

# Community engagement in Ebola outbreaks in sub-Saharan Africa and implications for COVID-19 control: A systematic review

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## Systematic Review

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# Abstract

## Objectives

There is a paucity of systematic data on the specific roles community engagement played in preventing and managing the Ebola Virus Disease (EVD) outbreak in Sub-Saharan Africa (SSA). We assessed community engagement's role, benefits, and mechanisms to understand its effect on EVD case detection, survival, and mortality in SSA. Implications for COVID-19 prevention and control were also highlighted.

## Methods

We systematically searched for articles between 2010 and 2020 in databases such as MEDLINE and EMBASE. Study types included were randomised trials, quasi-experimental studies, observational studies, case series, and reports.

## Results

A total of 903 records were identified for screening. 216 articles met the review criteria, 103 were initially selected, and 44 were included in the final review. Our findings show that effective community involvement during the EVD outbreak depended on the survival rates, testimonials of survivors, risk perception, and community leaders' inclusion. Community-based interventions improved knowledge and attitudes, case findings, isolation efforts and treatment.

## Conclusion

Although the studies included in this review were of highly variable quality, community engagement lessons learned from Ebola outbreaks can be applied to COVID-19 pandemic control in SSA.

## 1. Introduction

Ebola virus is the etiological agent of the Ebola Virus Disease (EVD), a hemorrhagic fever that occurs in epidemics in the west and equatorial Africa as defined by (Malvy et al., 2019). The virus was named after the river 'Ebola' in the Democratic Republic of Congo, where the first EVD outbreak occurred in 1976. According to (Khallafalah et al., 2017), it is an enveloped, negative-sense, single-stranded RNA virus belonging to the genus *Ebolavirus* and the *Filoviridae* family. There are five species of Ebola viruses: Zaire, Bundibugyo, Sudan, Côte d'Ivoire (Taï Forest), and Reston as shown in (Kourtis et al, 2015). It is transmitted in humans through close contact with blood or bodily fluids from an infected individual or animal. The main clinical manifestations of EVD are fever, myalgia, abnormal inflammatory responses, dehydration, electrolyte imbalance, haemorrhage, and sometimes death (Laupland and Valiquette, 2014)

Since the first outbreak in 1976, several epidemics have occurred in sub-Saharan Africa, which have claimed thousands of lives. A recent outbreak in 2014-2016 in West Africa was the most widespread to date, killing over 11,000 people with a case fatality rate of over 40%, as stated in (CDC 2020). There is an ongoing outbreak in the Democratic Republic of Congo, with more than 3,470 and 2,287 cases and deaths, respectively, as of August 18, 2020, according to (MSF 2020).

A community refers to individuals bound by a geographical boundary and sharing social, traditional, or economic interests (Cyril et al., 2015). Community engagement is how organisations and individuals work collaboratively with communities to achieve a collective vision (WHO, 2020). A successful community engagement seeks the active involvement of community members in program design, leadership, implementation, and monitoring and evaluations (WHO, 2020). There are two main community engagement strategies: community coalition and community-based participatory research (CBPR). Community coalition aims to improve health outcomes either indirectly through enhanced participation or directly through policy changes with a specific health target (Wallerstein et al., 2011). CBPR is a collaborative research approach that involves all partners— academics, practitioners, and community members— with an overall goal of combining knowledge and action for social change to improve community health and reduce health disparities (Wallerstein et al., 2011). These community engagement strategies avoid the prevalent “top-down” dynamic between community interventionists and community members. These strategies decentralise power, decision-making and create a shared responsibility to design culturally appropriate and sustainable programs.

Community engagement is a crucial tool in improving population health and empowers communities to be responsible for their health, as discussed in (Israel et al., 1998). Historically, community-based approaches have been effective in addressing complex health challenges. For instance, the HIV Equity Initiative (HEI) successfully worked with community members in Haiti’s lower Central Plateau to improve HIV treatment uptake (Farmer et al., 2001). This was achieved by assigning patients to specific community health workers who monitored the patients’ medication adherence, met with patients monthly and provided patients with social support, such as paying school fees for children whose parents were HIV-positive. With the engagement of the local government, HEI was able to change behaviours associated with the spread of new infections.

