

NARRATIVE REVIEW IN PUBLIC HEALTH AND INFECTIOUS DISEASES

Traditional funeral and burial rituals and Ebola outbreaks in West Africa: A narrative review of causes and strategy interventions

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Abstract

Introduction: In West Africa, traditional funerals and burials have proven main contributors to the spread of infectious diseases, such as Ebola, plague, the Marburg virus, and others. Although the World Health Organization has provided guidelines for the safe burial process after learning of the culture of the afterlife in Ebola-affected areas, little effort has been made to integrate theoretical interventions and models for changing West Africans' funeral behavior. This research was conducted to study 1) the background of traditional burial rituals, 2) interventions to contain Ebola outbreaks in West Africa, and 3) a strategic approach to future disease outbreak in the region.

Methods: A narrative review was conducted by using four electronic databases—PubMed, Medline, Web of Science, and Scopus—using search key terms and a manual search of Google Scholar and gray literature. A date range was open to all years, up to 2017 to include a historical aspect of Africans' funerary rituals and 2014–2016 Ebola outbreak in West Africa.

Results: West Africans believe that performing funeral rituals enables them to cement unity between the living and ancestral spirits and to receive spiritual gifts from deaths. Funeral rituals include several actions, such as washing and cleaning the body, washing one's hands in a common bowl after touching the face of the deceased, and lying over the corpse of a prominent person. Although Ebola-affected countries created national Ebola response and communication strategies in 2014, the efforts at the government level were not sufficiently effective to contain the disease's outbreak.

Conclusion: Traditional funeral and burial practices are a part of the culture in West Africa and should be evaluated and respected. Policymakers should design a theory- and practice-based socioecological model based on social and behavioral strategies for villagers in remote areas to prevent the spread of infectious diseases via traditional burial practices.

KEY WORDS: Africa, Western; anthropology, cultural; burial; cemeteries; communicable diseases; communication; disease outbreaks; ebolavirus; health services; mortuary practice; social behavior.

Riassunto

Introduzione: Nell'Africa occidentale i funerali tradizionali e le sepolture sono stati i fattori principali che hanno contribuito alla diffusione di malattie infettive, come l'Ebola, la peste, il virus di Marburg ed altri. Sebbene l'Organizzazione Mondiale della Salute abbia fornito delle linee guida per un sepolture sicura dopo la comprensione della cultura dell'aldilà nell'area colpita dal virus Ebola, poco sforzo è stato fatto per integrare interventi teorici e modelli per modificare la cultura dei funerali per gli africani occidentali. Questa ricerca è stata condotta per studiare 1) il background dei rituali di sepoltura tradizionali; 2) gli interventi per contenere le

epidemie di Ebola nell’Africa Occidentale ed attuare 3) un approccio strategico per prevenire future epidemie della malattia nella regione.

Metodi: Una revisione narrativa è stata condotta usando quattro database elettronici-PubMed, Medline, Web of Science e Scopus— usando parole chiave ad una ricerca manuale su Google scholar e della letteratura grigia. Le date degli articoli pubblicati hanno riguardato tutti gli anni fino al 2017 per includere una visione storica dei rituali funebri degli africani e l’epidemia di Ebola del 2014-2016 avvenuta in Africa occidentale.

Risultati: Gli africani occidentali credono che realizzare rituali funebri consente loro di cementare l’unità tra il vivente e gli spiriti ancestrali e di ricevere doni spirituali dai morti. I rituali funebri includono diverse azioni, come lavare e pulire il corpo, lavare le proprie mani in una vasca comune dopo aver toccato il volto del defunto, e distendersi sul cadavere di una persona importante. Sebbene i Paesi interessati dall’Ebola hanno creato delle strategie nazionali di contrasto all’Ebola e di comunicazione nel 2014, gli sforzi a livello governativo non sono stati sufficientemente efficaci per contenere l’epidemia della malattia.

Conclusioni: Le pratiche di sepoltura ed i funerali tradizionali sono una parte della cultura in Africa occidentale e dovrebbero essere valutati e rispettati. I decisori politici dovrebbero progettare un modello socioecologico basato su aspetti teorici e pratici che tenga in considerazione le strategie sociali e comportamentali per gli abitanti dei villaggi di aree remote con la finalità di prevenire la diffusione di malattie infettive attraverso le pratiche funebri tradizionali.

TAKE-HOME MESSAGE: Understanding the importance of funerary rituals and respecting culture, religion, and spirituality in Africa should be the first step to initiate effective and coordinated humanitarian action. To prevent or control future infectious disease outbreaks in Africa, it is essential to design and implement culturally tailored health communication theory frameworks, interventions, and models.

