An analytic perspective of a mixed methods study during humanitarian crises in South Sudan: translating facility- and community-based newborn guidelines into practice

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Abstract

Background: In South Sudan, civil war worsened in 2016 leading to massive displacement in Juba that rapidly spread to other regions of the country. Access to health care is sparse due to attacks on health facilities and workers; pregnant women and newborns are amongst the most vulnerable in this context. The feasibility of implementing a new package of community- and facility-based newborn health interventions was assessed in displaced person camps during periods of sudden violence from 2016 to 2017. The case study aimed to understand implementation research outcomes such as acceptability, adoption, and other factors influencing implementation.

Discussion: Countries with the highest neonatal mortality have recently experienced humanitarian emergencies and the translation of newborn guidelines into public health practice, particularly during periods of on-going violence, are not well understood or operationalized in these contexts. Unique challenges to conducting research in South Sudan included violent attacks against health facilities and workers that required implementing partners to modify modes of service delivery on an ongoing basis to ensure staff and patient safety. South Sudan faced devastating outbreaks such as a cholera and measles that shifted response priorities and then a new wave of displacement due to conflict resulted in staff relocation. Costs associated with transporting study staff and equipment kept rising due to hyperinflation, and study co-investigators were unable to return to South Sudan for some months following the July 2016 violence to conduct refresher trainings or monitor data collection. Strategies used to address these challenges were: collaborating with diverse partners to identify creative solutions; hiring locally-based research staff; maintaining flexible budgets and timelines; using mobile data collection to conduct timely data entry and remote quality checks; and utilizing a cascade training approach to train field researchers.

Conclusions: The study provides lessons that are applicable to similar humanitarian settings, including the need for adaptable research methods, flexible budgets, innovative training, remote supervision, local researchers, and careful consideration of sociopolitical factors that impact access and safety of research staff. Engagement of community stakeholders can ensure data collection and interventions continue and findings translate to public health action, even in contexts facing extreme and unpredictable insecurity.

Background

Humanitarian Context

After gaining independence in 2011, South Sudan enjoyed relative peace and progress until December 2013 when internal conflict arose between the government and the opposition. This worsened in 2016 leading to massive displacement of the population in Juba and rapidly spread to other regions of the country particularly the Upper Nile and areas with relative peace and stability.(1) Fragmentation of political groups and longstanding intercommunal cattle raiding further intensified and increased the number of internally displaced persons (IDP) seeking refuge in United Nations (UN) protection of civilian

(POC) camps.(2) By the end of 2017, an unprecedented number of 1.9 million people were estimated to be internally displaced in a country of about 10.8 million people.(3, 4) In Juba and Malakal, the UN POC camps predominately housed displaced women and children who are from the Nuer and Shilluk tribes(1). In addition, there were over 260,000 refugees from Sudan primarily residing in Upper Nile.(5) Decades of conflict, widespread insecurity, mass migration, and lack of public funding disrupted the fragile health system in South Sudan, leaving behind long-term impacts on public health. The country continues to face a neonatal morality rate (NMR) one of the highest in Africa of 39 per 1000 live births and stillbirth rate of 30 per 1000 total births.(6–8)

Research Study

A study from 2016 to 2017 was undertaken in four displaced person camps located in Upper Nile State (Maban and Malakal Counties) and Juba Central Equatoria State to assess the implementation of a newly developed package of evidence-based newborn health interventions for humanitarian settings at the community and facility levels during a protracted humanitarian crisis.(9–11) We aimed to address outcomes of implementation research, specifically to (1) examine change in knowledge and attitudes among community- and facility-based health workers toward uptake of newborn health interventions (i.e. acceptability), (2) describe change in correct and timely newborn care practices during childbirth and the immediate postnatal period (i.e. adoption), and (3) explore health system-related factors that influence implementation. To address the first two aims, we employed a quasi-experimental pre-post design using clinical observations of delivery and postnatal care practices, structured exit interviews with recently delivered women, and semi-structured interviews with health workers (see Table 1). To explore factors influencing implementation, we employed a mixed methods case study design using in-depth interviews, focus group discussions, health facility checklists, and health worker time-use observations at multiple time points during implementation.