It is well established that interventions to address public health challenges cannot be “one-size-fits-all” and must be tailored for their specific regions and contexts (Israel et al., 1998; Farmer et al., 2001). While the role of community engagement in disease conditions such as HIV/AIDS, tuberculosis, maternal and infant care has received much attention, there is a paucity of systematic data on the specific roles it played in the prevention and management of the EVD outbreak in SSA. Consequently, there is a knowledge gap in how community engagement can address other SSA outbreaks, such as future EVD outbreaks and the ongoing COVID-19 pandemic.

This review aimed to examine the effects of community engagement on EVD case detection, survival, deaths in sub-Saharan Africa and assess critical factors and attributes of successful community

engagement. The findings will inform best community engagement practices to control and prevent similar outbreaks.

## **2. Materials And Methods**

### ***Search Strategy and Eligibility Criteria***

The study was a systematic review. We searched key electronic databases such as MEDLINE and EMBASE and identified relevant articles on PubMed, Google Scholar, Google, and ResearchGate. The eligibility criteria entailed a broad array of studies, including randomised trials, quasi-experimental studies, observational studies, case series and reports, with participants such as communities and individuals in African countries afflicted with EVD, including healthcare providers, governmental and non-governmental organisations. The articles must also be published in English. The search terms included community engagement during the Ebola outbreak as one or more of the following: community-based prevention and care, community surveillance systems, community health workers, involving local community leaders, community members and local medical staff, social mobilisation, or community implementation. Date restriction from 2010 to 2020 was imposed on the search, but the priority was given to the relevance of the materials in terms of their substantial contribution to the discourse on EVD.

### ***Article Selection and Information Extraction***

We evaluated all titles and abstracts to determine their relevance and eligibility. Literature that did not meet the eligibility criteria were excluded. There was not enough information to decide based on the abstract and title; we obtained the full text and reviewed it accordingly to determine. Copies of the full text of potentially relevant references were obtained and reviewed to ensure they met the eligibility criteria. Where necessary, opinions were resolved by discussion among the authors who have varied expertise on the topic.

Our search results generated studies that were mainly observational and quasi-experimental.; We identified 896 titles from the search conducted in all databases and seven from the reference list of the screened studies culminating in a total of 903 records; 680 studies were excluded mainly because they did not use any of the interventions stated in our eligibility criteria. After screening titles and abstracts, 216 full texts were reviewed and screened further (Figure 1). Of the 216 full texts studied, 103 were initially selected, while 113 articles did not meet inclusion criteria based on the full-text screening. Forty-four articles were finally included because they met all the eligibility requirements, whereas 59 articles were not included based on their methods, key findings and contributions.

The authors performed the information extraction process, and any discrepancies that emerged were discussed among themselves. For each article, the following information was documented: author(s), year of publication, country, study design, type of intervention, community engagement factors (if any), and primary outcome(s).

## ***Quality Screening***

We assessed the quality of articles included using the Joanna Briggs Institute (JBI) Appraisal Checklist and the NIH Quality Assessment Tools for Observational and Cross-Sectional Studies (Supplementary Tables). In each assessment, we screened for sources of selection bias such as convenience sample or location, potential blinding of outcomes in the included studies, and further evaluated these studies to see if authors selectively reported positive or significant results and left out negative results. We also assessed the blinding of participants and personnel (patients and treatment providers) and checked to see if some participants knew the intervention or not. Finally, we evaluated studies to see if there was any proportion of subjects whose outcomes were not recorded at the end of the study because of follow-up loss.

## **3. Results**

Of the 44 articles that were finally included, 19 were cross-sectional and observational studies, 13 were qualitative studies, 3 were pre-post studies with no control groups, 6 were quasi-experimental studies, 2 were opinion pieces that merited inclusion based on our qualitative assessment, and 1 was a meta-analysis as illustrated with the PRISMA table in Figure 1.