Competing interests: none declared

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INTRODUCTION

Every human being begins life having nothing and cannot avoid meeting death in the end, leaving everything behind. As stated by Pulilius Syrus, a Roman writer (85–43 BC), “As men, we are all equal in the presence of death” (Maxim 1) and “Nowhere can we die happier than where we have lived happily” (Maxim 1050) [1]. Around the world, one can observe many different ways to respect death through various types of funerals. In the United States, bereaved families may choose one of three options: conventional (embalmed) burial, natural (without a vault and embalming) burial, or cremation [2]. The nation’s embrace of cremation has changed

dramatically, increasing from 5% in the 1970s to 50.1% in 2016 [3]. Cremation is now outpacing traditional burial [4]. The Japanese have a homogenous cremation culture; 99.9% of the deceased are cremated, the highest percentage in the world [2]. Japan's rate is followed by those of Taiwan (93%) and Switzerland (95%) [2]. Whereas developed countries have been leaning toward cremation, a number of countries in the developing world still adhere to their traditional funerary rituals. In the mountains of Tibet, where wood is too scarce for cremation and the ground is too rocky and frozen for burial, it is common to practice 'sky (celestial) burial' [2, 5, 6]. A death professional, called a *rogyapa*, removes the flesh of the body, crushes the bones, and then mixes them with yak butter or milk to attract vultures to consume the entirety of the remains [2]. Tibetans believe that sky burial is a virtuous gift of returning the body to nature in an honorable, generous way by feeding the vultures [6]. In a remote region of Tana Toraja in Indonesia, people sleep with the body in the same bed and change the dead's clothes every day. For ritualistic Torajan funerals, the corpse lies in a traditional Torajan mini-house carried atop the shoulders of 35 young men [2]. A pig and a sacrificial buffalo are brought by a different family, with the expectation that they will be repaid by the bereaved family for their funerals in the future [2, 7, 8]. For a three-day funeral, at least seven buffaloes are slaughtered, which is the same as the cost of three to four houses in Toraja [7]. Torajans do not consider the body truly dead until the sacrifice of the animals [2, 7].

Harris stated, "As Mary is to Christians the mother of God, the cow to Hindus is the mother of life" [9]. Likewise, witchcraft, sorcery, and other superstitions are deeply rooted in funerals in Africa. West Africans believe that supernatural forces can interrupt normative transitioning of the soul to the afterlife [10]. Mourners at the funeral believe that ancestral spirits can influence the

living, so they talk directly to the deceased to ask for a smooth transition to the afterlife in the future [10]. Nichter [11] argued that ethnophysiology—the study of perceptions of health and medicine in a different culture—should be considered to treat disease in an ethno-tailored manner.

It is understandable that every culture wants to respect the dead through over-expenditure or hopes to cement the connection between this world and the next. However, traditional burial practices can lead to the spread of infectious disease. In sub-Saharan Africa, traditional funerary rituals are deeply rooted and positioned in African cultures. In Madagascar, the Malagasy people perform a funerary tradition called ‘Famadihana’ rewrapping the bodies of their ancestors in fresh clothes and dancing with the dead around the tomb to upbeat music. Although it has not been scientifically proven, mass media has nonetheless reported that this sacred ritual could spread plague in Madagascar [12]. From August 1 to November 22 in 2017, 2,348 confirmed, probable, or suspected cases of pneumonic, bubonic, septicemic, or unspecified plague were reported, along with 202 deaths, in Madagascar [13]. One of the public health response measures advised by the World Health Organization (WHO) is to provide information regarding infection control practices for burial rituals [13]. In Uganda, three cases of Marburg were reported in 2017, and all of the afflicted died [14]. The virus was presumed to be spread by traditional burial ceremonies [14].

During the unprecedented Ebola outbreak in West Africa of 2014–2016, villagers’ resistance to the use of burial teams to protect their family members seriously exacerbated the spread of the disease. This Ebola outbreak claimed 11,310 lives in Guinea, Liberia, and Sierra Leone [15], more than all other previous Ebola outbreaks combined. The Ebola virus can be transmitted even

after the infected person dies, when bodily fluids from the deceased permeate the broken skin or mucous membranes of those handling the bodies [16].

The virus can also survive for a few days on body surfaces as well as on sheets contaminated with bodily fluids [16]. Demiryürek et al. indicated that the infectious pathogens of *Mycobacterium tuberculosis*, hepatitis B and C, and HIV survive in cadavers even after embalming and suggested that specific safety guidelines are necessary for cadaver handlers to avoid accidental disease transmission [17]. The long period of pathogen viability extends far beyond the time when bereaved families claim a body for funeral services, which involve the opening of caskets that could be contaminated from contact with the body [18]. Human remains can become serious public health threats if they are infected with highly lethal contagious pathogens that are resistant to environmental alterations or have very high concentrations [19]. During the 2014–2016 Ebola outbreak in West Africa, the greatest risk was from lethal pathogens on the bodies, and improper burial practices may have contributed to the ongoing transmission of the Ebola virus [19]. According to the WHO, 60% of all Ebola cases in Guinea were linked to traditional burial practices [20]. In addition, organizations involved in the Ebola response in Sierra Leone claimed that 70% of newly infected cases stemmed from funerary rituals that involved touching the bodies of those who had died from Ebola [21].

