SYSTEMATIC REVIEW

Data Collection Tools for Maternal and Child Health in Humanitarian Emergencies: An Updated Systematic Review

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ABSTRACT

The worst rates of preventable mortality and morbidity among women and children occur in humanitarian settings. Reliable, easy-to-use, standardized, and efficient tools for data collection are needed to enable different organizations to plan and act in the most effective way. In 2015, the World Health Organization (WHO) commissioned a review of tools for data collection on the health of women and children in humanitarian emergencies. An update of this review was conducted to investigate whether the recommendations made were taken forward and to identify newly developed tools. Fifty-three studies and 5 new tools were identified. Only 1 study used 1 of the tools identified in our search. Little has been done in terms of the previous recommendations. Authors may not be aware of the availability of such tools and of the importance of documenting their data using the same methods as other researchers. Currently used tools may not be suitable for use in humanitarian settings or may not include the domains of the authors' interests. The development of standardized instruments should be done with all key workers in the area and could be coordinated by the WHO.

Key Words: child health, humanitarian emergencies, maternal health

A humanitarian emergency is an event, or series of events, that represents a critical threat to the health, safety, security, or well-being of a community or other large group of people, usually over a wide area. During such emergencies, maternal and child health continue to be overlooked, leading to staggering consequences and devastating health implications; the worst rates of preventable mortality and morbidity among women and children occur in humanitarian settings and other crises.[1,2] In 2015, over 75% of 84 million people in need of humanitarian assistance were women and children, the majority of whom were impoverished, which aggravates this scenario.[3]

The need for high quality and timely information and research in humanitarian emergencies has been a topic of great discussion over the past several years. Recent high profile incidents have exposed gaps in knowledge about the health impacts of disasters or the benefits of specific interventions.[4] In this context, besides funding an organized professional research network, reliable, easy-to-use, standardized, and efficient tools for data collection are needed to enable different organizations to plan and act in the most effective way.

In 2015, the World Health Organization (WHO) commissioned a review of data collection tools concerning the health of women and children in humanitarian emergencies.[5] Tools that were available between 2000 and 2014 were identified and reviewed. For each study, the setting where tools were used, the types of data collected, and the type of tools used to collect the data were described. Recommendations were then proposed, including the development of a simplified, standardized tool. An update of the 2015 review to investigate whether this recommendation has been taken forward and to identify possible newly developed tools by type and purpose was conducted. This article describes data collection gaps and recommends the next steps to promote harmonized monitoring of the health status of mothers, newborns, and children under the age of 5 years in humanitarian settings and emergency situations. These tools and the data collected can be used to prioritize actions for programs. Differently from the previous review, this study does not include studies or tools on sexual and reproductive health because this subject will be studied separately for the sake of better clarity in each study field.

METHODS

Search Strategy

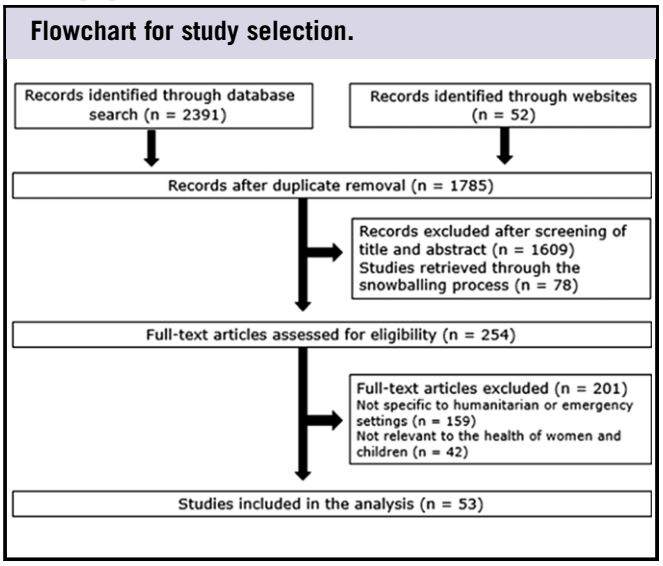
In order to update the previous review, the search strategy formerly used was reproduced and a systematic review according to the PRISMA guideline was conducted.[6] MEDLINE, Web of Knowledge, and POPLINE databases were searched for studies in all languages between July 1, 2014 and January 24, 2018. A search for the whole study period, that is, between January 1, 2000 and January 24, 2018, was conducted to amplify the search, adding new studies identified in all languages except English, because the previous review included studies in English only. LILACS was also searched in all languages for the whole study period, because this database had not been included in the previous review. The search incorporated the same medical subject heading (MeSH) terms, key words, and free text as in the 2015 review, excluding the terms regarding sexual and reproductive health. The terms used were "maternal," "newborn," "child/child health service*," "pregnan*," "neonat*," under one search string and "disaster," "post conflict," "war," "humanitarian," "refugee," "internally displaced" under another string. Similarly, the Boolean operator "OR" was used for the terms under each search string, and "AND" was used to combine both strings.

The website of organizations that work with humanitarian emergencies that were included in the previous search – CARE International, the Centers for Disease Control and Prevention, Harvard Humanitarian Initiative, the Inter-Agency Standing Committee, the International Federation of Red Cross and Red Crescent Societies (IFRC), Knowledge for Health (K4Health), Médecins Sans Frontières (MSF), the Office of the United Nations High Commissioner for Refugees, Oxfam, the Reproductive Health Response in Crises Consortium, Save the Children, the United Nations Population Fund (UNFPA), the Women's Refugee Commission, WHO, and World Vision – were included in the search. Action Against Hunger, The Population Council, Surgeons Overseas, and The Measure Evaluation Program were also included. The snowballing process included reviewing the reference list and authors of the retained studies and the organizations websites and documents.

Inclusion and Exclusion Criteria

Only studies that described the development or use of data collection tools concerning maternal and child health in humanitarian emergency settings were included. This occurred even if the tools used were not specified or the methods were not described. Because sexual and reproductive health was not incorporated in the current study, sexual/gender-based violence, family planning, and sexually transmitted infections, including HIV/AIDS, were excluded from this review.

FIGURE 1



Two independent authors searched databases and websites, and if there was not consensus whether or not a study should be included, a third independent reviewer was consulted. First, the titles and abstracts of all studies were screened. Studies were then excluded if they did not meet the inclusion criteria. The ones that met the inclusion criteria were fully read to assess eligibility (Figure 1). Two reviewers summarized the information on tools used, type of data collected, and purpose of the study (Table 1). Data were classified into 2 categories: (1) maternal and newborn (0–28 days) health; and (2) infant (0–11 months) and child (12–59 months) health.

