergency settings. However, there is substantial evidence on the effectiveness of NCD interventions in stable and development contexts as argued by Ebrahim et al. (2013) with numerous reviews available in the literature (e.g. Araujo et al. 2007, Djulbegovic et al., 2010, Saquibe et al., 2013).

4.6.2 Expert interviews

Key findings from the expert interviews were as follows:

- There was some consensus that NCDs in humanitarian crises were not generally seen as a priority for intervention, nor for research. It was therefore felt that one of the priorities for NCDs should be to make their case as an important public health issue during humanitarian crises.
 - Another priority evidence gap that emerged was around protocols, guidelines and frameworks for NCDs that could be translated to different crisis scenarios. One specific gap cited was in the inclusion of NCDs in the basic package of health care for humanitarian crises.
 - There was a sense that knowledge already exists around what interventions are effective for NCDs but that there was a gap in knowledge around implementation. One expert thought that improvements had been made in effective delivery mechanisms, citing the case of Haiti. However, this review did not uncover any studies from Haiti.
 - Acute conditions, such as kidney injury or complications of NCDs were seen to take precedence. NCDs, in particular hypertension and diabetes, are increasing problems pre-crisis and it was thought that evidence should expand to cover these more diverse health needs.
 - Data collection was seen as a barrier to developing evidence in crisis settings. Assessments of health needs were reliant on verbal accounts of current needs. Conflict zones bore additional problems since it was difficult to continue data collection while working in dangerous conditions, which called the accuracy of data into question. Also, information on resource and infrastructure are often classified in these settings.
 - Ethical approval was cited as a common obstacle to research in crisis settings.
 - Experts proposed that a pre-conflict understanding of NCD needs would assist the understanding of the interventions needed in an emergency. Before and after study designs were recommended, in particular to understand how best to ensure continuity of care and reduction of complications.
 - There was considered to be a lack of follow up of NCD interventions. Longitudinal study designs were recommended.
 - There was felt to be a lack of consideration of older people during crises, who are disproportionately affected by NCDs. Age stratification of these older age groups was therefore recommended.
 - Several experts highlighted the problem of lack of essential drugs for NCDs in emergency kits.
 - Suggestions were made for the development of guidelines and standards centred on sharing learning from other chronic diseases such as HIV/AIDS and tuberculosis.
-

4.6.3 Recommendations for future research

Indicators, standards, and guidelines

- The key priority for NCD research is in the development and testing of standards and guidelines for the delivery of NCD care in crisis settings.
- The evidence base would benefit from an understanding of how current practice varies from new recommended standards and guidelines, in order to develop recommendations for implementation.

Study design

- Attention should be paid to producing higher quality evidence. The evidence base would benefit from before and after, or, longitudinal study designs, with careful consideration of feasibility and cost, bearing in mind the movement of affected populations.
- There is a need for sex and age disaggregated data of the pre-crisis situation.

Delivery of health interventions

- Improvements to the effectiveness of delivery of NCD interventions during crises could be achieved by working with specialists in other health areas. For example, addressing nutritional standards, particularly in camp situations where support is likely to be longer term, would play an important role in the prevention of NCDs.
- Of high priority is identification and inclusion of essential drugs for NCDs into emergency kits and the subsequent evaluation of the basic package of care for humanitarian crises.

Context

- There is a lack of evidence beyond the Middle East region, despite a high prevalence of NCDs in Asia and increasing prevalence in other regions.

References of final selected studies (A and B categories):

Non-communicable diseases (NCDs)

1. Bolt, M.J.D. and B.A. Schoneboom, Operative splenectomy for treatment of homozygous thalassemia major in afghan children at a US military hospital. *AANA Journal*, 2010. 78(2): p. 129-133.
 2. Khader, A., et al., Cohort monitoring of persons with hypertension: An illustrated example from a primary healthcare clinic for Palestine refugees in Jordan. *Tropical Medicine and International Health*, 2012. 17(9): p. 1163-1170.
 3. Hebert, K., et al., Feasibility of a heart failure disease management program in eastern Europe: Tbilisi, Georgia. *Circulation: Heart Failure*, 2011. 4(6): p. 763-9.
 4. Khader, A., et al., Cohort monitoring of persons with diabetes mellitus in a primary healthcare clinic for Palestine refugees in Jordan. *Tropical Medicine & International Health*, 2012. 17(12): p. 1569-76.
 5. Khader, A., et al., Treatment outcomes in a cohort of Palestine refugees with diabetes mellitus followed through use of E-Health over 3 years in Jordan. *Tropical Medicine & International Health*, 2014. 19(2): p. 219-23.
 6. Khader, A., et al., Diabetes mellitus and treatment outcomes in Palestine refugees in UNRWA primary health care clinics in Jordan. *Public Health Action*, 2014. 3(4): p. 259-264.
 7. Sever, M.S., et al., Features of Chronic Hemodialysis Practice after the Marmara Earthquake. *Journal of the American Society of Nephrology*, 2004. 15(4): p. 1071-1076.
 8. Ryan, M., Efficacy of the Tibetan treatment for arthritis. *Social Science & Medicine*, 1997. 44(4): p. 535-9.
-

Examples of references of NCD-related reviews:

1. Araujo, D., et al. (2007). "Cost-effectiveness and budget impact analysis of rosuvastatin and atorvastatin for LDL-cholesterol and cardiovascular events lowering within the SUS scenario." *Int J Atheroscler* 2(3): 189 - 194.
 2. Djulbegovic, M., et al. (2010). "Screening for prostate cancer: systematic review and meta-analysis of randomised controlled trials." *BMJ* 341.
 3. Saquib, N., et al. (2012). "Cardiovascular diseases and Type 2 Diabetes in Bangladesh: A systematic review and meta-analysis of studies between 1995 and 2010." *BMC Public Health* 12(1): 434.
 4. Ebrahim, S., et al. (2013). "Tackling Non-Communicable Diseases In Low- and Middle-Income Countries: Is the Evidence from High-Income Countries All We Need?" *PLoS Med* 10(1): e10017
-

Table 17: NCD Intervention Studies in Humanitarian Crisis Settings, 1980 – 2014

Author, date	Setting	NCD type	Intervention	Outcome measured	Results
Bolt et al., 2010	Afghanistan (US Military Hospital)	Thalassaemia	palliative splenectomy (programme of undeclared duration)	change in mean Hgb/Hct change in mean blood transfusion frequency complications encountered	Hgb: 5.4g/L pre-op to 8.7g/L post-op Hct: 16.5% pre-op to 26.3% post-op Transfusion: every 24 days pre-op to every ~50 days post-op Complications: 2 pre-op deaths; 1 post-op respiratory distress; 1 transfusion reaction; 1 case CHF post-transfusion
		45 paediatric patients aged 13mos-11yrs			
Khader et al., 2012	Jordan (Nuzha primary care clinic for Palestinian refugees)	Hypertension	Standardised hypertension algorithm, including: • diet/lifestyle management • graduated anti-hypertensive medications • referral if HTN persists • screening for HTN complications and associated conditions (e.g.: DM) • quarterly follow-up appointments Cohort monitored via EMR for up to 2.5-years	HTN clinical measures: • BP • glucose, cholesterol, kidney function (creatinine) testing • medications used Cohort Monitoring: • incidence/prevalence of HTN • clinic attendance (%); missed appointments; loss to f/u	4130 patients with HTN registered in EMR (cumulative, 2.5 years): • 76% remain in care • 74% of those had BP checked • 74% of those checked had BP <140/90 mmHg • 15% had 1+ complications 226 patients assessed for 12-15-month outcomes: • 62% remain in care • 76% of those meeting BP target (<140/90 mmHg) • 3% glucose (DM) screened; 100% cholesterol screened; 99% creatinine screened • 8% had 1+ complications
		4130 patients diagnosed with HTN			
Hebert et al., 2011	Georgia (1 urban hospital and 3 rural districts)	Heart Failure	2-year HFDMP: • Physician training; salary support • Equipment supplied • Patient education • Free outpatient care	change in: • ejection fraction (EF) (mean) • BP (mean) • BMI (mean) • smoking status • health services and medication usage • NYHA HF class	400 patients studied: 337 complete f/u, 51 lost to f/u, 12 died in war • EF: increase 4.1±2.6% (p<0.001) • BP: SBP decrease 30.9±20.0 mmHg (p<0.001); DBP decrease 17.8±13.0 mmHg (p<0.001) • BMI statistically unchanged • Smokers decrease 18.3% (p<0.001) • ER use decrease 40.7% (p<0.001); hospital admission decrease 52.5% (p<0.001) • Beta-blocker use increase 73.3% (p<0.001) • NYHA HF class: increase in Class I (+13.7%) and Class II (+19.2%); decrease in Class III (-26.0%) and Class IV (-6.8%) • Patients lost to f/u more likely rural
		400 adult heart failure patients			

Author, date	Setting	NCD type	Intervention	Outcome measured	Results
Khader et al., 2012	Jordan (Nuzha primary care clinic for Palestinian refugees)	Diabetes Mellitus	Standardised DM algorithm, including: <ul style="list-style-type: none"> diet/lifestyle management graduated anti-DM medications, including insulin if necessary screening for DM complications and associated conditions (e.g.: HTN) quarterly follow-up appointments Cohort monitored via EMR up to 2.5 years	DM clinical measures: <ul style="list-style-type: none"> 2-hr post-prandial blood glucose BP, cholesterol, kidney function (creatinine) testing; foot assessment; ophthalmology referral medications used Cohort Monitoring: <ul style="list-style-type: none"> incidence/prevalence of DM clinic attendance (%); missed appointments; loss to f/u 	2851 patients with DM registered in EMR (cumulative, 2.5 years): <ul style="list-style-type: none"> 70% remain in care 42% of those had 2h-PPBG checked 50% of those checked had PPBG \leq180 mg/dl 18% had 1+ complications 117 patients assessed for 12-15-month outcomes: <ul style="list-style-type: none"> 61% remain in care 58% of those meeting DM target (\leq180 mg/dl) 100% cholesterol screened; 99% creatinine screened; 3% foot checked; no data on ophthalmology referrals 10% had 1+ complications
		2851 patients with DM			
Khader et al., 2014	Jordan (Nuzha primary care clinic for Palestinian refugees)	Diabetes Mellitus	Standardised DM algorithm, including: <ul style="list-style-type: none"> diet/lifestyle management graduated anti-DM medications, including insulin if necessary screening for DM complications and associated conditions (e.g.: HTN) quarterly follow-up appointments Cohort monitored via EMR for up to 3 years	DM clinical measures: <ul style="list-style-type: none"> 2-hr post-prandial blood glucose BP, cholesterol, kidney function (creatinine) testing; BMI DM complications Cohort Monitoring: <ul style="list-style-type: none"> baseline prevalence of DM clinic attendance (%); missed appointments; loss to f/u 	119 patients with DM assessed at 12-, 24-, and 36-months: <ul style="list-style-type: none"> 72/64/61% remaining in care at 12-/24-/36-months (2 test-for-trend = 47.9; p<0.001) 9/19/29% lost to f/u at 12-/24-/36-months (2 test-for-trend = 43.5; p<0.001) 71/78/71% meeting DM goal (PPBG \leq180 mg/dl) at 12-/24-/36-months 71/14/15% with 1+ complications at 12-/24-/36-months
		119 patients with DM			
Khader et al., 2014	Jordan (6 primary care clinics for Palestinian refugees)	Diabetes Mellitus	Standardised DM algorithm, including: <ul style="list-style-type: none"> diet/lifestyle management graduated anti-DM medications, including insulin if necessary screening for DM complications and assoc. conditions (e.g.: HTN) quarterly follow-up appointments Cohort monitored via EMR across 6 clinics (up to 2 years at 5 clinics, 3.5 years at 1 clinic)	DM clinical measures: <ul style="list-style-type: none"> 2-hr post-prandial blood glucose BP, cholesterol, kidney function (creatinine) testing; BMI; foot assessment; ophthalmology referral DM complications and associated risk factors Cohort Monitoring: <ul style="list-style-type: none"> incidence/prevalence of DM clinic attendance (%); missed appointments; loss to f/u 	12550 patients with DM registered in EMR (cumulative; 2 years at 5 clinics, 3.5 years at 1 clinic): <ul style="list-style-type: none"> 78% remaining in care Males more likely to be smokers (OR M:F = 7.4 (CI 6.6-8.2; p<0.001)) and inactive (OR M:F = 1.8 (CI 1.6-1.9; p<0.001)) and to have 1+ complications (OR M:F = 1.6 (CI 1.4-1.8; p<0.001)) Females more likely obese (OR M:F = 0.34 (CI 0.32-0.37; p<0.001)) 99% had PPBG measured; 65% at goal (\leq180 mg/dl) 99% had cholesterol measured; 63% at goal (<200 mg/dl) 99% had BP measured; 87% at goal (<140/90 mmHg) 100% had BMI measured; 40% non-obese (<30 kg/m²)
		12550 patients with DM on 288 newly registered cases			

Author, date	Setting	NCD type	Intervention	Outcome measured	Results
Sever et al., 2004	Turkey (8 HD centres in Marmara region)	Chronic Kidney Disease 8 HD centres responsible for 439 patients with chronic kidney disease	Haemodialysis	Clinical outputs of HD centres: <ul style="list-style-type: none"> Total number of HD visits % patients receiving weekly HD Clinical outcomes: <ul style="list-style-type: none"> Patient weight; BP HD infrastructure: <ul style="list-style-type: none"> Number of HD centres, machines, patients served 	8 HD centres assessed: <ul style="list-style-type: none"> HD machines: 95 pre-earthquake; 74 (1mo) and 79 (3mos) post-earthquake HD personnel: 112 pre-earthquake; 86 (1mo) and 94 (3mos) post-earthquake HD patients: 439 pre-earthquake; 175 (1wk), 239 (1mo), and 288 (3mos) post-earthquake HD sessions: 1093/wk pre-earthquake; 520/wk (1wk), 616/wk (1mo), and 729/wk (3mos) post-earthquake % weekly HD: 2.3% pre- to 7.2% 1wk-post-earthquake Interdialytic weight gain: 2.9±1.1kg pre- to 2.6±1.1kg 1wk-post-earthquake BP stable throughout
Ryan, 1997	India (Tibetan refugee settlements)	Arthritis 28 patients with arthritis (24 OA, 4 RA, in 14 matched pairs)	Traditional Tibetan arthritis treatment (3 mos): <ul style="list-style-type: none"> herbal pills dietary restriction behavioural advice Western arthritis treatment (3 mos): <ul style="list-style-type: none"> Ibuprofen or Indomethacin 	Limb mobility assessed via praxis-based scale (0-5) for active movement Pain assessed via Visual Analogue Scale	Limb mobility: <ul style="list-style-type: none"> Traditional Tibetan treatment led to greater improvement in 12/14 matched pairs; 2 pairs were a draw Mean improvement 1.39 (SD 0.59) points using traditional Tibetan treatment; 0.57 (SD 0.33) points using Western treatment Pain: <ul style="list-style-type: none"> Western treatment led to better pain improvement (data not given)

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Health outcome(s)	Intervention type (1)	Intervention type (2)	Intervention type (3)	Age group	Evidence category
Pityaratstian et al, 2007	Thailand	Rural	General	Natural disaster	PTSD	CBT			School children	A
Priebe S et al, 2010	Serbia and Croatia	Urban & rural	General	Armed conflict	PTSD, functioning, costs	Psychological support			adults	B
Qouta SR et al, 2012	Palestine	Urban	General	Armed conflict	PTSD	Recovery techniques			School children	A
Salcioglu E, 2007	Turkey	Urban & rural	General	Natural disaster	PTSD	CBT			adults	A
Selimbasic Z et al, 2001	Bosnia and Herzegovina	Urban & rural	Refugees	Armed conflict	PTSD	Psychotherapy			School children	B
Shooshtrary MH et al, 2008	Iran	Urban	General	Natural disaster	PTSD	CBT			adolescents	A
Sonderegger R et al, 2011	Uganda	Camp	IDPs	Armed conflict	Functioning	CBT			adults	A
Staples JK et al, 2011	Palestine	Urban & rural	General	Armed conflict	PTSD, depression, hopelessness	Mind-body techniques			adolescents	A
Telles S et al, 2007	Andaman Islands	Rural	General	Natural disaster	Distress	Yoga			adults	A
Telles S et al, 2010	India	Rural	General	Natural disaster	Distress	Yoga			adults	A
Thabet AA et al, 2005	Palestine	Camp	Refugees	Armed conflict	PTSD, depression	Play therapy	Psychoeducation		School children	A
Tol W et al, 2008	Indonesia	Urban & rural	General	Armed conflict	PTSD, depression, anxiety	School-based psychosocial			School children	A
Tol W et al, 2009	Nepal	Urban & rural	IDP and general	Armed conflict	Various	Mixed psychosocial			adults	A
Tol W et al, 2012	Sri Lanka	Urban & rural	General	Armed conflict	PTSD, depression, anxiety	CBT	Play therapy	Recreational	adolescents	A

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Health outcome(s)	Intervention type (1)	Intervention type (2)	Intervention type (3)	Age group	Evidence category
Urrago Z et al, 2009	Colombia	Urban & rural	General	Armed conflict	Depression, general mental health	Psychotherapy			adults	B
Vijayakumar L et al, 2006	India	Urban	General	Natural disaster	Various	Mixed psychosocial			School children	A
Vijayakumar L et al, 2008	India	Urban	General	Natural disaster	PTSD, depression, general mental health	Emotional support			adults	A
Wagner B et al, 2012	Iraq	Urban & rural	General	Armed conflict	PTSD, depression, functioning	Internet-based CBT			adults	A
Woodside D et al, 1999	Croatia	Urban	General	Armed conflict	PTSD	Psychoeducation			School children	B
Yeomans PD et al, 2010	Burundi	Rural	General	Armed conflict	PTSD	Psychoeducation			adults	B
Zang Y et al, 2013	China	Urban & rural	General	Natural disaster	PTSD, depression, anxiety	Narrative exposure therapy	Mind-body techniques		adults	A

4.7 Injury and physical rehabilitation

4.7.1 Systematic review

- The combined search strategies captured a large number of peer-reviewed articles broadly related to injury and rehabilitation (n=4798). Following full review, a combined total of 47 articles met the inclusion criteria, and were related to injury and rehabilitation-related public health interventions in humanitarian crises.
- A small number of papers (n=18) evaluated health outcomes and quoted some form of significance test (category A).
- 29 articles described health outcomes following surgical, medical, and rehabilitative interventions, but did not draw a statistical association between the intervention and the stated outcome (category B).
- Each paper was quality-assessed using an adaptation based on the STROBE criteria for observational studies. Only 4% (n=2) papers were of high quality. No papers met the full STROBE criteria as sample size calculations were often absent.
- Both the quantity and quality of papers increased over the course of the last 23 years. 57% (n=27) of the papers in this study were published between 2000 and 2013. 81% (n=38) of the higher quality studies were published between 2000 and 2013 (Figure 21).

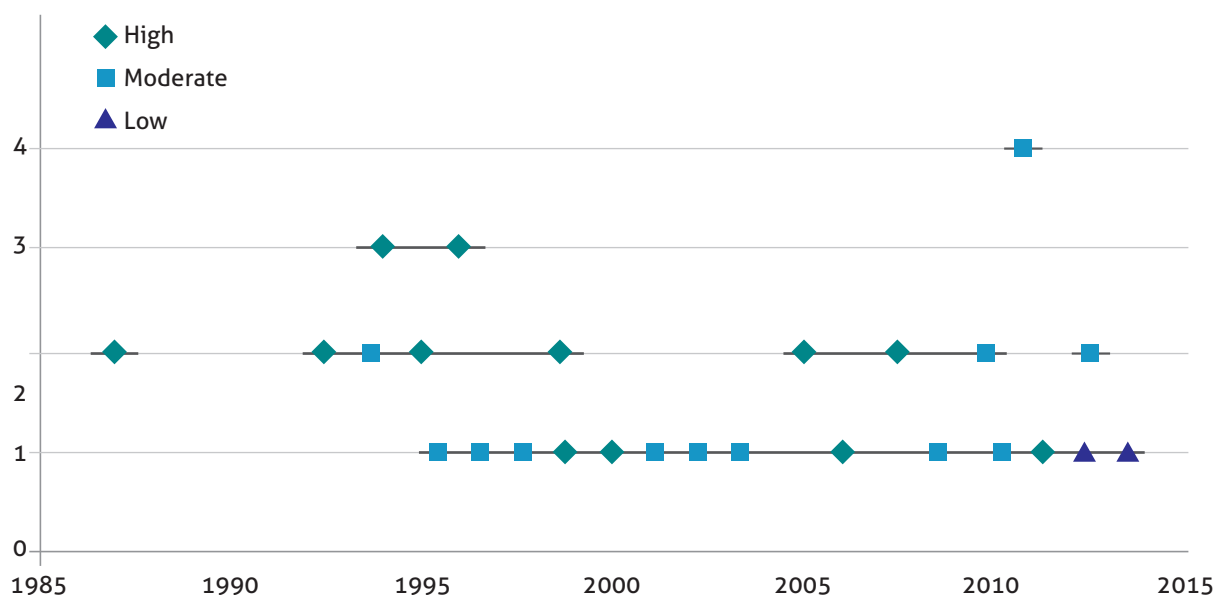


Figure 21: Quantity and quality of injury rehabilitation publications over time 1980-2013

- The majority of studies were cross-sectional in design (n=30; 64%), followed by uncontrolled longitudinal studies (n=11; 23%). A single economic study investigated the cost-effectiveness of short-term orthopaedic missions in relief and elective contexts. Five studies were non-random trials.
- The majority of studies were based on injuries seen in Asia (n=16; 34%). Ten of the Asian studies (63%) were specifically related to the 2008 Wenchuan Earthquake, Central China. The second most studied region was Eastern Europe, with 14 studies (30%). All of these studies related to conflict in the Former Yugoslavia in the 1990s. See Figure 22.

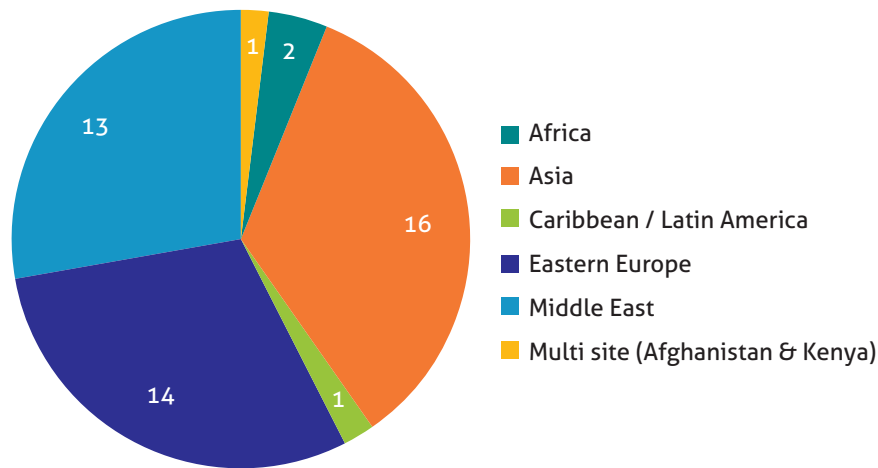


Figure 22: Geographic regions for injury rehabilitation studies

- 62% (n=29) of the studies were conducted in conflict settings, or with patients who had suffered conflict-related injuries.
- The majority of papers reviewed or collected data from the acute phase of a crisis (n=39; 83%). A small number of papers looked at health outcomes in the early recovery and stabilisation phases (n=4 and n=4 respectively). No papers were identified that examined the relationship between preparedness and health outcomes (See Figure 23).

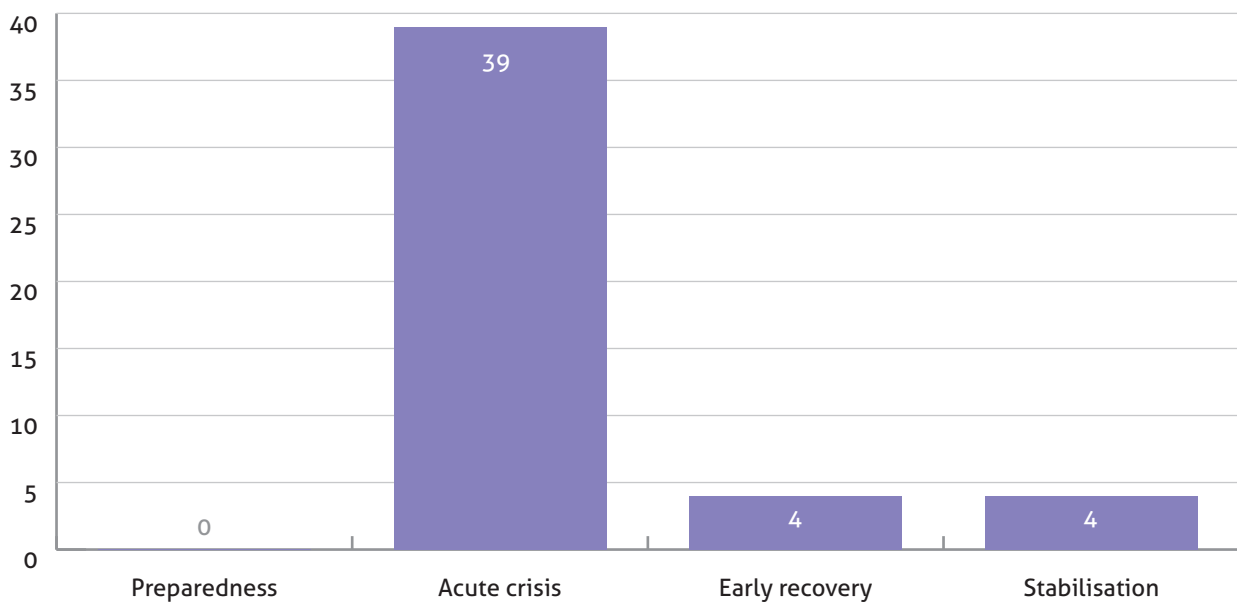


Figure 23: Injury rehabilitation studies by crisis stage

- 98% of the papers described interventions for the general population (n=46).
- The majority of the papers were set in a mixed urban-rural environment (n=34; 72%). Four papers focused specifically on urban areas, while a further 9 papers focused on rural settings.
- The majority of the papers examined a range of orthopaedic injuries (n=15; 32%), of which the repair of fractures featured prominently (Figure 24).

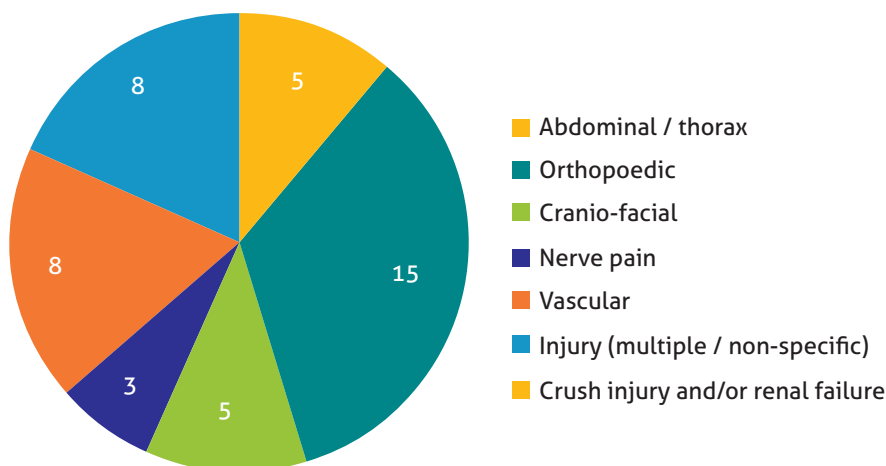


Figure 24: Health outcomes measured by injury rehabilitation studies

- Twenty-two of the forty seven studies described a range of surgical interventions (47%). Six papers looked at surgical external and internal fixation techniques in particular (13%). This type of operation was the focal point of published research more frequently than any other complex surgical technique. Nine papers described different forms of renal therapy, and / or fasciotomy (19%). A further four papers looked at health outcomes following limb amputation specifically (9%), while four papers evaluated different forms of rehabilitation (9%) (Figure 25).

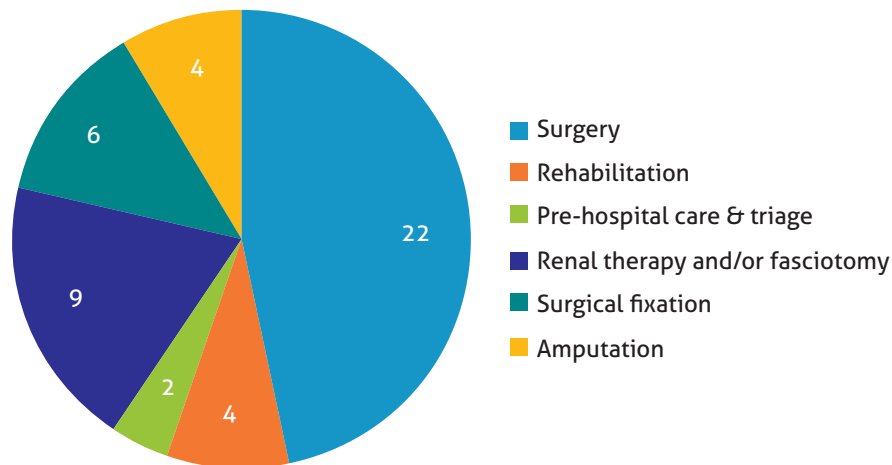


Figure 25: Injury rehabilitation intervention types

Summary

Injury and rehabilitation is characterised by a strong focus on surgery and medical care. The rehabilitation aspect of the area has been limitedly documented by researchers. The number of publications significantly increased during the period 2000 and 2013, which may indicate a growing interest from researchers and implementers to conduct research in humanitarian crises. However, as confirmed by a recent review (Nickerson et al., 2012), the quality of the studies remains quite low and further improvement could be made by diversifying the type of study designs by introducing more RCTs in this field of investigation. One has to mention that a large volume of evidence from more stable settings can be analysed (e.g. van Middendorp et al., 2013, Koea et al. 2014, Lemmi et al., 2014)

4.7.2 Expert interviews

- Evidence for rehabilitation-related interventions is particularly limited and currently there are no major research initiatives in this field.
- Research related to injury and rehabilitation is limited among operational NGOs and is rarely integrated into programmes.
- Patients suffering from physical injury, and requiring rehabilitation, need continued care and follow up; in this sense management is comparable to that of non-communicable diseases. As such, it is crucial that local service providers are able to maintain the services delivered during the emergency phase. This has been challenging in a number of different contexts.
- Experience of armed conflict – specifically civil war – in middle-income countries has forced practitioners to adapt their standards and model for interventions: the technologies used were upgraded, competency within the local health system was better harnessed, and it was possible to import materials.
- Many of the studies were conducted by surgeons, and are based on their experiences during crises.

- Research related to injury and rehabilitation has largely focused on the clinical and technical aspects of an intervention, as practitioners wanted to test different protocols and technologies.
- The progress made with new technologies means that research can now focus on under-researched aspects of crisis interventions, such as service delivery and health systems. Several guidelines are available on surgery and orthopaedics. At the individual level, professionals know what services they have to deliver. The challenge remains with whom to work, how to integrate rehabilitation into the general health system, and how to integrate local services when establishing an acute intervention.
- Research also focused on demonstrating that people with disabilities should not be excluded from mainstream services offered by humanitarian organisations. Physical and communication obstacles experienced by people with disabilities during the acute emergency phase create barriers to access to services. However, the complexity of this situation has not been fully explored.
- The aftermath of the 2010 Haitian earthquake required extensive surgical and rehabilitative interventions. The scale of the interventions and the difficulties met by operational actors generated new questions related to the capacity of humanitarian organisations to intervene in such contexts.

4.7.3 Recommendations for future research

Study design

- More evidence is needed on the effectiveness and cost-effectiveness of rehabilitative interventions. More before and after studies are needed to assess the impact of interventions.
- There is a need for more high quality, methodologically robust, evidence and studies that assess long-term health outcomes. While there is a reasonable quantity of evidence related to injury, much of this evidence is low quality, cross-sectional in nature, and conducted by clinical practitioners.
- Follow-up studies would enable better assessment of long-term health outcomes, functionality, and quality of life (e.g. standardised assessment forms for physical function as well as environmental factors in disaster victims to enable comparative research). In particular, there is a lack of high-quality evidence related to the effect of rehabilitative interventions on physical disabilities.
- More research is needed to better understand the mechanisms that enable a continuum of care as programmes transition from the acute to the longer term, development phase.

Indicators, standards, and guidelines

- Research is needed to develop appropriate quality standards and measurements of service performance.

Context

- More research should be conducted during crises in Africa and the Americas in order to develop an evidence base for context-specific interventions.
- More evidence must be collected following natural disasters, as illustrated by the response to the 2010 Haitian Earthquake.
- More evidence must be collected related to physical rehabilitation in refugee camp contexts.
- More studies are needed that evaluate interventions in the preparedness phase, and the subsequent impact they have on health outcomes.

Delivery of health interventions

- More research is needed on how to integrate rehabilitation into the general health system, and how to integrate local services in the delivery of humanitarian health interventions.
 - More research is needed to understand the complexity of mainstreaming disability into humanitarian health interventions.
-

References (A and B categories): Injury and physical rehabilitation

1. Amirjamshidi, A., K. Abbassioun, and H. Rahmat, Minimal debridement or simple wound closure as the only surgical treatment in war victims with low-velocity penetrating head injuries. Indications and management protocol based upon more than 8 years follow-up of 99 cases from Iran-Iraq conflict. *Surgical Neurology*, 2003. 60(2): p. 105-10; discussion 110-1.
 2. Atef MR, et al. Acute renal failure in earthquake victims in Iran: epidemiology and management. *Quarterly Journal of Medicine*, 1994. 87: p. 35-40.
 3. Bazardzanovic, M., et al., Craniocerebral injuries in combat soldiers treated at the Sapna war hospital, Bosnia and Herzegovina. *Croatian Medical Journal*, 1998. 39(4): p. 446-9.
 4. Bumbasirevic, M., et al., War-related infected tibial nonunion with bone and soft-tissue loss treated with bone transport using the Ilizarov method. *Archives of Orthopaedic & Trauma Surgery*, 2010. 130(6): p. 739-49.
 5. Chen, E., et al., Management of gas gangrene in Wenchuan earthquake victims. *Journal of Huazhong University of Science and Technology. Medical Sciences*, 2011. 31(1): p. 83-7.
 6. de Wind, C.M., War injuries treated under primitive circumstances: experiences in an Ugandan mission hospital. *Annals of the Royal College of Surgeons of England*, 1987. 69(5): p. 193-5.
 7. Dedic, S.D., M. Budalica, and M. Bazardzanovic, Treatment of penetrating chest injuries during the 1992-1995 war in Bosnia and Herzegovina. *Croatian Medical Journal*, 1998. 39(4): p. 442-445.
 8. Dubravko, H., et al., External fixation in war trauma management of the extremities--experience from the war in Croatia. *Journal of Trauma-Injury Infection & Critical Care*, 1994. 37(5): p. 831-4.
 9. Ebrahimzadeh, M.H. and M.T. Rajabi, Long-term outcomes of patients undergoing war-related amputations of the foot and ankle. *Journal of Foot & Ankle Surgery*, 2007. 46(6): p. 429-33.
 10. Fakri, R.M., et al., Reconstruction of nonunion tibial fractures in war-wounded Iraqi civilians, 2006-2008: better late than never. *Journal of Orthopaedic Trauma*, 2012. 26(7): p. e76-82.
 11. Gosselin, R.A., G. Gialamas, and D.M. Atkin, Comparing the cost-effectiveness of short orthopedic missions in elective and relief situations in developing countries. *World Journal of Surgery*, 2011. 35(5): p. 951-5.
 12. Gosselin, R.A., et al., Outcome of arterial repairs in 23 consecutive patients at the ICRC-Peshawar hospital for war wounded. *Journal of Trauma-Injury Infection & Critical Care*, 1993. 34(3): p. 373-6.
 13. Gousheh, J., The treatment of war injuries of the brachial plexus. *Journal of Hand Surgery - American Volume*, 1995. 20(3 Pt 2): p. S68-76.
 14. Hammer, R.R., et al., Simplified external fixation for primary management of severe musculoskeletal injuries under war and peace time conditions. *Journal of Orthopaedic Trauma*, 1996. 10(8): p. 545-54.
 15. Has, B., et al., Minimal fixation in the treatment of open hand and foot bone fractures caused by explosive devices: case series. *Croatian Medical Journal*, 2001. 42(6): p. 630-3.
 16. Hudolin, T. and I. Hudolin, The role of primary repair for colonic injuries in wartime. *British Journal of Surgery*, 2005. 92(5): p. 643-7.
 17. Jevtic, M., et al., Treatment of wounded in the combat zone. *Journal of Trauma-Injury Infection & Critical Care*, 1996. 40(3 Suppl): p. S173-6.
 18. Jiang, J., et al., Lessons learnt from the Wenchuan earthquake: Performance evaluation of treatment of critical injuries in hardest-hit areas. *Journal of Evidence-based Medicine*, 2012. 5(3): p. 114-123.
 19. Leininger, B.E., et al., Experience with wound VAC and delayed primary closure of contaminated soft tissue injuries in Iraq. *Journal of Trauma-Injury Infection & Critical Care*, 2006. 61(5): p. 1207-11.
 20. Li, C.-y., et al., Continuous renal replacement therapy and blood transfusions in treating patients with crush syndrome: 8 Case studies from the Wenchuan earthquake. *Transfusion & Apheresis Science*, 2011. 45(3): p. 257-60.
-

21. Li, W., et al., Management of severe crush injury in a front-line tent ICU after 2008 Wenchuan earthquake in China: an experience with 32 cases. *Critical Care (London, England)*, 2009. 13(6): p. R178.
 22. Li, Y., et al., Evaluation of functional outcomes of physical rehabilitation and medical complications in spinal cord injury victims of the Sichuan earthquake. *Journal of Rehabilitation Medicine*, 2012. 44: p. 534-540.
 23. Liu, L., et al., The use of external fixation combined with vacuum sealing drainage to treat open comminuted fractures of tibia in the Wenchuan earthquake. *International Orthopaedics*, 2012. 36(7): p. 1441-7.
 24. Liu, L., et al., Treatment for 332 cases of lower leg fracture in "5.12" Wenchuan earthquake. *Chinese Journal of Traumatology - English Edition*, 2010. 13(1): p. 10-14.
 25. Lovric, Z., et al., War injuries of major extremity vessels. *Journal of Trauma-Injury Infection & Critical Care*, 1994. 36(2): p. 248-51.
 26. Marcikic, M., A. Melada, and R. Kovacevic, Management of war penetrating craniocerebral injuries during the war in Croatia. *Injury*, 1998. 29(8): p. 613-8.
 27. Moreels, R., et al., Wartime colon injuries: Primary repair or colostomy? *Journal of the Royal Society of Medicine*, 1994. 87(5): p. 265-267.
 28. Motamedi, M.H., et al., Rehabilitation of war-injured patients with implants: analysis of 442 implants placed during a 6-year period. *Journal of Oral & Maxillofacial Surgery*, 1999. 57(8): p. 907-13; discussion 914-5.
 29. Mulvey, J.M., A.A. Qadri, and M.A. Maqsood, Earthquake injuries and the use of ketamine for surgical procedures: The Kashmir experience. *Anaesthesia and Intensive Care*, 2006. 34(4): p. 489-494.
 30. Natafi I., et al., Suggested guidelines for treatment of acute renal failure in earthquake victims. *Renal Failure*, 1997. 19(5): P. 655-664.
 31. Nikolic, D., et al., Missile injuries of the knee joint. *Injury*, 2000. 31(5): p. 317-24.
 32. Ozturk S, et al. The effect of the type of membrane on intradialytic complications and mortality in crush syndrom. *Renal Failure*, 2009. 31: p. 655-61.
 33. Rautio, J. and P. Paavolainen, Delayed treatment of complicated fractures in war wounded. *Injury*, 1987. 18(4): p. 238-40.
 34. Roostar, L., Treatment plan used for vascular injuries in the Afghanistan war. *Cardiovascular Surgery*, 1995. 3(1): p. 42-5.
 35. Roy, N., et al., Surgical and psychosocial outcomes in the rural injured--a follow-up study of the 2001 earthquake victims. *Injury*, 2005. 36(8): p. 927-34.
 36. Safari, S., et al., Outcomes of fasciotomy in patients with crush-induced acute kidney injury after bam earthquake. *Iranian journal of Kidney Diseases*, 2011. 5(1): p. 25-28.
 37. Sagheb MM., et al. Effect of fluid therapy on prevention of acute renal failure in Bam Earthquake crush victims. *Renal Failure*, 2008. 30: p. 831-35.
 38. Sever, M.S., et al., Treatment modalities and outcome of the renal victims of the Marmara earthquake. *Nephron*, 2002. 92(1): p. 64-71.
 39. Splavski, B., et al., Early management of war missile spine and spinal cord injuries: experience with 21 cases. *Injury*, 1996. 27(10): p. 699-702.
 40. Sprem, N., S. Branica, and K. Dawidowsky, Tympanoplasty after war blast lesions of the eardrum: retrospective study. *Croatian Medical Journal*, 2001. 42(6): p. 642-5.
 41. Stanec, Z., et al., The management of war wounds to the extremities. *Scandinavian Journal of Plastic & Reconstructive Surgery & Hand Surgery*, 1994. 28(1): p. 39-44.
 42. Strada, G., et al., Large bowel perforations in war surgery: one-stage treatment in a field hospital. *International Journal of Colorectal Disease*, 1993. 8(4): p. 213-6.
-

43. Tajsic, N.B. and H. Husum, Reconstructive surgery including free flap transfers can be performed in low-resource settings: experiences from a wartime scenario. *Journal of Trauma-Injury Infection & Critical Care*, 2008. 65(6): p. 1463-7.
44. Xiao, M., et al., Factors affecting functional outcome of Sichuan-earthquake survivors with tibial shaft fractures: a follow-up study. *Journal of Rehabilitation Medicine*, 2011. 43(6): p. 515-20.
45. Zangana, A.M., Penetrating liver war injury: a report on 676 cases, after Baghdad invasion and Iraqi civilian war April 2003. *Advances in Medical and Dental Sciences*, 2007. 1(1): p. 10-14.
46. Zhang, X., et al., Functional outcomes and health-related quality of life in fracture victims 27 months after the Sichuan earthquake. *Journal of Rehabilitation Medicine*, 2012. 44(3): p. 206-9.
47. Zhang, X., et al., The NHV Rehabilitation Services Program Improves Long-Term Physical Functioning in Survivors of the 2008 Sichuan Earthquake: A Longitudinal Quasi Experiment. *PLoS ONE*, 2013. 8(1).