The WHO staff and Guinean health officials conducted retrospective studies to find the origin of the 2014–2016 Ebola epidemic; the index case was an 18-month-old boy from the remote village of Meliandou in Guinea, who came into contact with wild animals in his backyard and died on December 28, 2013 [22]. Meliandou, where only 31 households existed at that time, is located in Guéckédou Prefecture, a forest region destroyed by foreign mining and timber operations [22].

The forest loss drove more than 80% of infected wild animals into human settlements [22]. The boy's immediate family and those who treated them at a hospital in Guéckédou, including midwives, traditional healers, and staff, also fell sick and died during the second week of January 2014 [22]. The boy's extended family members who attended funerals or took care of ill relatives developed a similar illness and died the following week [22]. A pattern of unprotected exposure and continued funerals spread the disease further, and it ended up affecting three countries in West Africa: Guinea, Liberia, and Sierra Leone.

The aim of this research was to understand the history, importance, and social context of Africans' traditional burial rituals to see why the initial Ebola-control interventions set up by various stakeholders in West Africa faced a backlash from the local population. With a focus on the aid workers' efforts to ensure dignified and safe burials, this study emphasized the integration of theoretical culturally tailored interventions and models to prevent and control future Ebola outbreaks by understanding how Africans' funerary rituals could coexist with humanitarian aid efforts.

METHODS

A narrative literature review was conducted. Among public health-related abstract and citation databases, four electronic databases—PubMed, Medline, Web of Science, and Scopus—were used to search for and review the relevant literature. A date range was open to all years, up to 2017 to include a historical aspect of Africans' funerary rituals and 2014–2016 Ebola outbreak in West Africa. Related articles from a variety of disciplines, such as public health, sociology, anthropology, politics, and history were considered. The language was not restricted to a particular language, but the majority of selected references were written in English.

The search strategy for four electronic databases consisted of the combination of four major categories: the region (Africa), infectious disease (Ebola virus), traditional behavior (funeral rites), and social and behavioral interventions (health services and communication). The search was initially conducted in PubMed, using the following Medical Subject Headings (MeSH) terms, such as ‘Africa’, ‘Ebola virus’, ‘communicable diseases’, ‘funeral rites’, ‘burial’, ‘cemeteries’, ‘embalming’, ‘mortuary practice’, ‘social behavior’, ‘health services’, ‘delivery of health care’, and ‘communication’. Then, relevant MeSH terms and keywords searchable in article titles or abstracts were added to expand the scope of a search. After searching in PubMed, the same approach to keyword searching was applied in the other three databases, Medline, Web of Science, and Scopus. The full search strategy for the identification of articles in the databases is described in Supplement 1.

Additionally, a manual search of Google Scholar and websites was conducted to review additional research articles, gray literature, reports, online news, and Youtube videos published by Discovery and National Geographic. This study concerned all African regions and countries to comprehensively understand traditional burial practices linked to Ebola and other infectious diseases.

RESULTS

Background of the afterlife: History, importance, and social context of Africans’ funerary rituals

In Europe and North America, death is a private affair that is sanitized and medicalized as a result of the biomedical model of medicine [23, 24]. Africans, in contrast, consider death and life two essential components of their social world [24]. In Bushluckridge, South Africa, for

example, where the HIV/AIDS stigma is extremely high, AIDS patients and HIV-positive persons are described as being in the ‘waiting room for death’ or as ‘dead before dying’. However, bereaved families host ostentatious funerals for them that draw more than 500 attendees [25]. For Africans, death invokes fear, revulsion, and trouble [26]. For this reason, Africans want their deceased relatives to take their places alongside their ancestors through the proper performance of ritual customs with the individuals and social groups closest to the deceased [24]. They have elaborate and complex funerals with a high degree of expectation to maintain a connection with the world of the dead and their ancestors [24]. That is why Africans attend every ceremony they can, and relatives do not skimp on funeral, burial, and mourning practices.

To ensure the dignity and decency of funerals, Africans make sure that a proper coffin is conveyed to the cemetery and that rituals are attended by properly dressed mourners who strongly believe in the existence of God [27]. Although having a dignified funeral with fellow Christians or Muslims has become essential for a respectable death in Africa, traditional healers still have a significant influence on villagers. Supernatural beliefs in indigenous, traditional medicine have long been central to sub-Saharan Africans’ conceptions of the etiology, symptoms, and treatment of disease [28–31]. Therefore, witchcraft, sorcery, and traditional medicine still prevail in remote regions of Africa [28]. For this reason, traditional healers, who are agents of supernaturalism, are considered reliable sources for understanding misfortunes, affliction, and painful diseases.