### **Figure 1 here**

Table 1 summarises the findings of community-based interventions and their significant outcomes. There were 33 different studies from 6 different countries, most of them conducted in Liberia and Sierra Leone. Of the 33, there were 15 different types of community-based interventions, many of them focused on community-based education and mobilisation (Reaves et al., 2012; Sepers et al., 2019; Blackley et al., 2015; Hagan et al., 2015; Williams et al., 2015; Li et al., 2016; Fallah et al., 2016; Jiang et al., 2016). Others included community-based surveillance systems, as discussed in (Miglietta et al. 2019; Tiffany et al., 2016; Ratnayake et al., 2016; Sacks et al., 2015). Mobile Health (MHealth) and technology-based tools (Jia and Mohammed, 2015; Nic et al., 2018; Out et al. 2016, McMahon et al., 2016). There were also the integration of community members into formal healthcare systems (Siekman et al., 2017; Miller et al., 2018; Pronyk et al. 2016), survivor reintegration programs (Reaves et al., 2014; Carter et al., 2017), community care centres (CCCs) (Nyenswah et al., 2015; Pellecchia et al. 2015) and community quarantine initiatives (Okware et al., 2015; Capps et al., 2017). Other interventions included joint community mobilisation and palliative care (Sharma et al., 2014), community-led total sanitation (Abramowitz et al., 2017), community-based Ebola Treatment Units (ETUs) (Roess et al., 2017), a non-video health communication campaign (Turay, 2017), a video-centred health communication intervention (Fallah et al., 2017), and interpersonal communication approach (Caleo et al., 2018) and then a joint field blood draw and point of care diagnostics (Gray et al., 2018).

### **Table 1 here**

A summary of the frequency of these interventions as reported in different studies and the countries where the interventions were implemented are illustrated in Table 2.

Table 3 summarises the main factors that impacted the level of community engagement during Ebola response efforts. Some of the key factors that influenced community involvement were the survival rates of those who were infected (Nyakarahuka et al., 2017; Masumbuko et al., 2019) testimonials of survivors during their re-integration (Nyakarahuka et al., 2017; Masumbuko et al., 2019), risk perception of EVD (Jiang et al., 2016; Vinck et al., 2019; Along et al., 2019; Abramowitz et al., 2015), and the role of local leaders in garnering community trust (Masumbuko et al., 2019; de Vries et al., 2016; Lee-Kwan et al., 2017). Additionally, proximity to a healthcare facility (Masumbuko et al., 2019), clarity in communication (Nyakarahuka et al., 2017; Stone et al., 2016), engagement of community members in safe burials (Roess et al., 2017; Lee-Kwan et al., 2017; Kirsch et al., 2017) top-down or bottom-up government approaches (Capps et al., 2017), donor-community collaborations (Reaves et al., 2014; Pellecchia et al., 2015; Kasereka et al., 2019; Carrión Martin et al., 2016), level of satisfaction with EVD response (Thiam et al., 2015), acceptance or denial of biomedical discourse (Thiam et al., 2015) and community resilience (Hagan et al., 2015; de Vries et al., 2016) all impacted the level of community engagement.

**Tables 2 & 3 here**

## **4. Discussion**

We found that community-based interventions such as community education and mobilisation, survivor reintegration programs, and community-based surveillance systems helped to improve case finding, isolation and treatment as shown in (Reaves et al., 2014; Williams et al., 2015; Li et al., 2016; Fallah et al., 2016). Moreover, community-based interventions improved knowledge, attitudes, and behaviours towards EVD response efforts and helped flatten the EVD epidemic curve (Sepers et al., 2019; Hagan et al., 2015; Jiang et al., 2016). Factors such as survival rates of those infected, testimonials of survivors during their re-integration, risk perception of EVD, and the role of local leaders in garnering community trust helped ensure effective community engagement (Reaves et al., 2014; Carter et al., 2017). In addition, we found that proximity to a healthcare facility, clarity in communication, engagement of community members in safe burials, bottom-up government approaches, donor-community collaborations, level of satisfaction with the EVD response (Kasereka et al., 2019), acceptance or denial of biomedical discourse (Kasereka et al., 2019), and community resilience were also associated with whether any of the community-based interventions we reviewed were successful or not (Reaves et al., 2014; Okware et al., 2015; Capps et al., 2017; Masumbuko et al., 2019; Stone et al., 2016).