Exemples of other systematic reviews in Injury and Rehabilitation

1. van Middendorp, J. J., et al. (2013). "The effects of the timing of spinal surgery after traumatic spinal cord injury: a systematic review and meta-analysis." *J Neurotrauma* 30(21): 1781-1794.
 2. Koea, J. B., et al. (2014). "Provision of acute general surgery: A systematic review of models of care." *Journal of Trauma and Acute Care Surgery* 76(1): 219-225 210.1097/TA.1090b1013e3182a92481.
 3. Lemmi, V., et al., (2014). *Community-based rehabilitation for people with physical and mental disabilities in low and middle income countries*. London, LSHTM, 3iE.
-

Table 18. Injury and Physical Rehabilitation Intervention Studies in Humanitarian Crisis Settings, 1980 – 2014

Study author	Year	Study country	Setting	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health intervention	Study design	Evidence category
Amirjamshidi	2003	Iran	Urban & rural	Armed Conflict	Acute crisis	Low velocity penetrating head injuries	Minimal wound debridement (suture, referral)	Cohort	B
Atef	1993	Iran	Urban & rural	Natural Disaster	Acute crisis	Range of physical injuries, acute renal failure	Intensive medical management (hydration, regular review, haemodialysis)	Non-Random Trial	A
Bazardzanovic	1998	Bosnia and Herzegovina	Rural	Armed Conflict	Acute crisis	Cranocerebral injuries	Application of first aid and medical care (exploration of wounds, treatment, antibiotic)	Cross-Sectional	B
Bumbasirevic	2010	Serbia	Urban & rural	Armed Conflict	Acute crisis	Infected tibial nonunion after open fractures (refracture, infection, need for amputation)	Radical bony and soft tissue resection and bone transport - Iliza technique	Cohort	B
Chen	2011	China	Urban & rural	Natural Disaster	Acute crisis	Gas gangrene infection	Surgical treatment, quarantine antibiotics	Cohort	B
De Wind	1987	Uganda	Urban	Armed Conflict	Acute crisis	Missile injuries (healing, disability, union of fractures)	Surgical procedures in a resource limited setting	Cohort	B
Dediae	1998	Bosnia & Herzegovina	Urban & rural	Armed Conflict	Acute crisis	Penetrating chest injuries (infection, mortality)	Thoracotomy, conservative treatment (thoracostomy and/or thoracocentesis)	Cross-Sectional	A
Dubravko	1994	Croatia	Urban & rural	Armed Conflict	Acute crisis	Fracture of the extremities (complications, healing)	External fixation	Cross-Sectional	B
Ebrahimzadeh	2007	Iran	Urban & rural	Armed Conflict	Stabilisation	Lower extremity injuries (pain, employment, psychological problems)	Foot / ankle amputation	Cohort	B
Fakri	2012	Jordan	Urban & rural	Armed Conflict	Acute crisis	Infected and non-infected tibial non-union (recurrence of infection, readmission, non-union, mortality)	Amputation and / or reconstruction	Cohort	A

Study author	Year	Study country	Setting	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health intervention	Study design	Evidence category
Gosselin	2011	Haiti & Dominican Republic	Urban & rural	Natural Disaster	Acute crisis	Orthopaedic trauma (DALYs averted)	Orthopaedic surgery	Economic Study	B
Gosselin	1993	Pakistan	Rural	Armed Conflict	Acute crisis	Acute arterial injury - revascularisation	Amputation and / or revascularisation procedures	Cohort	A
Gousheh	1995	Iran	Urban & rural	Armed Conflict	Acute crisis	Brachial plexus injuries	Surgery (nerve grafts etc)	Cohort	B
Hammer	1996	Somalia	Urban	Armed Conflict	Acute crisis	Musculoskeletal injury of extremities	Unilateral external fixation device - hammer external fixation system (HEFS)	Cohort	B
Has	2001	Croatia	Urban & rural	Armed Conflict	Acute crisis	Open fractures of the hands and feet	Minimal fixation method with Kirschner's wires	Cross-Sectional	B
Hudolin	2005	Bosnia & Herzegovina	Urban & rural	Armed Conflict	Acute crisis	Penetrating colonic injury (complications, mortality)	Primary repair, colostomy	Cross-Sectional	B
Jevtic	1996	Bosnia & Herzegovina	Urban & rural	Armed Conflict	Acute crisis	Range of physical injuries	First aid and evacuation	Cross-Sectional	B
Jiang	2012	China	Urban & rural	Natural Disaster	Acute crisis	Range of physical injuries	Medical, surgical and rehabilitation care	Cross-Sectional	B
Leininger	2006	Iraq	Urban & rural	Armed Conflict	Acute crisis	Range of physical injuries	Surgery, vacuum-assisted surgical dressings	Cross-Sectional	B
Li	2012	China	Rural	Natural Disaster	Early recovery	Spinal cord injuries	Institutional rehabilitative programme	Cohort	A
Li	2009	China	Urban & rural	Natural Disaster	Acute crisis	Crush injuries	Intensive care unit (haemodialysis, prompt medical treatment)	Cross-Sectional	A
Li	2011	China	Urban & rural	Natural Disaster	Acute crisis	Crush injuries	Renal replacement therapy and blood transfusion	Cross-Sectional	A

Study author	Year	Study country	Setting	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health intervention	Study design	Evidence category
Liu	2010	China	Urban & rural	Natural Disaster	Acute crisis	Lower leg fracture	Orthopaedic surgery	Cross-Sectional	B
Liu	2012	China	Urban & rural	Natural Disaster	Acute crisis	Tibial and fibular fractures	External fixation and vacuum sealing	Cohort	B
Lovric	1994	Croatia	Urban & rural	Armed Conflict	Acute crisis	Injury of major blood vessels of the extremities	Emergency surgical treatment (fasciotomy, antibiotics)	Cross-Sectional	B
Marcikic	1998	Croatia	Urban & rural	Armed Conflict	Acute crisis	Penetrating craniocerebral injury	Surgery and management	Cohort	B
Morells	1994	Cambodia	Rural	Armed Conflict	Acute crisis	Penetrating intraperitoneal colon injuries	Primary repair, colostomy	Non-Random Trial	A
Motamedi	1999	Iran	Urban & rural	Armed Conflict	Early recovery	Maxillofacial injuries	Branemark implant system	Cohort	B
Mulvey	2006	Pakistan	Rural	Natural Disaster	Acute crisis	Range of physical injuries	Anaesthesia - ketamine	Cross-Sectional	B
Nadjafi	1997	Iran	Urban & rural	Natural Disaster	Acute crisis	Acute renal failure	Comprehensive diagnostic and treatment protocol	Cross-Sectional	A
Nikolic	2000	Serbia	Urban & rural	Armed Conflict	Acute crisis	Missile injuries of the knee (complications, mortality)	Orthopaedic surgery, plaster cast, external fixation	Cohort	B
Ozturk	2009	Turkey	Urban	Natural Disaster	Acute crisis	Crush injuries – renal manifestations	Renal replacement therapy (continuous / intermittent haemodialysis)	Cross-sectional	A
Rautio	1987	Afghanistan	Rural	Armed Conflict	Acute crisis	Complicated fracture	External fixation, plaster cast, amputation	Cross-Sectional	B
Roostar	1995	Afghanistan	Urban & rural	Armed Conflict	Acute crisis	Salvageable vascular injuries	Amputation, reconstruction	Cross-Sectional	B
Roy	2005	India	Rural	Natural Disaster	Stabilisation	Injury	Field medical care and rehabilitation	Cohort	B

Study author	Year	Study country	Setting	Humanitarian crisis type	Crisis stage	Health outcome(s)	Type(s) of health intervention	Study design	Evidence category
Safari	2011	Iran	Urban & rural	Natural Disaster	Acute crisis	Crush injuries	Fasciotomy	Cross-Sectional	A
Sagheb	2008	Iran	Urban & rural	Natural Disaster	Acute crisis	Acute renal failure	Standard fluid therapy / variable volume treatment - dialysis	Cross-Sectional	A
Sever	2002	Turkey	Urban & rural	Natural Disaster	Acute crisis	Acute renal problems	Renal replacement therapy	Cross-Sectional	A
Splavski	1996	Croatia	Urban & rural	Armed Conflict	Acute crisis	Spinal cord injury	Reconstructive surgery - laminectomy and dural repair	Cross-Sectional	B
Sprem	2001	Croatia	Urban & rural	Armed Conflict	Acute crisis	Blast injury affecting the eardrum	Tympanoplasty	Cross-Sectional	A
Stanec	1994	Croatia	Urban & rural	Armed Conflict	Acute crisis	Physical injury	Microvascular flap (local / free) reconstruction	Cross-Sectional	B
Strada	1993	Afghanistan	Rural	Armed Conflict	Acute crisis	Large bowel injury	Surgical intervention with limited facilities	Cross-Sectional	A
Tajsic	2008	Balkan country (unspecified)	Rural	Armed Conflict	Early recovery	Landmine and blast injuries	Microsurgical post-injury reconstructive surgery (flap transfers)	Cohort	B
Xiao	2011	China	Urban	Natural Disaster	Stabilisation	Tibial shaft fractures	Rehabilitation intervention	Cohort	A
Zangana	2007	Iraq	Urban & rural	Armed Conflict	Acute crisis	Penetrating liver injury	Emergency liver surgery	Cross-Sectional	B
Zhang	2011	China	Urban & rural	Natural Disaster	Stabilisation	Bone fracture	Rehabilitation service programme (NGO-Health Sector-Volunteer)	Non-Random Trial	A
Zhang	2013	China	Urban & rural	Natural Disaster	Early recovery	Physical disability	Rehabilitation service programme (NGO-Health Sector-Volunteer)	Non-Random Trial	A

4.8 Health service delivery

4.8.1 Systematic review

- The search strategy was designed to be sensitive, and as a result captured 28,199 papers. An initial filter, removing papers that did not discuss humanitarian crises, health service delivery or lower and middle income countries reduced this number to 2,534 papers. The second and final filter only included studies that discussed the acute stage of crises, the effectiveness of health service delivery and put a quantifiable figure on the effectiveness of health services. Thirty-two papers met these inclusion criteria.
- A number of websites were reviewed for grey literature but no papers met the inclusion criteria.
- The majority of papers (28/32, 87.5%) considered only outputs of health service delivery, such as the number of patient consultations performed. These papers were considered to be category C and since they did not evaluate health outcomes they were not further assessed for quality. The four papers from category B (which considered health outcomes but did not assess their statistical significance) assessed quality using the adapted STROBE quality criteria and all four papers were assessed as being low quality. See Figure 26 for the trends of papers over time.
- There appears to be an increasing interest in evaluating the effectiveness of health service delivery in humanitarian crises. 69% (22/32) of papers have been published since 2000, including 3 of the 4 category B papers (Figure 26).

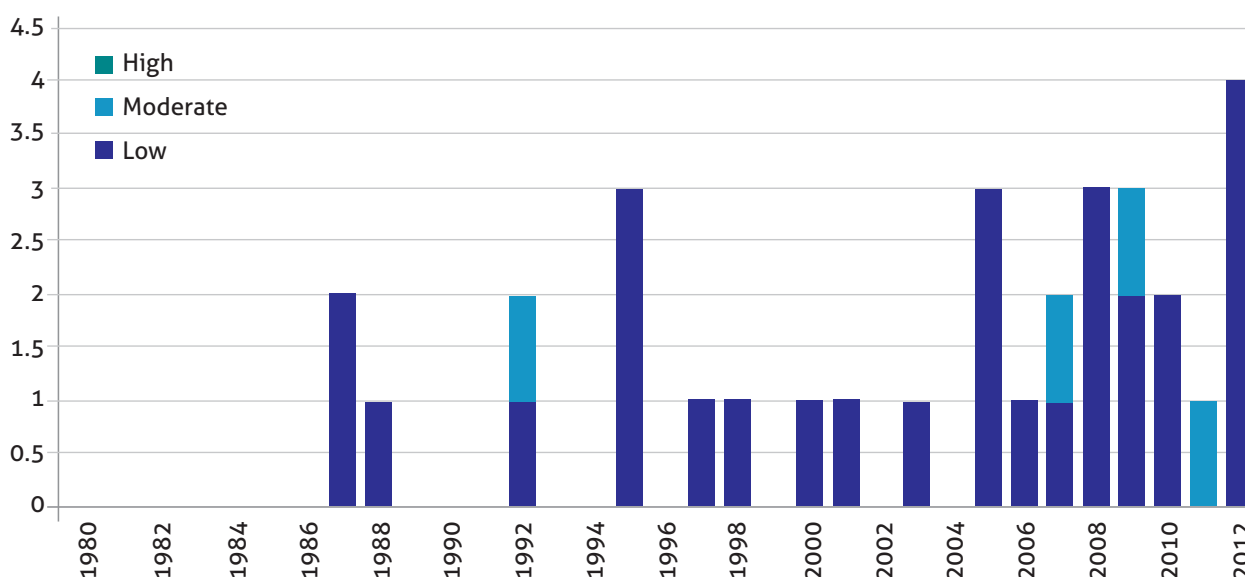


Figure 26: Quantity and quality of health service delivery studies over time

- All 32 papers were of cross sectional study design. The studies assessed a single point in time rather than following up the effectiveness of health services over a period of time, which constitutes a lower quality study design for the evaluation of effectiveness.

- 38% (12/32) of studies were conducted by multiple agencies. The most common type of research agency was academic institutions (21/32, 66%). 50% (16/32) of studies were conducted by medical facilities, 13% (4/32) were by NGOs, 9% (3/32) by the army or navy and 9% (3/32) by government agencies.
- It was not possible to identify which agency had funded the research in any of the papers reviewed.
- Research was conducted in a range of global locations (Figure 27). The most common region for study was the Middle East (11/32, 34%), followed by Asia (8/32, 25%), Eastern Europe (5/32, 16%), the Caribbean (3/32, 9%), Africa (2/32, 6%) and South America (1/32, 3%). One paper (3%) considered multiple countries and one paper (3%) did not detail the countries under analysis.
- All of the studies conducted in Eastern Europe and Africa considered armed conflict. Studies conducted in the Middle East considered equally natural disasters (5/11) and armed conflict (6/11). Studies in Asia were predominantly about natural disasters (7/8), and all studies in South America, across multiple countries and where the country was unknown, considered natural disasters.
- Papers were split as to the type of humanitarian crisis researched: 56% (18/32) were of natural disasters and 44% (14/32) of armed conflict (Figure 28).

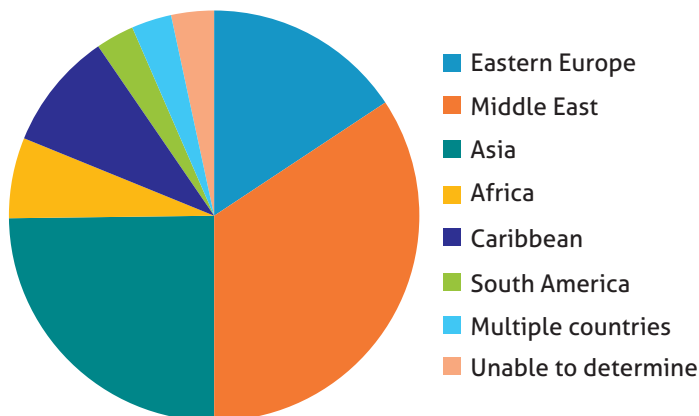


Figure 27: Geographic regions of health service delivery studies

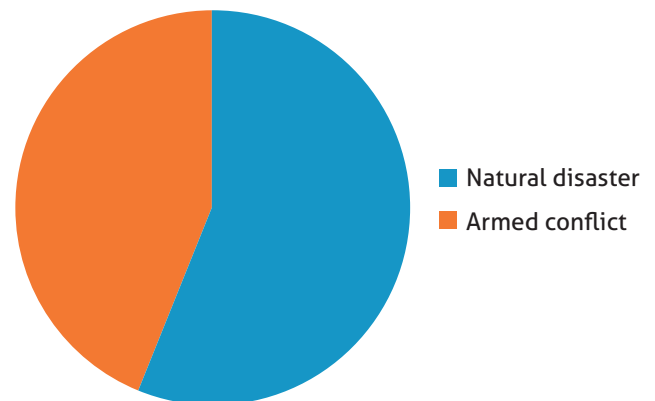


Figure 28: Health service delivery research by crisis type

- The papers reviewed spanned a range of health settings. 25% (8/32) of papers evaluated an urban location, 28% (9/32) evaluated a rural setting, 34% (11/32) spanned both urban and rural locations, 9% (3/32) evaluated a camp setting, and one paper (3%) compared a rural location and a camp setting.

- The majority of studies (72%, 23/32) evaluated the acute crisis, and a further 2 papers (6%) considered both the acute stage and early recovery (Figure 29).

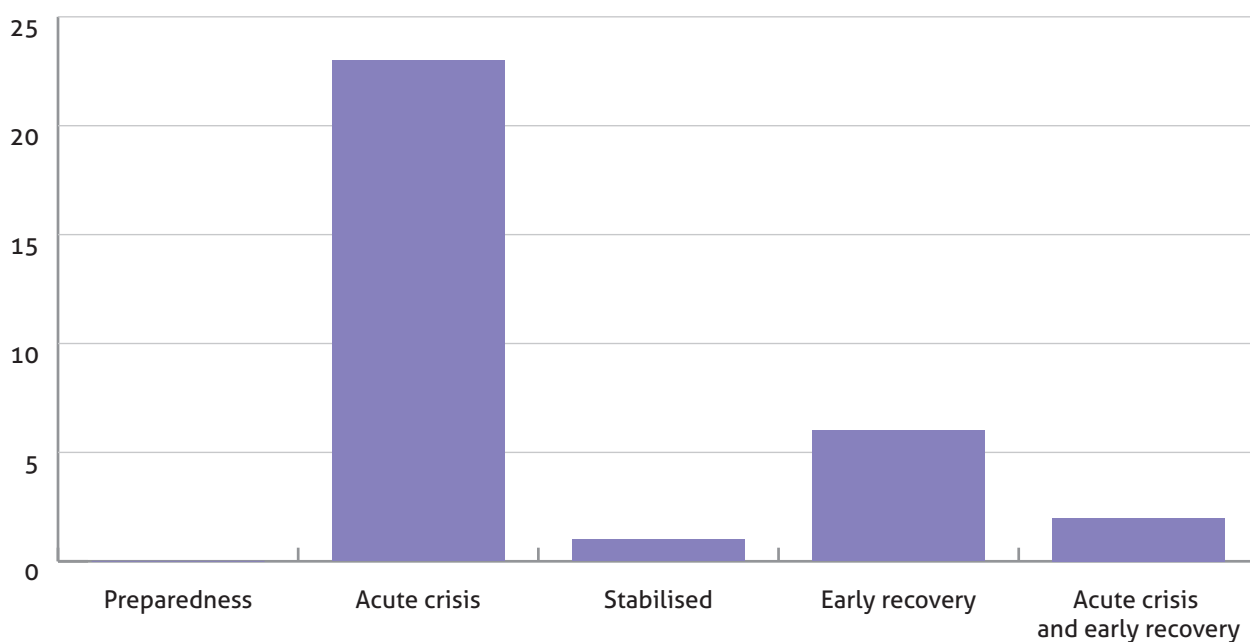


Figure 29: Number of health service delivery studies by crisis stage

- Papers were split between discussing health services that met all health needs (14/32, 44%) and services that focused specifically on casualty management (14/32). Four papers (13%) tackled more specific health needs: orthopaedic casualties and infection, paediatric services, surgery, and HIV, tuberculosis and family planning.
- The majority of papers (17/32, 53%) focused on secondary care services. Papers also focused on primary care (6/32, 19%) or looked at the interconnection between primary and secondary care (5/32, 16%), and possibly also tertiary care (1/32, 3%). Smaller numbers of papers discussed ambulatory (2/32, 6%) and self care (1/32, 3%). See Figure 30.

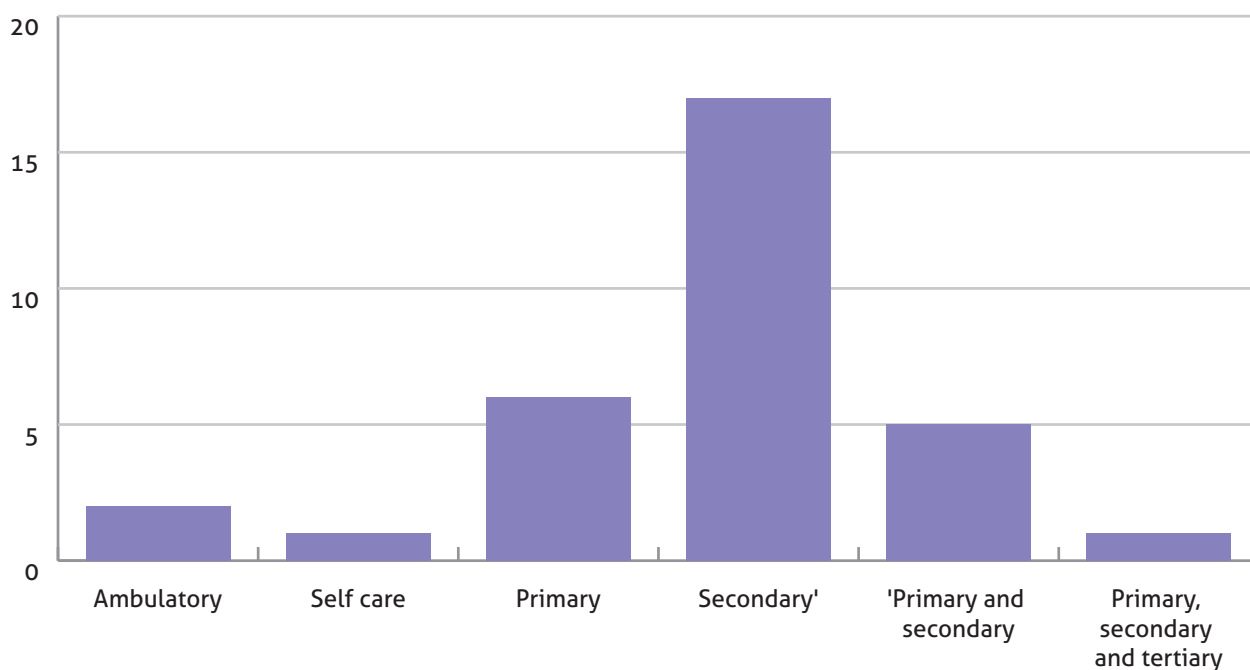


Figure 30: Number of studies examining each service delivery level

- Most papers (18/32, 56%) evaluated the effectiveness of health service delivery in terms of numbers of patients seen or procedures performed (Figure 31). A number of other health outcomes were also evaluated, albeit by smaller numbers of papers: mortality (4/32, 13%), outputs of a procedures, such as patient transfer or discharge (3/32, 9%), equity (2/32, 6%), patient satisfaction (2/32, 6%), quality (1/32, 3%), security (1/32, 3%) and the appropriateness of an assessment for locating field hospitals (1/32, 3%).
- Statistical analysis of the effectiveness of health service delivery was fairly crude. Twenty-five papers (78%) presented numbers and/or percentages as measures of health outcomes, four papers (13%) measured mean scores, two papers (6%) measured rates and one (3%) calculated the difference between means.
- Nine papers (28%) examined how existing health services within a country managed the crisis. Of these papers, six focused on rescue and casualty management and three discussed the impact on general health services. Twenty-two papers (69%) examined the implementation of temporary health services to help manage the crisis. Of these, 12 papers discussed field hospitals, seven discussed war hospitals and three examined health services in relief camps. One paper (3%) compared existing health services across a rural district and temporary health services in a camp (Figure 32).

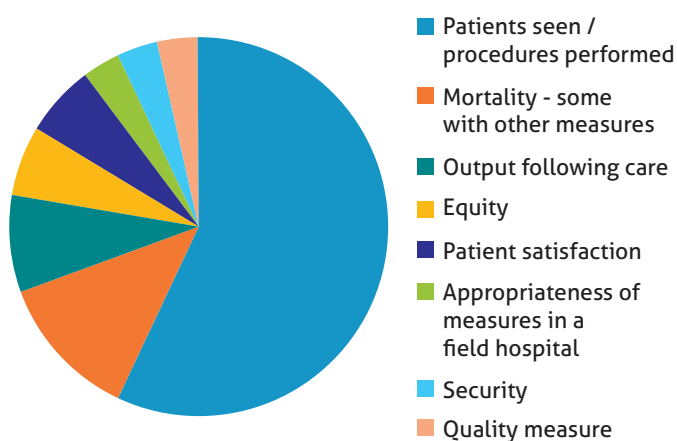


Figure 31: Measures of health service effectiveness

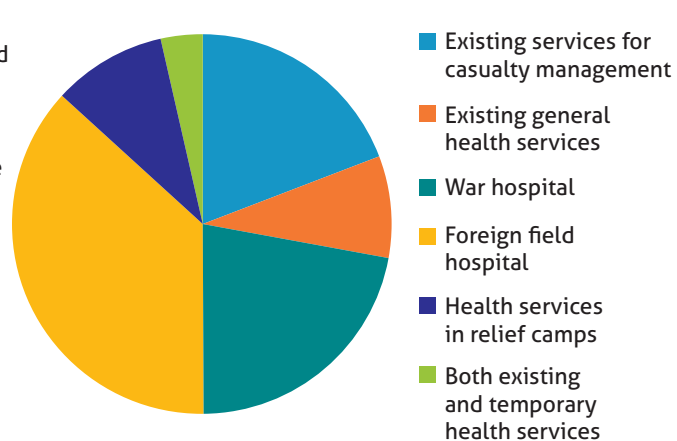


Figure 32: Types of health service delivery

- Seventeen papers (53%) included discussion of the impact of external factors on health service delivery – these factors were discussed, not evaluated. Common factors touched on included facilitation by the Ministry of Health, financial assistance and the availability, or lack of, local health personnel.
- None of the papers included discussion of the impact that health service delivery had on any external factors.

- Eight (25%) papers referenced the use of guidelines within health services. No two papers referenced the same guidelines, however. The guidelines referred to were: WHO/PAHO essential requirements; the RAND/UCLA appropriateness method for determining field hospital setting in an earthquake; NATO guidelines for mass casualties; and Zung's Self-Rating Depression Scale; as well as locally produced guidelines for patient transfer, performance appraisal and war surgery.

4.8.2 Expert interviews

Methodologies and quality of evidence:

- Health service delivery is a cross-cutting issue common to every health topic. Most research gaps in public health in humanitarian crises concern the mode of delivery of health interventions. However, the number of studies in this field remains very limited.
- There has been increasing interest in research on health service delivery in humanitarian crises during the last decade. However, the quality of many studies is questionable. There is a pressing need for introducing innovative and robust methods to study health service delivery in humanitarian crises.
- There needs to be better use of mathematical models in assessing the (cost) effectiveness of different models of delivery.

Model of delivery and integration of interventions into local health services:

- Humanitarian interventions are often in parallel to the local health services which have usually been weakened by the crisis. Many respondents mentioned the necessity of collaborating with local health services to ensure the continuity of care after the end of the humanitarian crisis. There is, however, little evidence on the most effective way of integrating humanitarian interventions into the local health services. There are additional research questions related to: which interventions should be integrated? Which ones should be vertically delivered?
- The objective of universal coverage during humanitarian crises is often accompanied with free healthcare but may create unexpected effects (positive and negative) on local health services and has issues for sustainability and equity of services. These aspects have nevertheless not been explored sufficiently by researchers.
- The importance of measuring the effectiveness of different models of delivery was highlighted. Comparisons should be made between facility-based and community-based interventions as well as the delivery of comprehensive packages of interventions compared with single interventions. This field of investigation is broad as every health topic may have different models of delivery.
- Packages of care are commonly promoted but need more research evidence-base for the content of packages, costs of the package, and health benefits of packages. There is also a lack of evidence on the minimum package that could be implemented in very acute settings and what the tradeoffs may be.

Continuity of care:

- The issue of integration is also related to the continuity of care which is a necessity in a context where chronic diseases and NCDs are increasingly important. Studies should focus on examining health facility capacities to deliver and financially sustain quality services after the departure of humanitarian actors.
 - There is a need for much more evidence on how to develop longer-term strategies for delivering health care (including for the health system more broadly) to move beyond the short-term approaches common to humanitarian settings.
-

4.8.3 Recommendations for future research

- There is a strong need to improve the quantity and quality of the evidence base on health service interventions. Existing studies predominantly measure outputs of services, rather than health outcomes, and are exclusively of cross sectional study design.
- More research is required on different service delivery models of health care.
- More research is required on the content, delivery and health outcomes of different service delivery packages of care.
- There was a bias in the evidence base towards the impact of temporary health services and issues of continuity and sustainability of care need to be researched. Longitudinal study designs are needed to help capture this information.
- There was a lack of consensus over the guidelines to be used, or even evaluated, for health service delivery. Further studies looking specifically at this issue would enable practical suggestions for service delivery in crisis situations.

References: Health services delivery

1. Bar-Dayan, Y., et al., A multidisciplinary field hospital as a substitute for medical hospital care in the aftermath of an earthquake: the experience of the Israeli Defense Forces Field Hospital in Duzce, Turkey, 1999. *Prehospital & Disaster Medicine*, 2005. 20(2): p. 103-6.
 2. Beckett, A., et al., Multidisciplinary trauma team care in Kandahar, Afghanistan: Current injury patterns and care practices. *Injury*, 2012. 43(12): p. 2072-2077.
 3. Chan, E.Y.Y. and J.J. Kim, Remote mobile health service utilization post 2005 Kashmir-Pakistan earthquake. *European Journal of Emergency Medicine*, 2010. 17(3): p. 158-63.
 4. Chapin, E., et al., Impact of the 2007 Ica earthquake on health facilities and health service provision in Southern Peru. *Prehospital and Disaster Medicine*, 2009. 24(4): p. 326-332.
 5. Chen, J., et al., Administration of Nursing Services in a Newly Built Traumatic Infection Ward After an 8.0-magnitude Earthquake in Wenchuan. *Journal of Emergency Nursing*, 2009. 35(6): p. 532-535.
 6. Chen, J., et al., Trans-province transfer of 10,373 patients injured in Wenchuan earthquake. *Journal of Evidence-based Medicine*, 2009. 2(4): p. 270-6.
 7. Ebling, Z., et al., Osijek Health Center during the 1991-1992 war in Croatia. *Military Medicine*, 2000. 165(12): p. 929-34.
 8. Fernald, J.P. and E.A. Clawson, The mobile army surgical hospital humanitarian assistance mission in Pakistan: the primary care experience. *Military Medicine*, 2007. 172(5): p. 471-477.
 9. Fosse, E. and H. Husum, Surgery in Afghanistan: A light model for field surgery during war. *Injury*, 1992. 23(6): p. 401-404.
 10. Fosse, E., H. Husum, and C. Giannou, The siege of Tripoli 1983: war surgery in Lebanon. *Journal of Trauma-Injury Infection & Critical Care*, 1988. 28(5): p. 660-3.
 11. Giangreco, A., et al., War outside, ceasefire inside: An analysis of the performance appraisal system of a public hospital in a zone of conflict. *Evaluation & Program Planning*, 2012. 35(1): p. 161-70.
 12. Halpern, P., et al., Intensive care in a field hospital in an urban disaster area: lessons from the August 1999 earthquake in Turkey. *Critical Care Medicine*, 2003. 31(5): p. 1410-4.
 13. Kang, P., et al., Medical evacuation management and clinical characteristics of 3,255 inpatients after the 2010 Yushu earthquake in China. *The Journal of Trauma and Acute Care Surgery*, 2012. 72(6): p. 1626-33.
 14. Kwak, Y.H., et al., Experience of a Korean disaster medical assistance team in Sri Lanka after the South Asia tsunami. *Journal of Korean Medical Science*, 2006. 21(1): p. 143-150.
-

15. Loghmani, A., N. Jafari, and M. Memarzadeh, Determining the field hospital setting in earthquake: using RAND/UCLA Appropriateness Method. *Iranian Red Crescent Medical Journal*, 2008. 10(3): p. 181-189.
 16. Misic, Z., et al., Delivery of medical services to different national groups during the war: an example from Bosnia and Herzegovina, 1991-2000. *Military Medicine*, 2005. 170(9): p. 810-3.
 17. Missair, A., et al., Surgery under extreme conditions in the aftermath of the 2010 Haiti earthquake: the importance of regional anesthesia. *Prehospital and Disaster Medicine*, 2010. 25(6): p. 487-493.
 18. Muawwad-Jarawan, E., A. Ashkar, and F. Saadeh, Self-care under war conditions. The case of Beirut, Lebanon. *Medical Care*, 1987. 25(9): p. 904-912.
 19. Nia, M.S., N. Nafissi, and Y. Moharamzad, Survey of Bam earthquake survivors' opinions on medical and health systems services. *Prehospital & Disaster Medicine*, 2008. 23(3): p. 263-8; discussion 269.
 20. Petricevic, A., et al., Surgical experience at the Rama war hospital in Bosnia and Herzegovina. *Israel Journal of Medical Sciences*, 1995. 31(10): p. 630-4.
 21. Porignon, D., et al., How robust are district health systems? Coping with crisis and disasters in Rutshuru, Democratic Republic of Congo. *Tropical Medicine & International Health*, 1998. 3(7): p. 559-65.
 22. Riddez, L., et al., The surgical and obstetrical activity at the ICRC field hospital in Banda Aceh in the aftermath of the tsunami 2004. *International Journal of Disaster Medicine*, 2005. 3(1-4): p. 55-60.
 23. Rukavina, A., et al., War-related transformation and work of surgery service of the Pozega Medical Center, East-Croatian Hospital unaffected by direct war activities. *Military Medicine*, 1995. 160(12): p. 604-8.
 24. Schreeb, J.v., et al., Foreign field hospitals in the recent sudden-onset disasters in Iran, Haiti, Indonesia, and Pakistan. *Prehospital and Disaster Medicine*, 2008. 23(2): p. 144-151.
 25. Sheng, Z.Y., Medical support in the Tangshan earthquake: a review of the management of mass casualties and certain major injuries. *Journal of Trauma-Injury Infection & Critical Care*, 1987. 27(10): p. 1130-5.
 26. Sowa, K., T. Nishikura, and K. Maruki, Report of two visits to the Tibetan refugee camp in Dharamsala, North India [I] - The present conditions of the medical system and the medical facilities in the refugee camp. *International Medical Journal*, 1997. 4(3): p. 193-197.
 27. VanRooyen, M.J., et al., Mobile medical relief and military assistance in Somalia. *Prehospital & Disaster Medicine*, 1995. 10(2): p. 118-20.
 28. von Saint Andre-von Arnim, A., et al., Intensive care for infants and children in Haiti in April 2010. *Pediatric Critical Care Medicine*, 2011. 12(4): p. 393-7.
 29. Walk, R.M., et al., Haitian Earthquake Relief: Disaster Response Aboard the USNS Comfort. *Disaster Medicine and Public Health Preparedness*, 2012. 6(4): p. 370-377.
 30. Wickramasinghe, W.A.K.K., et al., Are tsunami survivors satisfied with the provision and quality of healthcare they received? *Asia-Pacific Journal of Public Health*, 2007. 19 Spec No: p. 35-9.
 31. Zic, R., et al., Organization and work of the war hospital in Tomislavgrad during the war in Bosnia and Herzegovina from 1992 to 1995. *Military Medicine*, 2001. 166(1): p. 59-63.
-

4.9 Health systems

4.9.1 Systematic review

- The systematic review on health systems included both quantitative and qualitative studies given the particularly multifaceted nature of health systems. The search strategy yielded 16,997 papers, but only 56 papers met the inclusion criteria.
- The number of papers has been increasing with time (Figure 33), with a significant increase in papers published from 2010 onwards. It has some predictable surges following major humanitarian crises, such as the 2004 Asian Tsunami. Interestingly only one paper was identified as looking at the health system context of natural disasters prior to 2004, with most papers focusing on conflicts from 1987 to 2003.
- The majority (36/56) of the papers focused on a context of conflict, 18 focused on a natural disaster and one on a political crisis. Of the papers on a natural disaster, 13 focused on earthquakes, five on the tsunami, three on floods and one on a cyclone (with some papers focusing on more than one crisis).
- The research was spread across four continents, with papers focussing on humanitarian crises in Asia (24 papers), Africa (19 papers), Europe (13 papers) and South America (8 papers). The crisis with most papers was the conflict in Kosovo (5 papers), followed by earthquakes and floods in Pakistan (4 papers) and conflict and tsunami in Indonesia.
- Two of the papers were graded as a high quality of evidence. Two papers were graded as a medium quality of evidence. Forty-four of the papers were assessed as low quality. Eight of the papers could not be assessed as the full paper could not be obtained.