A narrative synthesis was used to summarize the studies that were included in our review.[7] A full report on the findings and methods was also prepared. The report also included a list of all studies that met and those that did not meet the inclusion criteria and all included tools. These are available upon request. Trends in the number of published studies from 2000 to 2017 were assessed statistically. The trend analysis was done using The Joinpoint Regression Analysis Program, version 4.6.0.0.[8]

RESULTS

Of the 53 studies retained in the review, 49 reported the number of women and children included in the study sample. Of a total population of 134 889 individuals, 29 171 (22%) were women and 95 317 (71%) were newborns and children under age 5 years. The sample sizes varied from 11 (interviews with midwives regarding pregnant women health in Ebola centers)[9] to 28 996 (Technical report from the Food and Agriculture Organization of the United Nations assessing the prevalence of acute malnutrition amongst children and under-age-5 mortality rate).[10] Despite the inclusion of other languages, all

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TABLE 1

Summary Table of Included Studies

Title	Author	Tools and Methods	Type of Data Collected by Category	Outcome (Use of Data Collected)	Setting (Country – Type of Emergency If Information Available)	Populations Included	Publication Type	Type of disaster
"The system here isn't on patients' side" – perspectives of women and men on the barriers to accessing and utilizing maternal healthcare services in South Sudan	Ngatho et al., 2018	In-depth, 1-on-1 interviews	Maternal and newborn health – perceived and experienced barriers to receiving maternal health services	Geographic accessibility, affordability, acceptability, security/ cultural preferences, availability	South Sudan – internal arm conflict	30 Women and 15 men	Peer reviewed	Manmade
A high-risk group of pregnant women with elevated levels of conflict-related trauma, intimate partner violence, symptoms of depression and other forms of mental distress in post-conflict Timor-Leste	Rees et al., 2016	Large cross-sectional study using Edinburgh Postnatal Depression Scale, the Kessler 10 Psychological Distress Scale, modified Harvard Trauma Questionnaire, and WHO Multi-Country Study on Women's Health and Domestic Violence measure	Maternal and newborn health – indices of IPV, depression, posttraumatic stress disorder (PTSD) symptoms, psychological distress	Assess an index of exposure to traumatic events of war and IPV to identify pregnant women attending antenatal clinics in conflict-affected areas	Timor-Leste – post conflict	1672 Women	Peer reviewed	Manmade
A mental health needs assessment of children and adolescents in post-conflict Liberia: results from a quantitative key-informant survey	Borba et al., 2016	Quantitative cross-sectional needs assessment, focused on the mental health needs of Liberian youth. The survey instrument included questions on participants' sociodemographic characteristics, such as age, gender, professional degrees, and nationality. The survey sought to assess the KIs response on 4 domains of mental health.	Infant and child health – emotional and behavioral problems, functional limitations	Examine the impact of war and post-war events on emotional and behavioral problems of, functional limitations of, and appropriate treatment settings for Liberian youth ages 5–22 years	Liberia - post-war	171 Key informants	Peer reviewed	Manmade
A qualitative analysis of psychosocial outcomes among women with sexual violence-related pregnancies in eastern Democratic Republic of Congo	Scott et al., 2017	Mixed methods study, using semi-structured qualitative interviews	Maternal and newborn health – emotional responses and psychological well-being	Describe psychosocial outcomes among this subgroup of sexual violence survivors in order to inform future interventions	Democratic Republic of Congo	55 Women	Peer reviewed	Manmade
Abuses, resilience, behavioral problems and post-traumatic stress symptoms among unaccompanied migrant minors: an Italian cross-sectional exploratory study	Longobardi et al., 2017	Self-report questionnaires on emotional and behavioral problems, posttraumatic stress symptoms, abuse, and resilience	Infant and child health – emotional and behavioral problems, posttraumatic stress symptoms, abuse, and resilience	Investigate the type and prevalence of pre-migratory and peri-migratory (physical, psychological, and sexual) abuse	Italy – rehabilitation centers	19 Unaccompanied migrant minors	Peer reviewed	Manmade
Acute malnutrition among children, mortality, and humanitarian interventions in conflict-affected regions – Nigeria, October 2016–March 2017	Leidman et al., 2017	Cross-sectional household surveys using a cluster methodology	Infant and child health – standard anthropometric procedures, nutritional status, growth standards	Coverage of major public health interventions, mortality among children age < 5 years, prevalence of acute malnutrition, morbidity, and access to primary care	Nigeria – conflict-affected regions	7763 Children ages 0–59 months	Peer reviewed	Manmade

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TABLE 1

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Title	Author	Tools and Methods	Type of Data Collected by Category	Outcome (Use of Data Collected)	Setting (Country – Type of Emergency If Information Available)	Populations Included	Publication Type	Type of disaster
An assessment of antenatal care among Syrian refugees in Lebanon	Benage et al., 2015	Field-based survey, 1-on-1 interviews using a modified Multiple Indicator Cluster Survey 4 (MICS 4, UNICEF)	Maternal and newborn health – gestational age, antenatal care coverage, antenatal care content, antenatal health behaviors, antenatal health literacy, and family planning perception and practices	Describe antenatal care access, the scope of existing antenatal care, and antenatal and family planning behaviors and practice	Lebanon – geographic sites of refugee concentration	420 Pregnant Syrian refugee women	Peer reviewed	Manmade
Birth outcomes in a disaster recovery environment: New Orleans women after Katrina	Harville et al., 2015	The Edinburgh Postnatal Depression Index (EDSI) was used to measure depression; pregnancy-specific anxiety was assessed using the Revised Prenatal Distress Questionnaire	Maternal and newborn health – birthweight, length, head circumference, gestational age, indications of depression, PTSD, and pregnancy-related anxiety	Examine how the recovery following Hurricane Katrina affected pregnancy outcomes	United States – areas affected by hurricane	308 Pregnant women	Peer reviewed	Natural
Community health workers and disasters: lessons learned from the 2015 earthquake in Nepal	Fredricks et al., 2017	Key-informant interviews, FCHV interviews, and focus group discussions (FGDs) using semi-structured guides	Maternal and child health	Document the ways in which FCHVs contributed to the 2015 earthquake relief response	Nepal – post-earthquake	19 Interviews	Peer reviewed	Natural
Comparison of the nutritional status of overseas refugee children with low income children in Washington State	Dawson et al., 2016	Examine of records, anthropometric measurements, and nutritional status at the overseas medical screening prior to resettlement	Infant and child health – anthropometric measurements	Describe the prevalence of wasting, stunting, overweight, and obesity among refugee children and to compare the nutritional status of refugee children with that of low-income children in Washington State	United States	982 Children from Somalia, Iraq, and Burma	Peer reviewed	Manmade
Emotional, physical, and social needs among 0–5-year-old children displaced by the 2010 Chilean earthquake: associated characteristics and exposures	Arbour et al., 2017	Post-disaster, cross-sectional, direct interview-based study, using adapted Child Status Index (Child Well-being Scale in Emergency Situations)	Infant and child health – caregiver stability and protection, health, housing, nutrition, psychosocial situation, and stimulation	Assess the needs of young children living in camps, to explore the degree to which children's needs were associated with baseline characteristics and exposures	Chile – internally displaced people living in camps after the earthquake	140 Displaced 0- to 5-year-old children	Peer reviewed	Natural
Evaluating the micronutrient status of women of child-bearing age living in the rural disaster areas one year after Wenchuan earthquake	Dong et al., 2014	Survey collecting data on concentration of hemoglobin, ferritin, and micronutrients	Maternal and newborn health – concentrations of hemoglobin in whole blood and ferritin and micronutrients in serum assessed	Evaluate the prevalence of anemia and micronutrient status of women of reproductive age in disaster areas	China – post earthquake	58 Pregnant, 66 lactating, and 242 women of childbearing age from 19 to 45 years	Peer reviewed	Natural
Gestational diabetes mellitus prevalence in Maela refugee camp on the Thai-Myanmar border: a clinical report	Gilder et al., 2014	Clinical report using the 75 g, 2-hour glucose tolerance test	Maternal and newborn health	Estimate the prevalence of gestational diabetes mellitus	Thailand–Myanmar border; Maela refugee camp	228 Women	Peer reviewed	Manmade