Our findings suggest that community-based interventions focused on community education and mobilisation are effective in improving early case detection, isolation, treatment, and significant positive changes in EVD knowledge and attitudes among community members (Reaves et al., 2014; Sepers et al., 2019, Blackley et al., 2015; Hagan et al., 2015; Williams et al., 2015, Li et al., 2016; Fallah et al., 2016; Jiang et al., 2016).

Survivor reintegration programs, jointly championed by community members and private partners such as Firestone Liberia, Inc., also markedly contributed to successful control of EVD outbreak (Reaves et al., 2015; Carter et al., 2017). The return of survivors and the testimonials of excellent Ebola Treatment Unit care that they received were critical in engendering community trust and social mobilisation. In particular, the role of survivor integration efforts in health promotion was even more prominent in countries like Sierra Leone, where survivor testimonials were deemed more effective communication tools than those of the mass media seen by community members as top-down and imposed.

Community-based surveillance systems also helped improve alert reporting, case finding, and eventual isolation (Tiffany et al., 2016; Ratnayake et al., 2015; Sacks et al., 2015; Kasereka et al., 2019). Although, in some instances, these generated false alerts (Ratnayake et al., 2015; Sacks et al., 2015). For example, in Sierra Leone, community-based surveillance helped detect EVD cases even though it produced a side effect of false alerts (Sacks et al., 2015).

These interventions can be scaled-up considerably at the community level to target vulnerable populations such as those geographically remote communities and have unique cultural dynamics. However, such scale-up efforts may come with implementation and long-term sustainability challenges that should be accounted for in advance (Reaves et al., 2014; Sepers et al., 2019; Vinck et al., 2019; Dickmann et al., 2018).

We observed that the reported positive outcomes were much higher for almost all the interventions when there were more components. For instance, joint community mobilisation and palliative care helped to improve case detection and treatment, and a patient's odds of survival significantly than if community mobilisation alone was conducted (Sharma et al., 2014). Also, community education and mobilisation interventions that combined reporting, case finding and isolation, education and training in hygienic burial practices produced better outcomes than when these interventions were deployed alone (Blackley et al., 2015; Li et al., 2016). Similarly, the use of cell phones in conducting surveillance performed better than traditional community-based surveillance systems. It may be helpful as a supplementary tool to address the challenges of false alerts generated in conventional surveillance systems. Despite software and internet connectivity challenges, devices such as cell phones can help to improve data access and data collection and accelerate case death reporting (Jia and Mohammed, 2015).

As a community-based intervention, the joint field blood draw and point of care diagnostics initiative and its success shed light on the potential of combining home-based care and point of contact diagnostics.<sup>42</sup> Future implementation science studies should explore the efficacy of home-based care and its role in accelerating EVD diagnosis and isolation. (Fallah et al., 2014) found that contrary to initial concerns, no healthcare worker or household member of the patient treated at home got infected with the disease. In times of epidemics, this will be important in communities with unique cultural dynamics where infected community members may resist admission to treatment facilities. Such resistance to medical care will increase mortality rates for the infected and put the lives of the non-infected in jeopardy by increasing their risk of community transmission.

Partnerships between private companies and their operating communities, such as those between Firestone Liberia Inc. and community members in Firestone District, Liberia, could serve as a model for how other private companies can contribute to response efforts during epidemics. When the EVD epidemic broke out among some of their staff members and their communities, Firestone Liberia Inc. could successfully engage community members and quickly work with them to reduce EVD cases (Reaves et al., 2014). This shows that multilateral organisations like WHO are not the only non-governmental entities to help stop epidemics. Private for-profit companies also have a role to play. This is especially important given the limited funding available for control efforts in times of outbreaks (Sanogo, 2019).

Community resilience: the sense of self-responsibility and agency that community members wield in addressing their challenges also played a crucial role in slowing the epidemic. One of the biggest challenges in global health today is inadequate health financing. This problem is particularly heightened during emergencies such as epidemics where the international community has at its disposal limited funding to implement control efforts. Yet, in the face of financial difficulties, we can learn from the critical roles that community resilience played in flattening the EVD epidemic curve. For instance, during the EVD epidemic, many resilient communities could adopt measures that enable them to support each other long before their health workers arrived (Hanefield et al., 2018). This was particularly important in rural and remote communities where geographic barriers delayed access to treatment. In some communities, resilience achieved through solid social cohesion, respect for community culture, social capital and robust community leadership, as opposed to foreign aid that is top-down in nature, proved to be the best option to stop an outbreak (de Vries et al., 2016; Stone et al., 2016). Community resilience has historically proved important in preparing, implementing, and declining outbreaks such as the 1918 Influenza and the ongoing HIV/AIDS pandemic. Investing in initiatives that strengthen community resilience in rural and remote communities in sub-Saharan Africa before and during disease outbreaks may help save lives and be cost-effective.