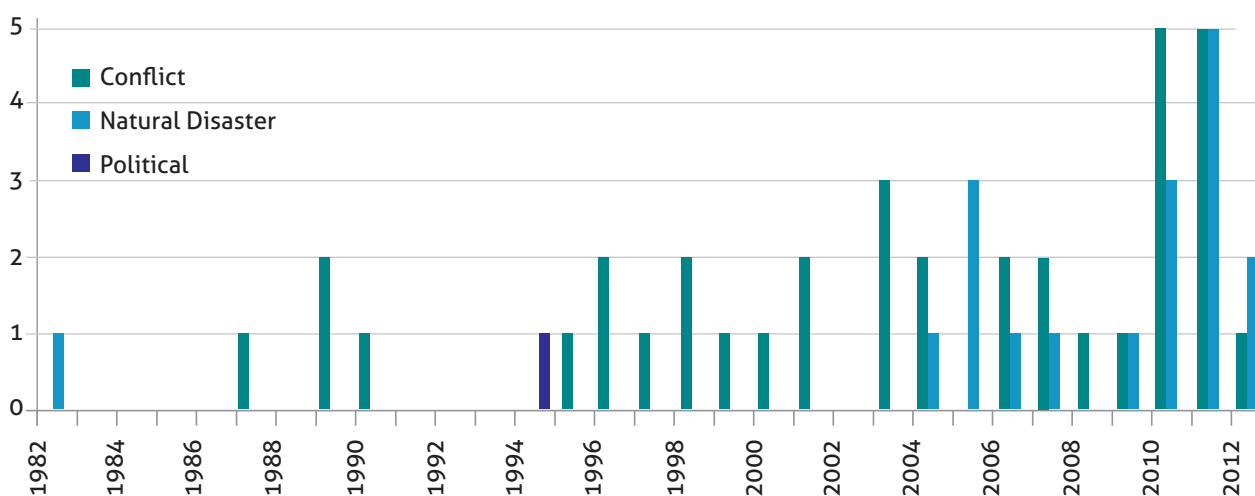


Figure 33: Quantity of health systems studies over time, by crisis type

- The majority (48/56) of the papers focused on the general population, three papers focused on refugee populations, one on Internally Displaced People (IDP) populations, two on health workers and two on a mixed population (Figure 34).
- Most of the papers (37/56) were case studies from humanitarian crises. Other papers included 14 descriptive papers, 2 literature reviews, and 1 epidemiological community-based study.



Figure 34: Health systems studies by target group

Health system building blocks:

- The studies on different health system building blocks are shown in Figure 35.
- Eight papers had a focus on policy areas of leadership and governance, of which five looked at opportunities for policy and four on impact of the crisis (one looking at both areas).
- There were five papers with a focus on coordination, with coordination mentioned in 11 other papers.
- There were seven papers identified with a focus on health workforce and ten papers which mentioned health workforce. Five papers looked at the impact of crises on human resources and four papers looked at crises as opportunities for building back better.
- A single paper had a focus on health financing, and 10 others mentioned health financing.
- Only one paper was identified with a focus on medicines, which looked at essential medicines management following the earthquake in Pakistan. Three of the other papers had a mention of medicines.
- Eight papers had a focus on the use of Health Information Systems in response to humanitarian crises papers. Three other papers had a mention of Health Information Systems. Most of the papers specifically looked at disease surveillance systems.

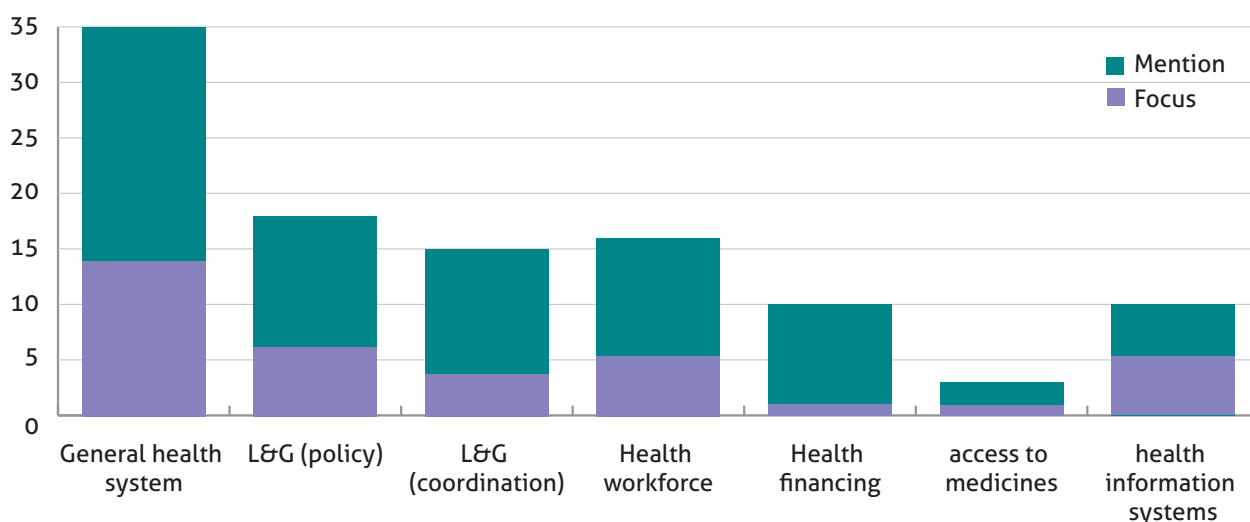


Figure 35: Studies by health system building block

4.9.2 Expert interviews

4.9.2.1 Methodologies and quality of evidence:

- There has been increasing interest in health systems research in humanitarian crises. There are nevertheless many questions about how to conduct health research in insecure and unpredictable settings. As a result, the quality of studies is questionable and has often been rated as low. There is a pressing need for introducing innovative and robust methods to study health systems in humanitarian crises.
- One constraint identified by the key informants is the lack of reliable health information systems in most developing countries before the crisis starts. Researchers have to conduct research where baseline data is often inconsistent or missing.

4.9.2.2 Delivery and integration of interventions into local health systems:

- Humanitarian interventions are often implemented in parallel to the local health systems, which have most often been weakened by the crisis. Many respondents mentioned the necessity of collaborating with local health services to ensure the continuity of care after the end of the humanitarian crisis. There is however little evidence on the most effective way of integrating humanitarian interventions into the local health system. There are additional research questions related to: which interventions should be integrated? Which ones should be vertically delivered?
- The objective of universal coverage during humanitarian crises, often accompanied with free healthcare, may create unexpected effects on local health services. These aspects have nevertheless not been explored by researchers.
- A third aspect highlighted by respondents is the importance of measuring the effectiveness of different models of delivery. Comparisons should be made between facility-based and community-based interventions, as well as the delivery of comprehensive packages of interventions compared with single interventions. This field of investigation is broad as every health topic may have a different model of delivery.

4.9.2.3 Continuity of care:

- The issue of integration is also related to the continuity of care, which, as many key informants explained, is a necessity in a context where chronic diseases and non communicable diseases (NCDs) are increasingly important. Studies should focus on the assessment of health systems capacities to deliver quality services after the departure of humanitarian actors.

4.9.2.4 The resilience of health systems:

- Research is needed to measure and predict the capacity of health systems to adapt to humanitarian crises. This notion of resilience is related to measurement of preparedness for crises. There is limited evidence on the impact of preparedness activities on the capacity of health systems to absorb or adjust to crises.

4.9.3 Recommendations for future research

- Whilst understanding the considerable challenges that exist when carrying out research in this area, there is a need for more high quality evidence with regards to the health systems context of humanitarian crises.

Health system strengthening

- There is a need for much more research into some of the specific areas of the health system, particularly the influence of health financing and access to essential medicines during humanitarian crises.
-

Resilience

- Evidence on the resilience of health systems to absorb crises and on their capacities to continue the delivery of services (e.g. non communicable diseases) after the departure of humanitarian actors.
- There are a number of papers that focus on conflict, but the evidence is weaker for natural disasters. These include the impact of natural disasters on the health system and opportunities arising from natural disasters for areas of the health system.
- There is a need for further research to measure the impact crises can have on local health systems.

Integration of services

- Evidence on the effectiveness of different models of delivering health interventions during humanitarian crises: vertical versus integrated humanitarian interventions, facility-based versus community-based interventions, comprehensive package vs. single interventions.

Preparedness of crises

- There is a clear need for a strong evidence base on the impact of preparedness and whether stronger and better prepared health systems have improved health outcomes following a humanitarian crisis.

References: Health systems

1. Adams, P., Health-care dynamics in Haiti. *The Lancet*, 2010. 376(9744): p. 859-860.
 2. Alonso, A. and R. Brugha, Rehabilitating the health system after conflict in East Timor: a shift from NGO to government leadership. *Health Policy Plan*, 2006. 21(3): p. 206-16.
 3. Barnabas, G.A.B. and A. Zwi, Health policy development in wartime: Establishing the Baito health system in Tigray, Ethiopia. *Health Policy and Planning*, 1997. 12(1): p. 38-49.
 4. Batley, N.J., J. Makhoul, and S.A. Latif, War as a positive medical educational experience. *Medical Education*, 2008. 42(12): p. 1166-71.
 5. Betsi, N.A., et al., Effect of an armed conflict on human resources and health systems in Cote d'Ivoire: prevention of and care for people with HIV/AIDS. *AIDS Care*, 2006. 18(4): p. 356-65.
 6. Bile, K.M., et al., Learning through crisis: Development and implementation of a health cluster strategy for internally displaced persons. [French] *Apprendre grace a la crise: Elaboration et mise en oeuvre d'une strategie de groupe Sante en faveur des personnes deplacees*. *Eastern Mediterranean Health Journal*, 2010. 16(SUPPL.): p. S82-90.
 7. Bisika, T., Health systems strengthening in conflict situations. *East Afr J Public Health*, 2010. 7(3): p. 277-81.
 8. Bissell, R.A., et al., Evidence of the effectiveness of health sector preparedness in disaster response: the example of four earthquakes. *Fam Community Health*, 2004. 27(3): p. 193-203.
 9. Bornemisza, O., et al., Promoting health equity in conflict-affected fragile states. *Social Science & Medicine*, 2010. 70(1): p. 80-8.
 10. Bradt, D.A., C.M. Drummond, and M. Richman, Complex emergencies in Indonesia. *Prehosp Disaster Med*, 2001. 16(4): p. 294-301.
 11. Braveman, P. and D. Siegel, Nicaragua: a health system developing under conditions of war. *International Journal of Health Services*, 1987. 17(1): p. 169-178.
 12. Brennan, R.J., et al., Rehabilitating public health infrastructure in the post-conflict setting: epidemic prevention and preparedness in Kosovo. *Prehosp Disaster Med*, 2001. 16(4): p. 244-51.
 13. Bukhari, S.K.S., et al., Essential medicines management during emergencies in Pakistan. *Eastern Mediterranean Health Journal*, 2010. 16 Suppl: p. S106-13.
 14. Bulbulia, S. and F. Alvarez-Castillo, Vulnerability, resilience and coping of communities and health systems in responding to infectious diseases in the context of war/conflict: Kandy, Sri Lanka. *African Safety Promotion*, 2004. 2(2): p. 73-75.
-

15. Buwa, D. and H. Vuori, Rebuilding a health care system: war, reconstruction and health care reforms in Kosovo. *European Journal of Public Health*, 2007. 17(2): p. 226-230.
 16. Cometto, G., G. Fritsche, and E. Sondorp, Health sector recovery in early post-conflict environments: experience from southern Sudan. *Disasters*, 2010. 34(4): p. 885-909.
 17. Curic, I., et al., Public health services in Herzegovina region during 1992-1995 war. *Collegium antropologicum*, 2010. 34 Suppl 1: p. 321-324.
 18. Dodge, C.P., Health implications of war in Uganda and Sudan. *Soc Sci Med*, 1990. 31(6): p. 691-8.
 19. Eisenbruch, M., J.T. de Jong, and W. van de Put, Bringing order out of chaos: a culturally competent approach to managing the problems of refugees and victims of organized violence. *Journal of Traumatic Stress*, 2004. 17(2): p. 123-31.
 20. EMRO, W., Health sector response to the Bam earthquake: lessons learnt. *Health sector response to the Bam earthquake: lessons learnt*, 2005. 40.
 21. Garfield, R.M., War-related changes in health and health services in Nicaragua. *Social Science & Medicine*, 1989. 28(7): p. 669-676.
 22. Giacaman, R., H.F. Abdul-Rahim, and L. Wick, Health sector reform in the Occupied Palestinian Territories (OPT): targeting the forest or the trees? *Health Policy Plan*, 2003. 18(1): p. 59-67.
 23. Goyens, P., et al., Humanitarian aid and health services in eastern Kivu, Zaire: collaboration or competition? *Journal of Refugee Studies*, 1996. 9(3): p. 268-280.
 24. Hill, P., Ethics and health systems research in 'post'-conflict situations. *Dev World Bioeth*, 2004. 4(2): p. 139-53.
 25. Ityavyar, D.A. and L.O. Ogba, Violence, conflict and health in Africa. *Soc Sci Med*, 1989. 28(7): p. 649-57.
 26. Jones, L.M., et al., Crisis into opportunity: Setting up community mental health services in post-Tsunami Aceh. *Asia-Pacific Journal of Public Health*, 2007. 19(SEPC. ISS.): p. 60-68.
 27. Kapucu, N., Collaborative governance in international disasters: Nargis cyclone in Myanmar and Sichuan earthquake in China cases. *International Journal of Emergency Management*, 2011. 8(1): p. 1-25.
 28. Khankeh, H.R., et al., Disaster health-related challenges and requirements: a grounded theory study in Iran. *Prehosp Disaster Med*, 2011. 26(3): p. 151-8.
 29. Kohan, I., et al., Emergencies and disasters as opportunities to improve mental health systems: Peruvian experience in Huancavelica. *Intervention: International Journal of Mental Health, Psychosocial Work & Counselling in Areas of Armed Conflict*, 2011. 9(3): p. 237-248.
 30. Lanjouw, S., J. Macrae, and A.B. Zwi, Rehabilitating health services in Cambodia: the challenge of coordination in chronic political emergencies. *Health Policy & Planning*, 1999. 14(3): p. 229-42.
 31. Lopez Tagle, E. and P. Santana Nazarit, The 2010 earthquake in Chile: the response of the health system and international cooperation. (Special Issue on Internacional Health.) [Spanish]. *Revista Panamericana de Salud Publica/Pan American Journal of Public Health*, 2011. 30(2): p. 160-166.
 32. Macrae, J., A.B. Zwi, and L. Gilson, A triple burden for health sector reform: 'post'-conflict rehabilitation in Uganda. *Soc Sci Med*, 1996. 42(7): p. 1095-108.
 33. Melgaard, B., et al., Repair and recovery of health systems. *Prehospital and Disaster Medicine*, 2005. 20(6): p. 428-431.
 34. Morikawa, M.J., Primary care training in Kosovo. *Fam Med*, 2003. 35(6): p. 440-4.
 35. Morton, M. and J.L. Levy, Challenges in disaster data collection during recent disasters. *Prehosp Disaster Med*, 2011. 26(3): p. 196-201.
 36. Newbrander, W., R. Waldman, and M. Shepherd-Banigan, Rebuilding and strengthening health systems and providing basic health services in fragile states. *Disasters*, 2011. 35(4): p. 639-60.
 37. Okuonzi, S.A., From emergency to creating a just health system: what issues surround the proposed health policy for Uganda? *CUAMM News*, 1998.
-

38. Patel, P.P., et al., Transitioning mental health & psychosocial support: from short-term emergency to sustainable post-disaster development. Humanitarian Action Summit 2011. *Prehosp Disaster Med*, 2011. 26(6): p. 470-81.
 39. Pavignani, E., Human resources for health through conflict and recovery: Lessons from African countries. *Disasters*, 2011. 35(4): p. 661-679.
 40. Peltz, R., et al., Disaster healthcare system management and crisis intervention leadership in Thailand--lessons learned from the 2004 Tsunami disaster. *Prehospital and disaster medicine : the official journal of the National Association of EMS Physicians and the World Association for Emergency and Disaster Medicine in association with the Acute Care Foundation*, 2006. 21(5): p. 299-302.
 41. Porignon, D., et al., The role of the Zairian health services in the Rwandan refugee crisis. *Disasters*, 1995. 19(4): p. 356-360.
 42. Porignon, D., et al., How robust are district health systems? Coping with crisis and disasters in Rutshuru, Democratic Republic of Congo. *Trop Med Int Health*, 1998. 3(7): p. 559-65.
 43. Procacci, P., et al., Session 1.5: health policy and coordination: a critical review of experiences. *Prehospital & Disaster Medicine*, 2005. 20(6): p. 393-5.
 44. Rahim, M., et al., The impact of the disease early warning system in responding to natural disasters and conflict crises in Pakistan. *East Mediterr Health J*, 2010. 16 Suppl: p. S114-21.
 45. Raminashvili, D., et al., The health impact and consequences of war in Shida Kartli region. *Georgian Med News*, 2009(172-173): p. 104-6.
 46. Raviola, G., et al., Mental health response in Haiti in the aftermath of the 2010 earthquake: a case study for building long-term solutions. *Harv Rev Psychiatry*, 2012. 20(1): p. 68-77.
 47. Sabatinelli, G., Kakar, S.R., Khan, M.R., Malik, M., Kazi, B.M., , M. Gayer, Husain, F., Brennan, M., Bilukha, O., Shaikh, I., and S. Cookson, Shahpar, C., Early warning disease surveillance after a flood emergency--Pakistan, 2010. *MMWR Morb Mortal Wkly Rep*, 2012. 61(49): p. 1002-7.
 48. Sabes-Figuera, R., et al., Long-term impact of war on healthcare costs: an eight-country study. *PLoS One*, 2012. 7(1): p. e29603.
 49. Seyedin, S.H., M.R. Aflatoonian, and J. Ryan, Adverse impact of international NGOs during and after the Bam earthquake: health system's consumers' points of view. *American Journal of Disaster Medicine*, 2009. 4(3): p. 173-9.
 50. Shuey, D.A., et al., Planning for health sector reform in post-conflict situations: Kosovo 1999-2000. *Health Policy*, 2003. 63(3): p. 299-310.
 51. Simunovic, V.J., Health care in Bosnia and Herzegovina before, during, and after 1992-1995 war: a personal testimony. *Conflict and Health*, 2007. 1(7).
 52. Thieren, M., Special issue: Health information systems; Gauging a response to humanitarian emergencies; Good data is vital for poverty reduction. (Special issue: Health information systems; Gauging a response to humanitarian emergencies; Good data is vital for poverty reduction.). *Bulletin of the World Health Organization*, 2005. 83(8): p. 561-640.
 53. Tiembre, I., et al., Impact of armed conflict on the health care system of a sanitary district in Cote d'Ivoire. *Revue Medecine Tropicale*, 2011. 71(3): p. 249-252.
 54. Ugalde, A., et al., Conflict and health: The health costs of war: can they be measured? Lessons from El Salvador. *BMJ*, 2000. 321(7254): p. 169-72.
 55. Val D'Espaux, S.d., et al., Strengthening mental health care in the health system in the occupied Palestinian territory. (Special Issue: Integrating mental health care into existing systems of health care: during and after complex humanitarian emergencies.). *Intervention International Journal of Mental Health, Psychosocial Work and Counselling in Areas of Armed Conflict*, 2011. 9(3): p. 279-290.
 56. Western, K.A., *Epidemiologie surveillance after natural disaster*. Pan American Health Organization Scientific Publication, 1982. 420(94).
-

5. Results for Contextual Factors

5.1 Access to healthcare

5.1.1 Systematic review

- The search strategy on contextual factors captured a large number of related peer-reviewed articles (2224), the vast majority of which (2160) either did not discuss humanitarian crises, or did not consider the impact of access to healthcare when looking at public health interventions during crises.
 - There is only a modest body of available evidence assessing the impact of access to healthcare on the effectiveness of health interventions during humanitarian crises (64 papers).
 - There is increasing interest in the characterisation of the impact of access on healthcare interventions during humanitarian crises, with 58/64 (91%) of all studies conducted since 1980 being published in the last decade.
 - The majority of available evidence is of low to moderate quality: 18/64 (28%) of papers were from category C evidence, 27/64 (42%) were from category B, and 19/64 (30%) were from category A.
 - All studies were observational. 32/64 (50%) of studies were descriptive in design and of these 14/32 (44%) were comparative: half the comparative studies (7/14) compared changes during the period of a humanitarian crisis, the other half (7/14) compared changes before and after a crisis struck. 31/64 (48%) employed a cross sectional design and one paper (2%) was a retrospective cohort study.
 - Of the location-identified research on health access during humanitarian crises, the country most commonly studied was Afghanistan (10/64, 16%), followed by Pakistan (8/64, 13%), Sri-Lanka (5/64, 8%), then Burma (4/64, 6%). As a region, Africa followed Asia in being the most intensely studied, with 13/64 (20%) articles focusing on countries including, DRC (2), Côte d'Ivoire (2), Sudan (2), Botswana (1), Guinea-Bissau (1), Kenya (1), Nigeria (1), Sierra Leone (1) and Somalia (1). Indeed, these countries represent some of the most violent environments to live in during their respective times of conflict and would be expected to have been associated with reduced access to healthcare for their populations. Other countries studied included China (3), Colombia (3), Haiti (3), Indonesia (2), Jordan (2), Nepal (2), Nicaragua (1), Peru (1) and Syria (1). 5/64 (8%) papers studies multiple countries.
 - Evidence for the different types of humanitarian crises focused heavily on armed conflict, which constituted 53/64 (83%); 11/64 (17%) considered natural disaster, in particular earthquakes (8) and tsunamis (2).
 - Most papers (39/64, 61%) focused on the general population, 15/64 (23%) considered IDPs, and one paper compared the general population with IDPs. 9/64 (14%) papers considered refugee populations.
 - Most papers (41/64, 64%) considered both urban and rural settings, 14/64 (22%) considered only the rural setting, and 9/64 (14%) considered only the urban environment.
 - Evidence for access to healthcare during humanitarian crises focused principally on the access of end-users (56/64, 88%). Of these papers, 25/64 (39%) considered all aspects of access of end-users, 16/64 (25%) considered only their physical access, 4/64 (6%) only economic access, two papers focused on the issue of non-discrimination in healthcare access; and one on informational access. Only 3/64 (5%) articles considered primarily the access of health workers to provide healthcare to end-users. Of these, two papers considered their economic access in terms of feasibility of their planned public health interventions; one paper considered their physical access. Finally, 5/64 (8%) papers considered access issues of both end-user and health workers together.
 - Regarding the types of public health interventions, 36/64, (56%) articles studied access to existing medical services. 18/64 (28%) articles considered access to international medical assistance or existing services supplemented by international intervention. The remaining articles (10/64, 16%) considered a combination of local governmental, non-governmental or an undefined mechanism of supplementation of existing medical services.
-

- Female reproductive health, antenatal and obstetric services together formed the health topic most studied regarding access (12/64, 19%). 10/64 (16%) papers considered all health services in general, 8/64 (13%) papers considered primary care and 4/64 (6%) considered mental health services. There was also specific evidence on access to infectious disease control: 6/64 (9%) papers studied malaria, 4/64 papers (6%) TB, and two papers HIV/AIDS.
- Concerning the stage of crisis, 10/64 (16%) studies focused on the acute phase, 5/64 (8%) on early recovery, and the vast majority (49/64, 77%) on chronic situations.

5.1.2 Expert Interviews

Key findings from the expert interviews were as follows:

Priority gaps in the available evidence on access to healthcare which need to be filled include:

- Real-time mapping of access to healthcare of end-users.
- Optimising healthcare access in crisis areas outside government control for both end-users and healthcare workers.
- Health disparities arising from access inequities between resident and transiting populations within a crisis location.
- Role of mobile phones and other digital technologies in improving health access for end-users.
- Certain populations experiencing crisis, including adolescents, the disabled, the elderly, those with chronic disease, and prisoners or detainees.

Issues related to the type of crisis and access to healthcare:

- Gathering evidence and study contextual factors is most difficult in the context of armed conflict and in situations where infrastructure has suffered severe and extensive destruction, such as is typical after earthquakes.

Type of studies needed:

- Randomised and controlled trials would be an impractical, unfeasible and unethical means of seeking evidence on contextual factors.
- The greatest source of shared knowledge likely lies within the grey literature, but the extent to which this can be used as scientific evidence is highly variable and its usefulness would be dependent on the reputation of the agency producing it.
- By nature, innovations aimed at systemic transformative change need to transcend evidence-based interventions and therefore the quest for evidence must itself be carefully directed.

Use of guidelines and standards in the study or programmatic development of access to healthcare:

- The Geneva Conventions are the most widely used standards for contextual factors.
- Other guidelines and standards which are particularly useful include: (i) government sources and statistics, (ii) International Crisis Group (ICG) reports, (iii) existing institutional guidelines, (iv) policy statements of agencies, (v) needs assessments of agencies, and (vi) informal peer advice.
- Other than the Institutional Review Board (IRB) process, there are very few standardised ethical guidelines in the field of humanitarian research and programmatic development.

There was excellent consensus on the perceived research gaps in contextual factors among the humanitarian experts interviewed.

5.1.3 Recommendations for future research

General

- Given the current interest in and debate surrounding the issue of access to service provision during crises in the humanitarian sector, more quality research needs to be done in the domain of access to healthcare during humanitarian crises.

Evidence needed to explore the following issues:

- Real-time mapping of access to healthcare of end-users.
- Optimising healthcare access in crisis areas outside government control for both end-users and healthcare workers.
- Health disparities arising from access inequities between resident and transiting populations within a crisis location.
- Role of mobile phones and other digital technologies in improving health access for end-users.

Indicators, standards and guidelines

- In order to facilitate the generation of more relevant evidence, research into the development of standardised methods or indicators to measure the different aspects of both end-user and health worker access to healthcare would be most useful.

Context and populations

- Current evidence on contextual factors focuses primarily on descriptions of what types of access to healthcare are affected during crises, and not the influence of access on the impact of public health interventions, which therefore require greater research attention.
- Research is needed to measure the impact of access to healthcare on health interventions during natural disasters and in the acute phase of crises.
- Populations needing increased research include IDP and refugee populations, adolescents, the disabled, the elderly, those with chronic disease, and prisoners, or detainees.

References: Access to health care

1. Abdelmoneium, A.O.A., Policy and practice: Non-governmental organisations and the health delivery system for displaced children in Khartoum, Sudan. *Child Abuse Review*, 2010. 19(3): p. 203-217.
 2. Abeyasinghe, R.R., et al., Malaria Control and Elimination in Sri Lanka: Documenting Progress and Success Factors in a Conflict Setting. *PLoS ONE*, 2012. 7(8).
 3. Ali, M., et al., Emergency obstetric care availability, accessibility and utilization in eight districts in Pakistan's North West Frontier Province. *Journal of Ayub Medical College, Abbottabad: JAMC*, 2006. 18(4): p. 10-5.
 4. Ameli, O. and W. Newbrander, Contracting for health services: effects of utilization and quality on the costs of the Basic Package of Health Services in Afghanistan. *Bulletin of the World Health Organization*, 2008. 86(12): p. 920-8.
 5. Balthazar, B., Needs and accessibility to health services: Attitudes and perceptions of internally displaced head-of-household victims from Medellin, Colombia, 2011, ProQuest Information & Learning: US.
 6. Bartlett, L.A., et al., Maternal mortality among Afghan refugees in Pakistan, 1999-2000. *Lancet*, 2002. 359(9307): p. 643-649.
 7. Beeche, A.A., Disparities in key health indicators between vulnerable groups living in refugee and host communities. Case study: Largo refugee camp and host community, Kenema District, Sierra Leone, 2008, ProQuest Information & Learning: US.
 8. Bukhari, S.K.S., et al., Essential medicines management during emergencies in Pakistan. *Eastern Mediterranean Health Journal*, 2010. 16(SUPPL.): p. S106-113.
-

9. Carruth, L., *The aftermath of aid: Medical insecurity in the northern Somali Region of Ethiopia*, 2012, ProQuest Information & Learning: US.
 10. Chan, E.Y. and S. Griffiths, Comparison of health needs of older people between affected rural and urban areas after the 2005 Kashmir, Pakistan earthquake. *Prehospital & Disaster Medicine*, 2009. 24(5): p. 365-71.
 11. Chan, G.J., et al., Improving health services to displaced persons in Aceh, Indonesia: a balanced scorecard.[Erratum appears in *Bulletin of the World Health Organization*. 2010 Oct 1;88(10):796]. *Bulletin of the World Health Organization*, 2010. 88(9): p. 709-12.
 12. Contini, S., et al., Emergency and essential surgical services in Afghanistan: still a missing challenge. *World Journal of Surgery*, 2010. 34(3): p. 473-9.
 13. Cope, J.R., Estimating the factors associated with health status and access to care among Iraqis displaced in Jordan and Syria using population assessment data, 2012, ProQuest Information & Learning: US.
 14. Daniels, A., et al., Access to Health Services and Care-seeking Behaviors After the 2007 Ica Earthquake in Peru. *Disaster Medicine and Public Health Preparedness*, 2009. 3(2): p. 97-103.
 15. Dijkzeul, D. and C.A. Lynch, NGO management and health care financing approaches in the Eastern Democratic Republic of the Congo. *Global Public Health*, 2006. 1(2): p. 157-72.
 16. Enwereji, E.E., Assessing interventions available to internally displaced persons in Abia State, Nigeria. *Libyan Journal of Medicine*, 2009. 4(1): p. 17-22.
 17. Fu, X.Q., et al., Emergency management and security of first-line medical supplies in the 3A hospital during the Wenchuan earthquake - May 12-June 30,2008. *Chinese Journal of Evidence-Based Medicine*, 2009. 9(4): p. 384-388.
 18. Furst, T., et al., Dynamics of socioeconomic risk factors for neglected tropical diseases and malaria in an armed conflict. *PLoS Neglected Tropical Diseases*, 2009. 3(9).
 19. Gustafson, P., et al., Tuberculosis mortality during a civil war in Guinea-Bissau. *Journal of the American Medical Association*, 2001. 286(5): p. 599-603.
 20. Haththotuwa, R., et al., Models of care that have reduced maternal mortality and morbidity in Sri Lanka. *International Journal of Gynecology and Obstetrics*, 2012. 119(SUPPL.1): p. S45-S49.
 21. Heldal, E., et al., Successful management of a national tuberculosis programme under conditions of war. *International Journal of Tuberculosis and Lung Disease*, 1997. 1(1): p. 16-24.
 22. Hirose, A., et al., Difficulties leaving home: A cross-sectional study of delays in seeking emergency obstetric care in Herat, Afghanistan. *Social Science & Medicine*, 2011. 73(7): p. 1003-1013.
 23. Howard, N., et al., Malaria control under the Taliban regime: insecticide-treated net purchasing, coverage, and usage among men and women in eastern Afghanistan. *Malaria Journal*, 2010. 9.
 24. Jordans, M.J.D., et al., Practice-Driven Evaluation of a Multi-layered Psychosocial Care Package for Children in Areas of Armed Conflict. *Community Mental Health Journal*, 2010: p. 1-11.
 25. Khan, I.M. and U. Laaser, Burden of tuberculosis in Afghanistan: Update on a war-stricken country. *Croatian Medical Journal*, 2002. 43(2): p. 245-247.
 26. Kim, G., R. Torbay, and L. Lawry, Basic health, women's health, and mental health among internally displaced persons in Nyala Province, South Darfur, Sudan. *American Journal of Public Health*, 2007. 97(2): p. 353-361.
 27. Kim, Y.M., et al., Availability and quality of emergency obstetric and neonatal care services in Afghanistan. *International Journal of Gynecology and Obstetrics*, 2012. 116(3): p. 192-196.
 28. Krause, S.K., J.L. Meyers, and E. Friedlander, Improving the availability of emergency obstetric care in conflict-affected settings. *Global public health*, 2006. 1(3): p. 205-228.
 29. Lee, C.I., et al., Internally displaced human resources for health: villager health worker partnerships to scale up a malaria control programme in active conflict areas of eastern Burma. *Global Public Health*, 2009. 4(3): p. 229-41.
-

30. Lee, R.B., Delivering Maternal Health Care Services in an Internal Conflict Setting in Maguindanao, Philippines. *Reproductive Health Matters*, 2008. 16(31): p. 65-74.
 31. Liu, J., et al., Post-earthquake mental health and psychosocial support (MHPSS) capacity of health facilities in some areas in Sichuan: Questionnaire survey and key informant interview with grassroots health professionals. *Chinese Mental Health Journal*, 2011. 25(2): p. 102-106.
 32. Mahn, M., et al., Multi-level partnerships to promote health services among internally displaced in eastern Burma. *Global public health*, 2008. 3(2): p. 165-186.
 33. Mateen, F.J., et al., Medical conditions among Iraqi refugees in Jordan: data from the United Nations Refugee Assistance Information System. *Bulletin of the World Health Organization*, 2012. 90(6): p. 444-51.
 34. McIntyre, T., et al., Emergency Surgical Care Delivery in Post-earthquake Haiti: Partners in Health and Zanmi Lasante Experience. *World Journal of Surgery*, 2011. 35(4): p. 745-750.
 35. Mills, E.J., et al., Providing antiretroviral care in conflict settings. *Current HIV/AIDS Reports*, 2009. 6(4): p. 201-9.
 36. Mogollon-Perez, A.S. and M.L. Vazquez, Factors affecting access to health care institutions by the internally displaced population in Colombia. *Cadernos De Saude Publica*, 2008. 24(4): p. 745-754.
 37. Morikawa, M., Effect of security threats on primary care access in Logar province, Afghanistan. *Medicine, conflict and survival*, 2008. 24(1): p. 59-64.
 38. Mullany, L.C., et al., The MOM Project: Delivering Maternal Health Services among Internally Displaced Populations in Eastern Burma. *Reproductive Health Matters*, 2008. 16(31): p. 44-56.
 39. Mullany, L.C., et al., Access To Essential Maternal Health Interventions and Human Rights Violations among Vulnerable Communities in Eastern Burma. *Plos Medicine*, 2008. 5(12): p. 1689-1698.
 40. Oucho, J.O. and N.O. Ama, Immigrants' and refugees' unmet reproductive health demands in Botswana: Perceptions of public healthcare providers. *South African Family Practice*, 2009. 51(3): p. 237-243.
 41. Partap, U. and D.R. Hill, The Maoist insurgency (1996-2006) and child health indicators in Nepal. *International Health*, 2012. 4(2): p. 135-142.
 42. Pike, I.L., et al., Documenting the health consequences of endemic warfare in three pastoralist communities of northern Kenya: a conceptual framework. *Social Science & Medicine*, 2010. 70(1): p. 45-52.
 43. Ponsar, F., et al., Mortality, violence and access to care in two districts of Port-au-Prince, Haiti. *Conflict and Health*, 2009. 3: p. 4-4.
 44. Qayum, M., et al., Assessment of health services on relevant primary health care principles in internally displaced people of Pakistan based on SPHERE standards and indicators. *Journal of the College of Physicians and Surgeons Pakistan*, 2011. 21(5): p. 315-316.
 45. Qayum, M., et al., Sphere-based assessment of knowledge and preventive measures related to malaria among the Displaced Population of Jalozi, Pakistan. *Journal of the Pakistan Medical Association*, 2012. 62(4): p. 344-346.
 46. Raheel, H., et al., Knowledge, Attitudes and Practices of Contraception among Afghan Refugee Women in Pakistan: A Cross-Sectional Study. *Plos One*, 2012. 7(11).
 47. Rajabali, A., et al., Communicable disease among displaced Afghans: refuge without shelter. *Nature Reviews. Microbiology*, 2009. 7(8): p. 609-14.
 48. Rassekh, B.M., Utilization of health services for children after the Tsunami in Aceh, Indonesia, 2007, ProQuest Information & Learning: US.
 49. Roberts, B., et al., A basic package of health services for post-conflict countries: implications for sexual and reproductive health services. *Reproductive Health Matters*, 2008. 16(31): p. 57-64.
 50. Ruiz-Rodriguez, M., et al., Access to medicines among internally displaced and non-displaced people in urban areas in Colombia. *Cadernos De Saude Publica*, 2012. 28(12): p. 2245-2256.
-

51. Saadi, A., B. Bond, and S. Percac-Lima, Perspectives on preventive health care and barriers to breast cancer screening among Iraqi women refugees. *Journal of Immigrant and Minority Health*, 2012. 14(4): p. 633-639.
52. Sarani, B., et al., The academic medical centre and nongovernmental organisation partnership following a natural disaster. *Disasters*, 2012. 36(4): p. 609-616.
53. Saxena, S., M.V. Ommeren, and B. Saraceno, Mental health assistance to populations affected by disasters: World Health Organization's role. *International Review of Psychiatry*, 2006. 18(3): p. 199-204.
54. Simetka, O., et al., Obstetrics during Civil War: six months on a maternity ward in Mallavi, northern Sri Lanka. *Medicine, Conflict & Survival*, 2002. 18(3): p. 258-70.
55. Tiembre, I., et al., [Impact of armed conflict on the health care system of a sanitary district in Cote d'Ivoire]. *Medecine Tropicale*, 2011. 71(3): p. 249-52.
56. Tiwari, S.K. and E.J. Love, Gender and tuberculosis control in armed conflict areas in Nepal. *International Medical Journal*, 2007. 14(4): p. 265-271.
57. van der Hoek, W., D.A. Premasiri, and A.R. Wickremasinghe, Early diagnosis and treatment of malaria in a refugee population in Sri Lanka. *Southeast Asian Journal of Tropical Medicine & Public Health*, 1997. 28(1): p. 12-7.
58. Van Herp, M., et al., Mortality, violence and lack of access to health-care in the Democratic Republic of Congo. *Disasters*, 2003. 27(2): p. 141-153.
59. Varley, E., Targeted doctors, missing patients: Obstetric health services and sectarian conflict in Northern Pakistan. *Social Science and Medicine*, 2010. 70(1): p. 61-70.
60. Ventevogel, P., et al., Improving Access to Mental Health Care and Psychosocial Support within a Fragile Context: A Case Study from Afghanistan. *Plos Medicine*, 2012. 9(5).
61. Whelan, A. and J. Blogg, 'Halfway people': refugee views of reproductive health services. *Global public health*, 2007. 2(4): p. 373-394.
62. Wickramasinghe, W.A.K.K., et al., Are Tsunami survivors satisfied with the provision and quality of healthcare they received? *Asia-Pacific Journal of Public Health*, 2007. 19(SEPC. ISS.): p. 35-39.
63. Williams, J.L. and B. McCarthy, Observations from a maternal and infant hospital in Kabul, Afghanistan - 2003. *Journal of Midwifery and Women's Health*, 2005. 50(4): p. e31-e35.
64. Zhang, L.L., et al., Emergency pharmaceutical administration of hospital for women and children in medical rescue after Wenchuan earthquake. *Chinese Journal of Evidence-Based Medicine*, 2008. 8(9): p. 692-697.