TABLE 1

Continued

Title	Author	Tools and Methods	Type of Data Collected by Category	Outcome (Use of Data Collected)	Setting (Country – Type of Emergency If Information Available)	Populations Included	Publication Type	Type of disaster
Health service utilization and access to medicines among Syrian refugee children in Jordan	Doocy et al., 2016	Cross-sectional survey using questionnaire developed by consensus between partner agencies	Infant and child health – health service utilization, access to care, barriers to care seeking, children's health and vaccination, and chronic medical conditions	Characterize care-seeking behaviors and health service utilization for child refugees to inform humanitarian programming for non-camp settings	Jordan – refugee camp	1550 Households with 9580 household members of Syrian refugees living outside of camps	Peer reviewed	Manmade
High burden of malaria and anemia among tribal pregnant women in a chronic conflict corridor in India	Correa et al., 2017	Descriptive study of routine program data of women	Maternal and newborn health	Measure the burden of malaria and anemia among pregnant women	India – conflict-affected areas	575 Pregnant women	Peer reviewed	Manmade
High hepatitis B seroprevalence and risk factors for infection in pregnant women on the Thailand-Myanmar border	Banks et al., 2016	Descriptive research regarding counseling and screening for hepatitis B	Maternal and newborn health	Evaluate a new screening program for hepatitis B in pregnant women as a component of antenatal services in a marginalized population	Thailand–Myanmar border	6158 Women	Peer reviewed	Manmade
Humanitarian obstetric care for refugees of the Syrian war. The first 6 months of experience of Gynecologie Sans Frontieres in Zaatari Refugee Camp (Jordan)	Bouchghoul et al., 2015	Prospective observational study of the maternity activity of Gynécologie Sans Frontières	Maternal and newborn health – age, parity, antenatal care, gestational age at delivery, mode of delivery, characteristics of amniotic fluid, type of perineal laceration, birthweight, Apgar score at 5 min, and neonatal morbidity	Describe GSF work, delivery characteristics, and indications for referral	Jordan – refugee camp	All pregnant women among Syrian refugees who came to the unit for delivery	Peer reviewed	Manmade
Immediate effects of the Fukushima nuclear power plant disaster on depressive symptoms among mothers with infants: a prefectural-wide cross-sectional study from the Fukushima Health Management Survey	Goto et al., 2015	Survey using a 2-item screening measure of depression	Maternal and newborn health – depressive symptoms	Estimate the prevalence of depressive symptoms among mothers after nuclear disaster	Japan – post-nuclear disaster	8196 Women	Peer reviewed	Manmade
Immediate needs and concerns among pregnant women during and after Typhoon Haiyan (Yolanda)	Sato et al., 2016	Cross-sectional study using focus group discussions and semi-structured interviews	Maternal and newborn health – ways to deal with health concerns, food availability, forms of avoiding diseases	Determine concerns and problems regarding public health needs and coping mechanisms among pregnant women during and shortly after the typhoon	Philippines – typhoon-affected areas	53 Women from 4 affected communities who were pregnant at the time of the typhoon	Peer reviewed	Manmade
Impact of the Great East Japan Earthquake on feeding methods and newborn growth at 1 month postpartum: results from the Fukushima Health Management Survey	Kyozuka et al., 2016	Population-based study, maternal survey questionnaire, part of the Fukushima Health Management Survey (FHMS)	Infant and child health – newborn and maternal background, feeding methods, newborn growth	Examined the effects of disasters on feeding methods and growth in infants born	Japan - areas affected by earthquake	1706 Newborns	Peer reviewed	Natural

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TABLE 1

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Title	Author	Tools and Methods	Type of Data Collected by Category	Outcome (Use of Data Collected)	Setting (Country – Type of Emergency If Information Available)	Populations Included	Publication Type	Type of disaster
Impact of the Great East Japan Earthquake on regional obstetrical care in Miyagi Prefecture	Sugawara et al., 2016	Surveys on disaster damages of maternity institutions, evacuation status of pregnant women and prehospital childbirths	Maternal and newborn health – gestational age at delivery, birth weight, delivery at unplanned institutions, cancelled childbirth appointments, state of emergency, transport of pregnant women, prehospital childbirth, disaster damages of maternity institutions, stoppage of childbirth services	Assess obstetric emergencies to devise future disaster countermeasures	Japan – tsunami-affected areas	50 Maternity institutions and 12 fire departments	Peer reviewed	Natural
Increasing neonatal mortality among Palestine refugees in the Gaza Strip	Berg et al., 2015	Survey to estimate infant mortality	Infant and child health – infant mortality	Estimate infant mortality in Gaza Strip and compare with previous rates	Gaza Strip	3128 Mothers	Peer reviewed	Manmade
Infant feeding practices in the Saharawi refugee camps Algeria, a cross-sectional study among children from birth to six months of age	Aakre et al., 2016	Cross-sectional study using pre-coded questionnaire	Maternal and newborn health – breastfeeding, feeding practices, and nutrition	Describe breastfeeding and general feeding practices and the nutrition status among children	Algeria – refugee camp	111 Mothers	Peer reviewed	Manmade
Integrating health research into disaster response: the new NIH Disaster Research Response Program	Miller et al., 2016	Description of the development of a new tool	Maternal and newborn health – infant and child health	Describe the development of the New NIH Disaster Research Response Program	NA	NA	Peer reviewed	NA
Losing women along the path to safe motherhood: why is there such a gap between women's use of antenatal care and skilled birth attendance? A mixed methods study in northern Uganda	Anastasi et al., 2015	Quantitative and qualitative methods used included: structured antenatal care client entry and exit interviews; semi-structured interviews and focus group discussions. Based on Uganda Service Provision Assessment Survey and the Safe Motherhood Needs Assessment (WHO)	Maternal and newborn health – antenatal assistance, access to services	Identify factors for the gap between antenatal care attendance health-facility delivery; examine the association between advice during antenatal care to deliver at a health facility and actual place of delivery; investigate whether antenatal care services actively link women to skilled birth attendant services; and make policy recommendations	Uganda – post-conflict	130 Women	Peer reviewed	Manmade
Maternal health care in the time of Ebola: a mixed-method exploration of the impact of the epidemic on delivery services in Monrovia	Gizelis et al., 2017	2 Representative surveys and in-depth semi-structured interviews	Maternal and newborn health	Study the resilience of health systems during crises	Liberia – Ebola crisis	1836 Women	Peer reviewed	Natural