Barely before the EVD epidemic could become a far thought, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causing coronavirus disease-2019 (COVID-19) emerged. With millions of lives affected and hundreds of thousands of deaths recorded, proper measures must be put in place to stem the pandemic, especially in parts of the world like sub-Saharan Africa, where health systems are incredibly fragile. While the WHO currently reports that Africa remains the least affected continent with COVID-19, with 1.5% of the world's cases, and 0.1% of globally reported deaths, there is no cause for celebration and complacency (Sanogo, 2019). This is because community transmissions are ongoing amidst limited testing capacity in most African countries, particularly in rural and remote communities (Paintsil, 2020). The EVD outbreaks provide a unique opportunity to leverage COVID-19 prevention and control lessons. Existing evidence argues that during the EVD outbreaks, international efforts in Liberia arrived after the epidemic had subsided. Much of the flattening of the epidemic curve was due to significant behavioural changes at the community level (Carrión Martín et al., 2016). In the same vein, community-based interventions should be prioritised as a part of COVID-19 control efforts, with

community leaders leading the charge in engaging their community members and enacting by-laws, where necessary. COVID-19 survivors should also be made a key component of such interventions. Their testimonies may help to engender trust between community members and healthcare workers and encourage health-seeking behaviours. This would minimise chances of community resistant events that may potentially arise in the absence of community engagement (Pronyk et al., 2016). Additionally, individual and communal quarantines during the EVD outbreaks could shed light on how to ensure that COVID-19 quarantines and lockdowns are similarly effective. Top-down approaches such as state-enforced, military-style quarantines elicited protests, violence and deaths while community-led voluntary quarantine initiatives were successful (Capps et al., 2017).

## 5. Conclusions

Governments and international stakeholders should prioritise the goal of engaging community leaders and members before initiating any intervention. During quarantine, communities must have access to necessities such as food, water and medical services, as shown in (Okware et al., 2015; Lee-Kwan et al., 2017). Finally, given the paucity of funding for COVID-19, there is a great need to focus on community resilience in rural and remote places and engage the efforts of private partners as Firestone Liberia Inc., and ALIMA did during the EVD outbreaks.

Our review sheds light on the impact of community-based interventions during the EVD epidemic and factors associated with successful community engagement. Nonetheless, it is not without limitations. The overall quality of the studies included in this review was highly variable. Also, many studies had poorly described methods, making it challenging to evaluate biases such as social desirability bias and performance bias.

Several community-based interventions were instrumental in controlling EVD outbreaks, and their implementation successes or failures were hinged on myriads of factors that hampered community engagement efforts. Lessons learned on community engagement during EVD outbreaks can be leveraged in fighting other attacks such as COVID-19. It is imperative to engage community members to execute community-based initiatives for pandemic preparedness and control.

## Declarations

**Conflict of Interest:** The authors declare no conflicts of interest.

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**Ethical Approval Statement:** This study was a systematic review and was exempt from ethics approval. The authors gathered and synthesised data from previous studies in which the respective investigators have already obtained informed consent.