The Guéckédou and Kissidougou Prefectures in the forest region of Guinea are large landscapes where people embrace various healing traditions. In their villages, there is no clear distinction

between scientific medicine and traditional medicine (ethnomedicine), so they are compatible with everyday life [32]. For instance, in Guinea, when a patient dies, the body is rendered to the community, and the bereaved family performs the Kissi mortuary rites [32], a practice wherein ethnomedicine and biomedicine coexist.

In the postcolonial period, the growth of international networks and technologies has increased Africans' mobility and changed their understanding regarding their sense of belonging [33]. With this change, the culture of funerary rituals has altered. First, African international migration has risen [34]. Thanks to the telephone and the Internet, the connection between expatriates and those at home is strong, and more people are simply buried in the city to which they have immigrated [34]. Additionally, with the advent of new technologies, refrigerated transport of a corpse can reverse migration: Those who have migrated from rural to urban areas can be transported back to their natal homes for commemoration ceremonies and burials [19]. Second, fear of death has become far less common. In the past, children were not allowed see corpses, but now they can—and burials that were once conducted at night can now take place in the daytime [34]. Third, after mortuaries were gradually adopted, people began to delay burials for weeks or even months [34]. During the delay, people gathered resources, communicated with distant parties, and organized grand burial affairs for the dead [34]. However, the majority of people in Guinea and Sierra Leone are Muslims, and they have a fundamental Islamic duty to bury the deceased as soon as possible [34]. Furthermore, most households struggle with high mortuary fees, so they avoid delaying burials [34].

Risk factor for touching the dead body: Link between funerary rituals and Ebola outbreaks

In addition to the retrospective studies conducted by the WHO and Guinean health officials who

were searching for the origin of the 2014–2016 Ebola epidemic, other studies were conducted to determine whether traditional funeral practices posed a substantial risk for Ebola transmission [20, 35].

When traditional healers die, Africans show respect for these prominent individuals during their funerals. It is common for people to lie over a dead healer, hoping that the spiritual gifts from the deceased will transfer to them [36, 37]. The first Ebola index case in Sierra Leone was a young woman from the Kenema District who had crossed the border during the Ebola outbreak to meet a well-known, widely respected traditional healer in Guinea [20]. She was predictably infected with Ebola by the healer who died. To honor the healer's memory, hundreds of mourners from every corner of town participated in the traditional funeral and burial ceremony [20]. The consequence of attending this one funeral was devastating; local health authorities conducted quick investigations and reported that participation in the funeral was linked to more than 365 deaths from Ebola [20].

Later, the Sierra Leone Ministry of Health and Sanitation and the Centers for Disease Control and Prevention (CDC) conducted a retrospective analysis of laboratory-confirmed Ebola cases that occurred from July 11 to October 31, 2014 in Moyamba District, Sierra Leone, to investigate the cause of a sharp increase in cases in September 2014 [35]. Attending a village chief or village elder's funeral is as common as attending one for a traditional healer in West Africa. Through community engagement, active surveillance, and close follow-up of contacts, investigators learned that among 108 individuals with confirmed Ebola, 28 had attended the three-day funeral (September 5–7, 2014) of a prominent pharmacist in Moyamba who had treated an Ebola patient from a neighboring village [35]. Among them, 21 (75%) had touched the corpse, 16 (57%) had

had direct contact with the pharmacist when he was alive, and eight (29%) died [35].

All eight of the dead were men because in Sierra Leone, family members and friends who are the same sex as the dead are responsible for preparing, washing, and clothing the body for a traditional funeral, so they have direct, prolonged contact with corpses [35, 38]. The risk for Ebola transmission at funerals is substantial because the viral load is often highest during the later stages of the disease and at death [39]. Funerals invariably attract family, friends, and colleagues from different areas, and attendance is important to demonstrate respect for the deceased [35]. Mourners from other locations or travelers who become infected can create a new chain of transmission when they return home [35]. Investigators concluded that a single traditional funeral led to a rapidly growing Ebola epidemic in Moyamba, with a high rate of secondary transmission from one patient compared to the estimated basic Ebola virus reproduction number of 2.53 for Sierra Leone during the 2014–2016 outbreak in West Africa [35, 40]. The ‘super-spreader’ theory makes it clear that a prominent individual who dies of Ebola tends to transmit the virus to a large number of funeral attendees.