TABLE 1

Continued

Title	Author	Tools and Methods	Type of Data Collected by Category	Outcome (Use of Data Collected)	Setting (Country – Type of Emergency If Information Available)	Populations Included	Publication Type	Type of disaster
Maternal trauma affects prenatal mental health and infant stress regulation among Palestinian dyads	Isosavi et al., 2017	Interviews with mothers using questionnaires	Maternal and newborn health – exposure to current war trauma, physical abuse, prenatal mental health problems, and perceived stress	Examine how diverse and cumulated traumatic experiences predict maternal prenatal mental health and infant stress regulation in war conditions, and whether maternal mental health mediates the association between trauma and infant stress regulation	Gaza Strip	511 Mothers	Peer reviewed	Manmade
Maternal and child health of internally displaced persons in Ukraine: a qualitative study	Nidzvetska et al., 2017	Qualitative study, in-depth and semi-structured interviews via Skype and Viber	Maternal and newborn health – health status of mother and child, vaccination, breastfeeding practices, nutrition, access to health care services in hometowns, registration at health care centers in the place of displacement, quality of health care	Explore perceived health, barriers to access to health care, caring practices, food security, and overall financial situation of mothers and young children displaced by the conflict	Ukraine – internally displaced mothers	15 Internally displaced mothers with children under 2 years old	Peer reviewed	Manmade
Maternal, newborn, and child health after the 2015 Nepal earthquakes: an investigation of the long-term gendered impacts of disasters	Brunson et al., 2017	Qualitative field research using semi-structured interviews	Maternal and child health – access to nutritious foods, shelter, clean water, toilets, pre-natal care, trained birth assistance, post-natal care, infant care, and health care and medicine for children under 5 years	Understand the long-term impacts of disasters in maternal and child health	Nepal - post-earthquake	14 women	Peer reviewed	Natural
Midwives' experiences of caring for pregnant women admitted to Ebola centres in Sierra Leone	Erland et al., 2017	A qualitative interview study with an exploratory and descriptive approach	Maternal and newborn health	Explore and describe midwives' experiences of caring for pregnant women admitted to Ebola centers	Sierra Leone – Ebola outbreak	11 Midwives	Peer reviewed	Natural
Nutritional situation among Syrian refugees hosted in Iraq, Jordan, and Lebanon: cross sectional surveys	Hossain et al., 2016	Representative cross-sectional surveys	Maternal and newborn health – anthropometric indicators, morbidity, hemoglobin concentration, and feeding practice	Assess the health and nutrition of Syrian refugees affected by the conflict	Iraq, Jordan, and Lebanon – refugee camp and host communities	3375 Children and 250 pregnant women	Peer reviewed	Manmade
Nutritional status of women and child refugees from Syria-Jordan, April–May 2014	CDC, 2014	Cross-sectional, population-representative cluster surveys – standard anthropometric procedures, nutritional status based on 2006 WHO growth standards, hemoglobin measured using HemoCue Hb 301, anemia diagnosed according to WHO thresholds	Infant and child health – nutritional status, anthropometric status, hemoglobin levels, diagnosis of anemia	Assessing nutritional status of refugee children and nonpregnant women	Jordan – refugee camp and host community	810 Children ages 6–59 months, 944 nonpregnant women ages 15–49 years	Not peer reviewed	Manmade

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TABLE 1

Continued

Title	Author	Tools and Methods	Type of Data Collected by Category	Outcome (Use of Data Collected)	Setting (Country – Type of Emergency If Information Available)	Populations Included	Publication Type	Type of disaster
Pathways to perinatal depressive symptoms after mass conflict in Timor-Leste: a modelling analysis using cross-sectional data	Silove et al., 2015	Cross-sectional data	Maternal and child health – conflict-related PTEs, IPV, continuing adversity (poverty and insecurity), PTSD symptoms, and maternal depressive symptoms	Develop a theoretical model to examine pathways leading directly and indirectly to depressive symptoms	Timor-Leste – post conflict	427 Women	Peer reviewed	Manmade
Pediatric injury during conflict and prolonged insecurity in Iraq from 2003–2014	Carlson et al., 2016	Cluster randomized, cross-sectional, community-based survey using instrument based on the WHO survey guidelines and other global health survey tools in use, specifically the Surgeons Overseas Assessment of Surgical Need	Infant and childhealth – household characteristics, injury epidemiology, injury location, direct-conflict related injuries, trauma care, morbidity, and mortality	Detail the injury patterns and outcomes among children, care sought, and provided	Iraq – conflict areas	152 Pediatric injuries during the conflict period	Peer reviewed	Manmade
Perinatal health care in a conflict-affected setting: evaluation of health-care services and newborn outcomes at a regional medical centre in Iraq	Ahamadani et al., 2014	Field-based maternal and newborn health care needs assessment using semi-structured key-informant interviews, small-group discussions, and direct observation of maternal and newborn care	Maternal and newborn health – perinatal deaths, number of neonatal deaths, perinatal mortality rate, neonatal mortality rate, and potential risk factors	Evaluate health care services and newborn outcomes to propose improvements	Iraq – conflict areas	24 909 Births	Peer reviewed	Manmade
Peritraumatic distress mediates the effect of severity of disaster exposure on perinatal depression: The Iowa Flood Study	Brock et al., 2015	Study of psychological functioning during pregnancy, using Inventory of Depression and Anxiety Symptoms, the General Depression Scale, the Well-Being Scale, and the Storm32 Questionnaire and Peritraumatic Distress Inventory	Maternal and newborn health – maternal depression and well-being	Examine the impact of the floods on perinatal maternal depression and well-being, and the role of peritraumatic distress as a possible mechanism explaining this link	United States – areas affected by floods	171 Women exposed to flood during pregnancy	Peer reviewed	Natural
Political violence and mental health of Bedouin children in the West Bank, Palestine: a cross-sectional study	Massad et al., 2017	Cross-sectional household survey – mental health status was measured using the Strength and Difficulties Questionnaire	Infant and child health – mental health assessment, exposure to violence, confrontation level Maternal and newborn health – maternal self-rated mental health	Describe mental health of children and maternal health to assess the need psychosocial intervention	Palestine	455 Refugee children	Peer reviewed	Manmade
Predictors of violence against children in Tamil families in northern Sri Lanka	Sriskandarajah et al., 2015	Cross-sectional survey using the Conflict Tactics Scales, Composite Abuse Scale, Posttraumatic Diagnostic Scale, Alcohol Use Disorder Identification Test, Strengths and Difficulties Questionnaire, and other adapted questionnaires	Infant and child health – exposure to family violence and victimization, emotional, and behavioral problemsMaternal and newborn health – IPV, partner violence, PTSD, and alcohol dependence	Identify the variables associated with child victimization by parental violence and parental perpetration of violence against children	Sri Lanka – post conflict/tsunami	59 Children, 122 mothers, and 88 fathers	Peer reviewed	Manmade