Table 1
Study data collection methods and sample size, April 2016—January 2017

Data collection phase	Methods	Sample Size
Phase 1: Baseline	Health facility assessment	5 health facilities
April – June 2016	Time use observation	1163 observations
	Clinical observation and exit interview	Hospital: 159 mother-newborn pairs PHCC: 201 mother-newborn pairs
	In-depth interview	17 health workers
	Self-administered knowledge questionnaire	127 health workers
Phase 2: Midline	Health facility assessment	5 health facilities
July – November 2016	In-depth interview	16 health workers 7 program managers
	Focus group discussion	12 facility health worker groups 8 community health worker groups
	Supply consumption	5 health facilities 3 community health program sites
Phase 3: Endline	Health facility assessment	5 health facilities
November 2016 – January 2017	Time use observation	565 observations
	Clinical observation and exit interview	Hospital: 106 mother-newborn pairs PHCC: 127 mother-newborn pairs
	In-depth interview	10 health workers 4 program managers
	Focus group discussion	3 facility health worker groups 2 community health worker groups

Of the four displaced person camps, two were refugee camps in Maban County (Gendrassa and Kaya) and two were internally displaced persons (IDP) camps in Malakal County (Malakal POC) and Juba

County (Juba POC), with populations ranging from 17,000 to 40,000 displaced persons.(3, 5) In June 2016, International Medical Corps (IMC), an international humanitarian organization, implemented the study intervention in the camps, including: clinical training and ongoing supportive supervision for community and facility-based health workers; distribution of newborn medical commodities at the community, primary care, and hospital levels; and a strategic planning workshop for senior managers to prioritize programmatic considerations. Facility-based newborn interventions were implemented in maternity wards of primary care facilities in each of the four camps and one hospital in Juba POC, and community-based interventions were integrated within community health programs in all participating camps.

The study sites were prone to sudden conflict and attack because of the political and socioeconomic circumstances in and around the camps. A month prior to the baseline study, a violent attack on Malakal POC led to the death of civilians and health workers and the burning down of a study health facility.(12) During study implementation, a maternity ward in the Juba POC was shelled during the July 2016 crisis, and tensions between refugee and host populations in Maban led to fighting and displacement during the study endline period.(13) Humanitarian agencies, including IMC, were forced to frequently suspend operations and evacuate non-local staff. The ongoing crisis introduced unanticipated events that co-occurred with the study intervention; thus, the quasi-experimental study design became susceptible to threats to internal validity. We shifted the design to a descriptive study to understand the frequency and determinants of knowledge, attitudes, and practices for newborn care; outcomes consistent with implementation science.(14)

We found that acceptability and adoption of newborn health interventions was high following a two-day simulation training and distribution of supplies among community- and facility-based health workers. Knowledge of newborn danger signs and the benefits of practices such as skin-to-skin contact and early breastfeeding initiation improved among health workers.(10) Improvements in knowledge, however, did not lead to adoption of interventions at the community level. Postnatal home visits in the first week of life, while new and acceptable to community health workers (CHWs), were not sustained during periods of mass displacement because of the inability to locate households and limited staff available to manage competing priorities.(11) At the facility level, partograph use for fetal monitoring, skin-to-skin contact, and postnatal monitoring of danger signs were the least commonly used practices at baseline, highlighting gaps in care for small and sick newborns.(9) Despite this, essential newborn practices such as thermal care (immediate drying and wrapping), infection prevention, and feeding support were high following the intervention (ranging from 79.7% to 83.2%). Addressing certain health system bottlenecks influenced implementation, particularly: (1) leadership and governance to support comprehensive services, (2) health workforce for skilled care at birth, and (3) service delivery for small and sick newborns.(11)