5.2 Accountability to end-users

5.2.1 Systematic review

- The search strategy on this contextual factor captured a large number of related peer-reviewed articles (3876), the vast majority of which (3846) either did not discuss humanitarian crises or did not consider the impact of accountability to end-users on a public health intervention during crisis.
- There is little available evidence assessing the impact of accountability to end-users on the effectiveness of health interventions during humanitarian crises (30 papers).
- There is increasing interest in the characterisation of the impact of accountability to end-users on healthcare interventions during humanitarian crises, with 26/30 (87%) of all studies conducted since 1980 being published in the last decade.
- The majority of available evidence is of low to moderate quality: 12/30 (40%) of papers were from category C evidence; 7/30 (23%) were from category B; and 11/30 (37%) were from category A.
- All studies were observational. Half of the studies were descriptive in design and none of these were comparative. The other half of the studies were cross-sectional; of these, 6/15 (40%) compared changes over a period of time during a humanitarian crisis.

- Of the location-identified research on accountability to end-users during humanitarian crises, the most commonly studied region was Asia (10/30, 33%) with Afghanistan and Pakistan being most studied here (three papers each), followed by Africa (6/30, 20%). A further 12/30 (40%) papers considered multiple (more than two) different countries across regions.
- Evidence for the different types of humanitarian crises focused primarily on armed conflict: 13/30 (43%) considered these; 10/30 (33%) considered both armed conflict and natural disasters; and 7/30 (23%) considered only natural disasters, in particular floods (3) and tsunamis (2).
- Most papers (20/30, 66%) focused on the general population, 6/30 (20%) considered IDPs only, 3/30 (10%) papers considered refugee populations only, and one paper compared IDPs and refugees.
- Most papers (17/30, 57%) considered both urban and rural settings, 12/30 (40%) considered only the rural setting, and one paper considered only the urban environment.
- Of all the available evidence, only 2/30 (7%) studies considered all three aspects of healthcare accountability to end-users, namely its acceptability, availability and quality. 15/30 (50%) of studies considered acceptability; of these four considered one other aspect in addition. 12/30 (40%) of articles considered quality of healthcare; of these six considered one other aspect in addition. 9/30 (30%) of studies considered availability; of these, six considered one other aspect in addition.
- Regarding the types of public health interventions, 21/30 (70%) articles studied accountability of international medical assistance agencies; of these, 7/30 (23%) considered how they interacted with local existing health services, and 3/30 (10%) others concerned the organisation Médecins San Frontières (MSF) specifically. 6/30 (20%) further articles considered accountability to end-users of existing health services only.
- Basic, general and primary healthcare services together formed the public healthcare area most studied regarding accountability to end-users (19/30, 63%). 5/30 (17%) papers considered the health topic of communicable diseases, including TB (2 papers), malaria (1), HIV/AIDS (1), and cholera (1). 3/30 (10%) papers considered obstetric services.
- Concerning the stage of crisis, 4/30 (13%) studies focused on the acute phase, 4/30 (13%) on early recovery, and the vast majority (22/30, 73%) on chronic situations.

5.2.2 Expert Interviews

Key findings from the expert interviews were as follows:

Priority gaps in the available evidence on accountability to end-users which need to be filled include:

- Role and methods of informed consent of end-users in crisis settings.
 - Perception of end-users regarding humanitarian healthcare delivery.
 - Validation of assumptions concerning end-users.
 - Nexus of human rights and humanitarian public health interventions.
 - Impact of the asymmetry of power between end-users and humanitarian agencies on public health interventions.
 - Quality of healthcare delivered to end-users in crisis.
 - Cost-benefit analyses of interventions and humanitarian health economics.
 - Role and methods of behavioural change of end-users in improving the impact of humanitarian healthcare delivery.
 - Ethical guidelines for humanitarian public health policy-making.
 - Certain populations experiencing crisis, including adolescents, the disabled, the elderly, those with chronic disease, and the LGBT community.
-

Issues related to the type of crisis and accountability to end-users:

- Gathering evidence and the study of this contextual factor is difficult and has been limited in all types of crises largely due to a lack of consensus on appropriate measures of accountability and optimal endpoints.

Type of studies needed:

- Randomised and controlled trials would be an impractical, unfeasible and unethical means of seeking evidence on this contextual factor.
- The greatest source of shared knowledge likely lies within the grey literature but the extent to which this can be used as scientific evidence is highly variable and its usefulness is seen to be dependent on the reputation of the agency producing it.
- By nature, innovations aimed at systemic transformative change need to transcend evidence-based interventions and therefore the quest for evidence must itself be carefully directed.
- The most useful contribution towards the progress of this contextual factor is likely to come from debate and consensus-building around moral, philosophical and professional considerations rather than from scientific evidence.

Use of guidelines and standards in the study or programmatic development of accountability to end-users:

- The Sphere Project standards are the most widely used standards for this contextual factor.
- Other guidelines and standards which are particularly useful include: (i) ALNAP guidelines, (ii) CDC guidelines, (iii) UNICEF guidelines, (iv) WHO guidelines, (v) International Crisis Group (ICG) reports, (vi) existing institutional guidelines, (vii) policy statements of agencies, and (viii) informal peer advice.
- Other than the Institutional Review Board (IRB) process, there are very few standardised ethical guidelines in the field of humanitarian research and programmatic development.

There was excellent consensus on the perceived research gaps in this contextual factor among the humanitarian experts interviewed.

5.2.3 Recommendations for future research**General:**

- Accountability to end-users has become a core value in the humanitarian sector but represents an area relatively devoid of high quality evidence and needs more research.
- High quality comparative studies are needed to inform how accountability influences health interventions and outcomes, in particular comparing health interventions of varying levels of accountability, and comparing different mechanisms of healthcare accountability (e.g. international vs. purely local or domestic accountability mechanism).
- More evidence is needed on (i) the role and methods of informed consent of end-users in crisis settings, (ii) the perception of end-users regarding humanitarian healthcare delivery, (iii) the asymmetry of power between end-users and humanitarian agencies on public health interventions, (iv) the role and methods of behavioural change of end-users in improving the impact of humanitarian healthcare delivery, and (v) mechanisms and policies which safeguard or improve accountability to end-users during humanitarian crises.

Context:

- Current evidence on this contextual factor focuses primarily on descriptions of the different aspects of accountability to end-users in healthcare provision during crises such as availability, acceptability, quality, but does not assess the influence of accountability on public health interventions.

Indicators, standards and guidelines

- In order to facilitate the generation of more relevant evidence, research into the development of standardised methods or indicators to measure the different aspects of accountability in health interventions would be most useful.

References: Accountability to end-users

1. Beitler, A.L., J.L. Junnila, and J.H. Meyer Jr, Humanitarian assistance in Afghanistan: A prospective evaluation of clinical effectiveness. *Military Medicine*, 2006. 171(9): p. 889-893.
 2. Black, R., Ethical codes in humanitarian emergencies: from practice to research? *Disasters*, 2003. 27(2): p. 95-108.
 3. Bohler, M., S.A. Mustafaa, and O. Morkve, Tuberculosis treatment outcome and health services: A comparison of displaced and settled population groups in Khartoum, Sudan. *International Journal of Tuberculosis and Lung Disease*, 2005. 9(1): p. 32-36.
 4. Brennan, T.A. and R. Kirschner, Medical ethics and human rights violations: The Iraqi occupation of Kuwait and its aftermath. *Annals of Internal Medicine*, 1992. 117(1): p. 78-82.
 5. Chevalier, A.C., I. Beauquesne, and R. Gagnayre, An analysis of preliminary conditions for the implementation of health training programmes within the framework of humanitarian aid. *Sante Publique*, 2002. 14(1): p. 37-46.
 6. Christensen Rand, E., S. Hirano, and I. Kelman, Post-tsunami housing resident satisfaction in Aceh. *International development planning review*, 2011. 33(2): p. 187-211.
 7. du Mortier, S. and M. Arpagaus, Quality improvement programme on the frontline: An international committee of the Red Cross experience in the democratic Republic of Congo. *International Journal for Quality in Health Care*, 2005. 17(4): p. 293-300.
 8. Guthmann, J.P., [Clinical research and humanitarian work: the role of Medecins sans Frontieres in the fight against malaria]. *M S-Medecine Sciences*, 2009. 25(3): p. 301-6.
 9. Harries, A.D., et al., The Union and Medecins Sans Frontieres approach to operational research. *International Journal of Tuberculosis & Lung Disease*, 2011. 15(2): p. 144-54, i.
 10. Hunt, M.R., Ethics beyond borders: how health professionals experience ethics in humanitarian assistance and development work. *Developing World Bioethics*, 2008. 8(2): p. 59-69.
 11. Hunt, M.R., Establishing moral bearings: ethics and expatriate health care professionals in humanitarian work. *Disasters*, 2011. 35(3): p. 606-622.
 12. Hussein, J., et al., Monitoring obstetric services: Putting the 'UN guidelines' into practice in Malawi: 3 Years on. *International Journal of Gynecology and Obstetrics*, 2001. 75(1): p. 63-73.
 13. Kirsch, T., et al., Satisfaction with the humanitarian response to the 2010 Pakistan floods: A call for increased accountability to beneficiaries. *Emergency Medicine Journal*, 2012.
 14. MacKenzie, C., C. McDowell, and E. Pittaway, Beyond 'do no harm': the challenge of constructing ethical relationships in refugee research. *Journal of refugee studies*, 2007. 20(2): p. 299-319.
 15. Mogollon Perez, A.S., M.L. Vazquez Navarrete, and M.D.M. Garcia Gil, Health-related needs of the displaced population due to armed conflict in Bogota. *Revista Espanola de Salud Publica*, 2003. 77(2): p. 257-266.
 16. O'Mathuna, D.P., Conducting research in the aftermath of disasters: Ethical considerations. *Journal of Evidence-Based Medicine*, 2010. 3(2): p. 65-75.
 17. Partamin, et al., Patterns in training, knowledge, and performance of skilled birth attendants providing emergency obstetric and newborn care in Afghanistan. *International Journal of Gynecology and Obstetrics*, 2012. 119(2): p. 125-129.
 18. Qayum, M., et al., Bathing and cleaning practices in the camp of jalozai pakistan, for internally displaced people, based on Sphere standards and indicators. *Journal of the Pakistan Medical Association*, 2011. 61(12): p. 1169-1172.
 19. Rutta, E., et al., Refugee perceptions of the quality of healthcare: findings from a participatory assessment in Ngara, Tanzania. *Disasters*, 2005. 29(4): p. 291-309.
 20. Schwartz, L., et al., Models for humanitarian health care ethics. *Public health ethics*, 2012. 5(1): p. 81-90.
-

21. Sheather, J. and T. Shah, Ethical dilemmas in medical humanitarian practice: cases for reflection from *Medecins Sans Frontieres*. *Journal of Medical Ethics*, 2011. 37(3): p. 162-5.
22. Sullivan, T.M., N. Sophia, and C. Maung, Using evidence to improve reproductive health quality along the Thailand-Burma border. *Disasters*, 2004. 28(3): p. 255-68.
23. Wall, A., The context of ethical problems in medical volunteer work. *HEC Forum*, 2011. 23(2): p. 79-90.
24. Wang, Z., et al., A survey and analysis on residents' satisfactory degree to the rebuilding status of community health service system in Mianzhu City. *Chinese Journal of Evidence-Based Medicine*, 2012. 12(6): p. 647-650.
25. Zwi, A.B., et al., Placing ethics in the centre: negotiating new spaces for ethical research in conflict situations. *Global Public Health*, 2006. 1(3): p. 264-77.

25.1 Health assessment methods

25.1.1 Systematic review

- The search strategy on this contextual factor captured 663 related peer-reviewed articles, the vast majority of which (580) either did not discuss humanitarian crises or did not consider health assessment methods in such situations.
 - There is a relatively modest body of available evidence considering health assessment methods during humanitarian crises (83 papers).
 - There is increasing interest in the methodologies of assessment, evaluation and estimation of health and health-related factors during humanitarian crises, with 63/83 (76%) of all studies conducted since 1980 being published in the last decade.
 - The majority of available evidence is of low to moderate quality: 13/83 (16%) of papers were from category C evidence, 36/83 (43%) were from category B, and 34/83 (41%) were from category A.
 - All studies were observational. 16/83 (19%) of studies were descriptive in design and of these 9/16 (56%) were comparative. 67/83 (81%) employed a cross-sectional design and of these 13/67 (19%) were comparative. In the comparative studies, the points of comparison included assessment methods within different settings, different affected populations, and between different assessment methodologies themselves.
 - Of the location-identified research on health assessment methods during humanitarian crises, the most commonly studied region was Asia (29/83, 35%), followed by Africa (26/83, 31%), then the Middle East (11/83, 13%). The most commonly studied countries were Afghanistan and Thailand (six papers each), followed by Iraq, Pakistan, Sudan and Uganda (five papers each). A further 8/83 (10%) papers considered multiple (more than two) different countries across regions.
 - Evidence for the different types of humanitarian crises focused heavily on armed conflict: 60/83 (72%) considered these; 20/83 (24%) considered natural disasters, in particular earthquakes (8) and tsunamis (4); and 3/83 (4%) considered both types of crises.
 - Most papers (46/83, 55%) focused on the general population, 16/83 (19%) considered IDP, 15/83 (18%) considered refugees, and 6/83 (7%) included more than one population type.
 - Most papers (45/83, 54%) considered both urban and rural settings, 34/83 (41%) considered only the rural setting, and 4/83 (5%) considered only the urban environment.
 - Regarding the types of public health interventions, 68/83 (82%) articles used health assessment methods for care planning. 9/83 (11%) articles assessed health in the context of the use of existing health services. 3/83 (4%) articles studied health assessment methods to inform aspects of disaster preparedness.
 - Excess mortality and morbidity was the health topic most assessed in these studies (26/83, 31%), followed closely by nutrition and food security (25/83, 30%). 19/83 (23%) studies assessed mental health, 8/83 (10%) assessed basic or general health, and 3/83 (4%) focused on population estimation.
-

- A large array of different health assessment methods was studied covering a range of health topics. Within each health topic, there was little consistency in the assessment methods used with the exception of two health topics: nutrition and mental health. Of the nutritional assessment methods, anthropometric measurements (such as weight-for-height in children) were almost universally used. Of the mental health assessment methods, several assessment scales or checklists were used in more than one study: the Hopkins Symptoms Checklist was used in five studies, and the Harvard Trauma Questionnaire, Depression Self-Rating Scale, SF-36 Health Survey and Afghan Symptom Checklist (ASCL) were each used in two studies.
- Concerning stage of crisis, 42/83 (51%) studies focused on the acute phase, 13/83 (16%) on early recovery, and 28/83 (34%) on chronic situations.

25.1.2 Expert Interviews

Key findings from the expert interviews were as follows:

Priority gaps in the available evidence on health assessment methods which need to be filled include:

- Mortality estimates of crisis-affected populations.
- Identification of vulnerable populations.
- Burden of chronic disease.
- Reliable direct data gathering from end-users.
- Victim interview methodologies.
- Numbers of humanitarian workers involved in a crisis situation.
- The humanitarian system's 'fitness-for-purpose' for addressing health needs in a crisis situation.
- Appropriate indicators with which to measure humanitarian contextual factors.
- Long-term impact assessment methodologies.
- Consensus-building on the interpretation of assessment tools.
- Assessment data management and security.
- Certain populations experiencing crisis, including adolescents, the disabled, the elderly, those with chronic disease, and urban refugees.

Issues related to the type of crisis and health assessment methods:

- Despite significant data gathering and study of this contextual factor in the acute phase of crises, the application of available evidence in all types of crises has been limited largely due to a lack of consensus on the interpretation of assessment tools.

Type of studies needed:

- Randomised and controlled trials would be an impractical, unfeasible and unethical means of seeking evidence on this contextual factor.
- The greatest source of shared knowledge likely lies within the grey literature but the extent to which this can be used as scientific evidence is highly variable and its usefulness is seen to be dependent on the reputation of the agency producing it.
- By nature, innovations aimed at systemic transformative change need to transcend evidence-based interventions and therefore the quest for evidence must itself be carefully directed.

Use of guidelines and standards in the study or programmatic development of accountability to end-users:

- Existing institutional guidelines of the agencies or organisations within which humanitarian workers operate are the most widely used standards for this contextual factor.
 - Other guidelines and standards which are particularly useful include: (i) Sphere Project standards, (ii) ALNAP guidelines, (iii) CDC guidelines, (iv) UNICEF guidelines, (v) WHO guidelines, (vi) policy statements of agencies, and (vii) informal peer advice.
-

- Other than the Institutional Review Board (IRB) process, there are very few standardised ethical guidelines in the field of humanitarian research and programmatic development.

There was very good consensus on the perceived research gaps in this contextual factor among the humanitarian experts interviewed. The areas where there was a lack of consensus were in the health assessment methods involving (i) direct data gathering from end-users and (ii) victim interview methodologies, where only a minority of experts believed these to be research priorities.

25.1.3 Recommendations for future research

- More quality research is needed on the development, comparison, testing and validation of health assessment methods.
- Greater research attention should therefore be given to the impact of different health assessment methodologies on the effectiveness of public health interventions during humanitarian crises.
- More evidence is needed in a number of areas: (i) mortality estimates of crisis-affected populations, (ii) identification of vulnerable populations, (iii) burden of chronic diseases, and (iv) indicators with which to measure humanitarian contextual factors.

References: Health assessment methods

1. Ager, A., et al., Child protection assessment in humanitarian emergencies: Case studies from Georgia, Gaza, Haiti and Yemen. *Child Abuse and Neglect*, 2011. 35(12): p. 1045-1052.
2. Ahoua, L., et al., High mortality in an internally displaced population in Ituri, Democratic Republic of Congo, 2005: results of a rapid assessment under difficult conditions. *Global public health*, 2006. 1(3): p. 195-204.
3. AlDoori, W., et al., Child nutrition and armed conflicts in Iraq. *Journal of Tropical Pediatrics*, 1994. 40(1): p. 32-36.
4. Amowitz, L.L., M. Heisler, and V. Iacopino, A population-based assessment of women's mental health and attitudes toward women's human rights in Afghanistan. *Journal of Women's Health*, 2003. 12(6): p. 577-587.
5. Andersson, N. and G. Lamothe, Clustering and meso-level variables in cross-sectional surveys: an example of food aid during the Bosnian crisis. *BMC Health Services Research*, 2011. 11 Suppl 2: p. S15.
6. Article, R., et al., Rapid assessment of health needs after disasters: A systematic review. *Chinese Journal of Evidence-Based Medicine*, 2011. 11(6): p. 605-612.
7. Atuyambe, L.M., et al., Land slide disaster in eastern Uganda: Rapid assessment of water, sanitation and hygiene situation in Bulucheke camp, Bududa district. *Environmental Health: A Global Access Science Source*, 2011. 10(1).
8. Barath, A., Children's well-being after the war in Kosovo: Survey in 2000. *Croatian Medical Journal*, 2002. 43(2): p. 199-208.
9. Bengtsson, L., et al., Improved response to disasters and outbreaks by tracking population movements with mobile phone network data: A post-earthquake geospatial study in haiti. *PLoS Medicine*, 2011. 8(8).
10. Benner, M.T., et al., Reproductive health and quality of life of young Burmese refugees in Thailand. *Conflict and Health*, 2010. 4: p. 5-5.
11. Bern, C., et al., Risk factors for mortality in the Bangladesh cyclone of 1991. *Bulletin of the World Health Organization*, 1993. 71(1): p. 73-8.
12. Betancourt, T.S., et al., A qualitative study of mental health problems among children displaced by war in Northern Uganda. *Transcultural Psychiatry*, 2009. 46(2): p. 238-256.
13. Bisimwa, B.G., et al., Efficacité des relais communautaires dans le dénombrement et la détermination des populations vulnérables dans un contexte de malnutrition endémique et de conflit armé : Cas d'un district sanitaire en RD Congo. *Cahiers D'Études et De Recherche Francophone / Santé*, 2009. 19(2): p. 81-86.

14. Boss, L.P., M.J. Toole, and R. Yip, Assessments of mortality, morbidity, and nutritional status in Somalia during the 1991-1992 famine: Recommendations for standardization of methods. *Journal of the American Medical Association*, 1994. 272(5): p. 371-376.
 15. Brown, V., et al., Rapid assessment of population size by area sampling in disaster situations. *Disasters*, 2001. 25(2): p. 164-171.
 16. Cardozo, B.L., et al., Karenni refugees living in Thai-Burmese border camps: Traumatic experiences, mental health outcomes, and social functioning. *Social Science and Medicine*, 2004. 58(12): p. 2637-2644.
 17. Cheung, E., et al., An epidemic of scurvy in Afghanistan: assessment and response. *Food & Nutrition Bulletin*, 2003. 24(3): p. 247-55.
 18. Cronin, A.A., et al., Quantifying the burden of disease associated with inadequate provision of water and sanitation in selected sub-Saharan refugee camps. *Journal of Water and Health*, 2009. 7(4): p. 557-568.
 19. Degomme, O. and D. Guha-Sapir, Patterns of mortality rates in Darfur conflict. *Lancet*, 2010. 375(9711): p. 294-300.
 20. Ertl, V., et al., Validation of a mental health assessment in an african conflict population. *Psychological Assessment*, 2010. 22(2): p. 318-324.
 21. Ezard, N., et al., Six rapid assessments of alcohol and other substance use in populations displaced by conflict. *Conflict and Health*, 2011. 5: p. 1-1.
 22. Fernando, G.A., Assessing Mental Health and Psychosocial Status in Communities Exposed to Traumatic Events: Sri Lanka as an Example. *American Journal of Orthopsychiatry*, 2008. 78(2): p. 229-239.
 23. Field, J.O. and R.M. Russell, Nutrition mission to Iraq for UNICEF. *Nutrition Reviews*, 1992. 50(2): p. 41-46.
 24. Galway, L.P., et al., A two-stage cluster sampling method using gridded population data, a GIS, and Google Earth (TM) imagery in a population-based mortality survey in Iraq. *International Journal of Health Geographics*, 2012. 11.
 25. Garfield, R. and C.S. Leu, A multivariate method for estimating mortality rates among children under 5 years from health and social indicators in Iraq. *International Journal of Epidemiology*, 2000. 29(3): p. 510-515.
 26. Glass, R.I., et al., Rapid assessment of health status and preventive-medicine needs of newly arrived Kampuchean refugees, Sa Kaeo, Thailand. *Lancet*, 1980. 1(8173): p. 868-72.
 27. Grais, R.F., et al., Are rapid population estimates accurate? A field trial of two different assessment methods. *Disasters*, 2006. 30(3): p. 364-376.
 28. Grandesso, F., et al., Mortality and malnutrition among populations living in South Darfur, Sudan: Results of 3 surveys, September 2004. *Journal of the American Medical Association*, 2005. 293(12): p. 1490-1494.
 29. Grein, T., et al., Mortality among displaced former UNITA members and their families in Angola: A retrospective cluster survey. *British Medical Journal*, 2003. 327(7416): p. 650-653.
 30. Guerena-Burgueno, F., et al., Rapid assessment of health needs and medical response after the tsunami in Thailand, 2004-2005. *Military Medicine*, 2006. 171(10 SUPPL.): p. 8-11.
 31. Guerrier, G., et al., Malnutrition and mortality patterns among internally displaced and non-displaced population living in a camp, a village or a town in Eastern Chad. *PLoS ONE [Electronic Resource]*, 2009. 4(11): p. e8077.
 32. Guha-Sapir, D. and W.G. Van Panhuis, The importance of conflict-related mortality in civilian populations. *Lancet*, 2003. 361(9375): p. 2126-2128.
 33. Hemrich, G., Matching food security analysis to context: the experience of the Somalia food security assessment unit. *Disasters*, 2005. 29(1(Supp.)): p. 67-91.
 34. Holt, B.Y., et al., Planning STI/HIV prevention among refugees and mobile populations: situation assessment of Sudanese refugees. *Disasters*, 2003. 27(1): p. 1-15.
-

35. Hu, J.B., et al., [Reliability and validity of the self-reporting questionnaire for assessing mental health applied in Wenchuan earthquake]. *Chung-Hua Yu Fang i Hsueh Tsa Chih [Chinese Journal of Preventive Medicine]*, 2008. 42(11): p. 810-3.
 36. Jarrah, S., O. Nassar, and H. Amre, Iraqi refugees in Jordan: Assessment of health needs. *Jordan Medical Journal*, 2006. 40(4): p. 241-249+52.
 37. Kaiser, R., et al., Using design effects from previous cluster surveys to guide sample size calculation in emergency settings. *Disasters*, 2006. 30(2): p. 199-211.
 38. Khawaja, M., et al., Civic engagement, gender and self-rated health in poor communities: evidence from Jordan's refugee camps. *Health Sociology Review*, 2006. 15(2): p. 192-208.
 39. Kim, A.A., et al., HIV infection among internally displaced women and women residing in river populations along the congo river, democratic republic of Congo. *AIDS and Behavior*, 2009. 13(5): p. 914-920.
 40. Kolbe, A., et al., Mortality, crime and access to basic needs before and after the Haiti earthquake: a random survey of Port-au-Prince households. *Medicine, conflict and survival*, 2010. 26(4): p. 281-297.
 41. Laude, M., Assessment of nutritional status, cognitive development, and mother- child interaction in Central American refugee children. *Revista Panamericana de Salud Publica/Pan American Journal of Public Health*, 1999. 6(3): p. 164-171.
 42. Lee, T.J., et al., Mortality rates in conflict zones in Karen, Karenni, and Mon states in eastern Burma. *Tropical Medicine and International Health*, 2006. 11(7): p. 1119-1127.
 43. Mayaud, P., et al., STD rapid assessment in Rwandan refugee camps in Tanzania. *Genitourinary Medicine*, 1997. 73(1): p. 33-38.
 44. McGrath, M., A. Seal, and A. Taylor, Infant feeding indicators for use in emergencies: an analysis of current recommendations and practice. *Public Health Nutrition*, 2002. 5(3): p. 365-372.
 45. McVicar, T.R. and P.N. Bierwirth, Rapidly assessing the 1997 drought in Papua New Guinea using composite AVHRR imagery. *International Journal of Remote Sensing*, 2001. 22(11): p. 2109-2128.
 46. Miller, K.E., The effects of state terrorism and exile on indigenous Guatemalan refugee children: A mental health assessment and an analysis of children's narratives. *Child Development*, 1996. 67(1): p. 89-106.
 47. Miller, K.E., et al., The Afghan symptom checklist: A culturally grounded approach to mental health assessment in a conflict zone. *American Journal of Orthopsychiatry*, 2006. 76(4): p. 423-433.
 48. Miller, L.C., et al., Afghan refugee children and mothers. *Archives of Pediatrics and Adolescent Medicine*, 1994. 148(7): p. 704-708.
 49. Moore, P.S., et al., Mortality rates in displaced and resident populations of central Somalia during 1992 famine. *Lancet*, 1993. 341(8850): p. 935-938.
 50. Movaghar, A.R., et al., The impact of Bam earthquake on substance users in the first 2 weeks: A rapid assessment. *Journal of Urban Health*, 2005. 82(3): p. 370-377.
 51. Mukalay, A.W.M., P.M.K. Kalenga, and M. Dramaix, Predictive factors of malnutrition in under 5s in Lubumbashi (DRC). *Santé publique*, 2010. 22(5): p. 541-550.
 52. Orach, C.G., Morbidity and mortality amongst southern Sudanese in Koboko refugee camps, Arua District, Uganda. *East African Medical Journal*, 1999. 76(4): p. 195-199.
 53. Osborne Daponte, B., Wartime estimates of Iraqi civilian casualties. *International review of the Red Cross*, 2007. 89(868): p. 943-957.
 54. Panter-Brick, C., et al., Violence, suffering, and mental health in Afghanistan: a school-based survey. *The Lancet*, 2009. 374(9692): p. 807-816.
 55. Pawar, A.B., et al., A rapid assessment of mosquito breeding, vector control measures and treatment seeking behaviour in selected slums of Surat, Gujarat, India, during post-flood period. *Journal of Vector Borne Diseases*, 2008. 45(4): p. 325-327.
-

56. Pawar, A.T., S. Shelke, and V.A. Kakrani, Rapid assessment survey of earthquake affected Bhuj block of Kachchh District, Gujarat, India. *Indian Journal of Medical Sciences*, 2005. 59(11): p. 488-94.
 57. Pinto, A., et al., Setting up an early warning system for epidemic-prone diseases in Darfur: a participative approach. *Disasters*, 2005. 29(4): p. 310-322.
 58. Potts, A., K. Myer, and L. Roberts, Measuring human rights violations in a conflict-affected country: results from a nationwide cluster survey in Central African Republic. *Conflict and Health*, 2011. 5: p. 4-4.
 59. Prasad, A.N., Disease profile of children in Kabul: The unmet need for health care. *Journal of Epidemiology and Community Health*, 2006. 60(1): p. 20-23.
 60. Rasekh, Z., et al., Women's health and human rights in Afghanistan. *Journal of the American Medical Association*, 1998. 280(5): p. 449-455.
 61. Roberts, B., et al., A new method to estimate mortality in crisis-affected and resource-poor settings: Validation study. *International Journal of Epidemiology*, 2010. 39(6): p. 1584-1596.
 62. Rossi, L., N. Mangasaryan, and F. Branca, Nutritional status and poverty assessment of vulnerable population groups in Armenia. *Sozial-Und Preventivmedizin*, 2005. 50(3): p. 166-176.
 63. Safran, M.A., et al., Evaluating Mental Health After the 2010 Haitian Earthquake. *Disaster Medicine and Public Health Preparedness*, 2011. 5(2): p. 154-157.
 64. Salama, P., et al., Malnutrition, measles, mortality, and the humanitarian response during a famine in Ethiopia. *JAMA*, 2001. 286(5): p. 563-71.
 65. Shears, P., et al., epidemiologic assessment of the health and nutrition of ethiopian refugees in emergency camps in sudan, 1985. *British Medical Journal*, 1987. 295(6593): p. 314-318.
 66. Singh, M.B., et al., Studies on the nutritional status of children aged 0-5 years in a drought-affected desert area of western Rajasthan, India. *Public Health Nutrition*, 2006. 9(8): p. 961-967.
 67. Sollom, R., et al., Health and human rights in Chin State, Western Burma: A population-based assessment using multistaged household cluster sampling. *PLoS Medicine*, 2011. 8(2).
 68. Souza, R., et al., Mental health status of vulnerable tsunami-affected communities: A survey in Aceh Province, Indonesia. *Journal of Traumatic Stress*, 2007. 20(3): p. 263-269.
 69. Spiegel, P.B., et al., Quality of malnutrition assessment surveys conducted during famine in Ethiopia. *Journal of the American Medical Association*, 2004. 292(5): p. 613-618.
 70. Spiegel, P.B., et al., The accuracy of mortality reporting in displaced persons camps during the post-emergency phase. *Disasters*, 2001. 25(2): p. 172-180.
 71. Stark, L., et al., Measuring violence against women amidst war and displacement in northern Uganda using the "neighbourhood method". *Journal of Epidemiology and Community Health*, 2010. 64(12): p. 1056-1061.
 72. Sullivan, K., S.M.M. Hossain, and B.A. Woodruff, Mortality rate and confidence interval estimation in humanitarian emergencies. *Disasters*, 2010. 34(1): p. 164-175.
 73. Sullivan, K.M. and S.M.M. Hossain, Earthquake mortality in Pakistan. *Disasters*, 2010. 34(1): p. 176-183.
 74. Swain, M. and M. Swain, Impact of super cyclone on life and livelihood of women: a micro level study of two coastal districts in Orissa. *Asian economic review*, 2005. 47(3): p. 485-515.
 75. Thapa, S.B. and E. Hauff, Perceived needs, self-reported health and disability among displaced persons during an armed conflict in Nepal. *Social Psychiatry and Psychiatric Epidemiology*, 2012. 47(4): p. 589-595.
 76. Thienkrua, W., et al., Symptoms of posttraumatic stress disorder and depression among children in tsunami-affected areas in southern Thailand. *JAMA*, 2006. 296(5): p. 549-59.
 77. Van Griensven, F., et al., Mental health problems among adults in tsunami-affected areas in southern Thailand. *Journal of the American Medical Association*, 2006. 296(5): p. 537-548.
 78. Yamout, R. and M. Chaaya, Individual and collective determinants of mental health during wartime. A survey of displaced populations amidst the July-August 2006 war in Lebanon. *Global public health*, 2011. 6(4): p. 354-370.
-

79. Yamout, R. and S. Jabbour, Complexities of research during war: Lessons from a survey conducted during the summer 2006 war in Lebanon. *Public Health Ethics*, 2010. 3(3): p. 293-300.
80. Zhao, G.F., et al., [Application of the Children's Impact of Event Scale (Chinese Version) on a rapid assessment of posttraumatic stress disorder among children from the Wenchuan earthquake area]. *Chung-Hua Liu Hsing Ping Hsueh Tsa Chih Chinese Journal of Epidemiology*, 2009. 30(11): p. 1160-4.

25.2 Coordination

25.2.1 Systematic review

- The search strategy on this contextual factor captured 662 peer-reviewed articles, the vast majority of which (637) either did not discuss humanitarian crises or did not consider the impact of coordination on a public health intervention during crisis.
 - There is little available evidence assessing the impact of coordination on the effectiveness of health interventions during humanitarian crises (25 papers).
 - There is increasing interest in the characterisation of the impact of coordination on healthcare interventions during humanitarian crises, with 22/25 (88%) of all studies conducted since 1980 being published in the last decade.
 - The majority of available evidence is of low to moderate quality: 13/25 (52%) of papers were from category C evidence, 8/25 (32%) were from category B, and only 4/25 (16%) were from category A.
 - All studies were observational. All studies were purely descriptive, a study design very low down in the hierarchy of evidence. Only one of these was comparative, comparing two humanitarian information coordination bodies.
 - Of the location-identified research on coordination during humanitarian crises, Haiti and Pakistan were the most commonly studied countries (4/25, 16% papers each). A further 10/25 (40%) papers considered multiple (more than two) different countries across regions.
 - Evidence for the different types of humanitarian crises focused primarily on natural disasters: 10/25 (40%) considered these, in particular earthquakes, floods and tsunamis. 8/25 (32%) considered armed conflict only, and 7/25 (28%) considered both armed conflict and natural disasters.
 - Most papers (21/25, 84%) focused on the general population; 2/25 (8%) considered entrapped populations, one paper considered IDPs only, and one paper considered both IDPs and refugees.
 - Most papers (21/25, 84%) considered both urban and rural settings, 4/25 (16%) considered only the rural setting, and no studies considered only the urban environment.
 - Regarding the types of public health interventions, 14/25 (56%) articles considered the coordination of international medical assistance agencies with existing health services. 9/25 (36%) further articles considered the coordination of only international medical assistance agencies. Just 2/25 (8%) studies considered the coordination of only domestic humanitarian capabilities (both were conducted in China).
 - Of the available evidence on health coordination during humanitarian crises, 9/25 (36%) studies considered the UN OCHA and Cluster Approach systems, and 3/25 (12%) studies considered civil-military coordination. The majority of remaining papers (10/25, 40%) explored various domains of coordination which could be improved to increase the overall effectiveness of coordination during humanitarian crises, including: institutional and social networks (4 papers), trust between agencies (2), disaster preparedness and response (1), information management (1), logistics (1), and operational security (1).
 - Basic, general and primary healthcare services together formed the public healthcare area most studied regarding coordination during humanitarian crises (21/25, 84%). Of the remaining studies, there was one article written on each of the following health areas: hospital inpatient and surgical care; patient medical transfers; distribution of medical materials; and sexual and reproductive health.
 - Concerning stage of crisis, the majority (16/25, 64%) of studies focused on the acute phase, only 1/25 (4%) on early recovery, and 8/25 (32%) on chronic situations.
-

25.2.2 Expert Interviews

Key findings from the expert interviews were as follows:

Priority gaps in the available evidence on coordination which need to be filled include:

- OCHA's 'fitness-for-purpose' for addressing health needs
- Non UN/OHCA-centric mechanisms of coordination
- Impact of integrated UN missions on healthcare delivery
- Role of UNHCR in the coordination of healthcare delivery to IDPs and refugees
- How international communities coordinate with local government
- Advantages and disadvantages of pooled funding within the UN structure
- Cost-benefit analysis of coordination of humanitarian public health interventions
- Role of generating competitive market forces between agencies in improving coordination and healthcare delivery efficiency
- Certain populations experiencing crisis, including adolescents, the disabled, the elderly, those with chronic disease, IDP and refugees, and urban populations.

Issues related to the type of crisis and coordination:

- Gathering evidence and the study of this contextual factor is most limited and difficult in the context of armed conflict.

Type of studies needed:

- Randomised and controlled trials would be an impractical, unfeasible and unethical means of seeking evidence on this contextual factor.
- The greatest source of shared knowledge likely lies within the grey literature but the extent to which this can be used as scientific evidence is highly variable and its usefulness is seen to be dependent on the reputation of the agency producing it.
- By nature, innovations aimed at systemic transformative change need to transcend evidence-based interventions and therefore the quest for evidence must itself be carefully directed.

Use of guidelines and standards in the study or programmatic development of access to healthcare:

- The IASC guidelines are the most widely used standards for this contextual factor.
- Other guidelines and standards which are particularly useful include: (i) UNEG (UN Evaluation Group) norms and standards, (ii) ALNAP guidelines, (iii) International Crisis Group (ICG) reports, (iv) existing institutional guidelines, (v) policy statements of agencies, and (vi) informal peer advice.
- Other than the Institutional Review Board (IRB) process, there are very few standardised ethical guidelines in the field of humanitarian research and programmatic development.