TABLE 1

Continued

Title	Author	Tools and Methods	Type of Data Collected by Category	Outcome (Use of Data Collected)	Setting (Country – Type of Emergency If Information Available)	Populations Included	Publication Type	Type of disaster
Prevalence and associated factors influencing stunting in children aged 2–5 years in the Gaza Strip–Palestine: a cross-sectional study	El Kishawi et al., 2018	Cross-sectional study, structured questionnaire, interviews, anthropometric measurements, and maternal height	Infant and child health, structured questionnaire, interviews, anthropometric measurements, and maternal height	Prevalence and associated factors with stunting	Gaza Strip – refugee camp, urban area, and rural area	57 Children ages 2–5 years and their mothers ages 18–50 years	Peer reviewed	Manmade
Prevalence, severity, and determinant factors of anemia among pregnant women in South Sudanese refugees, Pugnido, Western Ethiopia	Alemayehu et al., 2016	Questionnaire-based interview, complete blood count, blood smear, and fecal analysis	Maternal and newborn health	Determine the prevalence, severity, and determinants of anemia among pregnant women	Ethiopia – refugee center	360 Pregnant women	Peer reviewed	Manmade
Quality of intrapartum care by skilled birth attendants in a refugee clinic on the Thai-Myanmar border: a survey using WHO Safe Motherhood Needs Assessment	Hoogenboom et al., 2015	WHO Safe Motherhood Needs Assessment tool to assess the facility, interview SBAs, collect data from maternal records and observation of practice during labor and childbirth	Maternal and newborn health	Describe the quality of intrapartum care provided by SBAs	Thai-Myanmar border	200 Pregnant women	Peer reviewed	Manmade
Relationship between implementing interpersonal communication and mass education campaigns in emergency settings and use of reproductive healthcare services: evidence from Darfur, Sudan	Adam et al., 2015	Cross-sectional surveys, structured interviews using questionnaire developed based on the Reproductive Health Response in Conflict, the Health Needs Assessment instrument of the Reproductive Health Response in Conflict Consortium and the Field Tools and Monitoring and Evaluation Toolkit	Maternal and newborn health – women's awareness of the existence of ANC and TT vaccination services, use of reproductive health care services, number of ANC visits, TT vaccine doses and number of PNC visits during the first week after delivery; pregnancy history, experience of abortion, bleeding during the last pregnancy, and fever or excessive vomiting during last pregnancy	Examine changes in women's awareness and utilization of reproductive health care services in emergency settings following provision of IPV and mass education campaigns, and describe factors associated with reproductive health care service use in IDP camps	Sudan – camps for internally displaced persons	640 Women ages 15-49 years	Peer reviewed	Manmade
Relationships among stress coping styles and pregnancy complications among women exposed to Hurricane Katrina	Oni et al., 2015	Cross-sectional prospective study – interviews using the Brief COPE, the Hurricane Experience Scale, the 10-Item Cohen Perceived Stress Scale (PSS), and review of medical charts	Maternal and newborn health – stress-coping styles, substance use, access to care, and psychosocial risk assessment	Examine the relationship between maternal stress exposure, stress coping styles, and pregnancy complications	United States – areas affected by hurricane	146 Women who were pregnant during or immediately after hurricane	Peer reviewed	Natural

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TABLE 1

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Rural women's experience of living and giving birth in relief camps in Pakistan	Maheen et al., 2017	Group-based discussion, in-depth interviews	Maternal and newborn health – women's social and demographic characteristics, pre-floods maternity care practices, risk perceptions and migration decisions during floods, antenatal and postnatal care, birthing experiences, and social support during the floods	Explore women's experiences of pregnancy and giving birth in natural disaster settings, the challenges they faced, and strategies employed to cope with them	Pakistan – rural villages affected by floods	15 Women who gave birth during the floods	Peer reviewed	Natural
Somalia nutrition analysis. Post Deyr 2014/15	Food and Agriculture Organization of the United Nations	Anthropometric and retrospective mortality surveys	Infant and child health – nutritional status of children, mortality rates	Assess the prevalence of acute malnutrition amongst children, the crude mortality rate, and under age 5 mortality rate	Somalia – 790 households across most regions and livelihood zones	28 996 Children	Not peer reviewed (Technical Series Report)	Manmade
Surgery for children in low-income countries affected by humanitarian emergencies from 2008 to 2014: The Médecins Sans Frontières Operations Centre Brussels experience	Flynn et al., 2016	Review of patient surgical record	Infant and child health – patient demographics and clinical data	Describe pediatric surgical care to inform resource allocation and define the pediatric-specific skill set necessary for humanitarian surgical teams	Low-income countries affected by humanitarian emergencies	24 576 Children	Peer reviewed	NA
The effect of gender norms on the association between violence and hope among girls in the Democratic Republic of the Congo	Stark et al., 2017	Secondary analysis of cross-sectional data using confidential survey, Computer-Assisted Personal Interview, and Audio Computer-Assisted Self-Interview programming	Infant and child health – Children's Hope Scale score and exposure to physical, emotional, and sexual violence within the last 12 months	Assess attitudes toward traditional gender norms as an effect modifier of the relationship between violence exposure and future orientation in displaced girls	Democratic Republic of the Congo	869 Girls	Peer reviewed	Manmade
The effects of maternal stress and illness during pregnancy on infant temperament: Project Ice Storm	Laplante et al., 2016	The Infant Characteristics Questionnaire 32, French version 35 of Impact of Event Scale – Revised, anxiety subscale on a validated French version 35 of the General Health Questionnaire-28, Life Experiences Survey, 10-Item Edinburgh Postpartum Depression Scale, adaptation of the scale used by Kinney for obstetric complications and hospital records	Maternal and newborn health – distress, maternal illness/ infection, maternal anxiety, maternal life events, postpartum depression, obstetric complications Infant and child health – infant temperament	Determine whether disaster-related prenatal maternal stress and maternal illness during pregnancy predict maternal-rated temperament status	Canada – area affected by ice storm	121 Infants	Peer reviewed	Natural