Gender differences in risk factors for Ebola transmission

During the early stage of Ebola outbreaks, differing gender roles contribute to disproportionate mortality, affecting women more than men [41, 42]. The WHO stated that elderly women traditionally care for the sick and prepare for burial the bodies of those who die of Ebola [43]. In Uganda, it is the custom for a paternal aunt or older woman to undertake this duty, and either a disease survivor or an elderly woman will care for the sick during severe disease outbreaks [44]. In the early stage of the Ebola outbreak in West Africa, a similar phenomenon occurred. In late August 2014, when the disease had already claimed the lives of at least 1,229 people in West

Africa, Julia Duncan-Cassell, Liberia's minister for gender and development, said that 75% of the Ebola deaths in Liberia occurred among female caregivers who had prepared bodies for funerals [45]. Marpue Spear, executive director of the Women's nongovernmental organizations (NGO) Secretariat of Liberia, mentioned that it is traditional for a woman caregiver to bathe a sick man, but a man cannot bathe a sick woman in Liberia [42]. Suafiatu Tunis, leader of the Social Mobilization Committee on Ebola and a spokesperson for the Community Response Group, also commented that women who treat sick family members are at higher risk of contracting the virus [45]. West African women are also the traditional birth attendants, nurses, cleaners, and laundry workers in hospitals, and therefore they are exposed to patients' bodily fluids [45].

However, as stated earlier, family members, relatives, or friends preparing for the funeral ritual must be the same sex as the dead in Sierra Leone. The WHO Ebola Response Team (ERT) published an article regarding these gender-specific epidemiologic patterns, citing a total of 20,035 confirmed and probable Ebola cases from December 2013 to August 2015. The data were analyzed to determine whether the different physiologies or cultural roles of the men and women actually resulted in different consequences depending on gender during the outbreak [46]. Among the 20,035 confirmed and probable Ebola cases, 51.2% were women, which is not greatly different from the proportion of men [46]. By country, the proportion of woman patients with Ebola was 52.7% in Guinea, 49.8% in Liberia, and 51.2% in Sierra Leone, which is broadly in line with the proportion of the female population in each country [46]. However, 63.4% of Ebola patients ($P < 0.001$) in Guéckédou Prefecture, Guinea, were women [46], which supported Duncan-Cassell, Spear, and Tunis's comments. Additionally, even though a higher proportion of

female patients were exposed to a sick person, the number of exposures reported by female and male patients was not significantly different [46]. Finally, female patients were less likely to die, and they had a lower risk of transmission than male patients because their average interval from symptom onset to hospitalization was 0.5 days shorter than that of male patients [46]. Nonetheless, designing a gender-based intervention should still be considered. Each region may have specific funeral expectations for men and women during a disease outbreak, just as in the Guéckédou Prefecture in Guinea, so it is important to address them.

Risk factors associated with resistance and violence from communities

During a public health emergency, such as an Ebola outbreak, laws permit the authorities to disregard survivors' wishes regarding human remains [19]. The ERT has a clear public health policy: Those who are ill should be isolated within Ebola treatment centers (ETCs), and burials should be performed safely [32]. However, this policy is difficult to implement. The complex interaction of religious and cultural beliefs surrounding death is rooted in thousands of years of tradition [19]. Being prohibited from performing rites to ensure a deceased's safe transfer into the afterlife is a spiritual insult to the deceased's family and community [19].

Resistance to Ebola assistance was much more widespread and severe in Guinea than in Liberia or Sierra Leone [47]. The inhabitants of the forest region of Guinea (called '*forestiers*') are disdained by those of other ethnicities in the country because it is believed that their practices are opposed to the laws of Islam and Christianity [32, 48]. The problem was that ERT members were not local and were appointed by political opponents of local leaders [32]. The team members were viewed as outsiders who disrespected and undermined the power of local religious beliefs and treated bodies like 'faggots of wood' through biomedical interference [49]. Villagers became

hostile to these outsiders, who were never seen to understand (or were not allowed to understand) the deeper mysteries of life and the parallel worlds of life and the afterlife via rituals that were essential for securing protection, health, fertility, and social solidarity [50].

Ebola was a tragic disease that disrupted the social accommodations of the communities by requiring the isolation of the patients and biomedicalized burials. The issue attracted unwelcome international responses. Guineans began stigmatizing Ebola as an ethnic disease that affected only the Kissi or *forestiers* [48]. Those who would not accept that they had the disease were cast as immoral and were resented because of their connection to Ebola [32]. The resentment led to noncompliance and even violent resistance of health interventions. A week after Médecins Sans Frontières (MSF) constructed the first ETC in Macenta, urban youth attacked and threatened more than 50 new expatriates, arguing with them and saying that outsiders had brought Ebola into Guinea on purpose [32]. In fact, 26 Kissi villages in the Guéckédou Prefecture isolated themselves in June 2014 by cutting bridges, felling trees, and stoning ERT vehicles [51]. Within villages, conciliatory villagers were accused of being traitors, and those who assisted NGOs were also beaten [51]. Many delegations were assaulted, wounded, taken hostage, and even murdered. In September 2014, eight members of a delegation of doctors, politicians, and journalists were murdered and disposed of in a latrine in the Nzérékoré Prefecture. Survivors of the delegation were pursued [32]. Continued violence ranged from verbal to physical assaults inflicted on volunteers from the International Federation of Red Cross and Red Crescent Societies (IFRC), averaging 10 attacks per month beginning in July 2014 [52]. Because of villagers' resistance to the ERT, efforts to control the epidemic in the early stages were severely hampered.