There was excellent consensus on the perceived research gaps in this contextual factor among the humanitarian experts interviewed. The area where there was a lack of consensus was in the role of UNHCR in the coordination of healthcare delivery to IDPs and refugees, where only a minority of experts believed this to be a research priority.

25.2.3 Recommendations for future research

General:

- More research is needed to understand the impact that coordination has on public health interventions during armed conflict.
 - Greater research attention should be given to the cost-benefit analysis of coordination of humanitarian public health interventions.
 - More research is needed into mechanisms and policies that safeguard or improve coordination during humanitarian crises.
 - Evidence is needed to understand OCHA's 'fitness-for-purpose' for helping to address health needs.
-

Integration with local systems

- More evidence is needed on the impact of integrated UN missions on healthcare delivery.
- More research is required to analyse how international communities coordinate with local government.

Comparing different coordination mechanisms

- High quality comparative studies are needed to inform how coordination influences public health interventions, in particular the comparison of health interventions under varying levels of coordination; international vs. purely local/domestic mechanisms of coordination; urban vs. rural settings; and in natural disasters vs. armed conflict.
- There is a need for research into the characterisation and influence of different aspects of coordination on public healthcare interventions, including coordination of information and its management; logistics; human and material resources; technologies; and institutional, trust and social networks.
- Greater research attention could be given to the advantages and disadvantages for health of pooled funding within the UN structure.

References: Coordination

1. Akashi, H., N. Fujita, and R.K. Akashi, Aid coordination mechanisms for reconstructing the health sector of post-conflict countries. *Japan Medical Association Journal*, 2006. 49(7-8): p. 251-259.
 2. Bile, K.M., et al., Protecting the right to health of internally displaced mothers and children: The imperative of inter-cluster coordination for translating best practices into effective participatory action. *Eastern Mediterranean Health Journal*, 2011. 17(12): p. 981-989.
 3. Bile, K.M., K.A. Lashari, and A.F. Shadoul, "Delivering as one" UN reform process to improve health partnerships and coordination: Old challenges and encouraging lessons from Pakistan. *Eastern Mediterranean Health Journal*, 2010. 16(SUPPL.): p. S122-131.
 4. Bollettino, V., Understanding the security management practices of humanitarian organisations. *Disasters*, 2008. 32(2): p. 263-279.
 5. Chen, J., et al., Trans-province transfer of 10373 patients injured in Wenchuan earthquake. *Chinese Journal of Evidence-Based Medicine*, 2009. 9(12): p. 1267-1271.
 6. Cheng, Y.Z., et al., Construction and operation of a system for secure and precise medical material distribution in disaster areas after Wenchuan earthquake. *Chinese Journal of Evidence-Based Medicine*, 2009. 9(12): p. 1263-1266.
 7. Coles, J.B., J. Zhuang, and J. Yates, Case study in disaster relief: a descriptive analysis of agency partnerships in the aftermath of the January 12th, 2010 Haitian earthquake. *Socio-economic planning sciences*, 2012. 46(1): p. 67-77.
 8. Dar, O.A., M.S. Khan, and V. Murray, Conducting rapid health needs assessments in the cluster era: experience from the Pakistan flood. *Prehospital & Disaster Medicine*, 2011. 26(3): p. 212-6.
 9. Harmer, A., Integrated missions: a threat to humanitarian security? *International peacekeeping*, 2008. 15(4): p. 528-539.
 10. Joyce, N., Civilian-military coordination in the emergency response in Indonesia. *Military Medicine*, 2006. 171(10 SUPPL.): p. 66-82.
 11. Laan, E.d., et al., Managing information cycles for intra-organisational coordination of humanitarian logistics. *International Journal of Services Technology and Management*, 2009. 12(4): p. 362-390.
 12. Landegger, J., et al., Strengths and weaknesses of the humanitarian Cluster Approach in relation to sexual and reproductive health services in northern Uganda. *International Health*, 2011. 3(2): p. 108-114.
 13. Macalister-Smith, P., Non-governmental organizations and coordination of humanitarian assistance. *International review of the Red Cross*, 1987. 260: p. 501-512.
-

14. McCann, D.G.C. and H.P. Cordi, Developing international standards for disaster preparedness and response: How do we get there? *World Medical and Health Policy*, 2011. 3(1).
15. Moore, S., E. Eng, and M. Daniel, International NGOs and the role of network centrality in humanitarian aid operations: a case study of coordination during the 2000 Mozambique floods. *Disasters*, 2003. 27(4): p. 305-318.
16. Øverland, I., Humanitarian organizations in Tajikistan and the coordination of aid to displaced Afghans in no man's land. *Journal of refugee studies*, 2005. 18(2): p. 133-150.
17. Pélissier, R. and T. Lanzer, The UN Department of Humanitarian Affairs in Angola. A model for the coordination of humanitarian assistance? *Journal of Southern African studies*, 1996. 22(4): p. 657-670.
18. Sommaruga, C., Strengthening of the coordination of humanitarian emergency assistance of the United Nations Organization. *International review of the Red Cross*, 1993. 292: p. 49-49.
19. Stephenson, J.M., Making humanitarian relief networks more effective: operational coordination, trust and sense making. *Disasters*, 2005. 29(4): p. 337-350.
20. Stephenson, J.M., Toward a descriptive model of humanitarian assistance coordination. *Voluntas*, 2006. 17(1): p. 41-57.
21. Stephenson, J.M. and M.H. Schnitzer, Interorganizational trust, boundary spanning, and humanitarian relief coordination. *Nonprofit management and leadership*, 2006. 17(2): p. 211-233.
22. Stumpfenhorst, M., R. Stumpfenhorst, and O. Razum, The un OCHA cluster approach: Gaps between theory and practice. *Journal of Public Health*, 2011. 19(6): p. 587-592.
23. Tapia, A.H., et al., Coordinating humanitarian information: the problem of organizational and technical trajectories. *Information technology and people*, 2012. 25(3): p. 240-258.
24. Tarantino, D., Asian tsunami relief: Department of Defense public health response: Policy and strategic coordination considerations. *Military Medicine*, 2006. 171(10 SUPPL.): p. 15-18

25.3 Security of healthcare workers

25.3.1 Systematic review

- The search strategy on this contextual factor captured a modest number of related peer-reviewed articles (344), the vast majority of which (328) either did not discuss humanitarian crises or did not consider the impact of security of healthcare workers on a public health intervention during crisis.
 - There is very limited available evidence assessing the impact of security of healthcare workers on the effectiveness of health interventions during humanitarian crises (16 papers).
 - There is increasing interest in the characterisation of the impact of security of healthcare workers on health interventions during humanitarian crises, with 11/16 (69%) of all studies conducted since 1980 being published in the last decade.
 - The large majority of available evidence is of low to moderate quality: 12/16 (75%) of papers were from category C evidence; 2/16 (13%) were from category B; and only 2/16 (13%) were from category A.
 - All studies were observational. The large majority (14/16, 88%) were descriptive in design; the remaining (2/16, 13%) were cross-sectional. No studies were comparative.
 - Of the location-identified research on the security of healthcare workers in humanitarian crises, Afghanistan, Iraq and Jordan had 2/16 (13%) articles specifically written on each of them; 1 article out of 16 (6%) studied Pakistan specifically. Indeed, these countries have been affected by some of the most violent armed conflicts in recent history. The remaining 9/16 (57%) studies considered multiple (more than two) different countries across regions.
 - All studies considered the security of healthcare workers in armed conflict; of these, 3/16 (19%) studies also considered natural disasters.
 - Nearly all papers (14/16, 88%) focused on the general population; just 2/16 (13%) considered only refugees. No studies considered only IDPs.
-

- Nearly all papers (14/16, 88%) considered both urban and rural settings; just 2/16 (13%) considered rural settings alone. There were no studies on urban settings alone.
- Evidence on the security of healthcare workers public health interventions during humanitarian crises concentrated around four main themes. The first, examined by 6/16 (38%) of the studies, is the different forms of violence faced by healthcare workers, including murder, gun violence, kidnappings and physical threats. The second theme, considered by 5/16 (31%) studies, is strategies on how security of healthcare workers could be improved. The third, considered by 3/16 (19%), is how violence against healthcare workers decimates health systems. Finally, 2/16 (13%) studies explored methods of measuring violence towards healthcare workers during humanitarian crises.
- Regarding the types of public health interventions 10/16 (63%) articles considered security of healthcare workers in settings of international medical assistance or existing services supplemented by international intervention. The remaining articles (6/16, 38%) considered security of healthcare workers in local existing medical services only.
- Basic, general, emergency and primary healthcare services together formed the public healthcare area most studied regarding security of healthcare workers (15/16, 94%). One paper considered the health topic of obstetric services specifically.
- Concerning stage of crisis, 4/16 (25%) studies focused on the acute phase, none (0%) on early recovery, and the vast majority (8/16, 75%) on chronic situations.

25.3. Expert Interviews

Key findings from the expert interviews were as follows:

Priority gaps in the available evidence on security of healthcare workers which need to be filled include:

- Increased risks posed by integrated UN missions.
- Impact of using foreign over local healthcare workers.
- Identification of risk factors associated with security threats to healthcare workers.
- Impact of asymmetry of power within a conflict setting on security.
- Impact of international involvement on security.
- Impact of religious context on security.
- Impact of end-user perception on security.
- Political role of healthcare worker kidnappings in conflict negotiation.
- Certain populations experiencing crisis, including adolescents, the disabled, the elderly, those with chronic disease, and urban refugees.

Issues related to the type of crisis and security of healthcare workers:

- Gathering evidence and the study of this contextual factor is difficult in the context of armed conflict since this in itself may be dangerous to the investigator.

Type of studies needed:

- Randomised and controlled trials would be an impractical, unfeasible and unethical means of seeking evidence on this contextual factor.
 - The greatest source of shared knowledge likely lies within the grey literature but the extent to which this can be used as scientific evidence is highly variable and its usefulness is seen to be dependent on the reputation of the agency producing it.
 - By nature, innovations aimed at systemic transformative change need to transcend evidence-based interventions and therefore the quest for evidence must itself be carefully directed.
-

Use of guidelines and standards in the study or programmatic development of access to healthcare:

- The (i) Geneva Conventions and (ii) existing institutional guidelines of the agencies or organisations within which humanitarian workers operate are the most widely used standards for this contextual factor.
- Other guidelines and standards which are particularly useful include: (i) IASC guidelines, (ii) ALNAP guidelines, (iii) International Crisis Group (ICG) reports, (iv) policy statements of agencies, and (v) informal peer advice.
- Other than the Institutional Review Board (IRB) process, there are very few standardised ethical guidelines in the field of humanitarian research and programmatic development.

There was excellent consensus on the perceived research gaps in this contextual factor among the humanitarian experts interviewed. The area where there was a lack of consensus was in the political role of healthcare worker kidnappings in conflict negotiations, where only a minority of experts believed this to be a research priority.

25.3.3 Recommendations for future research

- There needs to be more research on how healthcare worker security influences the effectiveness of public health interventions in humanitarian crises.
- High quality comparative studies are needed to inform how security influences health interventions and outcomes, in particular comparing crises of varying security levels, crises in urban vs. rural settings, and crises with international vs. purely local or domestic health assistance.
- Further evidence is needed on the impact on public health interventions of: (i) increased risks posed by integrated UN missions, (ii) using foreign over local healthcare workers, (iii) risk factors associated with security threats to healthcare workers, (iv) religious context on security, (v) the impact of end-user perception on security.

References: Security of health care workers

1. Burnham, G., et al., Understanding the impact of conflict on health services in Iraq: information from 401 Iraqi refugee doctors in Jordan. *International Journal of Health Planning & Management*, 2012. 27(1): p. e51-64.
 2. Donaldson, R.I., et al., A survey of national physicians working in an active conflict zone: the challenges of emergency medical care in Iraq. *Prehospital & Disaster Medicine*, 2012. 27(2): p. 153-61.
 3. Doocy, S., S. Malik, and G. Burnham, Experiences of Iraqi doctors in Jordan during conflict and factors associated with migration. *American Journal of Disaster Medicine*, 2010. 5(1): p. 41-7.
 4. Faiz, A., Health care under the Taliban. *Lancet*, 1997. 349(9060): p. 1247-8.
 5. Fast, L.A., Mind the gap: Documenting and explaining violence against aid workers. *European Journal of International Relations*, 2010. 16(3): p. 365-389.
 6. Hawkes, N., Attacks on doctors rise as rules of conduct in conflict zones are abandoned. *British Medical Journal*, 2012. 344.
 7. Kett, M., S. Rushton, and A. Ingram, Rethinking the space for health and conflict? *Medicine, Conflict & Survival*, 2010. 26(1): p. 1-3.
 8. Rogers, C.S., B. Sytsma, and S. Custer, World vision security manual: safety awareness for aid workers. *Development in practice*, 2001. 11(5): p. 648-650.
 9. Rowley, E.A., B.L. Crape, and G.M. Burnham, Violence-related mortality and morbidity of humanitarian workers. *American Journal of Disaster Medicine*, 2008. 3(1): p. 39-45.
 10. Schulte, J.M., et al., Violence and threats of violence experienced by public health field-workers. *Jama-Journal of the American Medical Association*, 1998. 280(5): p. 439-442.
 11. Van Brabant, K., Cool ground for aid providers: Towards better security management in aid agencies. *Disasters*, 1998. 22(2): p. 109-125.
 12. Varley, E., Targeted doctors, missing patients: obstetric health services and sectarian conflict in northern Pakistan. *Social Science & Medicine*, 2010. 70(1): p. 61-70.
-

13. Vastag, B., Afghanistan aid workers struggle through threats. *JAMA*, 2001. 286(19): p. 2387-9.
14. Webster, P., Medical faculties decimated by violence in Iraq. *CMAJ Canadian Medical Association Journal*, 2009. 181(9): p. 576-8.
15. Webster, P.C., The deadly effects of violence against medical workers in war zones. *CMAJ Canadian Medical Association Journal*, 2011. 183(13): p. E981-2.

25.4 Urbanisation

25.4.1 Systematic review

- The search strategy on this contextual factor captured a large number of related peer-reviewed articles (3141), the vast majority of which (3114) either did not discuss humanitarian crises or did not consider the impact of urbanisation on a public health intervention during crisis.
 - There is little available evidence assessing the impact of urbanisation on the effectiveness of healthcare interventions during humanitarian crises (27 papers).
 - There is increasing interest in the identification of health challenges particular to humanitarian crises in urban settings and the development of appropriate policies to address these, with 24/27 (89%) of all studies conducted since 1980 being published in the last decade.
 - The majority of available evidence is of low to moderate quality: 7/27 (26%) of papers were from category C evidence, 9/27 (33%) were from category B, and 11/27 (41%) were from category A.
 - All studies were observational. 17/27 (63%) of studies were purely descriptive in design and of these four were comparative. The remaining 10/27 (37%) employed a cross-sectional design and of these also four were comparative. Of all the comparative studies, 5/8 (63%) compared urban with rural settings, 2/8 (25%) compared general and IDP populations within urban settings, and one study compared two computer models to predict flood extent in an urban setting.
 - The majority of location-identified research on the influence of urbanisation on humanitarian crises was conducted in Asia (12/27, 44%), possibly due to the fact that Asia has been projected to lead the urban population growth over the coming decades and it is also the geographic region of the world most prone to natural disasters. 6/27 (22%) further studies considered urban settings across multiple different countries and regions.
 - Evidence for the different types of humanitarian crises focused heavily on natural disasters: 16/27 (59%) considered these, in particular floods (6/16) and earthquakes (6/16); 7/27 (23%) considered armed-conflict; and one paper evaluated both natural disasters and armed-conflict. A third and distinct category of humanitarian crisis – situations of “urban violence” – was identified by the literature: 3/27 (11%) focused specifically on this environment.
 - Most papers 22/27 (81%) considered the general population, 2/27 (7%) considered both the general population and IDPs, and one (4%) considered only IDPs. 2/27 (7%) of papers considered refugee populations.
 - As defined by this contextual factor, all papers considered urban settings. Of these, 6/27 (22%) considered rural settings in addition, and 5/6 (83%) of these conducted comparative analysis between these two environments. 3/27 (11%) further papers specifically identified the urban setting of study as “slums”.
 - Evidence for the influence of urbanisation on public health interventions during humanitarian crises concentrated around three main themes. The first, identified in 7/27 (26%) of studies, is the relative greater vulnerability of urban environments to excess mortality as a result of both natural disasters such as floods and droughts, as well as armed conflict. The second theme, identified in 7/27 (26%) further studies, are the particular health challenges faced by urban environments during humanitarian crises, including access to healthcare; collapse of the health system and the management of NCDs; food security; sanitation and diarrhoeal disease; and the detrimental impact of poverty on health. Thirdly, 3/27 (11%) studies identified a relatively greater capacity of urban environments for recovery in the areas of health access, mental health and urban infrastructure.
-

- Regarding the types of public health interventions, 13/27 (48%) articles focused on care planning, 9/27 (33%) on disaster preparedness, 3/27 (11%) on use of existing health services, and 2/27 (7%) on a combination of these interventions.
- Access to healthcare was the health-related topic most studied regarding urbanisation (10/27, 37%). 5/27 (19%) studies considered mental health, 5/27 (19%) considered nutrition and food security, 3/27 (11%) considered water, sanitation and hygiene, and 2/27 (7%) considered NCDs.
- Concerning stage of crisis, only 4/27 (15%) of studies focused on the acute phase, 5/27 (19%) on early recovery, and the vast majority (18/27, 67%) on chronic situations.

25.4.2 Expert Interviews

Key findings from the expert interviews were as follows:

Priority gaps in the available evidence on urbanisation which need to be filled include:

- Meaningful indicators for the measurement of urban health, including ones which are location-specific, able to differentiate between health states arising out of chronic deprivation and acute crisis, and able to measure associated tipping points or threshold criteria.
- Optimal methods of integrating humanitarian health interventions into existing urban healthcare infrastructures.
- Strategies to improve the baseline health status and robustness of health systems in rapidly urbanising populations to mitigate the detrimental health impacts of crises.
- Civil engineering and urban planning directed towards disaster preparedness, prevention and mitigation.
- Management of chronic disease during collapse of health systems in urban settings.
- Community-based humanitarian healthcare interventions.
- Monitoring and surveillance methodologies of health in urban settings.
- Efficient methods in the identification of and targeted intervention in specific populations (e.g. IDPs, refugees, women) within non-camp urban settings.
- Slum populations.
- Estuarine populations.
- Populations living on landslide prone or soft land areas unsuitable for urbanisation.

Issues related to the type of crisis and coordination:

- Gathering evidence and the study of this contextual factor is most limited and difficult in the context of armed conflict, other situations of urban violence and where there is a lack of social capital between researchers and affected communities.

Type of studies needed:

- Randomised and controlled trials would be an impractical, unfeasible and unethical means of seeking evidence on this contextual factor. However, stratification of data by similarities of interest in neighbourhoods and communities for comparative analysis is needed.
- The greatest source of shared knowledge likely lies within the grey literature but the extent to which this can be used as scientific evidence is highly variable and its usefulness is seen to be dependent on the reputation of the agency producing it. Grey literature can be very location specific which can be particularly useful.
- By nature, innovations aimed at systemic transformative change need to transcend evidence-based interventions and therefore the quest for evidence must itself be carefully directed.

Use of guidelines and standards in the study or programmatic development of access to healthcare:

- Government statistics are the most widely used standards for this contextual factor, although it is acknowledged that they can be technically inaccurate or reflect a political agenda.
-

- Other guidelines and standards which are particularly useful include: (i) UN Habitat reports and guidelines, (ii) IASC guidelines, (iii) ALNAP guidelines, (iv) existing institutional guidelines, (v) policy statements of agencies, and (vi) informal peer advice.
- Other than the Institutional Review Board (IRB) process, there are very few standardised ethical guidelines in the field of humanitarian research and programmatic development.

There was excellent consensus on the perceived research gaps in this contextual factor among the humanitarian experts interviewed. The area where there was a lack of consensus was in the importance put on the need for evidence in the management of chronic disease during collapse of health systems in urban crises, where a minority of experts believed this to be an over-emphasised research priority reflecting a current vogue.

25.4.3 Recommendations for future research

- Research is needed to analyse the influence of further aspects particular to urbanised environments on public health interventions, including:
 - Opportunities for disaster preparedness
 - Opportunities for coordination
 - Civil engineering and urban planning in disaster prevention and mitigation
 - Opportunities for the use of social media and other forms of mass communication
 - Opportunities for the control of infectious disease outbreaks.
- Efficient research methods of identification and targeted intervention of IDP and refugee populations within non-camp urban settings are needed.

References: Urbanisation

1. Blood, C.G. and M.E. Anderson, The battle for Hue: casualty and disease rates during urban warfare. *Military Medicine*, 1994. 159(9): p. 590-5.
2. Brown, A., A. Dayal, and C. Rumbaitis Del Rio, From practice to theory: emerging lessons from Asia for building urban climate change resilience. *Environment and Urbanization*, 2012. 24(2): p. 531-556.
3. Doocy, S., et al., Food security and humanitarian assistance among displaced Iraqi populations in Jordan and Syria. *Social Science and Medicine*, 2011. 72(2): p. 273-282.
4. Furusawa, T., et al., Communicable and non-communicable diseases in the Solomon Islands villages during recovery from a massive earthquake in April 2007. *New Zealand Medical Journal*, 2011. 124(1333).
5. Godoy-Paiz, P., B. Toner, and C. Vidal, 'Something in our hearts': Challenges to mental health among urban Mayan women in post-war Guatemala. *Ethnicity and Inequalities in Health and Social Care*, 2011. 4(3): p. 127-137.
6. Goudet, S.M., et al., Pregnant women's and community health workers' perceptions of root causes of malnutrition among infants and young children in the slums of Dhaka, Bangladesh. *American Journal of Public Health*, 2011. 101(7): p. 1225-33.
7. Goudet, S.M., et al., Impact of flooding on feeding practices of infants and young children in Dhaka, Bangladesh Slums: What are the coping strategies? *Maternal and Child Nutrition*, 2011. 7(2): p. 198-214.
8. Guterres, A. and P. Spiegel, The state of the world's refugees: Adapting health responses to urban environments. *JAMA - Journal of the American Medical Association*, 2012. 308(7): p. 673-674.
9. Hadley, C., et al., Household capacities, vulnerabilities and food insecurity: Shifts in food insecurity in urban and rural Ethiopia during the 2008 food crisis. *Social Science & Medicine*, 2011. 73(10): p. 1534-1542.
10. Harroff-Tavel, M., Violence and humanitarian action in urban areas: new challenges, new approaches. *International review of the Red Cross*, 2010. 92(878): p. 329-350.

11. Hosseini, K.A., et al., Development of urban planning guidelines for improving emergency response capacities in seismic areas of Iran. *Disasters*, 2009. 33(4): p. 645-64.
 12. Houghton, A., HEALTH IMPACT ASSESSMENTS A Tool for Designing Climate Change Resilience into Green Building and Planning Projects. *Journal of Green Building*, 2011. 6(2): p. 66-87.
 13. Hurford, A.P., C. Maksimovic, and J.P. Leitaó, Urban pluvial flooding in Jakarta: applying state-of-the-art technology in a data scarce environment. *Water Science & Technology*, 2010. 62(10): p. 2246-55.
 14. Kirsch, T.D., et al., Impact of the 2010 Pakistan Floods on Rural and Urban populations at six months. *PLoS Currents*, 2012(AUG): p. 1-7.
 15. Liu, Q.A., X.J. Ruan, and P.L. Shi, Selection of emergency shelter sites for seismic disasters in mountainous regions: Lessons from the 2008 Wenchuan Ms 8.0 Earthquake, China. *Journal of Asian Earth Sciences*, 2011. 40(4): p. 926-934.
 16. Liu, W.-M., et al., Posttraumatic stress symptoms and related factors among adolescents in Dujiangyan district 6 months after the earthquake. *Chinese Mental Health Journal*, 2010. 24(9): p. 647-651.
 17. Lucchi, E., Between war and peace: humanitarian assistance in violent urban settings. *Disasters*, 2010. 34(4): p. 973-995.
 18. Lucchi, E., Moving from the 'why' to the 'how': reflections on humanitarian response in urban settings. *Disasters*, 2012. 36(Supp. 1): p. S87-S104.
 19. Mullen, P.M.D., Protracted conflict, economic status and health services as determinants of health outcomes among the general population in Burundi, 2008, ProQuest Information & Learning: US.
 20. Munslow, B. and T. O'Dempsey, Globalisation and climate change in Asia: the urban health impact. *Third World Quarterly*, 2010. 31(8): p. 1339-356.
 21. Najarian, L.M., et al., The effect of relocation after a natural disaster. *Journal of Traumatic Stress*, 2001. 14(3): p. 511-526.
 22. Ochoa, S.F., et al., Supporting group decision making and coordination in urban disasters relief efforts. *Journal of Decision Systems*, 2007. 16(2): p. 143-172.
 23. Puertas, G., C. Rios, and H. del Valle, The prevalence of common mental disorders in urban slums with displaced persons in Colombia. *Revista Panamericana De Salud Publica-Pan American Journal of Public Health*, 2006. 20(5): p. 324-330.
 24. Rashid, S.F., The urban poor in Dhaka City: their struggles and coping strategies during the floods of 1998. *Disasters*, 2000. 24(3): p. 240-53.
 25. Suriya, S., B.V. Mudgal, and P. Nellyat, Flood damage assessment of an urban area in Chennai, India, part I: methodology. *Natural Hazards*, 2012. 62(2): p. 149-158.
-

ANNEX 1:

LIST OF KEY CONTRIBUTORS TO THE STUDY

Principal Investigators: Karl Blanchet and Bayard Roberts (LSHTM)

Co-investigators: Vera Sistenich (Harvard) and Mazeda Hossain (LSHTM)

Advisor: Sara Pantuliano (ODI)

Researchers (topic):

Anita Ramesh (Communicable disease control; water, sanitation and hygiene)

Séverine Frison (Nutrition)

James Smith (Nutrition; communicable disease control)

Emily Warren (Sexual and reproductive health (SRH), including maternal health, gender-based violence)

Mazeda Hossain (SRH, including maternal health, gender-based violence)

Bayard Roberts (Mental health and psychosocial support; non-communicable disease)

Nathan Post (Sexual and reproductive health (SRH), including maternal health, gender-based violence)

Alexander Ruby (Non-communicable disease)

Maysoon Dahab (Mental health and psychosocial support)

Aniek Woodward (Mental health and psychosocial support)

Abigail Knight (Non communicable diseases; health service delivery)

Karl Blanchet (Injury and physical rehabilitation; Health systems; Health service delivery)

Chris Lewis (Health systems)

Vera Sistenich (Contextual factors of health care access, accountability, health assessment methods, coordination, health worker security, and urbanisation)

Advisory Committee:

André Briend, Independent

Claude Bruderlein, Harvard School of Public Health (HSPH)

Sandy Cairncross, LSHTM

Peter Smith, LSHTM

Martin McKee, LSHTM

Deirdre Beecher, LSHTM

Jeroen Ensink, LSHTM

Project Steering Committee:

Chris Whitty (DFID)

Jimmy Whitworth (The Wellcome Trust)

Study Management Committee:

Chris Lewis (UK Department for International Development, DFID)

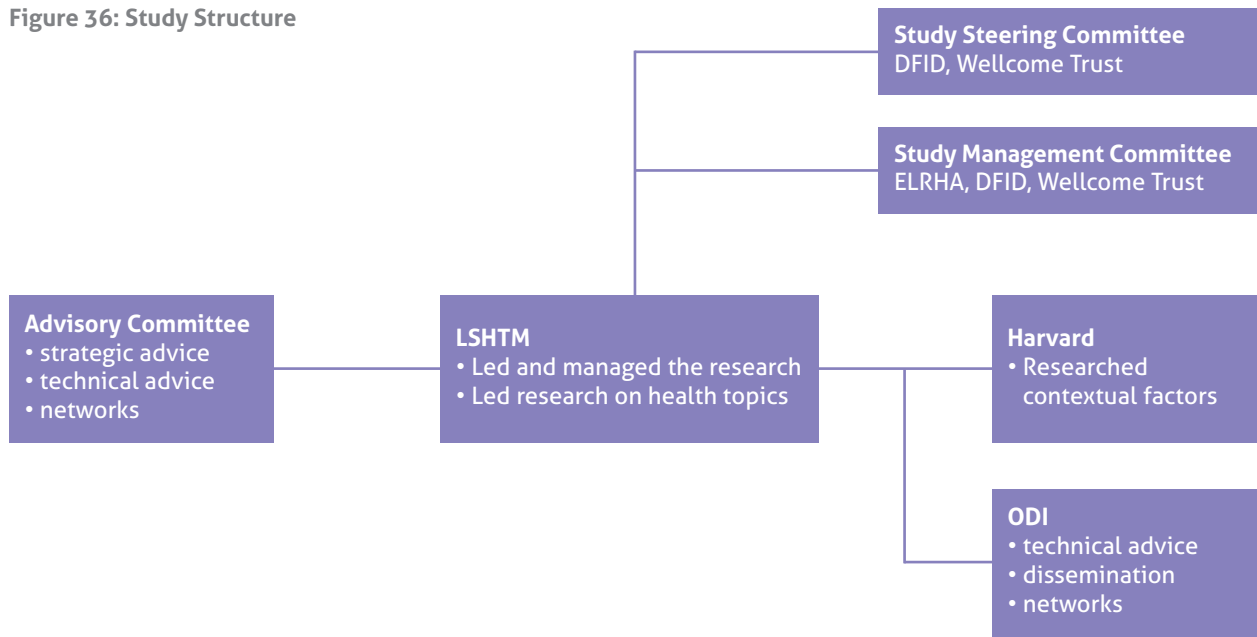
Val Snewin (The Wellcome Trust)

Daniel Davies (ELHRA)

Jessica Camburn (ELHRA)

Francesco Checchi (Save the Children UK)

Figure 36: Study Structure



ANNEX 2:

LIST OF EXPERT INTERVIEWEES

Consultancy meetings (all topics):

Paris:

Pierre Salignon, Médecins du Monde, France
 Jean-Hervé Bradol, CRASH, Fondation Médecins Sans Frontières, France
 Myriam Aissa, Action contre la Faim, France
 Cécile Salpeteur, Action contre la Faim, France
 Sevan Khadeej, WAHA, France
 Boris Martin, Humanitaire, France

Geneva:

Paul Spiegel, UNHCR, Switzerland
 Micelf Yao, WHO, Switzerland
 Nennette Motus, IOM, Switzerland
 Kaisa Kontunen, IOM, Switzerland
 Thierry Agagliate, Terre des hommes, Switzerland
 Capucine Jacquier, Terre des hommes, Switzerland

London:

Louise Knight, Merlin, UK
 Alice Fay, Save the Children, UK
 Andrew Hall, Save the Children, UK
 Bethan Lewis, Save the Children, UK
 Kate Godden, Nutrition Works, UK
 Anne Bush, Nutrition Works, UK
 Victoria Sibsén, Independent, UK
 David Bates, MoD, UK
 Marcus Skinner, HelpAge, UK
 Trudi Skinner, International Health Partner, UK
 Natasha Lelijveld, UCL, UK
 Andrew Seal, UCL, UK
 Mamoun Abu-Anqub, Islamic relief, UK
 Carla Stanke, Public Health England, UK
 Saskia de Pee, WFP, The Netherlands
 Claire Allen, Evidence Aid, UK
 Amy Hughes, UKIETR UKMed, UK
 Emily Mates, ENN, UK
 Margaret Lancaster, Concern Worldwide, UK
 Peter Medway, International Medical Corps, UK

Topic specific (by telephone or in-person):

Communicable Disease Control:

Muireann Brennan, CDC, USA

David Bates, Ministry of Defence, UK

David Heymann, LSHTM and Chatham House, UK

Heather Papowitz, UNICEF, USA

Toby Leslie, LSHTM, UK

Farooq Mansoor, Health Protection and Research Organization, Afghanistan

Ismail Mayen, Health Protection and Research Organization, Afghanistan

Asif Alokozai, Health Protection and Research Organization, Afghanistan

WASH

Andy Bastabale, Oxfam, UK

Sandy Cairncross, LSHTM, UK

Jeroen Ensink, LSHTM, UK

Paul Shanahan, UNICEF/Global WASH Cluster

Nutrition

Andrew Seale, UCL, UK

Cecile Salpeteur, Action Contre la Faim, France

Emmanuel Baron, Epicentre, France

Jay Berkeley, KEMRI Wellcome Trust, Kenya

Jeremy Shoham, Emergency Nutrition Network, UK

Kate Sadlers, Valid International, UK

Marie McGrath, Emergency Nutrition Network, UK

Marko Kerac, Malawi College of Medicine/UCL, Malawi

Myriam Aissa, Action Contre la Faim, France

Oleg Bilukha, CDC, USA

Rebecca Grais, Epicentre, France

Saul Guerrero, Action Against Hunger, UK

Reproductive health and gender-based violence

Basia Tomczyk, CDC, USA

Bethan Cobley, Marie Stopes International, UK

Catrin Schulte-Hillen, MSF, France

Chris Orach, Makerere University, Uganda

Emma Simpson-Independent Consultant, UK

Farhad Javid, Marie Stopes International, Afghanistan

Gina L. Bramucci, IRC, France

Julie Taft, Independent Consultant, UK

Lisa Jane Thomas, Department of Reproductive Health and Research, WHO, Switzerland

Lydia Ettema, Maires Stopes International, Belgium
 Mairi MacRae, IRC, UK
 Mihoko Tanabe, Women's Refugee Commission, USA
 Nadine Cornier, UNHCR, Switzerland
 Natasha Howard, LSHTM, UK
 Pam DeLargy, UNFPA, Sudan
 Samira Sami, CDC, USA

Mental health and psychosocial support

Ananda Galappatt, MHPSS network, University of Colombo, Sri Lanka
 Barbara Lopes-Cardozo, CDC, USA
 Cécile Bizouerne, ACF, France
 Derrick Silove, University of New South Wales, Australia
 Florence Baingana, Makerere University, Uganda
 Grace Akello, Gulu University, Uganda
 Inka Weissbecker, IMC, Ethiopia
 Karen Abbs, consultant, UK
 Lynne Jones, consultant, UK
 Mahesan Ganesan, Global Initiative on Psychiatry, Sri Lanka
 Mark Jordans, HealthNet TPO, Netherlands
 Mark Van Ommeren, WHO, Switzerland
 Paul Bolton, Johns Hopkins University, USA
 Peter Ventevogel, consultant, Netherlands
 Pierre Bastin, ICRC, Geneva
 Robert van Voren, Global Initiative on Psychiatry, Netherlands
 Wietse Tol, Johns Hopkins University, USA

NCDs

Pascale Fritsch, HelpAge International, UK
 Richard Garfield, CDC, USA
 Peter Lamptey, FH360, USA
 Louise Lillywhite, Chatham House, UK
 Dorothea Nitsch, LSHTM, UK
 Neil Pearce, LSHTM, UK
 Marcus Skinner, HelpAge International, UK
 Richard Sullivan, Kings Health Partners, UK

Injury and physical rehabilitation

Jim Gosner, The International Society of Physical and Rehabilitation Medicine, USA
 Barbara Rau, ICRC, Switzerland
 Claude Tardiff, ICRC, Switzerland
 Isabelle Urseau, Handicap International, France

Valerie Scherrer, CBM, Belgium

Jan Reinhardt, The International Society of Physical and Rehabilitation Medicine, Switzerland

Alana Officer, WHO, Switzerland

Health services and systems

Egbert Sondorp, Royal Tropical Institute, the Netherlands.