TABLE 1

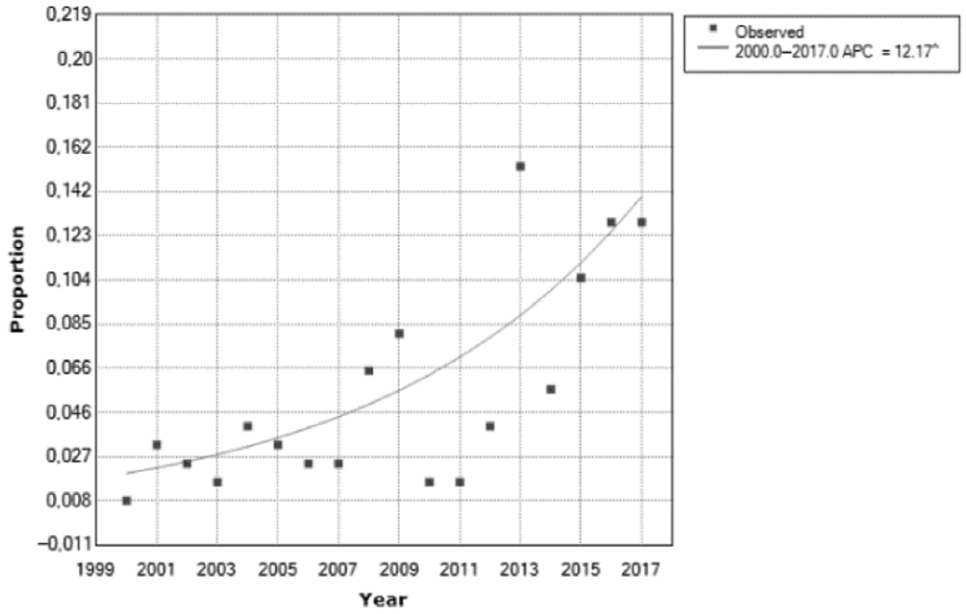
Continued

Title	Author	Tools and Methods	Type of Data Collected by Category	Outcome (Use of Data Collected)	Setting (Country – Type of Emergency If Information Available)	Populations Included	Publication Type	Type of disaster
The impact of six years of war on the mental health of Syria's children	Save the Children, 2017	Individual questionnaires based on the Inter-Agency Standing Committee guidelines and standard format for Mental Health and Psychosocial Support assessments, focus groups, and in-depth interviews	Infant and child health – self-harm and suicide attempts, emotional distress, toxic stress	Study children's mental health and well-being inside Syria during the conflict	Syria – conflict-affected areas	458 Children, adolescents, and adults	Peer reviewed	Manmade
The influence of maternal health education on the place of delivery in conflict settings of Darfur, Sudan	Adam et al., 2015	Cross-sectional study, interviewer-administered questionnaire tools were selected and adapted from the Reproductive Health Response in Conflict, Consortium's Health Needs Assessment, Field Tools and the Monitoring and Evaluation Toolkit	Maternal and newborn health – place of delivery, maternal health education	Determine the association between the place of delivery and home visits for maternal health education and the socio-demographic characteristics of women who gave birth during the last 2 years	Sudan – camps for internally displaced persons	640 Women	Peer reviewed	Manmade
The use of a lot quality assurance sampling methodology to assess and manage primary health interventions in conflict-affected West Darfur, Sudan	Pham et al., 2016	Secondary data analysis of information and interviews	Maternal and newborn health	Assess if Lot quality assurance sampling is a suitable method of assessing programs in disaster areas	Sudan – conflict-affected areas	1323 Women	Peer reviewed	Manmade
Validation of the Edinburgh Postnatal Depression Scale (EPDS) on the Thai-Myanmar border	Ing et al., 2017	Cross-sectional study applying the EPDS	Maternal and newborn health – postpartum depression	Assess the validity and acceptability of the EPDS	Thai-Myanmar border	70 Women	Peer reviewed	Manmade
War experiences, general functioning and barriers to care among former child soldiers in Northern Uganda: the WAYS Study	Amone et al., 2014	Longitudinal study using adapted War Trauma Screening Scale and other questionnaires	Infant and child health – mental rehabilitation, general functioning	Assess whether different categories of war experiences predict functioning and perceived need for, sources of, and barriers to mental health services	Uganda – post-conflict	539 Former child soldiers	Peer reviewed	Manmade

ANC = antenatal care; COPE = Coping Orientation to Problems Experienced; FCHV = female community health volunteers; GSF = Gynecologie Sans Frontieres; IDP = internally displaced person; IPV = intimate partner violence; KI = key-informant; NA = not applicable; PTE = potentially traumatic events; SBA = skilled birth attendants; TT = tetanus toxoid.

FIGURE 2

Distribution of natural disasters studies by country.



^ Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 0 Joinpoints.

studies that met the inclusion criteria and were retained were in English.

There was a mean of 5 studies published that used tools for the collection of data on maternal and child health in humanitarian settings per year during the period of January 2000 to July 2014. In the period of August 2014 to December 2017, the mean was of 15 studies per year. The trend analysis showed a significant 12% annual increase in the number of publications during the full period of 2000 to 2017 (Figure 2).

The previous review included 100 studies; however, 28 of them were not included in our analysis because they assessed only sexual and reproductive health. Among the total 125 studies on maternal, newborn, and child health (72 included in the previous review and 53 included in this one), 91 (73%) were related to manmade disasters, including armed conflicts, terrorist attacks, and nuclear accidents, whereas 33 (27%) were carried out following natural disasters or disease outbreaks, such as drought, earthquakes, floods, hurricanes, tsunami, ice storm, and Ebola outbreak. There was no difference in the proportion of the type of study between the 2 periods (74% manmade and 26% natural disaster in 2000–2014; and 73% manmade and 27% natural disaster in 2014–2017). That is, the nature of the emergency investigated remained similar through the years, with about 3 times more studies related to manmade disasters than to natural ones.

Table 1 and Figures 3 and 4 show the distribution of humanitarian emergency studies by country and type of emergency. Of the total 125 studies, only 2 (1.6%) were carried out in South America: 1 in Chile as a follow-up of the 2010 earthquake[11] and the other in Colombia regarding armed conflict and forced displacement settings.[12] Almost half (61/125) of the included studies were in Africa mostly on manmade disasters, and all referred to armed conflicts. Forty-three (34%) studies were in Asia and 10 (8%) in North America, mostly on natural disasters (9/10). The Democratic Republic of Congo was the single country with most studies regarding manmade disasters, a total of 11, whereas the United States was the country with the most reported studies on natural disasters, a total of 8 studies.

Similar to the findings from the previous review, studies that collected data during the disaster preparedness phase were not identified and were identified in the recovery phase only. Also, like the previous review, studies that had the primary aim of collecting data to support a funding request were not found. Table 2 shows that a variety of indicators were used in the collection of data in the included studies. Some used standardized toolkits for the monitoring and assessment of

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FIGURE 3

Distribution of natural disasters studies by country.