Dignified, safe burials interventions from intergovernmental organizations

To interrupt transmission and control Ebola in the midst of active community transmission, immediate, safe, and dignified burials by trained teams with appropriate protective equipment were essential [35]. At the same time, the dead also had to be respectfully treated. The WHO provided an updated version of its interim guidance in October 2017 for medical personnel or anyone involved in the management of burial to share a protocol for conducting safe and dignified burial of patients who had died from an infectious disease such as Ebola or Marburg [53]. Before taking the corpse, the burial team should fully inform the bereaved family about the dignified burial process and respect their religious and personal rights as much as possible. The initiation of the burial process was set out clearly in the WHO guidelines, stating that “no burial should begin until a family agreement has been obtained” [53]. The 12 steps of the burial process are as follows:

Table 1. 12 steps of the burial process by the WHO guidelines [53].

- Step 1. Composing team and preparing disinfectants prior to departure.
- Step 2. Assembling all necessary equipment.
- Step 3. Arriving at home of the deceased: preparing burial with family and evaluating risks.
- Step 4. Putting on all Personal Protective Equipment (PPE).
- Step 5. Placing the body in the body bag.
- Step 6. Placing the body bag in a coffin where culturally appropriate.
- Step 7. Sanitizing family's environment.
- Step 8. Removing PPE, managing waste and performing hand hygiene.
- Step 9. Transporting the coffin or the body bag to the cemetery and provide respectful time.
- Step 10. Burial at the cemetery: placing coffin or body bag into the grave.
- Step 11. Burial at the cemetery: engaging community for prayers to dissipates tensions.
- Step 12. Returning to the hospital or team headquarters.

In 2006, the Pan American Health Organization provided a field manual for the management of human remains after disasters [54]. Because the immediate management of the dead is done by nonspecialists, such as local organizations and communities, this manual focuses on practical

recommendations, especially to promote proper and dignified management and to maximize the identification of the dead [54]. Although this manual was available at the time of several large natural disasters, such as the South Asian tsunami in 2004 and Hurricane Katrina in 2005, it could not be implemented or promoted during the 2014–2016 Ebola outbreak because of the lack of information about the management of the dead during an infectious disease epidemic. Ten years after the first version, the second edition was published in 2016 with the addition of a large section on infectious diseases [16]. Annex 6 in the document clearly indicates that untrained first responders should not be involved in the management of deceased victims of an infectious disease [16]. However, first responders and nonexperts can also be educated and trained by those who are experienced in handling a highly infectious disease for the correct management of human remains [16]. The principles that the body handler must maintain are as follows [16]:

- An understanding of the organism, the disease, and its modes of transmission
- Knowledge of the correct procedures for handling potentially infectious bodies, including the donning and removal of personal protective equipment (PPE)
- Self-discipline to follow the correct procedures without exception

Health promotion and communication interventions from the CDC and West African governments

Regarding viral hemorrhagic fever (VHF), including Ebola, the CDC issued interim guidance in 2005 for managing patients with VHF who were admitted to hospitals in the United States [55]. During the Ebola outbreak in West Africa, 1,450 CDC staff members were deployed to Guinea, Liberia, and Sierra Leone from the beginning of the response in July 2014 to the end of March 2016. They assisted the Ministries of Health in providing technical support for infection control

and health communication at the prefecture (Guinea), country (Liberia), and district (Sierra Leone) levels [56].

The CDC's response to the Ebola outbreak varied by country [56]. In Liberia, for instance, the organization issued a culturally sensitive burial protocol entitled 'Ebola Must Go: Bury All Dead Bodies Safely' in December 2014 [57]. This guideline encouraged people to call the national hotline number 4455 to report a death and alert the burial team to take the body for free burial [57]. It is questionable whether the guideline convinced people to stay away from the bodies of Ebola victims. Although the protocol asserted that "all burials will be safe, free, and respect the families" [57], there was no explanation of how burial teams would pay respect without touching the body. The efficacy of this protocol is unknown because there was no follow-up evaluation of the system. Nonetheless, the system itself seemed highly popular; according to a United States Agency of International Development report, nearly 1,000 people called the call center with queries during the first 2 days of operation [58].