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## Tables

**Table 1:** Type, frequency, and countries of community-based interventions

Type of Community-Based Intervention	Number of studies reporting intervention	Country (ies)
Community-based education and mobilization	8	Liberia; Sierra Leone
Community-based surveillance systems	4	Sierra Leone; Guinea
Mobile Health (MHealth) and Technology-based tools	4	Sierra Leone; Guinea; Nigeria
Integration of community health workers, volunteers and formal health workers,	3	Liberia, Sierra Leone, Guinea
Survivor Re-Integration Programs	2	Guinea, Liberia
Community Care Centers (CCCs)	2	Sierra Leone
Community Quarantine	2	Liberia
Active Surveillance and health education	1	Sierra Leone
Joint Community Mobilization and Palliative Care	1	Uganda
Community-led total sanitation	1	Liberia
Non-video health communication campaign	1	Liberia
Video-centered health communication intervention	1	Congo
Interpersonal communication approach	1	Sierra Leone
Joint field blood draw and point of care diagnostics	1	Liberia
Community-based Ebola Treatment Unit (ETU)	1	Liberia

**Table 2:** Outcomes of community-based interventions by intervention type, country, and components

<b>Studies</b>	<b>Type of Community-Based Intervention</b>	<b>Country</b>	<b>Intervention Components</b>	<b>Main Outcome</b>
Reaves (2014)	CEM	Liberia	Radio campaigns; community meetings; survivor re-integration; voluntary quarantine; incident management; case finding and isolation.	Improved case detection, isolation and treatment, and eventual reduction in pandemic spread.
Sepers (2014)	CEM	Liberia	Safe burials; Social Mobilization; Engaging community leaders; Case Management.	Led to community involvement in positive EVD response activities such as alert reporting and safe burials, and this led to decrease in EVD spread.
Blackley (2015)	CEM	Liberia	Education; alert reporting system; case investigation; contact tracing; training in hygienic burial; case finding and isolation.	Multi-pronged intervention led to complete cessation of outbreak.
Hagan (2015)	CEM	Liberia	Culturally-sensitive safe burials; engaging a Village Chieftaincy Taskforce	Positive changes in EVD awareness; vital for geographically distant communities
Williams (2015)	CEM	Liberia	Community education and information dissemination; case finding and isolation; infection control	Epidemic stopped in community; no new cases recorded
Li (2016)	CEM	Sierra-Leone	Community education; alert reporting; contact tracing; social mobilization	Improved EVD case detection, zero infection of healthcare workers, no unsafe burials, and EVD-free goal was achieved four months earlier in participating communities than the entire Sierra Leone
Fallah (2016)	CEM	Liberia	Contact tracing; case finding and isolation; community education.	Community involvement led to cooperation with contact tracing and accelerated case isolation.
Jiang (2016)	CEM	Sierra-Leone	Intensified Training on EVD Response.	Positive changes in EVD knowledge and

				attitudes towards EVD response.
Stehling-Ariza (2016)	Active Surveillance and Health education	Sierra-Leone	Active surveillance; health education; ongoing outreach.	Rapid identification of suspected EVD cases.
Pronyk (2016)	CCCs	Sierra-Leone	Social mobilization; engagement of community leaders in site selection and facilities inauguration; mass media campaigns	Rapid case isolation compared in CCCs compared to other facilities.
Carter (2017)	CCCs	Sierra-Leone	Construction of CCCs close to communities; employing CCC workers from community; engaging community during CCC design process.	Proximity to CCCs reduced fears and stigma; Inclusion in design of CCCs improved community trust in EVD response and care.
Sharma (2014)	Community-based ETUs	Liberia	Transparent ETU walls; community engagement in safe burial process; local hotline; active case finding; contact tracing.	Rapid scale-up of multi-pronged intervention led to sharp decline in EVD transmission.
Stone (2016)	CBS	Sierra-Leone	Alert reporting, case confirmation, isolation.	Generated useful, unstructured data at the community level.
Miglietta (2019)	CBS	Sierra - Leone	Alert reporting; contact tracing.	Improved EVD alert/case reporting which became exponential over time.
Tiffany (2016)	CBS	Guinea	Reporting and data collection.	Community surveillance captured information in areas with poor data collection; yet it was hard to determine the cause of deaths.
Ratnayake (2016)	CBS	Sierra-Leone	Alert reporting; training of health officers and surveillance supervisors.	Community surveillance detected EVD cases, but generated lots of false alerts.
Sacks (2015)	Mhealth & Technology-based surveillance tools	Guinea	Mhealth app on phones for tracking.	Potential impact of improving access to data and case detection; yet has limitations of software malfunctioning; and technical literacy, and data privacy concerns.