Emily Ying Yang Chan, Hong Kong University

Preeti Patel, King's College London

Sarah Hersey, CDC, South Sudan

Ann Cannavan, International Medical Corps, USA

Philip Du Cros, MSF, UK

Beverly Collin, MSF, UK

Contextual factors

Abby Stoddard, Humanitarian Outcomes, USA

Barnaby Willitts-King, Independent Consultant, USA

Colleen Hardy, CDC, USA

Elizabeth Ferris, Brookings Institution, USA

Hansjoerg Strohmeyer, UN OCHA, USA

Iain Levine, Human Rights Watch, USA

James Shepherd-Barron, Independent Consultant, USA

Jeremie Labbe, International Peace Institute, USA

Mark Steinbeck, ICRC, USA

Peter Walker, Feinstein International Center, USA

Ronak Patel, Harvard Humanitarian Initiative, USA

Ruwan Ratnayake, International Rescue Committee, USA

Sophie Delaunay, MSF, USA

ANNEX 3:

SEARCH TERMS USED FOR KEY BIBLIOGRAPHIC DATABASES

(see Annexes for health topic specific search terms which were added on to these)

- 1 exp Disasters
 - 2 exp Relief Work
 - 3 Rescue Work
 - 4 Emergencies
 - 5 Emergency Medicine
 - 6 Emergency Medical Services
 - 7 Disaster Medicine
 - 8 Mass Casualty Incidents
 - 9 Emergency Responders
 - 10 Medical Missions, Official
 - 11 (humanitarian adj2 (crisis or crises or relief or response or agenc\$)).tw.
 - 12 humanitarian.tw.
 - 13 (disaster adj3 (relief or plan\$)).tw.
 - 14 ((relief or aid) adj2 work\$).tw.
 - 15 Refugees
 - 16 (refugee or evacuee or evacuated).tw.
 - 17 (displace\$ adj2 (force\$ or population or human or internal\$)).tw.
 - 18 Altruism
 - 19 exp War
 - 20 war.tw.
 - 21 ((armed or zone) adj2 conflict\$).tw.
 - 22 (conflict affected adj3 (population\$ or person\$ or communit\$)).tw.
 - 23 Avalanches
 - 24 Earthquakes
 - 25 Floods
 - 26 Landslide
 - 27 Tidal Waves
 - 28 Tsunamis
 - 29 Cyclonic Storms
 - 30 (typhoon\$ or hurricane\$ or cyclone\$).tw.
 - 31 (avalanche\$ or earthquake\$ or flood or floods or flooding or flooded or landslide\$ or tsunami\$).tw.
 - 32 (disaster adj2 (natural or victim)).tw.
 - 33 Droughts
 - 34 drought\$.tw.
 - 35 Starvation
 - 36 (starvation or famine\$).tw.
-

- 37 or/1-36
 - 38 randomized controlled trial
 - 39 controlled clinical trial
 - 40 cross-sectional studies
 - 41 case-control studies
 - 42 cohort studies
 - 43 pilot studies
 - 44 (random\$ or controlled).tw.
 - 45 (control adj3 (area or cohort? or compare? or condition or design or group? or intervention? or participant? or study)).ab. not (controlled clinical trial or randomized controlled trial).pt.
 - 46 ((evaluat\$ or prospective or retrospective) adj1 study).tw.
 - 47 ("quasi-experiment\$" or quasiexperiment\$ or "quasi random\$" or quasirandom\$ or "quasi control\$" or quasicontrol\$ or ((quasi\$ or experimental) adj3 (method\$ or study or trial or design\$))).tw.
 - 48 ("time series" adj2 interrupt\$).tw.
 - 49 (intervention\$ or impact or effectiveness or efficacy or service\$ or outcome\$ or output or treatment\$ or management or program\$ or project\$).tw.
 - 50 economics
 - 51 cost-benefit analysis
 - 52 cost control
 - 53 Cost savings
 - 54 cost of illness
 - 55 cost \$utility.tw.
 - 56 (Cost\$ adj2 effective\$).tw.
 - 57 cost-effective\$.tw.
 - 58 (cost adj3 utility).tw.
 - 59 cost-utilit\$.tw.
 - 60 or/38-59
 - 61 developing countries
 - 62 exp asia
 - 63 exp africa
 - 64 exp pacific islands
 - 65 exp eastern europe
 - 66 exp china
 - 67 balkan peninsula/ or europe, eastern/ or transcaucasia
 - 68 caribbean region/ or central america/ or "gulf of mexico"/ or latin america/ or south america
 - 69 atlantic islands/ or indian ocean islands/ or macau/ or pacific islands/ or philippines/ or prince edward island/ or svalbard/ or west indies
 - 70 or/61-69
 - 71 Japan
 - 72 70 not 71
 - 73 37 and 60 and 72
 - 74 limit 73 to yr="1980 -2013"
-

ANNEX 4:

DETAILS FOR SYSTEMATIC REVIEW ON COMMUNICABLE DISEASE CONTROL

Sources:

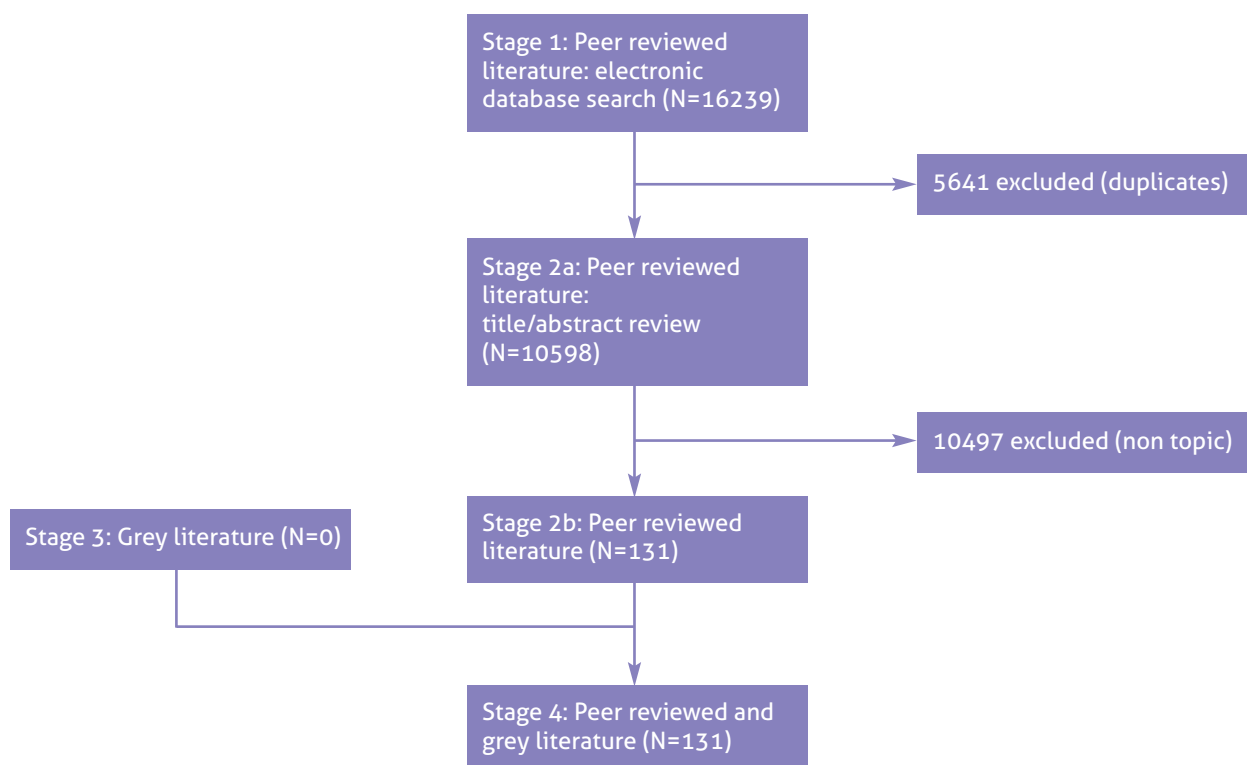
Published literature: Embase, Global Health, Medline.

Grey literature: R4D, MSF Field Research, UNHCR, WaterAid, SHARE, WHO, United States Center for Disease Control and Prevention (CDC).

Health topic specific search terms:

'Communicable disease' or 'infectious disease' or 'infection' or 'zoonoses' or 'environmental microbiology' or 'virus diseases' or 'viral diseases' or 'virus infections' or 'viral infections' or 'bacteria diseases' or 'bacterial diseases' or 'bacteria infections' or 'bacterial infections' or 'parasite diseases' or 'parasitic diseases' or 'parasite infections' or 'parasitic infections' or 'diarrhoeal diseases' or 'diarrheal diseases' or 'respiratory infections' or 'acute respiratory infections' or 'malaria' or 'tuberculosis' or 'TB' or 'HIV' or 'AIDS' or 'acquired immune deficiency syndrome' 'sexually-transmitted diseases' or 'STDs' or 'sexually transmitted infections' or 'STIs' or 'vaccine preventable diseases' or 'measles' or 'meningitis' or 'cholera' or 'typhoid' or 'shigella' or 'hepatitis' or 'dengue' or 'malaria' or 'leptospirosis' or 'scabies' or mycosis or viruses or bacteria or parasites or helminthes or worms or fungi or 'microorganism or micro-organism or 'pathogens' or 'pathogenic, virus' or viral, bacteria, fungi, fungal, fungus, mould, mycoses, parasite, incidence, prevalence, epidemic, seroepidemiological, occurrence, seroprevalence, exposure, exposed, aetiology, burden or risk, emerging, risk-factors, risk-assessment.

Communicable disease screening process:



ANNEX 5:

DETAILS FOR SYSTEMATIC REVIEW ON WATER, SANITATION AND HYGIENE

Sources:

Published literature: Embase, Global Health, Medline.

Grey literature: R4D, MSF Field Research, UNHCR, UN-Habitat, WaterAid, SHARE, UN-Water

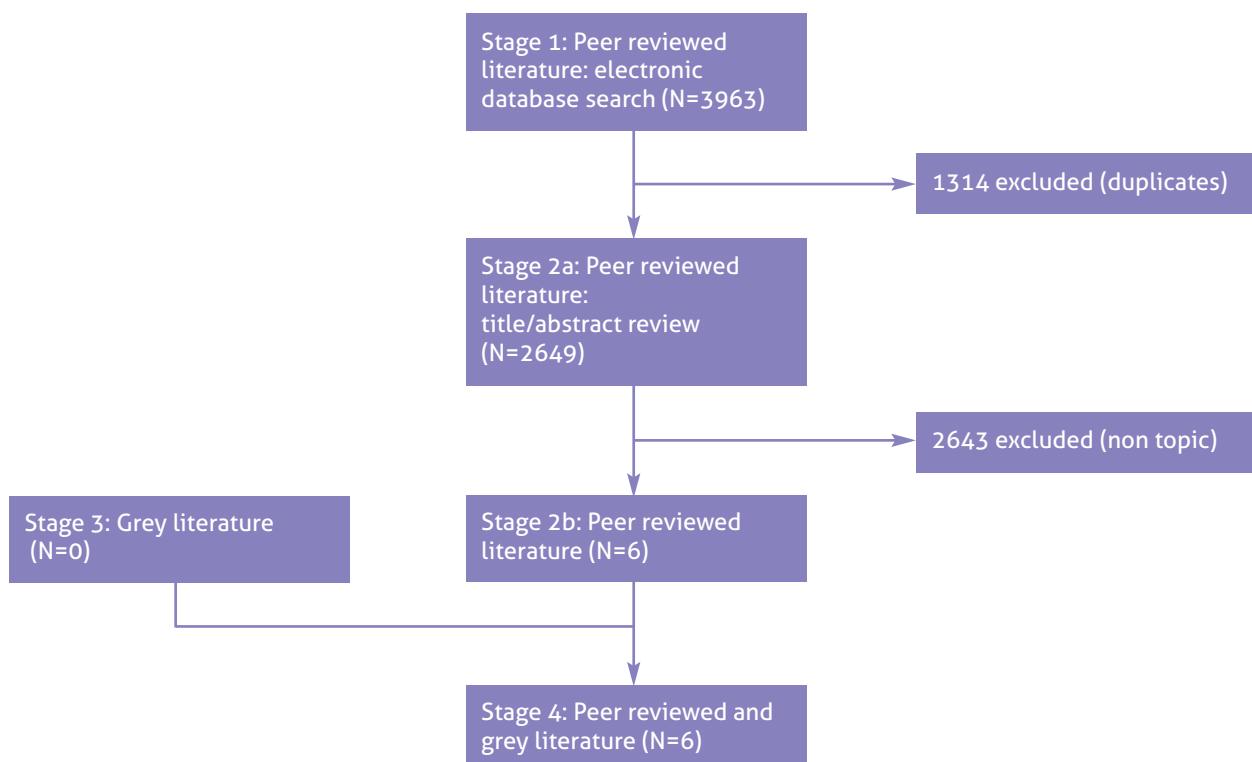
Secretariat of the United Nations Convention to Combat Desertification (UNCCD), UNDP, UNEP,

UN International Strategy for Disaster Reduction (UNISDR), International Water Resources Association (IWRA), Global Water Partnership, International Water Association (IWA), Public Services International (PSI), Gender and Water Alliance (GWA), Women for Water Partnership, Conservation International, Water.org, UN International Groundwater Resources Assessment Centre (IGRAC).

Health topic specific search terms:

"Water" or "water supply" or "water source" or "body of water" or "water bodies" or "drinking water" or "fresh water" or "water pollutants" or "sanitation" or "septic tank" or "latrine" or "pit latrine" or "public water" or "private water" or "domestic water" or "toilet" or "feces" or "faeces" or "defecation" or "hygiene" or "WASH" or "watsan" or "drainage" or "latrine" or "septic tank" or "hygiene" or "hand washing" or "handwashing" or "hand hygiene" or "soap" or "detergent" or "bore well" or "borewell" or "point of use" or "water provision" or "faecal-oral disease" or "fecal-oral disease" or "hygiene promotion" or "open defecation" or "flying latrines" or "interagency plastic slab" or "Oxfam bucket" or "water table" or "faecal sludge" or "waste disposal" or "waste treatment"

WASH Screening process:



ANNEX 6:

DETAILS FOR SYSTEMATIC REVIEW ON NUTRITION

Sources:

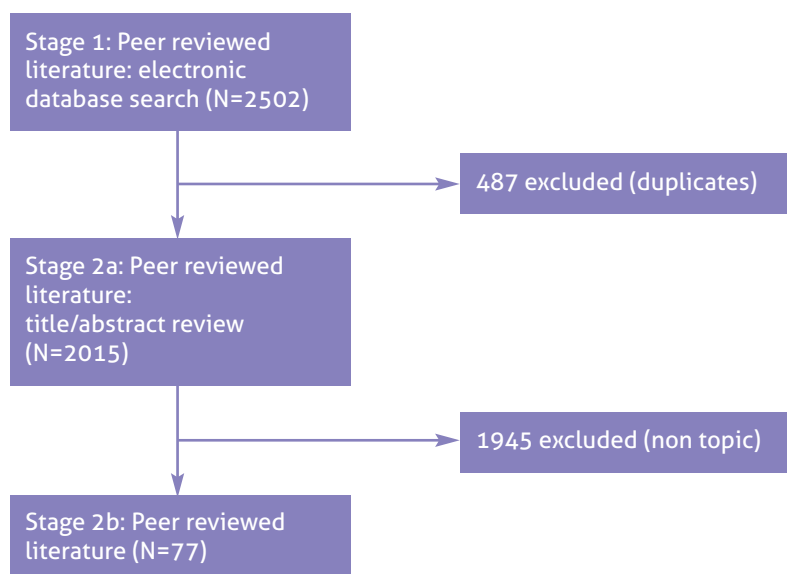
Published literature: Embase, Global Health, Medline.

Grey literature: Emergency Nutrition Network, The Global Nutrition Cluster, The United Nation Systems Standing Committee on Nutrition, CMAM forum, The International Lipid-Based Nutrient Supplements Project, the e-Library of Evidence for Nutrition Actions, Humanitarian Practice Network.

Health topic specific search terms:

Malnutrition or under-nutrition or nutrition or malnourished or wasted or wasting or ((arm or midarm or mid-arm or mid-upper arm) and circumference) or MUAC or weight-for-height or weight-for-length or WHZ or WHM or weight-for-age or WAZ or height-for-age or HAZ or kwashiorkor or nutritional deficiency or nutrition disorder or protein-energy malnutrition or starvation or hunger or micronutrient deficiency or food fortification or vitamin or multi-micronutrient sprinkles or scurvy or vitamin C deficiency or pellagra or niacin deficiency or beriberi or thiamine deficiency or goitre or iodine deficiency or breastfeeding or complementary food or nutrition assessment or nutrition survey or nutrition surveillance or malnutrition prevalence or supplementary feeding or selective feeding or therapeutic feeding or feeding centre or stabilisation centre or outpatient therapeutic care or outpatient therapeutic programme or therapeutic food or ready-to use therapeutic food or RUTF or ready to use supplementary food or RUSF or lipid based supplement or fortified milk or high energy milk or vitamin mix or micronutrient powder or mineral mix or food aid or food relief or general food distribution or general ration distribution or targeted food distribution or cash or voucher.

Screening Process for Nutrition:



ANNEX 7:

DETAILS FOR SYSTEMATIC REVIEW ON SEXUAL AND REPRODUCTIVE HEALTH (INCLUDING GBV)

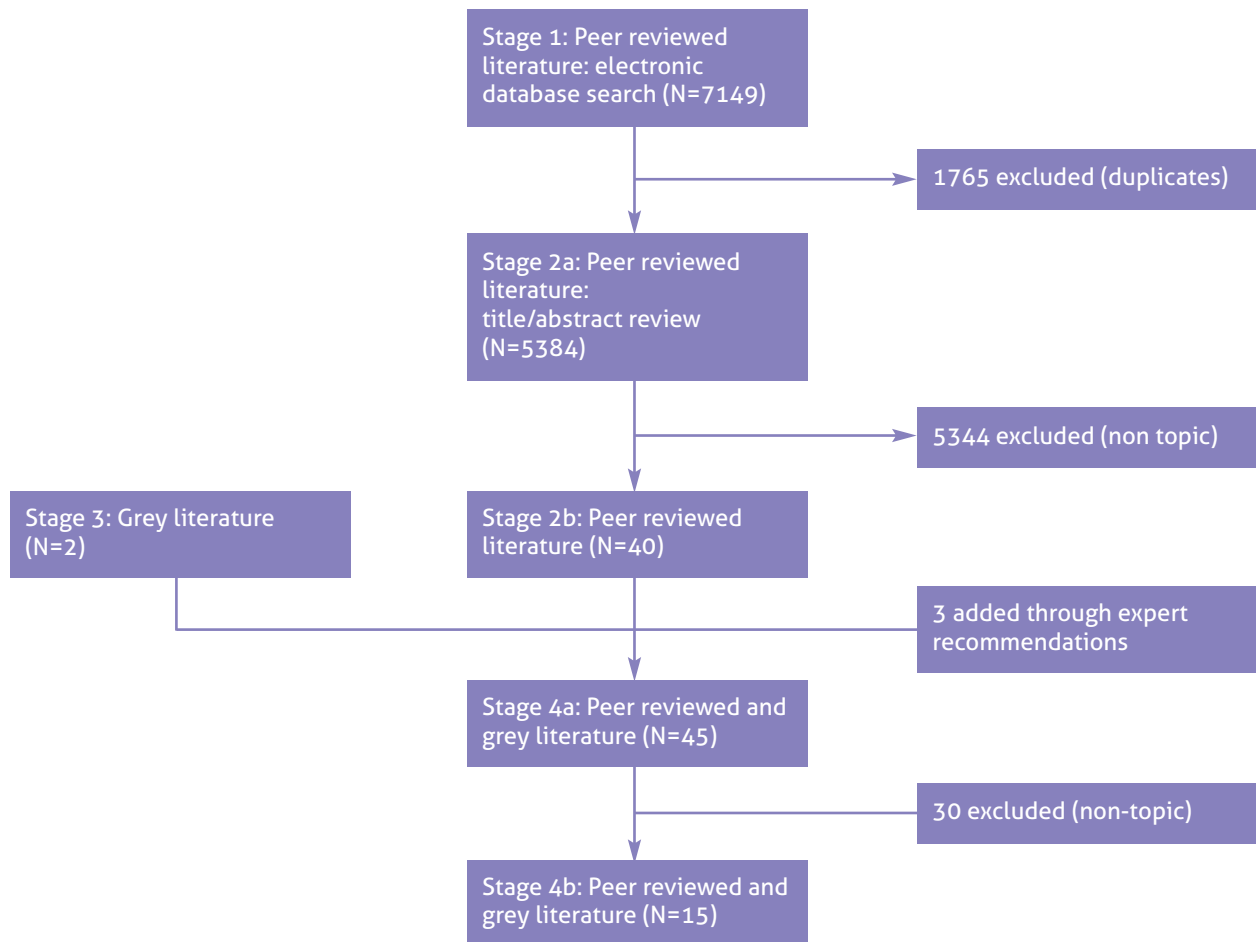
Sources:

Published literature: Embase, Global Health, and Medline.

Grey literature: R4D, Reproductive Health Response in Crisis Consortium (RHRC), MSF Field Research, UNFPA, RAISE Initiative, lawg.net, Save the Children, The International Rescue Committee (IRC), CARE, ICRC, International Planned Parenthood Federation (IPPF), AIDS Alliance, Marie Stopes International (MSI).

Health topic specific search terms:

sexual health or sexual health or reproductive health or sexual and reproductive health or maternal health or maternal welfare or neonatal health or perinatal care or perinatal health or prenatal care/ or prenatal health or ante-natal health or post-natal health or post-part* or newborn health or family planning or family planning or contracepti* or condom\$ or pregnan* or abortion or induced abortion or abort* or birth or miscarriage or spontaneous abortion or stillb* or Minimum Initial Service Package or obstetric* or gyn\$ecology or maternal welfare or safe motherhood or emergency obstetric \$ care or EmO\$C or safe delivery or skilled birth attend* or sexually transmitted infection* or sexually transmitted disease* or HIV or Human immunodeficiency virus or AIDS or acquired immune deficiency syndrome or PMTCT or fistula or rectovaginal fistula or urethra fistula or fistula or urinary tract fistula or adolescent sexual health or adolescent reproductive health or genital trauma or genital injury or vaginal trauma or vaginal injury or gender?based violence or partner violence or family violence or violence against women or domestic violence or sexual abuse or sexual abuse or sex crime or sexual crime or domestic violence or domestic violence or sexual violence or rape or physical violence or rape or rape or intimate partner violence or partner violence or partner abuse or partner violence or partner violence or partner violence or assault or physical assault or sexual assault or sexual crime or sexual harassment or sexual harassment or sexual coercion or forced sex or sexual slavery

Screening process for SRH (including GBV):

ANNEX 8:

DETAILS FOR SYSTEMATIC REVIEW ON MENTAL HEALTH AND PSYCHOSOCIAL SUPPORT

Sources:

Published literature: Embase, Global Health, Medline, PsychInfo, PsychExtra

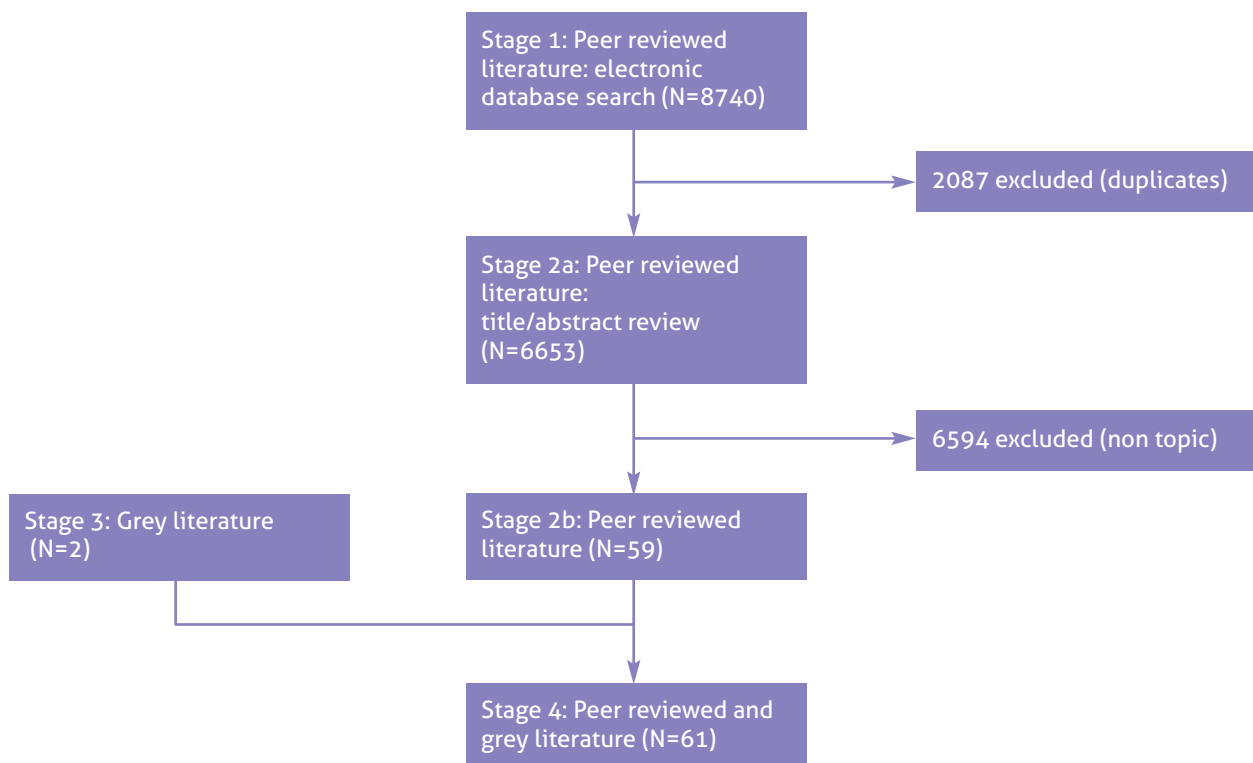
Grey literature: R4D, ReliefWeb, MSF Field Research, WHO, HealthNet-TPO, Global \

Initiative on Psychiatry, ALNAP, The Mental Health and Psychosocial Support Network, The Regional Psychosocial Support Initiative.

Health topic specific search terms:

psychosocial or mental or psychos* or mental disorders or psychiatr* or psychology or depress* or PTSD or post?traumatic stress disorder or neurotic or neuros* or anxiety or anxious or schizophrenic or schizothyme or mania or manic or delusion or OCD or phobia or phobic or somatic or somatoform or suicid* or dementia or alzheimer or epilepsy or alcohol or liquor or substance use or substance misuse or substance abuse or substance related disorders or psychotic or mood or affective or obsessive compulsive or panic or child behaviour or common mental disorder* or mental trauma or stress.

Screening process for mental health and psychosocial support:



ANNEX 9:

DETAILS FOR SYSTEMATIC REVIEW ON NON-COMMUNICABLE DISEASE

Sources:

Published literature: Embase, Global Health, Medline, PsychInfo, IBSS.

Grey literature: ReliefWeb, Eldis, ALNAP, NCD Alliance, MSF Field Research,

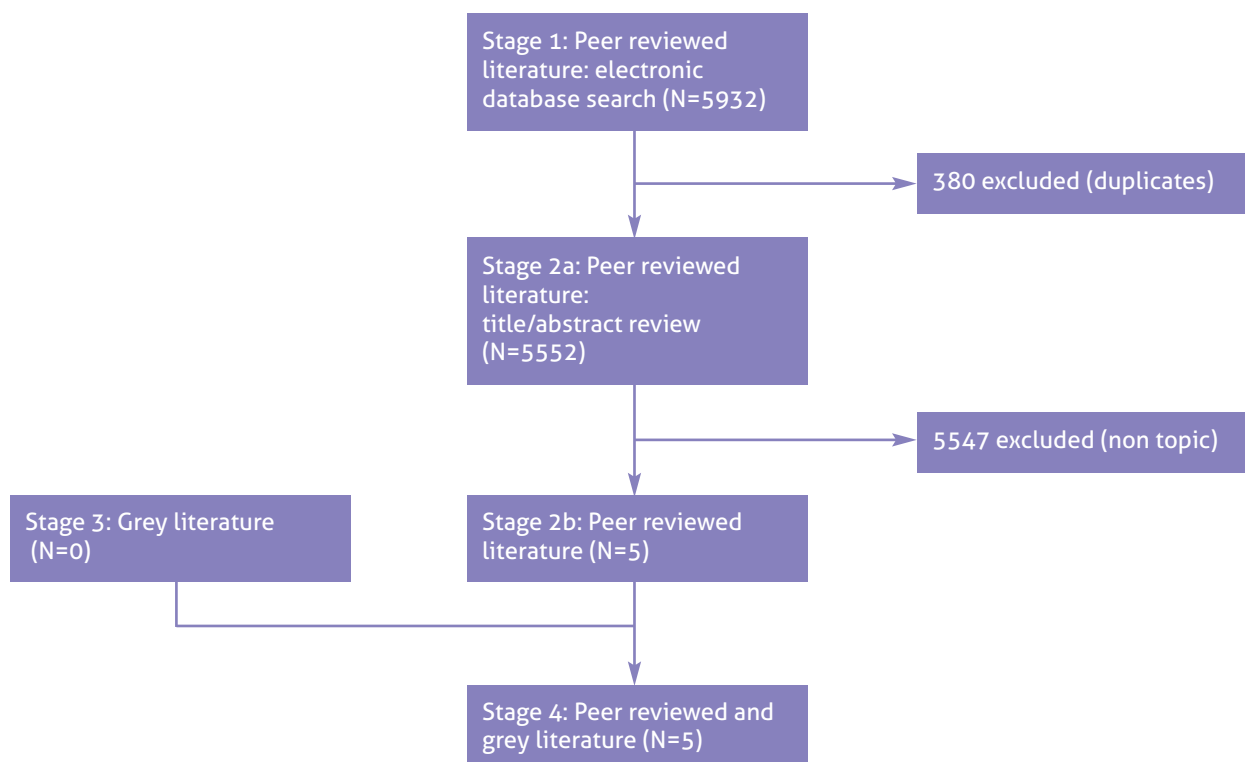
World Diabetes Foundation, UN High Commission for Refugees (UNHCR), WHOLIS

NY Academy of Medicine Grey Literature, CRED, International Society of Nephrology.

Health topic specific search terms:

Non-communicable disease* or NCD* or chronic disease* or chronic condition* or long term condition* or autoimmune disease* or Lupus or heart disease or cardiovascular or cerebrovascular or stroke or hypertens* or \$cholesterolaemia or heart failure or arrhythmia* or aneurysm* or cardiac or angina or myocardial infarction or coronary heart disease or CHD or ischaem\$ or cholesterol or blood pressure or blood sugar or blood glucose or diabetes or obesity or circulatory disorder* or \$carditis or cardiomyopathy or anaemi* or cancer* or neoplasm* or asthma* or respiratory or COPD or chronic obstructive pulmonary disease* or pulmonary or bronchitis or lung function or lung disease* or liver function or diabetes or chronic kidney disease* or CKD or liver disease* or renal failure or cirrho* or osteoporosis or fibromyalgia or musculoskeletal or chronic pain or \$arthritis or cystic fibrosis or thyroid disorder or neurological condition or Parkinson* or colitis or multiple sclerosis or MS or Alzheimer*

Screening process for NCDs:



ANNEX 10:

DETAILS FOR SYSTEMATIC REVIEW ON INJURY AND PHYSICAL REHABILITATION

Sources:

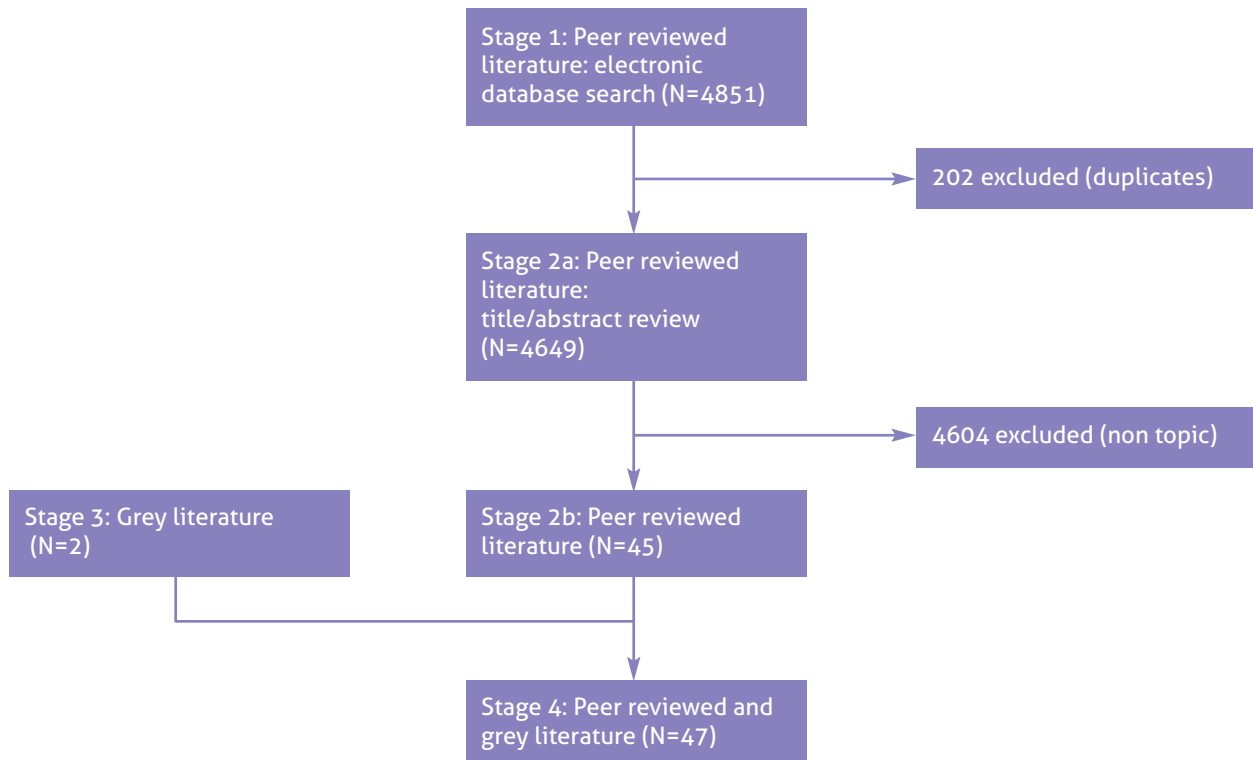
Published: Embase, Global Health, Medline, PsychInfo, IBSS.

Grey: SourceInfo, LCD, IDDC, Eldis, EDF, CBM, CIRRIE, R4D, MSF (France and Belgium), ALNAP, WHOLIS, CRED, International Society of Physical and Rehabilitation Medicine

Health topic specific search terms:

Rehabilit* or physiotherapy* or prothes* or orthes* or prosthetic* or orthotic* or crutch* or wheelchair* or orthopaedic* or disabled or physical* impair* or deficienc* or disabilit* or handicap* or cerebral pals* or spina bifida cystica or spina bifida occulta or muscular dystroph* or musculoskeletal abnormalit* or brain injur* or amputat* or clubfoot or poliomyelitis or paraplegia or hemiplegia or hearing loss or deaf* or blind* or vis* loss or intellectual disabilit* or learning disabilit* or developmental disabilit* or child development* disorder* or Communication disorder*

Screening process:



ANNEX 11:

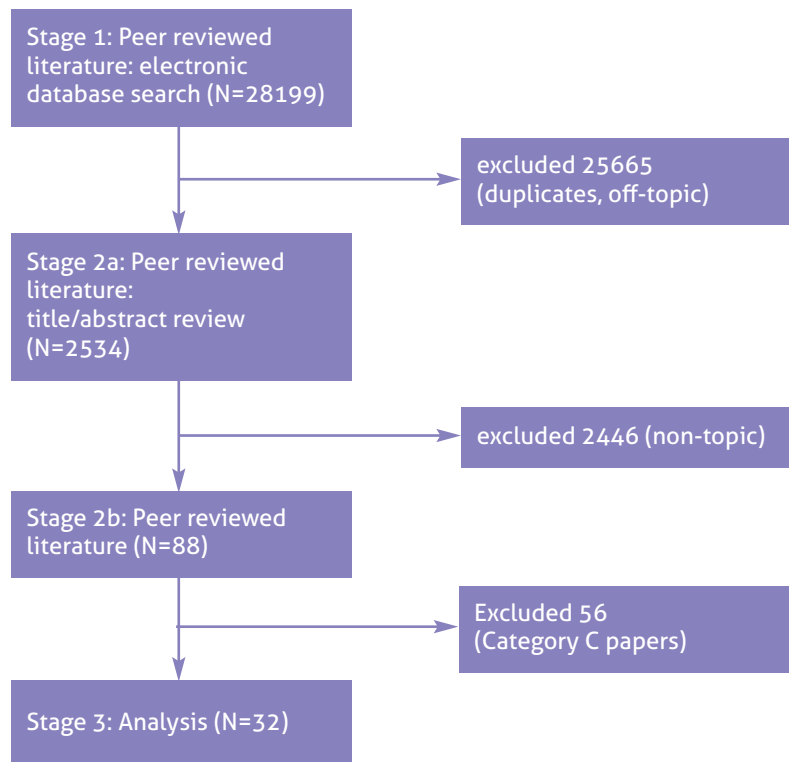
DETAILS FOR SYSTEMATIC REVIEW ON HEALTH SERVICE DELIVERY

Sources:

Medline, Embase, Global Health

Health topic specific search terms:

(Quality improvement OR quality management system* OR total quality management OR continuous quality improvement OR quality assurance OR health care OR quality of health care OR quality collaborative OR quality indicator comparison* OR benchmark* OR balanced scorecard OR quality strategy OR patient safety OR patient risk management OR community based service* OR community driven service* OR community mobile\$ation OR community based organi\$ation* OR non\$governmental organi\$ation* OR peer support OR community scorecard* OR service agreement* OR public\$private partnership* OR stewardship OR ambulatory care OR CBO OR community health practitioners OR community health service* OR community health OR volunteer* OR community health worker* OR district health system OR district hospital OR doctor* OR faith-based organi\$ation* OR FBO OR health care organi\$ation* OR health centre OR health facility OR mobile health OR health personnel OR health post* OR health service organi\$ation* OR health service* OR health service delivery OR health delivery OR health worker* OR clinic* OR hospital OR managed care OR nurse practitioner* OR paramedical OR pharmaceutical service* OR pharmacy OR physician* OR primary health care OR primary health centre* OR primary care OR voluntary organi\$ation* OR health provider* OR registered nurse* OR traditional health worker* OR alternative health delivery OR case management map OR certificate of need OR client provider interaction OR patient provider interaction Or patient satisfaction OR client satisfaction OR clinical decision support system OR clinical guidelines OR clinical pathways OR clinical peer review OR clinical practice OR communication OR community capacity for care OR community driven service* OR health education OR health improvement OR community partnership OR secondary care OR secondary health care OR tertiary care OR tertiary health care OR access* OR health care coverage OR equity OR essential kit* OR health care provision OR standard treatment guideline* OR standardi\$ed medical technology list* OR standardi\$ed pharmaceutical list* OR continuity of care OR coordination of care OR diagnos* OR patient experience OR treatment OR therapy OR health care intervention OR prevention OR assessment).mp

Screening process:

Summary data extraction table:

Author (year)	Country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health topic	Health outcome(s)	Intervention	Health service level of intervention	Study design	Evidence category
Bar-Dayyan (2005)	Turkey	Urban & rural	General	Natural disaster	Early recovery	All	assessments, hospitalisations, operations	Israeli Defence Force Field Hospital	secondary	cross-sectional	C
Beckett (2012)	Afghanistan	Urban & rural	General	Armed conflict	Acute	casualty management	admissions transfusions, operations	Multidisciplinary trauma care system at a combat hospital	secondary	cross-sectional	C
Chane (2010)	Pakistan	Rural	General	Natural disaster	Early recovery	All	equity of use	Relief services in static and outreach clinics	primary	cross-sectional	C
Chapin (2009)	Peru	Urban & rural	General	Natural disaster	Early recovery	Tuberculosis, HIV, Family Planning	patients seen before and after earthquake	primary, secondary and tertiary in 4 districts	primary, secondary, tertiary	cross-sectional	C
Chen_Admin (2009)	China	Urban	General	Natural disaster	Acute	infection, orthopaedic casualties	mortality, cross-infection, amputation, depression score	Nursing services in traumatic infection ward	secondary	cross-sectional	B
Chen_Trans (2009)	China	Urban & rural	General	Natural disaster	Acute	casualty management	patient transfers	Patient transfer protocol	Ambulatory - all	cross-sectional	C
Cutting (1992)	Lebanon	camp	Refugee	Armed conflict	Acute	casualty management	operations performed	Refugee Camp Hospital	secondary	cross-sectional	C
Ebling (2000)	Croatia	Urban & rural	General & refugee	Armed conflict	Acute	All	Trends in volume of visits to health centres, mortality, vaccination uptake	Medical crisis headquarters formed, new locations for health units, back up facilities in inpatient units, war reserves of drugs, training courses for GPs and first aid courses for civilian defence	Primary	cross-sectional	C

Author (year)	Country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health topic	Health outcome(s)	Intervention	Health service level of intervention	Study design	Evidence category
Fernald (2007)	Pakistan	Rural	General	Natural disaster	Early recovery	All	patient encounters, prescriptions, inpatient capability	Mobile Army Surgical Hospital - with primary care department	Primary, secondary	cross-sectional	C
Fosse (1992)	Afghanistan	Rural	General	Armed conflict	Acute	casualty management	operations, complications	Mobile medical team	Primary	cross-sectional	B
Fosse (1988)	Lebanon	camp	General & refugee	Armed conflict	Acute	Casualty management	Primary and secondary surgical operations performed	Triage and Surgical operations performed in the camp clinic with limited resource	Secondary	cross-sectional	C
Giangreco (2012)	Palestinian Territories	Urban	General	Armed conflict	Acute	All	Quality measure	Existing hospital services / performance appraisal system	Secondary	cross-sectional	C
Halpern (2003)	Turkey	Urban	General	Natural disaster	Acute	casualty management	treatment and operations	Intensive care in field hospital	secondary	cross-sectional	C
Kang (2012)	China	Rural	General	Natural disaster	Acute	casualty management	patient transfers	medical evacuation	Ambulatory	cross-sectional	C
Kwak (2006)	Sri Lanka	Rural	General	Natural disaster	Early recovery	All	output following management of cases	Korean Disaster Medical Assistance Team	primary	cross-sectional	C
Loghmani (2008)	-	Urban & rural	General	Natural disaster	Acute	Casualty measurement	appropriateness of measures in a field hospital	RAND/UCLA appropriateness method for determining field hospital setting in an earthquake	secondary	cross-sectional	C
Misic (2005)	Bosnia and Herzegovina	Urban & rural	General & IDP	Armed conflict	Acute, Early recovery	All	Equity - treatment of different ethnic groups	Civilian health service - outpatients and surgery	Secondary	cross-sectional	C