The CDC put a great deal of effort into implementing health promotion and communications on the ground. Emergency risk communication specialists were included in the CDC field teams, charged with not only designing and disseminating accurate information, decreasing stigma, addressing rumors, and reducing unsafe burial practices but also responding to community needs [59]. To reduce resistance to safe burials, CDC staff in Liberia and Sierra Leone identified and promulgated culturally acceptable burial practices that met community needs [36, 60]. The government of Liberia designed a National Ebola Response Strategy in September 2014 and planned to increase the number of burial teams in the highly affected areas of Montserrado and the leeward counties [61]. An algorithm for the management of human remains and a decision

tree for contract tracing was designed but incompletely adopted in Liberia [62].

In Lofa County, Liberia, an area with some of the highest numbers of reported Ebola cases in West Africa, the CDC implemented a strategy to reduce the transmission of the Ebola virus in September 2014 [60]. In collaboration with the Liberian Ministry of Health and Social Welfare, the CDC placed a high value on transparency in activities and engagement with the community [60]. The ETC in Lofa County was built without high or opaque walls to reduce fear of the facility. In addition, family members were permitted to visit their loved ones by walking with burial teams across a fence or inside the ward while wearing PPE [60]. They could be present when their loved one was buried at a designated burial site and could hold grieving ceremonies according to local customs [60]. Engagement with the local population raised confidence and trust in response activities; villagers could request help to transport ill persons quickly to the ETC [60]. These initial efforts in Lofa and Montserrado counties were expanded nationwide [63].

The government of Sierra Leone designed a National Communication Strategy for Ebola Response in September 2014 in an effort to provide safe and dignified burial practices for up to 90% of suspected Ebola casualties by the end of December 2014 [64]. Additionally, the CDC and the Sierra Leone Ministry of Health and Sanitation assessed safe and nontraditional burial practices, cemetery management, and adherence to recommended practices by directly observing them [36]. Findings from the assessment were used by the Sierra Leone Emergency Operations Center to develop a national standard operating procedure (SOP) for safe, dignified medical burials on October 1, 2014 [36]. The SOP was designed to provide operational guidance during the Ebola outbreak and is described in the following instructions [36, 65]:

- In high-incidence areas, all deceased persons should be buried by burial teams within 24 hours, regardless of laboratory results.
- Because of limited laboratory capacity, it is recommended to swab only bodies of 1) suspected or probable Ebola victims and 2) those who have died from an unknown cause. There is no need to conduct swab testing for those who have clearly died from another cause or were Ebola positive.
- It is recommended to increase the number of burial teams in the country to 120 to enable each team to collect a manageable number of bodies, five or fewer each day, and to put on and remove PPE a reasonable number of times each day. Furthermore, coordination of burial teams across 14 districts is needed.
- To increase community acceptance of safe, dignified medical burials, it is recommended to make an important alliance with religious and traditional leaders in the community.
- Because additional Ebola deaths cannot be avoided given the magnitude of the ongoing epidemic, burial teams can perform safe community burials when space is available for additional cemeteries.

Social mobilization and community outreach interventions from NGOs

A number of NGOs were dedicated to controlling the disease on the ground. Of these NGOs, MSF and Samaritan's Purse were notable during the Ebola outbreak for their sacrifice and dedication. They were the pioneers who responded at the earliest stage of the Ebola outbreak while others were reluctant to respond or did not quite know what to do. A few days after Ebola was identified in March 2014, MSF opened an ETC in the town of Macenta, Guinea [32]. After Ebola patients had been identified in more than 60 separate locations across three countries—

Guinea, Liberia, and Sierra Leone—Bart Janssens, MSF director of operations, warned that “the epidemic is out of control” and asked the WHO to deploy the massive resources necessary to contain the epidemic [66].

Social mobilization and community outreach programs were considered key components of increasing awareness of the Ebola virus and educating people about changing certain behaviors and burial practices [67]. For example, when the Liberian government and the WHO implemented a pilot training program in Lofa County, NGOs such as MSF, Samaritan’s Purse, the Liberian National Red Cross Society, and IFRC conducted independent ‘train-the-trainer’ sessions for awareness outreach campaigns [67]. Through these programs, more than 700 Liberian health workers (70% of the county’s health workforce) were retrained to refresh their knowledge of basic infection prevention and control measures [68]. Additionally, they learned the heightened measures required for the Ebola outbreak to perform safe, dignified burials in the communities [68].