Jia (2015)	Mhealth & Technology-based surveillance tools	Sierra-Leone	Cell phone messaging.	Cell phones performed better (in terms of reporting) than traditional surveillance systems.
Lochlainn (2018)	Mhealth & Technology-based surveillance tools	Sierra - Leone	Use of self-owned smartphones in community mobilization.	Quick implementation of survey to obtain essential and geographic rural information. Also led to creation of updated maps, all done at moderate cost.
Otu (2016)	Mhealth & Technology-based surveillance tools	Nigeria	Dissemination of Ebola info via tablet computers.	Improvement of knowledge of Ebola; Reinforcement of positive attitudes of avoiding contact with Ebola patients, eating bush meat, and risky burial practices.
Okware (2015)	Joint community mobilization and palliative care	Uganda	Social mobilization; voluntary quarantine; contact tracing; early detection; case finding and isolation	Palliative care increased odds of survival; early case detection and treatment helped to reduce EVD spread.
Meyer Capps (2017)	CLTS	Liberia	Community education; hand washing; defecation infrastructure; safe disposal of excreta	CLTS reduced risk of EVD, yet further studies required to determine if CLTS was the only difference between communities.
Abramowitz (2017)	Health Communication (Non-video)	Liberia	Billboards; radio; brochures; posters;	Post-intervention, there were rapid positive changes in beliefs about EVD, yet this lagged behind practices, and many people still supported conspiracy theories
Roess (2017)	Video-Centered Health communication	Congo	Community members watch film (movie) about Ebola	Statistically significant positive changes in EVD recognition, transmission, and mitigation. EVD knowledge gained through intervention was retained after one year.
Turay (2017)	Interpersonal communication	Sierra Leone	One on one Ebola education with community members	Improved relationship with external health care workers;

				increased EVD case reporting
Fallah (2017)	Joint field blood draw and point of care diagnostics	Liberia	Home-based care; point of contact diagnostics	Improved community involvement; sped up diagnosis and led to rapid EVD case isolation
Nyenswah (2015)	Community Quarantine	Liberia	Engagement of community leaders; provision of basic logistics during quarantine	Led to zero reported EVD cases
Pellechia (2015)	Community Quarantine	Liberia	State-imposed quarantine; forced cremation	Increased condemnation, stigmatization, and socio-economic distress
McMahon (2017)	Integration of community health workers, volunteers and formal health workers	Sierra Leone	Hiring of community members as volunteers; engagement of community leaders; creation of health management committee	Improved trust and support for EVD prevention and treatment; Formal health workers better understood and addressed community challenges.
Siekmans (2017)	Integration of CHWs, volunteers and formal health workers	Liberia	Training and supervision of CHW	Community members saw CHWs as trusted sources of EVD preventive information
Miller (2018)	Integration of CHWs, volunteers and formal health workers	Guinea, Liberia, Sierra Leone	Engagement of community health workers; and other community actors such as traditional birth attendants; traditional healers; and community leaders	Community actors and CHWs helped to improve EVD response activities in spite of insufficient support, and some initial community resistance
Martin (2016)	Survivor Re-Integration Program	Guinea	Survivor testimony of support and dignified care obtained; encouraging community members to seek care.	Significant improvement in community compliance with EVD response such as contact tracing, and consequent increase in case detection.
Reaves (2014)	Survivor Re-Integration Program	Liberia	Community education about survivor's Ebola-free status; community celebration event; survivor given medical certificate and encouraged to share their experience in ETU; broadcasting of event via radio; in-kind donation to survivor from Firestone.	Helped to improve community acceptance of EVD response, and the consequent trust reduced EVD spread

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<sup>1</sup>ETU = Ebola Treatment Unit; EVD = Ebola Virus Disease; CHW = Community Health Workers; CLTS = Community-led total sanitation; CEM = Community education and mobilization; CCCs = Community Care Centers; CBS = Community-based surveillance