Author (year)	Country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health topic	Health outcome(s)	Intervention	Health service level of intervention	Study design	Evidence category
Missair (2010)	Haiti	Urban & rural	General	Natural disaster	Acute	Casualty management	Procedures performed	Surgery and anaesthetic emergency team	secondary	cross-sectional	C
Muawwad-Jarawan (1987)	Lebanon	Urban	General	Armed conflict	Acute	All	Incidence of self care	Self-care	pre-primary	cross-sectional	C
Nia(2008)	Iran	Urban & rural	General	Natural disaster	Acute	Casualty management	Patient satisfactions	emergency medical response	primary, secondary	cross-sectional	C
Petricevic (1995)	Bosnia and Herzegovina	Rural	General	Armed conflict	Acute	Casualty management	operations performed	Abdominal operations, blood vessel operations and management of upper and lower extremities	Secondary	cross-sectional	C
Porignon (1998)	DR Congo	Rural, camp	Refugee	Armed conflict	Acute	All	consultation rate	Health district services and specific services in camps	Primary, secondary	cross-sectional	C
Riddez (2005)	Indonesia	Rural	General	Natural disaster	Acute	Surgery	Surgical procedure	Surgery in a field hospital	Secondary	cross-sectional	C
Rukavina (1995)	Croatia	Urban	Entrapped, refugee, IDP	Armed conflict	Acute	Casualty management	mortality	Change from peacetime to wartime hospital conditions of medical centre removed from warzone	Secondary	cross-sectional	C
Schreeb (2008)	Iran, Haiti, Indonesia, Pakistan	Rural	General	Natural disaster	Acute	All	Deployment of field hospitals, Consultations, Bed occupancy	Foreign Field Hospitals	secondary	cross-sectional	C

Author (year)	Country	Setting	Population type	Humanitarian crisis type	Crisis stage	Health topic	Health outcome(s)	Intervention	Health service level of intervention	Study design	Evidence category
Sheng (1987)	China	Urban	General	Natural disaster	Acute	Casualty management	survival rates, recovery	Triage, rescue times from wreckage, laminectomy, anterior decompression	Primary and secondary	cross-sectional	C
Sowa (1997)	India	Rural	Refugee	Armed conflict	Stabilised	All	volume of outpatients annually, number of inpatients annually, number of tests performed annually - volume trends	Outpatient and inpatient clinics	secondary	cross-sectional	C
VanRooyen (1995)	Somalia	Urban & rural	Refugee & general	Armed conflict	Acute	All	consultations, security rating	Mobile Medical Relief and Military assistance	Primary	cross-sectional	C
vonSaint (2011)	Haiti	Urban	General & IDP	Natural disaster	Early recovery	Paediatric	mortality	US field hospital staffed by short-term volunteers	Secondary	cohort	B
Walk(2012)	Haiti	Urban	General	Natural disaster	Acute	casualty management	patients, length of stay	USNS Comfort	Primary and secondary	cross-sectional	C
Wickramasinghe(2007)	Sri Lanka	camp	IDP	Natural disaster	Acute, Early recovery	All	patient satisfaction	Health care services in relief camps	Primary	cross-sectional	B
Zic(2001)	Bosnia and Herzegovina	Urban & rural	General & refugee	Armed conflict	Acute	All	number of examinations each year, number of operations	establishment of war hospital in advance of war, prior training of local professionals, medical technicians in armoured vehicles, triage	secondary	cross-sectional	C

ANNEX 12:

DETAILS FOR SYSTEMATIC REVIEW ON HEALTH SYSTEMS

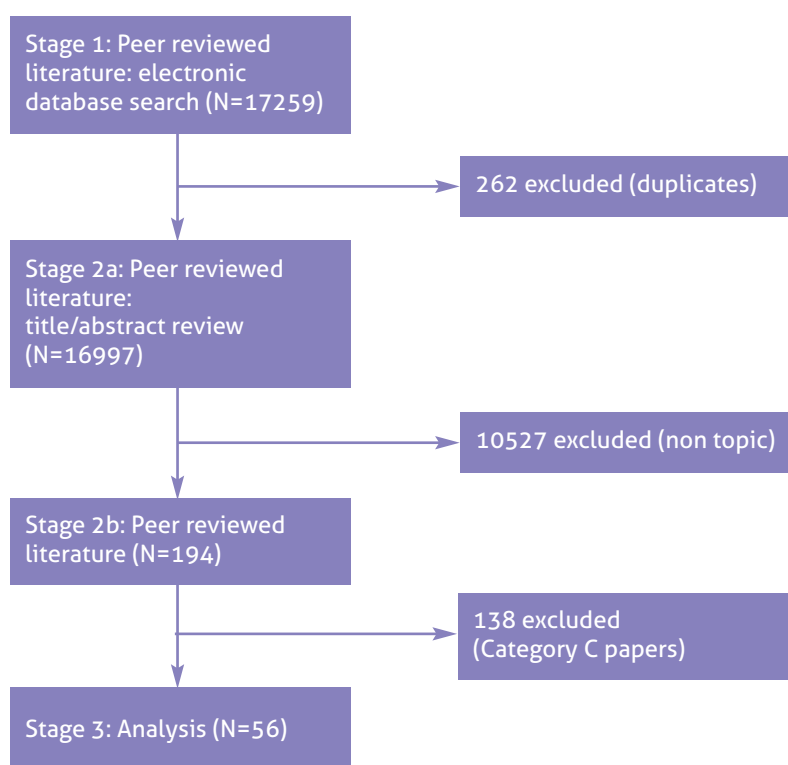
Sources:

PubMed, Medline, Embase, Global Health and PsychInfo.

Health topic specific search terms:

Health system* or Health system design or Healthcare polic* or Healthcare strateg* or National guideline* or National standard* or Health service delivery or Human resources or Health workforce or Medical staffing or Drug suppl* or Medical suppl* or Medical equipment or Supply chain or Health financing or User fees or Healthcare costs or Health information management or Health information system or Health management information system* or HMIS or Health surveillance system* or Medical data security or Leadership or Governance or Leadership in healthcare or Leadership in medical assistance or Leadership in medical operation* or Lead health agency or Ministry of health or MOH or Government* or Support of local system or Support of national system or Health system strengthening or Sustainability or System collapse or System failure.

Screening process:



Summary data extraction table:

Study author	Year	Study country	Population type	Humanitarian crisis type	Humanitarian crisis stage	Study design	Focus
Adams, P.	2010	Haiti	General population	Natural disaster	Acute crisis - early recovery	Case study	L&G
Alonso, A. and R. Brugha	2006	East Timor	General population	Conflict	Early recovery	Case study	General health system, L&G
Barnabas, G. A. B. and A. Zwi	1997	Ethiopia	General population	Conflict	Acute crisis	Case study	General health system, L&G
Batley, N. J., et al.	2008	Lebanon	Health workers	Conflict	Acute crisis - stabilised crisis	Case study	L&G
Betsi, N. A., et al.	2006	Cote d'Ivoire	General population	Conflict	Acute crisis	Case study	General health system, HR
Bile, K. M., et al.	2010	Pakistan	IDP	Natural disaster & conflict	Acute crisis	Comparative case studies	L&G, HIS
Bisika, T.	2010	Africa	General population	Conflict	Acute crisis - early recovery	Descriptive	General health system
Bissell, R. A., et al.	2004	Armenia	General population	Natural disaster	Preparedness	Case studies	
Bornemisza, O., et al.	2010	N/A	General population	Conflict	Acute crisis	Descriptive	
Bradt, D. A., et al.	2001	Indonesia	General population	Conflict	Acute crisis to early recovery	Case study	
Braveman, P. and D. Siegel	1987	Nicaragua	General population	Conflict	Early recovery	Case study	
Brennan, R. J., et al.	2001	Kosovo	General population	Conflict	Early recovery	Case study	HIS
Bukhari, S. K. S., et al.	2010	Pakistan	General population	Natural disaster	Acute crisis	Case study	Medicines
Bulbulia, S. and F. Alvarez-Castillo	2004	Sri Lanka	General population	Conflict	Preparedness	Case study	

Study author	Year	Study country	Population type	Humanitarian crisis type	Humanitarian crisis stage	Study design	Focus
Buwa, D. and H. Vuori	2007	Kosovo	General population	Conflict	Early recovery	Case study	General health system, L&G
Cometto, G., et al.	2010	South Sudan	General population	Conflict	Early recovery	Case study	
Curic, I., et al.	2010	Bosnia	General population	Conflict	Acute crisis	Case study	L&G
Dodge, C. P.	1990	Uganda and Sudan	General population, refugees and IDPs	Conflict	Acute crisis	Comparative case studies	
Garfield, R. M.	1989	Nicaragua	General population	Conflict	Early recovery	Case study	General health system
Giacaman, R., et al.	2003	OPT	General population	Conflict	All levels	Case study	
Goyens, P., et al.	1996	Zaire	Refugee	Conflict	Acute crisis	Case study	General health system
Hill, P.	2004	N/A	General population	Conflict	Post conflict (exception)	Descriptive	
Ityavyar, D. A. and L. O. Ogba	1989	Africa	General population and refugees	Conflict	Acute crisis	Descriptive	General health system, L&G
Jones, L. M., et al.	2007	Indonesia	General population	Natural disaster	Early recovery	Case study	General health system
Kapucu, N.	2011	Myanmar	General population	Natural disaster	Acute crisis	Case study	
Khankeh, H. R., et al.	2011	Iran	General population	Natural disaster	Acute crisis	Descriptive	L&G
Kohan, I., et al.	2011	Peru	General population	Natural disaster	Early recovery and stabilised crisis	Case study	
Lanjouw, S., et al.	1999	Cambodia	General population	Conflict	Early recovery	Case study	
Lopez Tagle, E. and P. Santana Nazarit	2011	Chile	General population	Natural disaster	Acute crisis	Case study	
Macrae, J., et al.	1996	Uganda	General population	Conflict	Early recovery	Case study	General health system, L&G

Study author	Year	Study country	Population type	Humanitarian crisis type	Humanitarian crisis stage	Study design	Focus
Marfin, A. A., et al.	1994	Nepal	Refugee	Political crisis	Acute crisis	Case study	HIS
Melgaard, B., et al.	2005	Tsunami	General population	Natural disaster	Preparedness and acute crisis	Descriptive	General health system
Morikawa, M. J.	2003	Kosovo	General population	Conflict	Acute crisis and early recovery	Case study	L&G
Morton, M. and J. L. Levy	2011	Haiti and Indonesia	General population	Natural disaster	Acute crisis	Case studies	HIS
Newbrander, W., et al.	2011	Afghanistan, DRC, Liberia, South Sudan	General population	Conflict	Early recovery	Descriptive	General health system
Okuonzi, S. A.	1998	Uganda	General population	Conflict	Early recovery	Case study	
Patel, P. P., et al.	2011	Lebanon, Sierra Leone, Indonesia, Gaza, Sri Lanka	General population	Any crisis	Acute crisis	Literature review	General health system, HR
Pavignani, E.	2011	Mozambique, Angola, Somalia, South Sudan	General population	Conflict	Acute crisis to early recovery	Case studies	HR
Peltz, R., et al.	2006	Thailand	General population	Natural disaster	Acute crisis	Case study	L&G
Porignon, D., et al.	1995	Zaire	Refugee	Conflict	Acute crisis	Case study	
Porignon, D., et al.	1998	DRC	General population	Conflict	Throughout	Case study	
Procacci, P., et al.	2005	Tsunami	General population	Natural disaster	Preparedness and acute crisis	Descriptive	L&G
Rahim, M., et al. S114-121.	2010	Pakistan	General population	Conflict and natural disaster	Preparedness	Case study	HIS
Raminashvili, D., et al.	2009	Georgia	General population	Conflict	Early recovery	Case study	L&G
Raviola, G., et al.	2012	Haiti	General population	Natural disaster	Early recovery	Case study	

Study author	Year	Study country	Population type	Humanitarian crisis type	Humanitarian crisis stage	Study design	Focus
Sabes-Figuera, R., et al.	2012	Bosnia, Croatia, Kosovo, F R Yugoslavia, Macedonia, Serbia	General population	Conflict	Acute crisis	Statistical analysis	Health Financing
Seyedin, S. H., et al.	2009	Iran	Health workers	Natural disaster	Early recovery	Case study	
Shuey, D. A., et al.	2003	Kosovo	General population	Conflict	Early recovery	Case study	L&G
Simunović, V. J.	2007	Bosnia	General population	Conflict	Acute crisis and early recovery	Personal testimony	L&G
Thieren, M.	2005	N/A	General population	N/A	Acute crisis and early recovery	Descriptive	HIS
Tiembre, I., et al.	2011	Cote d'Ivoire	General population	Conflict	Acute crisis	Case study	
Ugalde, A., et al.	2000	El Salvador	General population	Conflict	Throughout	Case study	L&G
Val D'Espaux, S. d., et al.	2011	OPT	General population	Conflict	Early recovery	Case study	General health system
Western, K. A.	1982	N/A	General population	Natural disaster	Acute crisis to early recovery	Descriptive	HIS
	2005	Iran	General population	Natural disaster	Acute crisis	Case study	General health system
	2012	Pakistan	General population	Natural disaster	Acute crisis	Case study	HIS

ANNEX 13:

DETAILS FOR SYSTEMATIC REVIEW ON ACCESS TO HEALTH CARE

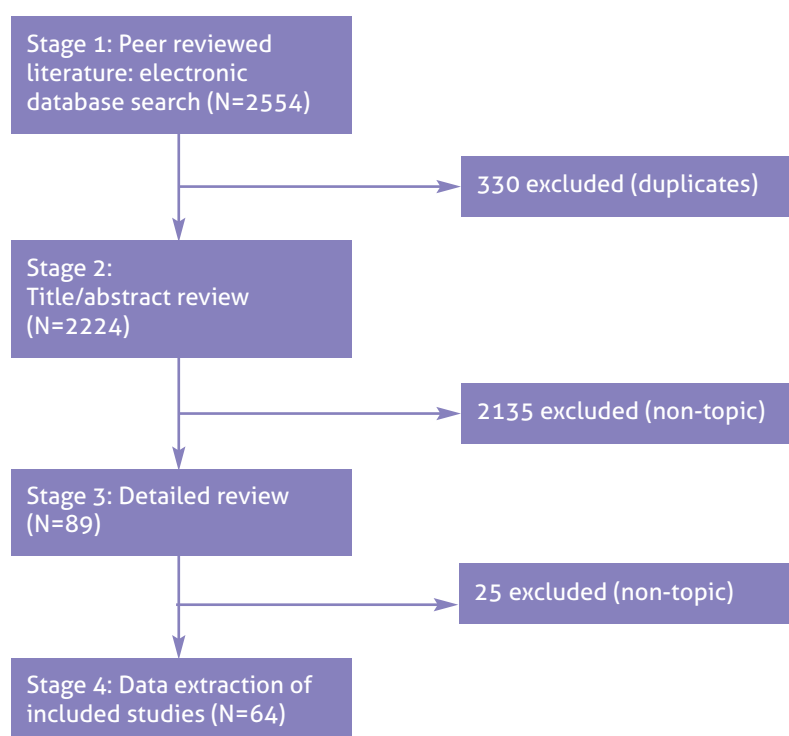
Sources:

Medline, Embase, Global Health, International Bibliography of Social Sciences, Web of Science.

Topic specific search terms:

"Health Services Accessibility"/ OR "Architectural Accessibility"/ OR exp "health care costs"/ OR "health expenditures"/ OR "healthcare disparities"/ OR (((access OR accessibility OR affordability OR cost OR costs) adj2 (health OR healthcare OR doctor\$ OR patient\$ OR beneficiaries OR hospital\$ OR clinic\$ OR medication\$ OR drug\$ OR surgery OR treatment)) OR ((discrimination OR disparit\$) adj2 (health OR healthcare))).tw

Screening process:



Summary data extraction table:

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Abdelmoneium (2010)	Sudan	Urban & rural	IDP	Conflict	Chronic	International medical aid	Informational; discrimination (gender) of access, end-users	Cross-sectional	Adolescents; Under 5s	B	Sexual and reproductive health
Abeyasinghe (2012)	Sri Lanka	Urban & rural	General	Conflict	Chronic	Use of existing services	Physical access, end-users	Comparative, of two years	All	A	Malaria control
Ali (2006)	Pakistan	Rural	General	Conflict	Chronic	Use of existing services	All aspects of access, end-users	Cross-sectional	All pregnant women	A	Emergency obstetric care (EmOC)
Ameli (2008)	Afghanistan	Urban & rural	General	Conflict	Chronic	Use of existing services	All aspects of access, end-users	Cross-sectional	All	B	Primary care
Balthazar (2011)	Colombia	Urban & rural	IDP	Conflict	Chronic	Use of existing services	Economic access, end-users	Cross-sectional	Adult	B	Emergency; Primary care
Bartlett (2002)	Pakistan	Urban & rural	Refugees (Afghan)	Conflict	Chronic	Use of existing services	All aspects of access, end-users	Cross-sectional	Women 15 – 49 years	A	Antenatal and obstetric care
Beeche (2008)	Sierra Leone	Urban	IDP; Refugees	Conflict	Early recovery	Use of existing services	All aspects of access, end-users	Comparative, descriptive	All	B	Primary care
Bukhari (2010)	Pakistan	Urban & rural	General	Natural (earthquake)	Acute	International medical aid	Physical; informational access, end-users	Descriptive	All	C	Access to medicines
Carruth (2012)	Somalia	Urban & rural	Refugees (Somali)	Conflict	Chronic	NGO medical aid; use of existing services	All aspects of access, end-users	Descriptive	All	C	All
Chan (2009)	Pakistan	Urban & rural	General	Natural (earthquake)	Early recovery	Use of existing services	All aspects of access, end-users	Comparative, descriptive	Older people	B	All
Chan (2010)	Indonesia	Urban & rural	IDP	Natural (tsunami)	Chronic	International medical aid	Physical; informational access, end-users	Comparative, descriptive	All	A	Primary care

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Contini (2010)	Afghanistan	Urban & rural	General	Conflict	Chronic	Use of existing services	Physical access, end-users	Cross-sectional	All	A	Surgery
Cope (2012)	Jordan; Syria	Urban	Refugees (Iraqi)	Conflict	Chronic	Use of existing services	All aspects of access, end-users	Cross-sectional	All	A	NCD
Daniels (2009)	Peru	Urban & rural	General	Natural (earthquake)	Early recovery	Use of existing services	Physical access, end-users	Comparative, descriptive	All	A	Trauma; NCD
Dijkzeul (2006)	DRC	Urban & rural	General	Conflict	Chronic	NGO medical aid	Economic access, workers	Cross-sectional	All	B	All
Enwereji (2009)	Nigeria	Urban & rural	IDP	Conflict	Chronic	Humanitarian medical aid; use of existing services	All aspects of access, end-users	Cross-sectional	All	C	HIV/AIDS prevention
Fu (2009)	China	Urban	General	Natural (earthquake)	Acute	Domestic supplementing of medical supplies	Physical access, end-users	Comparative, descriptive	All	A	Medical supplies
Furst (2009)	Côte d'Ivoire	Rural	General	Conflict	Acute	Use of existing services	All aspects of access, end-users	Comparative, before/after	All	B	Neglected tropical diseases; malaria
Gustafson (2001)	Guinea-Bissau	Urban	General	Conflict	Acute	Use of existing services	Physical access, end-users	Retrospective cohort	Adults	B	TB
Hathothuwa (2012)	Sri Lanka	Urban & rural	General	Conflict	Chronic	Use of existing services	All aspects of access, end-users	Descriptive	Women; children	C	Maternal child health
Heldal (1997)	Nicaragua	Urban & rural	General	Conflict	Chronic	Use of existing services	All aspects of access, end-users	Comparative, before/after	All	B	TB
Hirose (2011)	Afghanistan	Urban	General	Conflict	Chronic	Use of existing services	All aspects of access, end-users	Cross-sectional	Pregnant women	A	Emergency obstetric care (EmOC)

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Howard (2010)	Afghanistan	Urban & rural	General	Conflict	Chronic	Scaling up insecticide-treated mosquito nets	All aspects of access, end-users	Cross-sectional	Adult	B	Malaria control
Jordans (2010)	Multiple (Burundi, Indonesia, Sri Lanka, Sudan)	Urban & rural	General	Conflict	Chronic	International medical aid	All aspects of access, end-users; Economic access, workers	Cross-sectional	Children	A	Mental health & psychosocial support (MHPSS)
Khan (2002)	Afghanistan	Urban & rural	General	Conflict	Chronic	Use of existing services	All aspects of access, end-users	Cross-sectional	All	A	TB
Kim (2007)	Sudan	Urban & rural	IDP	Conflict	Chronic	International medical aid	Physical; economic access, end-users	Cross-sectional	All	B	Basic health; mental health; women's health
Kim (2012)	Afghanistan	Urban & rural	General	Conflict	Chronic	Use of existing services	All aspects of access, end-users	Cross-sectional	Women; children	B	Emergency obstetric and neonatal care (EmONC)
Krause (2006)	Multiple	Urban & rural	General	Conflict	Chronic	International medical aid; use of existing services	All aspects of access, end-users	Cross-sectional	Pregnant women	B	Emergency obstetric care (EmOC)
Lee (2009)	Burma	Rural	IDP	Conflict	Chronic	Use of existing services	All aspects of access, end-users	Comparative, before/after	All	B	Malaria control
Lee (2008)	Philippines	Rural	General	Conflict	Chronic	NGO medical aid; use of existing services	All aspects of access, end-users; physical, political access, workers	Descriptive	Pregnant women	C	Maternal health care
Liu (2011)	China	Urban & rural	General	Natural (earthquake)	Chronic	Use of existing services	Physical, informational access, end-users	Cross-sectional	All	B	Mental health & psychosocial support (MHPSS)

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Mahn (2008)	Burma	Urban & rural	IDP	Conflict	Chronic	International medical aid; use of existing services	Physical access, end-users	Descriptive	All	C	All
Mateen (2012)	Jordan	Urban & rural	Refugees (Iraqi)	Conflict	Chronic	International medical aid; use of existing services	Physical access, end-users	Cross-sectional	All	B	Primary health care
McIntyre (2011)	Haiti	Urban & rural	General	Natural (earthquake)	Acute	International medical aid; use of existing services	Physical access, end-users	Cross-sectional	All	A	Essential surgery
Mills (2009)	Africa (multiple)	Urban & rural	General	Conflict	Chronic	International medical aid; domestic medical aid	All aspects of access, end-users	Cross-sectional	All	C	HIV/AIDS (combination ART)
Mogollon-Perez (2008)	Colombia	Urban & rural	IDP	Conflict	Chronic	Use of existing medical services	Economic access, workers	Descriptive	All	C	Primary care
Morikawa (2008)	Afghanistan	Rural	General	Conflict	Chronic	Use of existing medical services	Physical access, end-users	Comparative, before/after	All	B	Primary care
Mullany (2008)	Burma	Rural	IDP	Conflict	Chronic	International medical aid; use of existing services	Physical access, end-users	Comparative, before/after	Women	A	Reproductive health services
Mullany (2008)	Burma	Rural	General	Conflict	Chronic	Use of existing services	All aspects of access, end-users	Cross-sectional	Women	B	Maternal health
Oucho (2009)	Botswana	Urban & rural	Refugees, immigrants	Conflict	Chronic	Use of existing services	Physical, economic access, end-users	Cross-sectional	Adults	A	Reproductive health services
Partap (2012)	Nepal	Urban & rural	General	Conflict	Chronic	Use of existing services	Physical access, end-users; physical, political access, workers	Comparative, before/after	Children	A	Child health

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Pike (2010)	Kenya	Rural	General	Conflict	Chronic	Use of existing services	Physical access, end-users	Descriptive	All	C	Primary care
Ponsar (2009)	Haiti	Urban	General	Conflict	Acute	International medical aid; use of existing services	Physical, economic access, end-users	Cross-sectional	All	B	All
Qayum (2011)	Pakistan	Rural	IDP	Conflict	Chronic	International medical aid; use of existing services	All aspects of access, end-users	Cross-sectional	All	A	Primary care
Qayum (2012)	Pakistan	Rural	IDP	Conflict	Chronic	International medical aid; use of existing services	Physical, informational access, end-users	Cross-sectional	All	A	Malaria control
Raheel (2012)	Pakistan	Urban	Refugees (Afghan)	Conflict	Chronic	International medical aid; use of existing services	Economic access, end-users	Cross-sectional	Women	B	Contraception
Rajabali (2009)	Multiple	Urban & rural	Refugees (Afghan)	Conflict	Chronic	Use of existing services	Physical access, end-users	Descriptive	All	C	Infectious diseases
Rassekh (2007)	Indonesia	Urban & rural	General	Natural (tsunami)	Acute	International medical aid; use of existing services	Physical, economic access, end-users	Cross-sectional	Under 5s	B	Child health
Roberts (2008)	Afghanistan	Urban & rural	General	Conflict	Early recovery	International medical aid; use of existing services	All aspects of access, end-users	Descriptive	All	C	Basic Package of Health Services
Ruiz-Rodriguez (2012)	Colombia	Urban	IDP	Conflict	Chronic	Use of existing health services	Physical, economic access, end-users	Comparative, descriptive	All	B	Access to medicines
Saadi (2012)	Multiple	Urban & rural	Refugees (Iraqi)	Conflict	Chronic	Use of existing health services	Informational/ psychosocial access, end-users	Descriptive	Women	C	Breast cancer screening

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Saadi (2012)	Multiple	Urban & rural	Refugees (Iraqi)	Conflict	Chronic	Use of existing health services	Informational/psychosocial access, end-users	Descriptive	Women	C	Breast cancer screening
Sarani (2012)	Haiti	Urban & rural	General	Natural (earthquake)	Acute	NGO medical aid; use of existing health services	Physical access, workers	Descriptive	All	C	All
Saxena (2006)	Multiple	Urban & rural	General	Natural	Early recovery	WHO intervention; use of existing medical services	All aspects of access, end-users and workers	Descriptive	All	C	Mental health
Simetka (2002)	Sri Lanka	Rural	IDP	Conflict	Chronic	Use of existing services	Physical access, end-users	Descriptive	All	C	All
Tiembre (2011)	Côte d'Ivoire	Rural	General	Conflict	Chronic	Use of existing services	Physical access, end-users	Cross-sectional	All	B	All
Tiwari (2007)	Nepal	Urban & rural	General	Conflict	Chronic	Use of existing services	Discrimination (gender) of access, end-users	Cross-sectional	Adult	A	TB
Van der Hoek (1997)	Sri Lanka	Rural	IDP	Conflict	Chronic	Health volunteers; field laboratory	Physical access, end-users; economic access; workers	Comparative, descriptive	All	B	Malaria control
Van Herp (2003)	DRC	Urban & rural	General	Conflict	Chronic	Use of existing services	Physical access, end-users	Cross-sectional	All	A	All
Varley (2010)	Pakistan	Rural	General	Conflict	Chronic	Use of existing services	Discrimination (sectarian) of access, end-users	Descriptive	Pregnant women	C	Obstetric services
Ventevogel (2012)	Afghanistan	Urban & rural	General	Conflict	Chronic	Use of existing services	All aspects of access, end-user	Descriptive	Adult	B	Mental health

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Whelan (2007)	(Multiple) DRC; Yemen; Uganda	Urban & rural	Refugees	Conflict	Chronic	Use of existing services	All aspects of access, end-users	Descriptive	Women	B	Reproductive health services
Wickramasinghe	Sri Lanka	Urban & rural	IDP	Conflict	Acute	NGO medical aid	All aspects of access, end-users	Cross-sectional	All	B	All
Williams (2005)	Afghanistan	Urban	General	Conflict	Chronic	Use of existing services	All aspects of access, end-users	Descriptive	Pregnant women; children	C	Maternal and child health
Zhang (2008)	China	Urban & rural	General	Natural (earthquake)	Acute	Pharmaceutical treatment	Physical access, end-users	Descriptive	All	C	Access to medicines

ANNEX 14:

DETAILS FOR SYSTEMATIC REVIEW ON ACCOUNTABILITY TO END-USERS

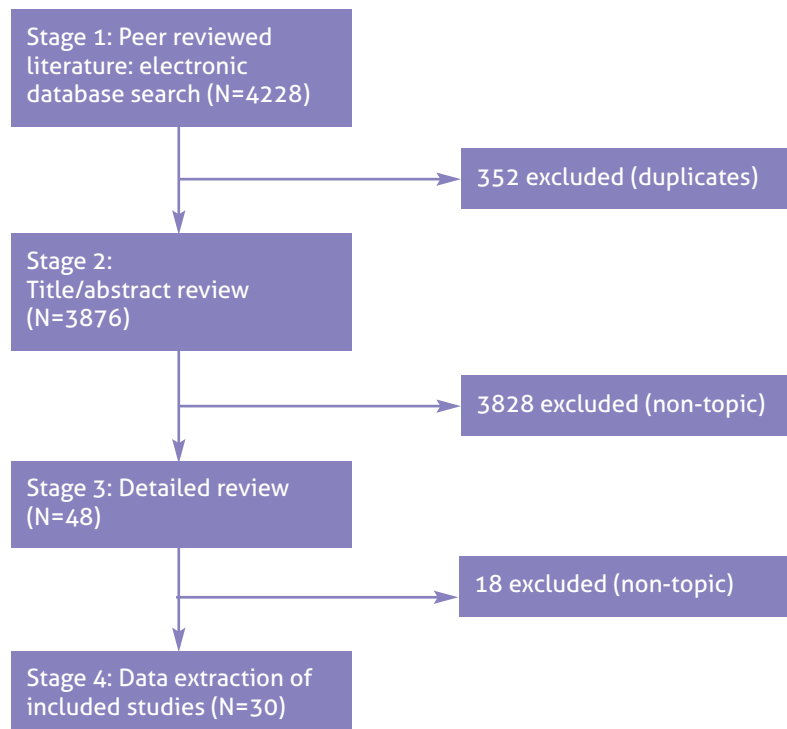
Sources:

Embase, Global Health, International Bibliography of Social Sciences, Medline, PsychINFO, Web of Science

Topic specific search terms:

exp "Social Responsibility"/ OR exp "Ethics, Medical"/ OR exp "Patient Rights" OR exp "culture"/ OR "quality of health care"/ OR exp "Guidelines as Topic"/ OR exp "Guideline"/ OR exp "patient safety"/ OR exp "Standard of Care"/ OR exp "Clinical Competence"/ OR exp "Guideline Adherence"/ OR exp "Quality Indicators, Health Care"/ OR (((("end users" OR "end user" OR beneficiar\$ OR patient\$) adj2 (accountability OR obligation OR duty OR right\$)) OR "right to health" OR "right to healthcare" OR ((availability OR acceptability) adj2 (healthcare OR "health care")) OR ((ethical OR ethics) adj2 (medical OR healthcare OR "health care")) OR "informed consent" OR (patient\$ adj2 (privacy OR confidentiality)) OR (cultur\$ adj2 (sensitiv\$ OR appropriat\$ OR acceptab\$)) OR (quality adj2 (healthcare OR "health care" OR medicine\$ OR drug\$ OR surgery OR procedure\$ OR "health worker" OR "health workers" OR "healthcare worker" OR "healthcare workers" OR "health professional" OR "health professionals" OR "healthcare professional" OR "healthcare professionals" OR doctor\$ OR nurse\$ OR "medical staff" OR "medical training" OR "medical skills")) OR ((professional OR gold OR national OR care OR practice OR medical) adj2 (standard\$ OR guideline\$ OR protocol\$)) OR (patient adj2 safety) OR ("professional expectations" OR "standard of care" OR incompeten\$ OR negligent\$ OR irresponsible)).tw

Screening process:



Summary data extraction table:

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Beitler (2006)	Afghanistan	Rural	General	Conflict	Chronic	Military support hospital	Quality of care and cure rates	Cross-sectional	All	A	All
Black (2003)	Liberia	Urban & rural	General	Conflict	Chronic	International NGO; UN agencies	Acceptability of care (ethical guidelines)	Descriptive	All	C	All
Bohler (2005)	Sudan	Rural	IDP	Conflict	Chronic	Use of existing services	Availability; quality of care	Cross-sectional, comparative	All	A	TB treatment
Brennan (1992)	Kuwait	Urban & rural	General	Conflict	Early recovery	Use of existing services	Acceptability of care (human rights violations)	Cross-sectional	All	A	All
Chan (2010)	Indonesia	Rural	IDP	Natural (tsunami)	Early recovery	International medical aid	Availability; quality of care	Cross-sectional, comparative	All	A	Primary health care
Chevalier (2002)	Multiple	Urban & rural	General	Conflict; natural	Chronic	International medical aid	Quality of care (appropriate staff training)	Descriptive	All	C	All
Christensen Rand (2011)	Indonesia	Rural	IDP	Natural (tsunami)	Early recovery	Temporary housing	Acceptability; quality of care	Descriptive	All	B	Shelter
Du Mortier (2005)	DRC	Urban & rural	General	Conflict	Chronic	International medical aid; use of existing services	Quality of care (development of indicators)	Cross-sectional, comparative	All	A	Primary care; hospital care
Guthmann	Multiple	Urban & rural	General	Conflict; natural	Acute	MSF malaria program	Quality of care	Cross-sectional	All	B	Malaria control
Harries (2011)	Multiple	Urban & rural	General	Conflict; natural	Chronic	MSF and The International Union Against TB and Lung Disease	Acceptability; quality of care (operational research)	Descriptive	All	B	TB control

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Hunt (2008)	Multiple	Urban & rural	General	Conflict; natural	Chronic	International medical aid	Acceptability of care (ethical training)	Descriptive	All	C	All
Hunt (2011)	Multiple	Urban & rural	General	Conflict; natural	Chronic	International medical aid	Acceptability of care (ethical training)	Descriptive	All	C	All
Hussein (2001)	Malawi	Urban & rural	General	Conflict	Chronic	International medical aid: Malawi Safe Motherhood Project	All aspects of accountability	Cross-sectional, comparative	Pregnant women	A	Obstetric services
Kim (2012)	Afghanistan	Urban & rural	General	Conflict	Chronic	Use of existing services	All aspects of accountability	Cross-sectional	Pregnant women; children	A	Emergency obstetric and neonatal care (EmONC)
Kirsch (2012)	Pakistan	Rural	General	Natural (flood)	Acute	International medical aid	Availability of care	Cross-sectional	All	B	All
MacKenzie (2007)	Multiple	Rural	Refugees	Conflict; natural	Chronic	International medical aid	Acceptability of care (informed consent to research)	Descriptive	All	C	All
Mills (2009)	Multiple	Urban & rural	General	Conflict	Chronic	International medical aid; use of existing services	Availability of care	Descriptive	All	B	HIV/AIDS treatment (cART)
Mogollon Perez	Bogota	Urban & rural	IDP	Conflict	Acute	Use of existing services	Availability of care	Descriptive	Adults	C	Basic health needs; mental health
O'Mathuna (2012)	Multiple	Urban & rural	General	Natural	Chronic	International aid; use of existing services	Acceptability of care (informed consent to research)	Descriptive	All	C	All

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Partamin (2012)	Afghanistan	Rural	General	Conflict	Chronic	Use of existing services	Availability; quality of care	Cross-sectional	Pregnant women; children	A	Emergency obstetric and neonatal care (EmONC)
Qayum (2011)	Pakistan	Rural	IDP	Natural (flood)	Chronic	International aid; use of existing services	Availability; quality of care	Cross-sectional	All	A	Sanitation and hygiene practices
Qayum (2011)	Pakistan	Rural	IDP	Natural (flood)	Chronic	International medical aid; use of existing services	Availability; acceptability of care	Cross-sectional	All	A	Primary health care
Rutta (2005)	Tanzania	Rural	Refugees (Burundian; Rwandan)	Conflict	Chronic	International medical aid	Acceptability of care	Cross-sectional	All	B	All
Schwartz (2012)	Multiple	Urban & rural	General	Conflict; natural	Chronic	International medical aid	Acceptability of care (ethical training)	Descriptive	All	C	All
Sheather (2011)	Multiple	Urban & rural	General	Conflict; natural	Chronic	International medical aid; MSF	Acceptability of care (ethical training)	Descriptive	All	C	All
Siddique (1995)	DRC (Zaire)	Urban	Refugees (Rwandan)	Conflict	Acute	International medical aid; use of existing services	Quality of care	Descriptive	All	C	Cholera treatment
Sullivan (2004)	Burma; Thailand	Rural	Refugees (Burmese); IDP	Conflict	Chronic	Use of existing services	Quality of care	Cross-sectional; comparative	Adults	A	Reproductive services
Wall (2011)	Multiple	Urban & rural	General	Conflict; natural	Chronic	International medical aid	Acceptability of care (ethical training)	Descriptive	All	C	All
Wang (2012)	China	Rural	General	Natural (earthquake)	Early recovery	Domestic medical aid	Availability; acceptability of care	Cross-sectional; comparative	All	B	Primary care
Zwi (2006)	Multiple	Urban & rural	General	Conflict; natural	Chronic	International medical aid; use of existing services	Acceptability of care (informed consent to research)	Descriptive	All	C	All

ANNEX 15:

DETAILS FOR SYSTEMATIC REVIEW ON HEALTH ASSESSMENT METHODS

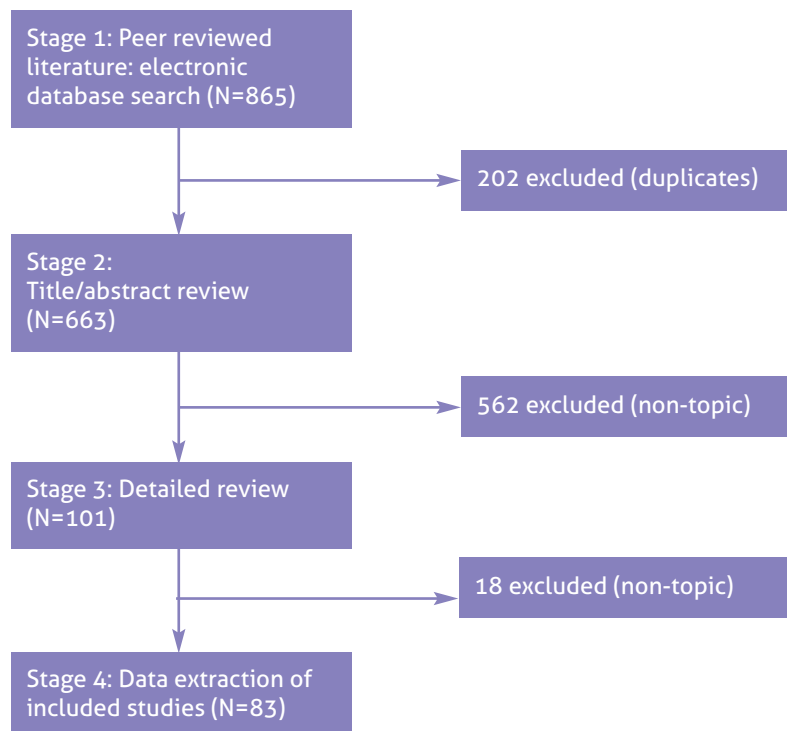
Sources:

Embase, Global Health, International Bibliography of Social Sciences, Medline, PsychINFO, Web of Science

Topic specific search terms:

("Rapid assessment" OR ((morbidty OR mortality OR population OR nutrition? OR fertility OR "birth rates" OR "birth rates") adj2 (estimat? OR assess?)) OR ((health OR weight OR height OR sanitation OR security OR shelter OR "health needs" OR "security needs" OR "shelter needs" OR water OR hygiene OR threat? OR protection? OR settlement? OR "food security") adj2 assess?)).tw

Screening process:



Summary data extraction table:

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Ager (2011)	Georgia; Gaza; Haiti; Yemen	Both	General	Conflict	Early recovery	International health aid; use of existing services	Inter-agency child protection assessment tool	Descriptive	Children	B	Child protection
Ahoua (2006)	DRC	Urban & rural	IDP	Conflict	Chronic	International health aid; use of existing services	MSF rapid assessment tool	Cross-sectional	All	A	Mortality; living conditions
AlDoori (1994)	Iraq	Urban	General	Conflict	Early recovery	Use of existing services	Nutritional assessment	Cross-sectional	Under 5s	C	Child nutrition
Amowitz (2003)	Afghanistan; Pakistan	Urban & rural	IDP; Refugees (Afghan)	Conflict	Chronic	Use of existing services	Structured interview assessment	Cross-sectional	Adults	C	Mental health
Andersson (2011)	Bosnia	Urban & rural	General	Conflict	Acute	International food aid; use of existing services	Mantel Haenszel procedure; Generalised Mixed Linear Model	Descriptive, comparative	All	A	Food security
Atuyambe (2011)	Uganda	Rural	General	Natural (landslide)	Acute	Use of existing services	Qualitative and quantitative sampling	Cross-sectional	All	A	Water, sanitation and hygiene
Barath (2002)	Kosovo	Urban & rural	General	Conflict	Early recovery	Care planning	Ryan-Wegner Coping Style Inventory	Cross-sectional	Children	B	Psychosocial needs of children
Bengtsson (2011)	Haiti	Urban & rural	IDP	Natural (earthquake)	Acute	Care planning	Positional data from mobile SIM cards	Cross-sectional	All	A	Mass population movement
Benner (2010)	Thailand	Urban & rural	Refugees (Burmese)	Conflict	Chronic	Use of existing services	Stratified two-stage sample survey	Cross-sectional	Youth 15 – 24 years	B	Reproductive health services
Bern (1993)	Bangladesh	Urban & rural	General	Natural (cyclone)	Acute	Disaster preparedness	Rapid epidemiological assessment	Cross-sectional	All	B	Excess mortality prevention

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Betancourt (2009)	Uganda	Urban & rural	General	Conflict	Chronic	Care planning	Rapid ethnographic assessment	Cross-sectional	Children	B	Mental health
Bisimwa (2009)	DRC	Rural	General	Conflict	Acute	Care planning	Community volunteer census	Cross-sectional	All	A	Food security
Boss (1994)	Somalia	Urban & rural	General	Conflict	Acute	Care planning	Governmental and NGO surveys	Descriptive, comparative	All	A	Morbidity; mortality; nutritional status
Brown (2001)	Multiple	Urban & rural	General	Conflict; natural	Acute	Care planning	Rapid assessment of population size by area sampling	Descriptive, comparative	All	A	Population estimation
Cardozo (2004)	Thailand	Urban & rural	Refugees (Burmese)	Conflict	Chronic	Care planning	Hopkins Symptoms Checklist-25; Harvard Trauma Questionnaire; SF-36 Health Survey	Descriptive, comparative	Adults	B	Mental health and psychosocial support
Cheung (2003)	Afghanistan	Rural	General	Conflict	Acute	Vitamin C supplements	Rapid health assessment	Descriptive, comparative	All	C	Scurvy prevention
Cronin (2009)	Multiple (Africa)	Urban & rural	Refugees	Conflict	Chronic	Care planning	WHO methodology	Descriptive, comparative	All	A	Excess mortality from diarrhoeal disease
Degomme (2010)	Sudan	Urban & rural	IDP	Conflict	Chronic	Care planning	Quasi-Poisson statistically modelling of surveys	Cross-sectional	All	B	Excess mortality associated with displacement
Ertl (2010)	Uganda	Urban & rural	General	Conflict	Acute	Care planning	Posttraumatic Diagnostic Scale; Depression section of Hopkins Symptom Checklist	Cross-sectional, comparative	Adolescents; young adults	A	Depression; PTSD

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Ezard (2011)	Multiple	Urban & rural	IDP; refugees	Conflict	Chronic	Use of existing services	Intervention-orientated qualitative rapid assessment and response methods	Descriptive	All	B	Substance abuse
Fernando (2008)	Sri Lanka	Rural	General	Conflict	Chronic	Care planning	Sri Lankan Index of Psychosocial Status-Adult Version (SLIPPS-A)	Cross-sectional, comparative	Adults	A	Psychosocial health
Field (1992)	Iraq	Urban & rural	General	Conflict	Acute	Care planning	Nutritional assessment	Cross-sectional	Under 5s	B	Child nutrition
Galway (2012)	Iraq	Urban & rural	General	Conflict	Acute	Care planning	Two-stage cluster sampling method using gridded population data and GIS	Cross-sectional	All	A	Mortality estimation
Garfield (2000)	Iraq	Urban & rural	General	Conflict	Early recovery	Care planning	Logistic regression modelling using health and social indicators	Cross-sectional	Under 5s	A	Mortality estimation
Glass (1980)	Thailand	Urban & rural	Refugees (Cambodian)	Conflict	Acute	Care planning	Rapid health assessment using epidemiology-cal techniques	Cross-sectional	All	B	Mortality estimation
Grays (2006)	Mozambique	Urban & rural	General	Conflict	Acute	Care planning	Quadrat method; T-square method	Descriptive, comparative	All	A	Population estimation
Grandesso (2005)	Sudan	Urban & rural	IDP	Conflict	Acute	Care planning	Rapid assessment of mortality by survey; nutritional status assessment by survey and weight-for-height in <5s	Cross-sectional	All; under 5s	B	Mortality estimation; child nutrition

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Grein (2003)	Angola	Urban & rural	General	Conflict	Early recovery	Care planning	Three-stage cluster sampling for interviews	Cross-sectional	All	B	Mortality estimation
Guerena-Burgueno (2006)	Thailand	Urban & rural	General	Natural (tsunami)	Acute	Care planning	Rapid health and needs assessment	Cross-sectional	All	C	All
Guerrier (2009)	Chad	Urban & rural	IDP	Conflict	Chronic	Care planning	Two-stage, 30-cluster household surveys	Cross-sectional, comparative	All	B	Mortality estimation; child nutrition
Guha-Sapir (2003)	Afghanistan; DRC; Somalia; Sudan	Urban & rural	General	Conflict	Acute	International aid for vulnerability reduction	Assessment of relative risk of death during conflict	Descriptive	All	B	Mortality estimation
Hemrich (2005)	Somalia	Urban & rural	General	Conflict	Chronic	Care planning	Somalia Food Security Assessment Unit assessment	Cross-sectional	All	B	Food security
Holt (2003)	Ethiopia	Urban & rural	Refugees (Sudanese)	Conflict	Chronic	Care planning	Focus group discussions and blood tests	Cross-sectional	Adults	B	HIV/STI prevention
Hossain (2003)	Bangladesh	Urban & rural	General	Natural (flood)	Acute	Care planning in acute vs. recovery phase	Weight-for-height anthropometric measurements	Cross-sectional, comparative	Children	B	Child nutrition
Hu (2008)	China	Rural	General	Natural (earthquake)	Acute	Screening	Self-reporting questionnaire (SRQ-20) tested by split-half and Cronbach's alpha coefficient	Cross-sectional	Adults	A	Mental health
Jarrah (2006)	Jordan	Rural	Refugees (Iraqi)	Conflict	Chronic	Care planning	Tailored health assessment tool	Cross-sectional	All	B	All

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Kaiser (2006)	Multiple	Urban & rural	General	Conflict	Acute	Care planning	Estimate of design effect of cluster-based surveys	Descriptive	All	A	Mortality estimation; child nutrition
Khatib (2010)	Jordan	Rural	Refugees (Iraqi)	Conflict	Acute	Care planning	Dietary, anthropometric and lab indicators	Descriptive	Children; women	C	Nutritional status
Kim (2009)	DRC	Rural	IDP	Conflict	Chronic	Care planning	Questionnaire and blood tests	Cross-sectional	Women 15 – 49 years	A	HIV prevention and treatment
Kim (2007)	Sudan	Rural	IDP	Conflict	Chronic	Care planning	Systematic random sampling with surveys	Cross-sectional	All	B	Basic health; mental health; women's health
Kolbe (2010)	Haiti	Urban	General	(earthquake)	Acute	Care planning	Household surveys	Cross-sectional	All	B	Mortality; injury; sexual assault; food security; shelter needs
Laude (1999)	Costa Rica	Rural	Refugees (Nicaraguan)	Conflict	Chronic	Care planning	Weight-for-height; Bayley Scale of Mental Development; Nursing Child Assessment Teaching Scale, Caldwell's Inventory	Cross-sectional	Children; mothers	A	Child nutrition and cognitive development
Lee (2006)	Burma	Rural	General	Conflict	Acute	Care planning	Cluster sampling surveys	Cross-sectional	All	B	Mortality estimation

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Mayaud (1997)	Tanzania	Rural	Refugees (Rwandan)	Conflict	Acute	Care planning	Rapid assessment for STD using survey and lab tests	Cross-sectional	Adults	A	STD control
McGrath (2002)	Kosovo	Urban & rural	IDP	Conflict	Acute	Care planning	Infant nutrition and health assessment with international indicators	Cross-sectional	Infants	B	Infant nutritional status
McVicar (2001)	Papua New Guinea	Rural	General	Natural (drought)	Acute	Care planning	Advanced Very High Resolution Radiometer (AVHRR) technology	Cross-sectional	All	B	Food security
Miller (1996)	Mexico	Rural	Refugees (Guatemalan)	Conflict	Chronic	Care planning	Mental health and psychosocial assessment	Cross-sectional	Children	C	Mental health and psychosocial support
Miller (2006)	Afghanistan	Urban & rural	General	Conflict	Early recovery	Care planning	22-item Afghan Symptom Checklist (ASCL)	Cross-sectional	Adults	A	Mental health
Miller (1994)	Pakistan	Urban & rural	Refugees (Afghan)	Conflict	Chronic	Care planning	Health and socioeconomic assessment	Descriptive	Women; children	C	Basic health; child nutrition
Moore (1993)	Somalia	Rural	IDP	Conflict (and famine)	Acute	Care planning	Mortality rate and risk assessment	Cross-sectional	All	B	Mortality estimation
Movaghar (2005)	Iran	Urban & rural	General	Natural (earthquake)	Acute	Care planning	Opium use and withdrawal assessment	Cross-sectional	Adults	B	Substance abuse management
Mukalay (2012)	DRC	Urban	General	Conflict	Early recovery	Care planning	Logistic regression of survey and anthropometric data	Cross-sectional	Under 5s	A	Child nutrition

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Orach (1999)	Uganda	Rural	Refugees (Sudanese)	Conflict	Chronic	Care planning	Review of treatment records; nutritional survey	Cross-sectional	Adults; under 5s	B	Morbidity and mortality estimation; child nutrition
Osborne Daponte (2007)	Iraq	Urban & rural	General	Conflict	Acute	Care planning	Civilian casualty assessment and statistical modelling	Cross-sectional	All	A	Mortality estimation
Panter-Brick (2009)	Afghanistan	Urban & rural	General	Conflict	Chronic	Care planning	Surveys in schools; ASCL; Depression Self-Rating Scale	Cross-sectional	Children 11 – 16 years	A	Mental health
Pawar (2008)	India	Rural	General	Natural (flood)	Acute	Care planning	Rapid assessment of vector breeding and control; treatment seeking behaviour	Descriptive	All	C	Malaria control
Pawar (2005)	India	Rural	General	Natural (earthquake)	Acute	Use of existing services	Village surveys with statistical analysis	Cross-sectional	All	C	Mortality estimation; water, sanitation and hygiene
Pinto (2005)	Sudan	Rural	IDP	Conflict	Acute	Disease outbreak early warning system	WHO, UN, NGO and local authority collaboration	Cross-sectional	All	B	Infection disease control
Potts (2011)	Central African Republic	Urban & rural	General	Conflict	Chronic	Detection of human rights violations; care planning	"Neighbour-hood Method" survey	Cross-sectional	All	B	Primary care; child protection
Prasad (2006)	Afghanistan	Urban	General	Conflict	Chronic	Care planning	Tertiary care hospital ED morbidity and mortality assessment	Cross-sectional	Children	A	Child morbidity and mortality

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Qayum (2011)	Pakistan	Rural	IDP	Natural (flood)	Early recovery	Care planning	Health survey	Cross-sectional	All	B	Primary care
Rasekh (1998)	Afghanistan; Pakistan	Urban & rural	General; Refugees	Conflict	Chronic	Care planning	Health and human rights survey assessment	Cross-sectional, comparative	Women	B	Women's health
Roberts (2010)	Afghanistan, Malawi; Tanzania; Thailand	Urban & rural	Refugees	Conflict	Chronic	Care planning	The "Informant Method" and next-of-kin interview assessment	Cross-sectional, comparative	All	A	Mortality estimation
Rossi (2005)	Armenia	Urban & rural	General	Conflict	Chronic	Care planning	Nutritional assessment by questionnaire and anthropometric data	Cross-sectional, comparative	Women; children	A	Nutritional status
Safran (2011)	Haiti	Urban & rural	General	Natural (earthquake)	Acute	Care planning	Mental health survey	Cross-sectional	Adults	C	Mental health
Salama (2001)	Ethiopia	Urban & rural	General	Conflict (famine)	Acute	Care planning	Assessment survey and anthropometric data	Cross-sectional	All	B	Morbidity and mortality estimation; child nutrition
Shears (1987)	Sudan	Rural	Refugees (Ethiopian)	Conflict (famine)	Acute	Care planning	Analysis of health and nutritional epidemiological data	Cross-sectional	All	C	Morbidity and mortality estimation; child nutrition
Singh (2006)	India	Rural	General	Natural (drought)	Acute	Care planning	Nutritional assessment by survey, anthropometric data and clinical signs	Cross-sectional	Under 5s	B	Food security

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Sollom (2011)	Burma	Rural	General	Conflict	Chronic	Detection of human rights violations; care planning	Multistage household cluster sampling with interviews	Cross-sectional	All	B	Basic health; food security
Souza (2007)	Indonesia	Urban & rural	General	Natural (tsunami)	Early recovery	Care planning	Hopkins Symptoms Checklist-25 (HSCL)	Cross-sectional	Adults	B	Mental health
Spiegel (2004)	Ethiopia	Urban & rural	General	Conflict (famine)	Chronic	Care planning	Validation of 125 nutritional surveys	Descriptive, comparative	All	A	Food security; nutrition
Spiegel (2001)	Multiple	Urban & rural	IDP	Conflict; natural	Early recovery	Care planning	Validation of 45 mortality assessments	Descriptive, comparative	All	A	Mortality estimation
Stark (2010)	Uganda	Rural	IDP	Conflict	Early recovery	Detection of human rights violations; care planning	Assessment with "Neighbour-hood method"	Cross-sectional, comparative	Women	A	Sexual health; gender-based violence
Sullivan (2010)	Multiple	Urban & rural	General	Conflict; natural	Acute	Care planning	Three methods of confidence interval analysis of mortality surveys	Cross-sectional, comparative	All	A	Mortality estimation
Sullivan (2010)	Pakistan	Rural	General; IDP	Natural (earthquake)	Acute	Care planning	Mortality assessment	Cross-sectional	All	B	Mortality estimation
Swain (2005)	India	Rural	General	Natural (super cyclone)	Acute	Care planning	Field survey	Cross-sectional	Women	C	Basic health; nutrition; water, sanitation and hygiene

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Thapa (2012)	Nepal	Rural	IDP	Conflict	Acute	Care planning	WHO Disability Assessment Schedule-II; Hopkins Symptom Checklist-25; PTSD Checklist Civilian Version.	Cross-sectional, comparative	Adults	A	Basic health; mental health
Thienkrue (2006)	Thailand	Rural	IDP; general	Natural (tsunami)	Early recovery	Care planning	PsySTART Rapid Triage System; OCLA PTSD Reaction Index; Birleson Depression Self-Rating Scale; 9-month follow-up	Cross-sectional, comparative	Children 7 – 14 years	A	Mental health of children
Van Griensven	Thailand	Rural	IDP; general	Natural (tsunami)	Early recovery	Care planning	SF-36 Health Survey; Harvard Trauma Questionnaire; Hopkins Symptoms Checklist-25; 9-month follow-up	Cross-sectional, comparative	Adults	A	Mental health
Yamout (2011)	Lebanon	Rural	IDP	Conflict	Acute	Care planning	Hamilton Anxiety Rate Scale	Cross-sectional	Adults	B	Mental health
Yamout (2010)	Lebanon	Rural	IDP	Conflict	Acute	Care planning	Epidemiological survey	Cross-sectional	Adults	C	Mental health
Zhao (2009)	China	Rural	General	Natural (earthquake)	Acute	Screening; care planning	Children's Impact of Event Scale (CRIES-13) vs. clinical diagnosis	Cross-sectional, comparative	Children	A	Mental health

ANNEX 16:

DETAILS FOR SYSTEMATIC REVIEW ON COORDINATION

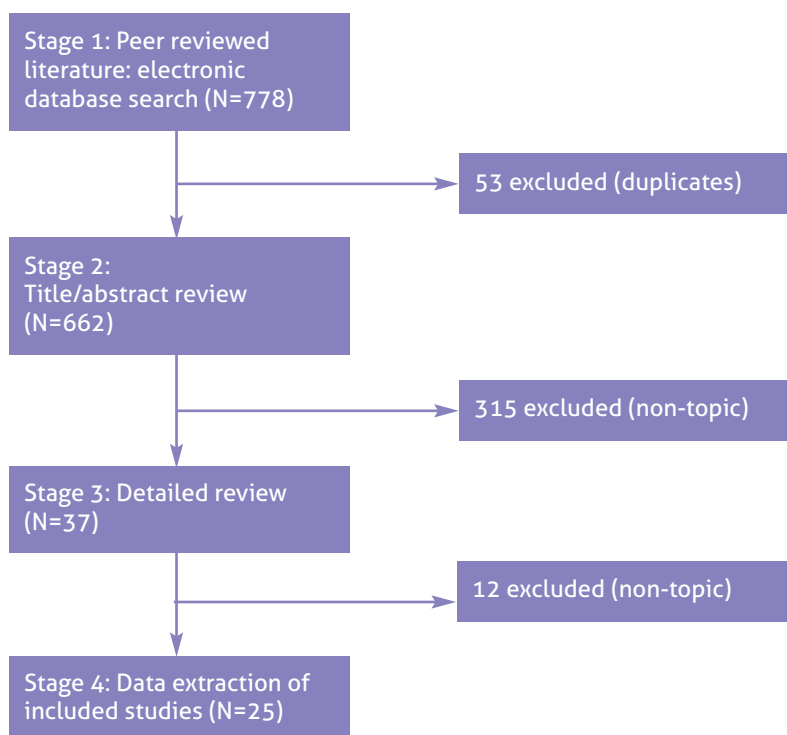
Sources:

Medline, Embase, Global Health, International Bibliography of Social Sciences, Web of Science.

Topic specific search terms:

((humanitarian adj2 (coordination OR reform\$)) OR ("cluster system" OR "cluster approach" OR "transformative agenda") OR (ocha adj2 (coordination OR mechanism\$)) OR (("united nations" OR "un" OR agency) adj1 partnership\$) OR ((competition OR rivalry) adj2 (agencies OR funding OR recognition OR data OR interagency)) OR ((leadership OR coordination) adj2 ("health care" OR healthcare OR "medical assistance" OR "medical operations")) OR ("lead health agency" OR "ministry of health" OR "primary health intervention" OR "subsidiary health intervention" OR "primary health interventions" OR "subsidiary health interventions") OR (support adj2 ("local health system" OR "national health system" OR "local health systems" OR "national health systems"))).

Screening process:



Summary data extraction table:

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Akashi (2006)	Afghanistan; Cambodia	Urban & rural	General	Conflict	Chronic	NGO medical aid; use of existing services	Coordination of MoH; donors; NGOs	Descriptive	All	C	All
Bile (2011)	Pakistan	Urban & rural	IDP	Conflict	Chronic	NGO medical aid; use of existing services	Application of the UN OCHA "Cluster Approach" through MoH; hosting populations; NGOs	Descriptive	All	B	
Bile (2010)	Pakistan	Urban & rural	General	Conflict	Chronic	UN agencies; use of existing services	"Delivering as One" initiative coordinating five programs, including health	Descriptive	All	A	All
Bollettino (2008)	Multiple	Urban & rural	General	Conflict	Chronic	NGO medical aid; use of existing services	Security coordination	Descriptive	All	C	All
Chen (2009)	China	Rural	Entrapped	Natural (earthquake)	Acute	Medical transfer	MoH; airline department; railway department	Descriptive	All	A	Patient transfer
Cheng (2009)	China	Rural	Entrapped	Natural (earthquake)	Acute	Up-scaling of existing services	government; provincial medical security team	Descriptive	All	A	Medical material distribution
Coles (2012)	Haiti	Urban & rural	General	Natural (earthquake)	Early recovery	Local and international medical aid	Building disaster relief networks	Descriptive	All	C	All
Dar (2011)	Pakistan	Urban & rural	General	Natural (flood)	Acute	Local and international medical aid; use of existing services	Global Health UN OCHA Cluster System; non-cluster members	Descriptive	All	B	All
Harmer (2008)	Multiple	Urban & rural	General	Conflict	Acute	NGO medical aid; use of existing services	Integrated missions	Descriptive	All	B	All

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Joyce (2006)	Indonesia	Urban & rural	General	Natural (tsunami)	Acute	Military, local and international medical aid	Civilian-military coordination	Descriptive	All	C	All
Laan (2009)	Multiple	Urban & rural	General	Conflict; natural	Chronic	International medical aid	Logistics information management	Descriptive	All	C	All
Landegger (2011)	Uganda	Rural	General	Conflict	Chronic	Local and international medical aid; UN agencies	Cluster Approach	Descriptive	Adults	A	Sexual and reproductive health services
Macalister-Smith (1997)	Multiple	Urban & rural	General	Conflict; natural	Acute	NGOs	NGO coordination; role of UN	Descriptive	All	C	All
McCann (2011)	Haiti; Pakistan	Urban & rural	General	Natural (earthquake; flood)	Acute	International medical aid	Coordination of disaster preparedness and response	Descriptive	All	C	All
Moore (2003)	Mozambique	Urban & rural	General	Natural (flood)	Acute	International medical aid	Network analysis and centrality scores	Descriptive	All	B	All
Øverland (2005)	Afghanistan; Tajikistan	Rural	IDP; refugees	Conflict	Chronic	International medical aid	OCHA coordination of UN and non-UN agencies	Descriptive	All	B	All
Pélisser (1996)	Angola	Urban & rural	General	Conflict	Chronic	International medical aid	Role of UN Department of Humanitarian Affairs (DHA)	Descriptive	All	C	All
Sommaruga (1993)	Multiple	Urban & rural	General	Conflict; natural	Acute	International medical aid	Coordinating role of the UN	Descriptive	All	C	All

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Stephenson (2005)	Multiple	Urban & rural	General	Conflict; natural	Acute	Local and international medical aid	Role of institutional networks and trust in coordination	Descriptive	All	C	All
Stephenson (2006)	Multiple	Urban & rural	General	Conflict; natural	Acute	Local and international medical aid	Interorganisational social networking in coordination	Descriptive	All	C	All
Stephenson (2006)	Multiple	Urban & rural	General	Conflict; natural	Acute	Local and international medical aid	Interorganisational trust coordination	Descriptive	All	C	All
Stumpfenhorst (2011)	Haiti	Urban & rural	General	Natural (earthquake)	Acute	International medical aid	UN OCHA Cluster Approach	Descriptive	All	B	All
Tapia (2012)	Multiple	Urban & rural	General	Conflict; natural	Acute	International medical aid	Two humanitarian information coordination bodies	Descriptive, comparative	All	B	All
Tarantino (2006)	Multiple	Urban & rural	General	Natural (tsunami)	Acute	International medical aid	Civilian-military coordination	Descriptive	All	B	All
Walk (2012)	Haiti	Urban & rural	General	Natural (earthquake)	Acute	USNS Comfort medical aid	MoH; US military; NGOs	Descriptive	All	C	Inpatient care; surgery

ANNEX 17:

DETAILS FOR SYSTEMATIC REVIEW ON SECURITY OF HEALTHCARE WORKERS

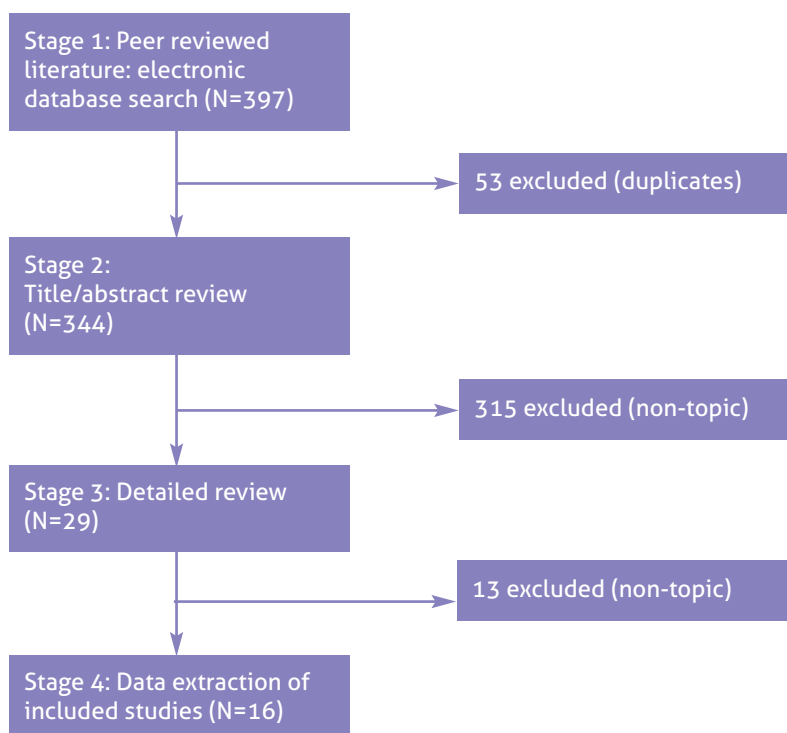
Sources:

Medline, Embase, Global Health, International Bibliography of Social Sciences, Web of Science.

Topic specific search terms:

(violence/ AND exp Health Personnel/) OR ((security OR safety OR attack? OR death? OR danger? OR threat? OR violence) adj4 ("healthcare worker" OR "healthcare workers" OR "health professional" OR "health professionals" OR "health care worker" OR "health care workers" OR "healthcare professional" OR "healthcare professionals" OR "health worker" OR "health workers" OR doctor? OR nurse? OR "medical operations" OR "aid worker" OR "aid workers")).tw

Screening process:



Summary data extraction table:

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Burnham (2012)	Jordan	Both	Refugees (Iraqi doctors)	Conflict	Chronic	Use of existing services	Assassination of doctors	Descriptive	All	C	All
Donaldson (2012)	Iraq	Both	General	Conflict	Chronic	Use of existing services	Assault and gun threat of doctors by patients and family	Cross-sectional	All	C	Emergency department services
Doocy (2010)	Jordan	Both	Refugees (Iraqi doctors)	Conflict	Chronic	Use of existing services	Kidnapping, violence, assassination attempts	Cross-sectional	All	B	All
Faiz (1997)	Afghanistan	Both	General	Conflict	Chronic	Use of existing services	Violence and humiliation of doctors by Taliban	Descriptive	All	C	All
Fast (2010)	Multiple	Both	General	Conflict	Chronic	International medical aid; use of existing services	Murder of and security threat to aid workers	Descriptive	All	B	All
Harmer (2008)	Multiple	Both	General	Conflict	Chronic	International medical aid; use of existing services	Security to aid workers during integrated missions	Descriptive	All	C	All
Hawkes (2012)	Multiple	Both	General	Conflict	Chronic	International medical aid; use of existing services	Security of doctors in changing nature of conflict	Descriptive	All	C	All
Kett (2010)	Multiple	Both	General	Conflict	Chronic	International medical aid; use of existing services	Security of doctors in changing nature of conflict	Descriptive	All	C	All
Rogers (2001)	Multiple	Both	General	Conflict; natural	Chronic	International medical aid; use of existing services	Security of aid workers in changing nature of conflict	Descriptive	All	C	All

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Rowley (2008)	Multiple	Both	General	Conflict; natural	Acute	International medical aid; use of existing services	Measuring rate of violence-related mortality and morbidity of aid workers	Descriptive	All	A	All
Schulte (1998)	Multiple	Both	General	Conflict; natural	Chronic	International medical aid; use of existing services	Measuring rate of violence and threats in public health field workers	Descriptive	All	A	All
Van Brabant (1998)	Multiple	Both	General	Conflict	Acute	International medical aid; use of existing services	Security management; deterring violence; seeking increased acceptance	Descriptive	All	C	All
Varley (2010)	Pakistan	Rural	General	Conflict	Chronic	Use of existing obstetric services	Physician targeting reducing medical coverage	Descriptive	Pregnant women	C	Obstetric care
Vastag (2001)	Afghanistan	Rural	General	Conflict	Chronic	International medical aid	Aid worker targeting reducing medical coverage	Descriptive	All	C	All
Webster (2009)	Iraq	Both	General	Conflict	Acute	Use of existing services	Targeting of medical schools, physicians and hospitals decimated health system	Descriptive	All	C	All
Webster (2011)	Multiple	Both	General	Conflict	Acute	International medical aid; use of existing services	Violence against health workers decimated health systems	Descriptive	All	C	All

ANNEX 18:

DETAILS FOR SYSTEMATIC REVIEW ON URBANISATION

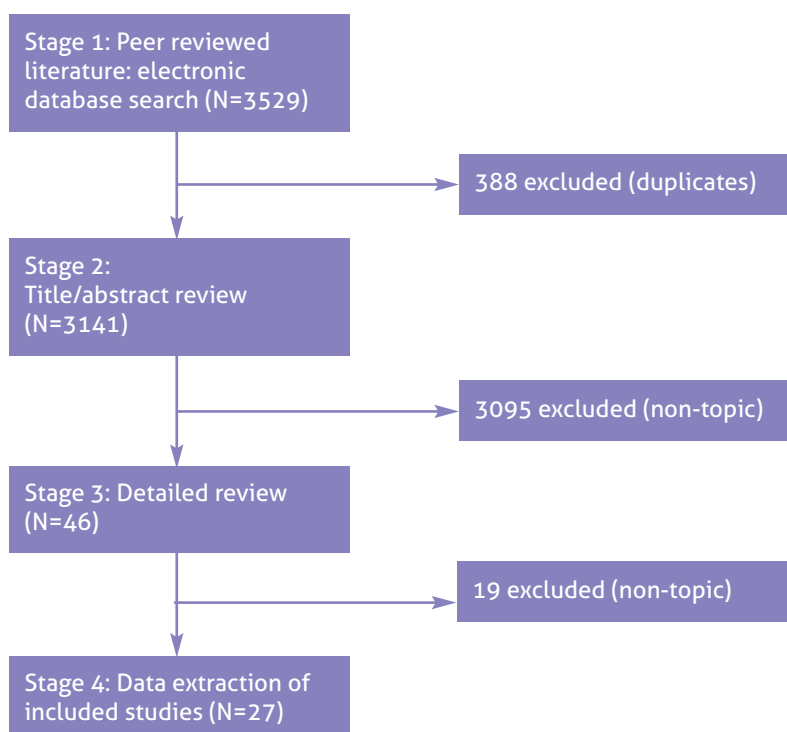
Sources:

Medline, Embase, Global Health, International Bibliography of Social Sciences, Web of Science.

Topic specific search terms:

"Urban Population"/ OR "Urbanization"/ OR "Urban Health"/ OR "Cities"/ OR "Poverty Areas"/ OR (urban OR urbaniz?
OR urbanis? OR slum OR slums? OR city OR cities).tw

Screening process:



Summary data extraction table:

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Blood (1994)	Multiple	Urban	General	Conflict	Acute	Care planning	Urban warfare morbidity and mortality rates higher	Descriptive	All	C	Mortality estimation
Brown (2012)	Multiple (Asian)	Urban	General	Natural	Chronic	Disaster preparedness	Climate change threat to urban environments	Descriptive	All	C	Health access; food security; shelter security; water, sanitation and hygiene
Chan (2009)	Pakistan	Rural; urban	General	Natural (earthquake)	Early recovery	Care planning	Health availability, access and NCD higher in urban vs rural setting	Descriptive, comparative	Older people	A	Primary care; NCD
Doocy (2011)	Jordan; Syria	Urban	Refugees (Iraqi)	Conflict	Chronic	Care planning	Improved cash-based programs may be more effective use of funding	Cross-sectional	All	A	Food security
Furusawa (2011)	Solomon Islands	Rural; Urban	General	Natural (earthquake)	Chronic Early recovery	Care planning	Urban environment at risk of communicable disease as well as NCD needs during crisis	Cross-sectional, comparative	All	B	Infectious disease; NCD
Godoy-Paiz (2011)	Guatemala	Urban	General (Mayan indigenous)	Conflict	Chronic	Care planning	Indigenous women affect by war have particular rehabilitative needs	Cross-sectional	Women	B	Mental health

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Goudet (2011)	Bangladesh	Urban (slums)	General	Natural (flooding)	Chronic	Disaster preparedness	Flooding is a major cause of malnutrition in slums	Cross-sectional	All; Pregnant women	A	Food security; nutrition
Goudet (2011)	Bangladesh	Urban (slums)	General	Natural (flooding)	Chronic	Disaster preparedness	Mothers compromise their nutritional intake to protect infants and young children	Cross-sectional	Infants and young children	A	Food security; nutrition
Gutierrez (2012)	Multiple	Urban	Refugees	Conflict; natural	Chronic	Care planning	NCD and collapse of health systems greatest threats; health insurance for refugees	Descriptive	All	C	All
Hadley (2011)	Ethiopia	Rural; Urban	General	Conflict (famine)	Chronic	Use of existing services	Poverty, not urban/rural differences per se, is the risk for food insecurity	Cross-sectional, comparative	All	B	Food security
Harroff-Tavel (2010)	Multiple	Urban	General	Urban violence	Chronic	Care planning	Innovations to mitigate urban violence	Descriptive	All	B	Health-promotion programs
Hosseini (2009)	Iran	Urban	General	Natural (earthquake)	Chronic	Disaster preparedness	Emergency medical response; evacuation; transportation	Descriptive	All	B	Medical evacuation
Houghton (2011)	Multiple	Urban	General	Natural	Chronic	Disaster preparedness	Climate change threat to urban environments: flooding, heatwaves; Health Impact Assessment (HIA) of urban planning	Descriptive	All	C	Preventive care

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Hurford (2010)	Indonesia	Urban	General	Natural (flooding)	Chronic	Disaster preparedness	1D vs 2D computer modelling to predict flood extent	Descriptive, comparative	All	A	Preventive care
Kirsch (2012)	Pakistan	Rural; Urban	General	Natural (flooding)	Early recovery	Care planning	Urban environments more resilient in disaster recovery	Descriptive, comparative	All	A	Health access; nutrition; water, sanitation, hygiene
Liu (2011)	China	Urban	General	Natural (earthquake)	Acute	Disaster preparedness	Urban health facilities and shelter must take account of seismic faults and threats	Descriptive	All	B	Health access
Liu (2010)	China	Rural; Urban	General	Natural (earthquake)	Early recovery	Care planning	Girls, older age groups and those from rural areas suffer more PTSD than those from urban areas	Cross-sectional, comparative	Children 11 – 17 years	A	Mental health
Lucchi (2010)	Brazil; Haiti; Guatemala	Urban	General	Urban violence	Chronic	Care planning	Health provision strategies outside traditional conflict setting	Descriptive	All	B	Health access
Lucchi (2012)	Multiple	Urban	General	Urban violence	Chronic	Care planning	Health provision strategies outside traditional conflict setting	Descriptive	All	A	Health access
Mullen (2008)	Burundi	Rural; Urban	General	Conflict	Chronic	Use of existing services	Lower socioeconomic status and greater distance from health facility reduces mental health and increases mortality in urban but not rural settings	Cross-sectional	All	A	Health access; mental health

Study authors (year)	Study country	Setting	Population type	Humanitarian crisis type	Crisis stage	Type(s) of health interventions	Character of factor influence	Study design	Target age group	Evidence category	Health topic
Munslow (2010)	Multiple (Asia)	Urban	General	Natural	Chronic	Disaster preparedness	Climate change threat to urban environments: flooding, drought	Descriptive	All	B	Health access
Najarian (2001)	Armenia	Urban	General; IDP	Natural (earthquake)	Early recovery	Care planning	Urban relocation associated with more mental health problems than non-relocation	Descriptive, comparative	Women	B	Mental health
Ochoa (2007)	Multiple	Urban	General	Natural	Chronic	Disaster preparedness; coordination	Extreme events affect urban areas more, necessitating more efficient decision-making and coordination	Descriptive	All	C	All
Puertas (2006)	Colombia	Urban (slums)	IDP	Conflict	Chronic	Use of existing services; care planning	IDP with health care cards had less mental health issues than those without	Cross-sectional	Adults	A	Health access; mental health
Rashid (2000)	Pakistan	Urban	General	Natural (flooding)	Acute	International medical aid; use of existing services; care planning	Major health challenges: water, sanitation, hygiene; diarrhoeal disease; domestic violence	Descriptive	All	C	Water, sanitation, hygiene; diarrhoeal disease
Ruiz-Rodriguez (2012)	Colombia	Urban	IDP; General	Conflict	Chronic	Use of existing services	IDP and non-IDP have similar access to medicines	Cross-sectional, comparative	All	A	Access to medicines
Suriya (2012)	India	Urban	General	Natural (flooding)	Acute	Care planning	Urban environments flood-prone	Descriptive	All	C	Health access



LONDON
SCHOOL of
HYGIENE
& TROPICAL
MEDICINE



HARVARD
SCHOOL OF PUBLIC HEALTH