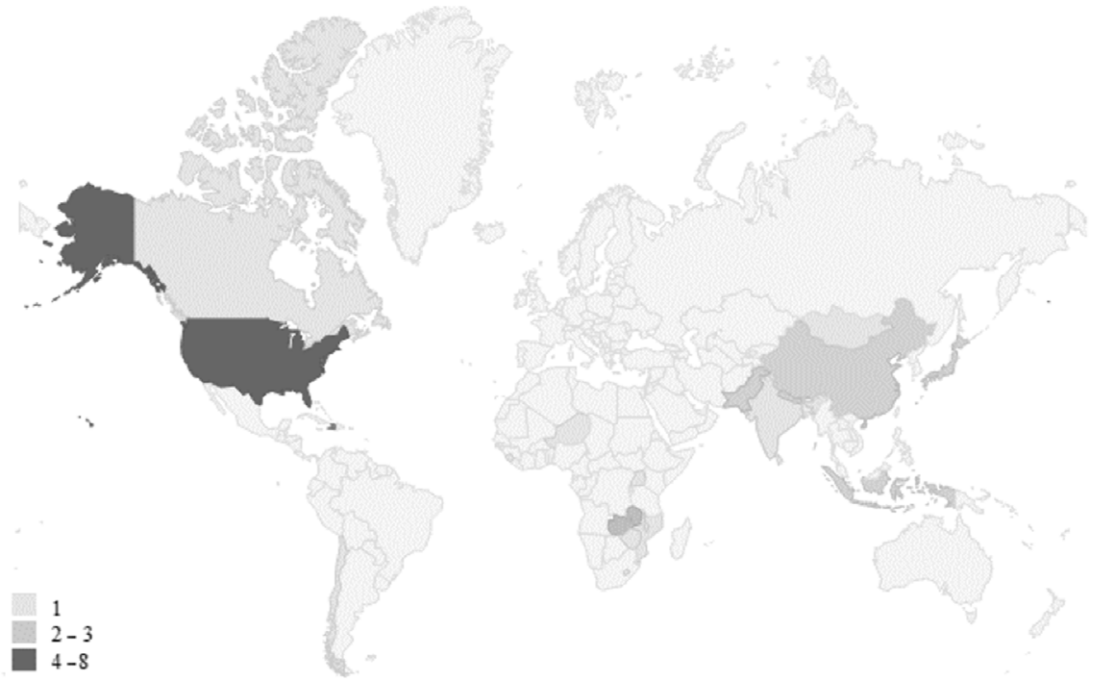

FIGURE 4

Distribution of natural disasters studies by country.

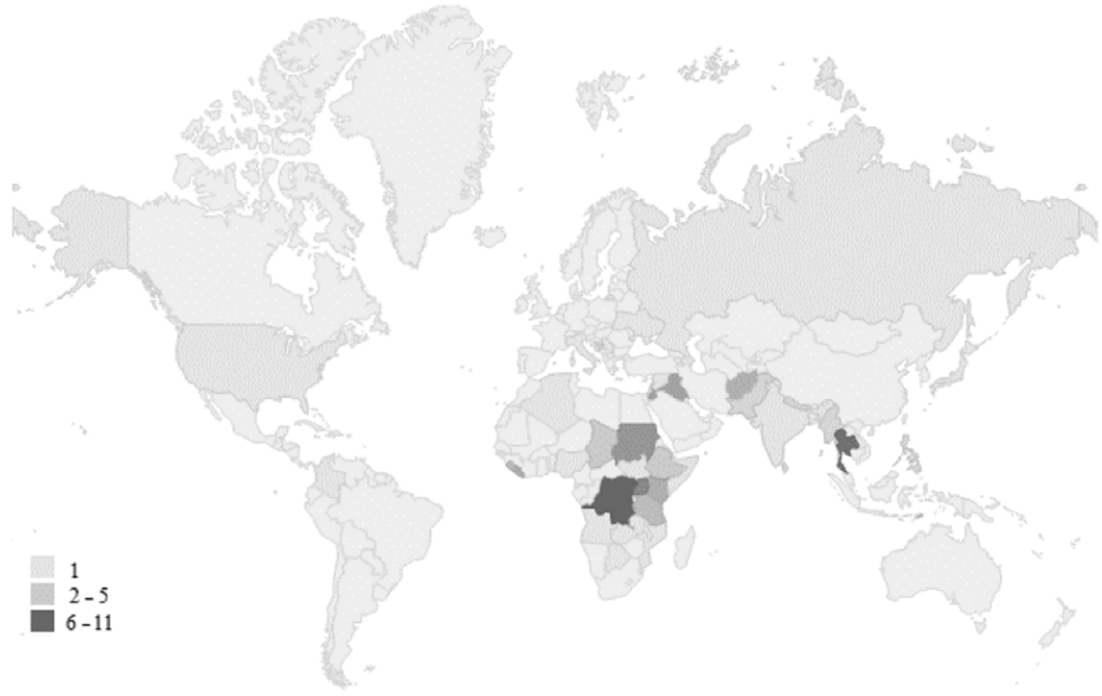

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TABLE 2

Data Collection Tools Used and Type of Data Collected for Maternal and Child Health During Humanitarian Emergencies

Category	Type of Data/Indicators Collected	Tool Application Described in the Literature
Maternal and Newborn Health		
Emergency obstetric care[13]	Number of deliveries at health facilities, caesarean section rate, induction of labor, obstetric complications managed, place of delivery, maternal deaths, and prehospital childbirths	No description of specific tools used
Newborn health[13–21]	Apgar score, birthweight, birth length, mean gestational age at birth, preterm labor, congenital malformations, maternal mortality, thoracic circumference, and head circumference at birth	No description of specific tools used
General maternal and newborn health[49,13–20,22–47]	Hypertensive disorders of pregnancy, reception of ANC and TT vaccination, use of postnatal care, perinatal maternal depression and well-being, miscarriage, transport of pregnant women, antenatal services, antenatal care quality, prevalence of gestational diabetes mellitus, malaria, anemia and screening for hepatitis B in pregnant women, delivery characteristics, indications for referral of pregnant, spontaneous vaginal deliveries, postpartum hemorrhage, hemoglobin, iron status, zinc, retinol, β-carotene, tryptophan, delivery history, maternal vital signs, labor pattern, fetal response, complications during pregnancy and labor, perinatal and neonatal mortality, intestinal parasitic infection in pregnant women	The standardized WHO Safe Motherhood Needs Assessment tool was adapted to the setting
Infant and Child Health		
Nutrition[10,11,18,48–50]	Malnutrition, weight, height/length measurements, prevalence of anemia and micronutrient status, breastfeeding, infant feeding practices, presence of edema, food assistance, and food security	Surveys were conducted using standardized monitoring and assessment of relief and transitions (SMART) methodology
Injuries[51]	Operative indication, procedure performed, perioperative death, injury, disease, surgery performed, epidemiology, and impact of injuries in children	No description of specific tools used
Miscellaneous[4,10,11,16,18,19,36–38,44,48,50–61]	Immunization coverage for diphtheria, pertussis, tetanus, measles, hepatitis B, neonatal tetanus protection, skilled attendant at delivery, child mental health symptoms, infant mortality, child mortality, access to health services, psychosocial situation, appropriate treatment setting for mental health care, posttraumatic stress symptoms, abuse and resilience, and receipt of essential public health services	Surveys were conducted using standardized monitoring and assessment of relief and transitions (SMART) methodology; United Nations Children's Fund's (UNICEF) Multiple Indicator Cluster Survey 4 (MICS4) questionnaire were adapted for assessment

ANC = antenatal care; TT = tetanus toxoid.

the situation; however, these tools were not necessarily specific to humanitarian emergencies.