Discussion

Scientific Importance of Research

Progress in reducing neonatal mortality is lagging behind improvements made in child survival, after the first month of life, and South Sudan continues to have the highest NMR in sub-Saharan Africa.(15) Despite this, there are evidence-based guidelines describing the most effective interventions to prevent and manage the main causes of newborn death.(16) However, countries with the highest NMR globally have recently experienced humanitarian emergencies and the translation of newborn guidelines into public health practice, particularly during periods of on-going violence, are not well understood or operationalized in these contexts.(17) The findings of this research have been used beyond crisis settings to inform methodologies for measuring newborn care signal functions in other low resource settings as well as a list of newborn medical supplies for community- and facility-based care.(18, 19) During the inception phase, study co-investigators drafted a dissemination plan to ensure findings were actively shared with partners in South Sudan and the global community. Prior to the study and following completion, the team held workshops in Juba with field partners and the South Sudan Reproductive Health Technical Working Group to encourage collaboration and greater uptake of findings for broader use. IMC program managers in Juba, Malakal, and Maban also received biweekly updates including medicine stock outs from research assistants based in each site. At the global level, learnings were shared using the following methods: a Newborn Health in Emergencies webpage hosted by Save the Children,(20) blogs disseminated through the Healthy Newborn Network, (20–22) a correspondence published in The Lancet,(23) a public webinar as part of Save the Children's Health and Nutrition Series, (24) poster and oral presentations at several international conferences, and research articles in peer-reviewed journals(9–11). The study led to the first national workshop on newborn health in South Sudan, co-hosted by the Ministry of Health and UNICEF, which set the stage for drafting an Every Newborn Action Plan (ENAP) for the country. South Sudan's ENAP has recently led to the development of a newborn service package under the main health funding mechanisms in the country, and the National Community Health Strategy has also been revised to incorporate community-based newborn interventions. Several programmatic changes were made at the global level using findings from the study such as development of the first newborn care supply kit and finalization of the Newborn Health Humanitarian Settings Field Guide including an implementation toolkit and in the development of a global roadmap to accelerate newborn health program scale-up in humanitarian settings. (19, 25, 26)

Strategies to Address Research Challenges

Methodological Issues

Study sites frequently experienced periods of conflict and insecurity, which posed several challenges concerning research methodology including staff capacity and ethics. In the design phase, facility-based newborn care practices were intended to be compared pre- and post-intervention using a quasi-experimental design. However, attacks against health facilities and workers required IMC to modify service delivery on an ongoing basis to ensure staff and patient safety. Maternity wards were also moved to alternative locations until destroyed facilities were rebuilt, and newborn supplies were shifted for other purposes. High health worker turnover left a limited number of clinicians at study facilities who were exposed to the study intervention, hence the move towards a descriptive study.

While insecurity in South Sudan presented many sudden challenges, study co-investigators represented a diverse group of agencies, including non-governmental organizations (NGO), Ministry of Health, and academia, that offered creative strategies for adapting research methods in the constantly changing environment. Research partnerships with NGOs and UN agencies such as IMC, Save the Children, UNHCR, and UNICEF, who had experience adapting services during acute conflict, were vital for understanding how to adapt similar methods to sustain operations during these periods. For instance, clinical observations for measuring newborn care practices in prior studies were conducted by research assistants with a clinical background such as nursing or midwifery, but this was not an option in a country facing extreme health workforce shortages. Instead, we worked closely with the NGOs to identify strong candidates from the community and we designed a data collection training, including tools and equipment for illiterate health workers, to meet their varying educational levels. The training was enthusiastically accepted, and addressed human subjects research and basic introductions to clinical practices that would be observed by researcher assistants such as partograph use, resuscitation, essential newborn care, and kangaroo mother care. This required allocating additional funds to extend the data collection training from an 8 to a 15-day period.

High Staff Turnover

As ethnic tensions and insecurity rose, more than half of facility-based health workers who received the study intervention left their position. This included restricting movement of non-local staff in the evening hours and temporarily staffing maternity wards with traditional birth attendants (TBA). Study partners worked closely with the donor to allocate additional funds for a second round of training among newly hired health workers. The study team also partnered with another UN agency, UNHCR, to integrate the second training within upcoming plans to expand maternal and newborn care in Maban. When TBAs were hired to conduct deliveries in study facilities in Maban and Malakal due to trained midwives fleeing the violence, the study team needed to carefully consider the expansion of the health worker training to include TBAs. This was critical for understanding the feasibility of implementing newborn care in contexts that are most representative of conflict-affected settings. Investing in hiring community members as research staff also allowed the study to continue data collection during periods of insecurity since staff resided in the camps. There was also limited turnover of research staff, which improved consistency in the application of data collection methods.