**Table 3:** Factors that impacted community engagement

<b>Studies</b>	<b>Countries</b>	<b>Factors</b>
Jiang (2016), Nyakarahuka (2019), Claude (2019), Vinck(2019)	Sierra Leone, Uganda	Risk Perception
Nyakarahuka (2017), Pellechia (2015), Thiam (2015)	Uganda; Liberia; Guinea	Fear and stigma experienced by the affected and their family (or their absence thereof)
Caleo (2018), Gray (2018)	Sierra Leone (both)	Survival rates of affected and their re-integration
Gray (2018)	Sierra Leone	Proximity to treatment facility
Caleo (2018), Sharma (2014), Abramowitz (2015), Carrion Martin (2016)	Sierra Leone; Liberia (both); Guinea	Transparency and communication (or lack thereof with ETU facility
Sharma (2014), Abramowitz (2015)	Liberia (both)	Engaging or excluding families in burial process
Gray (2018), Alonge (2019), Abramowitz (2015)	Sierra Leone; Liberia	Buy-in of community leaders
Pellechia (2015)	Liberia	Top-down or bottom-up approaches from government
de Vries (2016)	Uganda	Respect for, or lack of sensitivity to local culture
Caleo (2018), de Vries (2016)	Sierra Leone; Uganda	Mismatch between public health information from media, and the community experience.
Caleo (2018), Gray (2018)	Sierra Leone; DR Congo	Enactment of bye-laws by community leaders
Kasereka (2019)	DR Congo	Satisfaction or dissatisfaction with EVD response
Kasereka (2019)	DR Congo	Denial or acceptance of biomedical discourse
Thiam (2015)	Guinea	Resources and logistics availability
Vinck (2019), Pellechia (2015)	DR Congo; Liberia	Trust between community and government
Stone(2016), Carter (2017), Kirsch (2016), Reaves (2014)	Uganda	Donor-community partnerships
Alonge (2019), Hagan (2015)	Sierra Leone	Community resilience

<sup>2</sup>DR Congo = Democratic Republic of Congo; ETU = Ebola Treatment Unit

## Figures

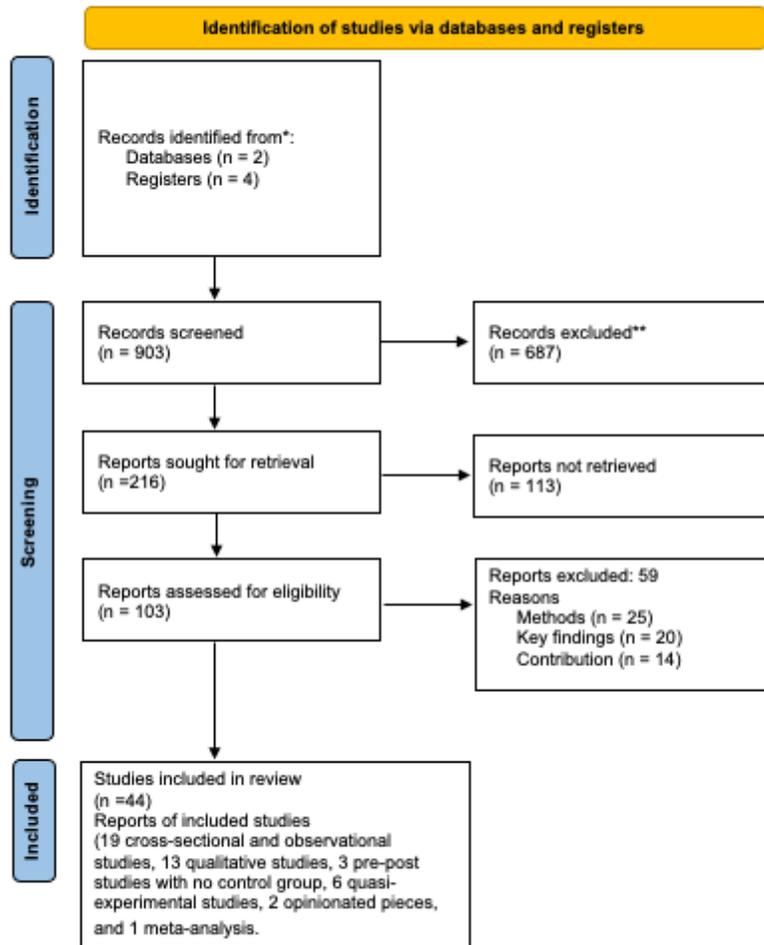


Figure 1

PRISMA FLOWCHART

## Supplementary Files

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