In this updated review, 45 studies focused on the health status of the affected population, and 8 examined the availability and coverage of health services before, during, or after the emergency. Forty-two studies collected data for monitoring and evaluation, 5 were operational research, and 6 studies collected data for needs assessment. One study described a program to create new tools, protocols, networks of researchers, training exercises, and outreach involving diverse groups of stakeholders to help overcome the challenges of disaster research.[4]

Data Collection Tools

The previous review identified 17 data collection tools. Since then, 5 new tools were found, most of which consisted of questionnaires.[62-65] Four of the 5 new tools were identified through a search of organization websites; the fifth tool was used in 1 of the studies included in the review. One of the tools, which aimed to collect data on children's well-being,

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used a qualitative approach[66] based on guided focus group discussions and interviews. One other tool was specific for post-disaster morbidity of pregnant women,[64] 1 assessed both newborn and maternal health,[62] and 1 other focused on child health.[66] Two tools[63,65] were specific for the evaluation of the nutritional status of children during emergencies, including an easy-to-use compilation of tools to measure the nutritional needs during emergencies, at the onset of a crisis or during protracted crisis.[65] The only tool that focused on child health was in Spanish and was developed before 2014 but had not been included in the previous review. This tool, the Escala de Bienestar Infantil en Situación de Emergencia (Scale of Child Well-being in Emergency Situation),[66] was adapted from the Child Status Index[67] for use in Chile in areas affected by the earthquake in 2010.[11] In the previous review, no specific tool for children was identified, but rather 4 toolkits had questionnaires that included the collection of some data on child health data. Similar to what was found in the previous review, there was no specific tool identified for newborn health. For this group, data were collected together with those for maternal health.

Our review also identified documents that can be valuable for the development of a standardized data collection tool to be used in humanitarian emergencies,[68,69] because these instruments list essential indicators for women's health during emergencies. However, only 1[11] of the 53 newly identified studies reported the use of any of the 22 tools found in both reviews. Some studies based their research on the WHO Safe Motherhood Needs Assessment, the Countdown to 2015 indicators, the Surgeons OverSeas Assessment of Surgical Need, the Health Needs Assessment instrument, and the Field Tools and Monitoring and Evaluation Toolkit of the Reproductive Health Response in Conflict Consortium and the Inter-Agency Standing Committee guidelines. Table 3 describes the type of data collected, the approach, and methods of each tool.

DISCUSSION

This review, together with the previous one, provides the current panorama of the existing tools for data collection in humanitarian settings, as well as the published experience of the use of these tools, regarding maternal and child health. Only tools that were specific to data collection in humanitarian emergencies were included; therefore, all tools that are used in these settings may not have been included. Although most of the tools identified had been reported to have some use in the field during humanitarian emergencies, only 1 of the 53 studies included in our review actually used 1 of the tools identified in our search. Thus, there is still the need to advocate for the harmonization, standardization, and use of existing tools, taking into consideration cultural alignments that may be necessary. Tools that might be useful in this harmonization process were identified, such as the Health Indicators for Disaster-Affected Pregnant Women, Postpartum Women, and Infants[68] and the Guideline for Timed and Targeted Counselling (TTC) Data Collection and Reporting.[69] These documents represent an advance in an agreed core set of indicators for maternal and child health. However, a similar core set of indicators for newborn health is still needed. A tool specific for newborn health would be of great importance because this population is especially vulnerable during emergencies.[70] The Newborn Health in Humanitarian Settings Field Guide[71] could be useful in the development of such a tool, because it provides a series of important indicators on newborn health in humanitarian settings.

The majority of the newly identified studies (42/53) were used to monitor and evaluate ongoing interventions in humanitarian settings. Forty-five (85%) of them focused on the evaluation of health status. The increase in mass emergencies in recent years has highlighted the importance of rapid assessment of health needs for a better allocation of resources and relief management. As a result, the development of techniques for the rapid assessment of health needs has been identified as a priority for effective emergency action.[72] Despite previous recognition of the need for data collection on disaster preparedness or disaster response,[5] no tools or studies on the subject were identified. So, the need to adapt or develop such a tool for this specific phase remains. The Rapid Health Assessment of Refugee or Displaced Populations[73] provides adequate methods for carrying out rapid health assessments and support in the analysis and interpretation of the results.

In this review, only 1 of the 53 included studies used any of the specific tools for data collection. In the previous review, among the 72 included studies, only 12 specified the use of any of the 17 identified tools. Authors may not be aware of the availability of such tools and of the importance of documenting their data using the same methods as other researchers. Also, tools may not be suitable for use in humanitarian settings or may not include the specific domains of the authors' interests.

A recent study showed that practical information relating to data collection obtained directly from experienced researchers and field workers gave important perspectives regarding the methodology used to obtain information; the importance of language in the development and use of data collection tools; the variety of and need for adaptation of existing data collection tools; and the capacity of staff for data collection in emergency and humanitarian settings.[74] As advocated in the previous review, to spread the use of these tools among researchers, educational programs or trainings should include the use of these toolkits.

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TABLE 3

Summary of Data Collection Tools for Maternal and Child Health, Approaches, and Methods of Data Collection in Humanitarian Emergencies

Existing Tools for Data Collection Identified From the Literature Review	Type of Data That Can Be Collected		Suitable in Acute Phase of Emergency	Field Application Reported	Approach	Methods	Data Sources
	Maternal and Newborn Health	Infant and Child Health					
Reproductive Health Assessment Questionnaire Pregnant and postpartum women[62]	Yes				Quantitative	Questionnaires to assess pregnant and postpartum women's health	Affected population
CMAM Toolkit: Rapid start-up resources for emergency nutrition personnel[65]	Yes				Quantitative	Guidance and tools for anthropometrics, rapid nutrition assessments, key forms, formats and templates for admissions, registrations, follow-up, child/mother assessments and reports	Affected population
Collecting Supplemental Information on Pregnant Women When Conducting Post-Disaster Morbidity Surveillance[64]	Yes				Quantitative	Questionnaire and forms to assess pregnant women's health	Affected population
Rapid SMART surveys for Emergencies[63]		Yes	Yes	Yes	Quantitative	Forms and graphics for anthropometric data	Affected population
Escala de Bienestar Infantil en Situación de Emergencia [Scale of Infant Well-being in Emergency Situation][66]		Yes		Yes	Mixed methods	Interview with caretakers	Affected population

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CONCLUSIONS

Since the publication of the previous review, very little has been done in terms of the recommendation to evaluate, standardize, and harmonize existing tools. On the contrary, 4 additional tools, newly developed during the last 3 and a half years, were identified. Therefore, the need to advocate remains for the harmonization of existing tools for data collection, for the use of such harmonized tools in studies in the field, and for the alignment of such tools for different types of culture, languages, and populations.

Studies in the field should contain a description of their experience in the use of the chosen data collection tool, its applicability, and the cultural adaptations required. The development of new, easy-to-use, and standardized tools and the adaptation of the existing ones should be done with all key workers in the area, because sharing and comparing information allows a clearer and more consistent picture to emerge, and could be coordinated by WHO.

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Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Disclaimer

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