Ethical and Safety Concerns

Study operations were designed to have a supervisor and four or five research assistants per site, and a research coordinator in Juba. During times of episodic violence, the safety of local researchers was the primary concern of the study team and implementing partners. Frequent discussions about staff safety included what is the degree of additional risk, if any, and how risks could be minimized. To address potential ethical and safety concerns, we recruited research staff who were either from the community or lived in the camp. This meant hiring staff who represented diverse ethnicities in South Sudan such as Shilluk, Dinka, and Nuer people. Given the insecurity following the July 2016 crisis and armed groups targeted civilians based on ethnic lines, bringing research staff to Juba or outside of the camps for joint

data collection trainings put them at risk of violence. Throughout the study, the research team worked closely with the security officers at partnering NGOs to anticipate how and when research staff could access the sites. This included adopting communication and transportation protocols used by NGO program staff to ensure the safety of the research team.

Remote Monitoring of Research Activities

Shortly after the violence in Juba in July 2016, study co-investigators were unable to return to South Sudan for a few months to conduct trainings or monitor data collection as planned in the original study protocol. Mobile data collection using tablets permitted research assistants to upload quantitative data every 24 to 48 hours using wireless internet at the IMC field offices. Site supervisors conducted daily reviews of the data before the team in the United States conducted weekly quality checks. Missing or erroneous data were reported immediately to the site supervisors. The close working relationship with IMC allowed us to identify practical strategies to ensure tablets were adequately maintained, charged, and safely stored in remote areas. When staff movement between facilities and IMC offices were restricted, additional tablets were purchased to reduce disruptions in data collection or uploads. Lastly, a study co-investigator met with the research coordinator and site supervisors in Entebbe, Uganda for a one-week refresher training to overcome the travel restrictions that were imposed during the conflict. Supervisors then returned to their study sites and trained local data collectors. This cascade approach built the capacity of local researchers in qualitative and quantitative methods and allowed data collection to continue with remote support.

Budget Implications

South Sudan also presented numerous logistical challenges because of the ongoing conflict. While costly, equipment for the study intervention had to be transported domestically by plane because of the high risk for armed attacks along roads. Costs associated with transporting study staff and equipment kept rising due to hyperinflation of the local currency. Additional funding was also needed to extend the study timeline to re-train health workers and reorder additional job aids and training supplies due to the high turnover.

Competing Health Priorities

Simultaneously in June 2016, South Sudan faced a cholera outbreak that shifted staffing and response priorities. As a result, program managers of community and facility health programs had limited capacity to maintain weekly supervision tasks related to the study interventions and research supervisors were often requested to support clinical supervision. With IMC input, the team developed a staffing plan so that each site had an adequate number of researchers to support their activities and avoid burdening program staff, which proved to be critical during the cholera outbreak and other strenuous moments on the health system. The engagement of MOH from the beginning was critical in the absorption of learning and using the research finding to inform the ENAP that was later developed for the country.

Conclusions

Our study provides specific lessons from the field including adaptable research methods, flexible budgets, innovative training and supervision of field researchers, and consideration of sociopolitical factors that affected the research team's safety and access throughout training and data collection. Building diverse partnerships allowed for more informed decision-making starting from the design to dissemination phase of the study. Careful consideration of different aspects of the research, including methodology, staff capacity, minimizing risk to study staff, and logistics, lead to new insights that developed effective research strategies. The study also generated learning that produced substantial programmatic and policy changes during a humanitarian crisis including a national level ENAP, because of the collaborative nature of the study with NGOs, UN, and the Ministry of Health that supported dissemination of findings early on. The success of this research is largely due to the ability to recruit and depend on community members serving as research assistants who persisted in times of greatest insecurity to continue data collection knowing the outcomes would help improve their communities. Conducting much needed implementation research in conflict settings is rare due to the many challenges described in this paper. This study provides important lessons for future research in these settings to assure quality services to extremely disadvantaged populations.

Abbreviations

CHW	Community health worker
ENAP	Every Newborn Action Plan
IDP	Internally displaced person
IMC	International Medical Corps
POC	Protection of civilians
NGO	Non-governmental organization
NMR	Neonatal mortality rate
TBA	Traditional birth attendant
UN	United Nations

Declarations

Ethics approval and consent to participate

This study received ethics approval by the ethical review board at the Republic of South Sudan Ministry of Health in Juba, South Sudan. Verbal informed consent was obtained from all participants in the study.

Consent for publication

Not applicable

Availability of data and material

The datasets used and/or analyzed during the current study available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests. The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the organisations, including Centers for Disease Control and Prevention.

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Authors' contributions

All authors contributed to the conception and drafting of the manuscript, and have read and approved the final manuscript.

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