DISCUSSION

The need for a strategic approach to future disease outbreak

Although the governments, intergovernmental organizations, NGOs, and communities eventually coordinated with one another to control the disease, the Ebola outbreak resulted in heavy casualties. Widespread cooperation among stakeholders from various entities was inhibited by resistance, mainly from villagers, which seriously hampered the Ebola response in the early stages of the epidemic. The Ebola outbreak in West Africa demonstrated that even if scientifically effective and efficient methods are available, they are unlikely to be implemented successfully unless they are culturally and religiously accepted [37]. For example, even if the

WHO's safe and dignified burial guidelines considered 'culture', they acknowledged only Christian and Islamic traditions [53]. Public health is not just about governmental or organizational superstructure; rather, it must also have an impact on attitudinal and behavioral changes in the traditions and daily lives of the people of West Africa [69]. Thus, effective science and health communication, as well as community engagement tailored to the local circumstances, should be key strategies for successful outbreak control [70]. In addition, spiritual well-being should be considered as another source of happiness, in addition to three dimensions of health—physical, mental and social well-being—defined by WHO [71, 72].

The need for designing and implementing health communication theory framework

Figuroa suggested that theory-based frameworks, such as the ideation model and pathways frameworks, should be considered important tools to guide how research and communication activities are conducted [73]. Kincaid et al. presented the most recent version of the ideation model representing a metatheory of health communication toward 'a wide broad range of communication, social and behavioral change theories and their interrelationships' [75]. In this model, psychosocial variables, which influence health behavior changes and determine the practice of a recommended behavior, are grouped into three domains: cognitive, emotional, and social.

For community-based preventive programs, Manguvo and Mafuvadze proposed that traditional leaders also be assigned to monitor and implement preventive measures to halt the spread of Ebola [37]. As Manguvo and Mafuvadze described [37], when a disease outbreak occurs, health officials, traditional and religious leaders, and traditional and spiritual healers should jointly launch community-based awareness campaigns. These campaigns should specifically target all

types of leaders who have a strong voice and decision-making power that community members respect and follow. After the community leaders are well informed, they will be willing to educate people in their communities about the importance of safe burials. Christian and Islamic leaders can also potentially play crucial roles in educating their congregants on the importance of adhering to scriptural recommendations for how to deal with human remains in a way that minimizes infections [37]. For example, the book of Numbers 19:11–12 states that whoever touches the corpse of any person must purify himself with water to be clean, and Leviticus 21:10–12 prescribes that a high priest “must not go where there is any dead person”.

After education, each group of people (health officials, community leaders, religious leaders, and spiritual healers) should collaborate with one another to implement and monitor prescribed preventive measures, such as the proper burial of those who have died of highly infectious diseases in line with cultural and religious norms [37]. Community leaders will be able to judge the degree to which to adjust the elements of traditional burial practices to scientifically prescribed methods, and vice versa, to reduce the spread of the disease. Even if community members still have feelings of mistrust and hostility toward foreign health workers and NGOs, they will respect their leaders’ thoughts and eventually accept the coexistence of biomedicine and ethnomedicine. In brief, Table 2 summarized findings from results and discussion sections.

Table 2. Summary of findings.

- An afterlife is considered to be a continuation of a lifetime among Africans; washing and clothing the body for traditional funeral and burial rituals have been an indispensable way for Africans to show full of respect for the dead.
- A number of retrospective epidemiological studies found that traditional funeral practices were proven to be a major risk for the 2014–2016 Ebola outbreak in West Africa.
- It was found that there were gender differences in risk factors for Ebola transmission; paternal aunts or older women were main caregivers who prepare for traditional funeral and burial rituals, which caused that a much higher proportion of women than men were exposed to Ebola transmissions and died of Ebola.
- The WHO Ebola Response Team met strong resistance and violence in remote areas, ranging from verbal to physical assaults to murder when they tried to isolate patients or take dead bodies from their residences for preventing further Ebola transmissions due to a lack of understanding of religious, spiritual, and traditional beliefs in West Africa.
- After experiencing villagers' resistance, WHO, CDC, NGOs, and governments in West Africa began implementing health promotion and communications in the field and culturally acceptable dignified, safe burials.
- To prevent or control any infectious disease outbreaks in the future, it is essential to further design and implement the health communication theory framework.

CONCLUSION

Everyone wants to show respect for the deceased. This respect manifests itself in different ways across the world. Whereas developed countries encourage cremation, people in remote areas of

the developing world may still adhere to traditional burial rituals. The overall lesson learned from the Ebola outbreak in West Africa is that implementing standard biomedical protocols alone is not enough to control the disease in the earliest stage. Fear and the spread of misinformation about disease outbreaks are rampant in Africa, and a high level of distrust and hostility exists among African people toward foreign health workers. Thus, it is essential for these workers to have a full understanding of the cultures, beliefs, religions, traditions, and values of communities to design effective disease control plans. Safe handling and burial procedures are a highly sensitive issue for the bereaved family and community. To prevent trouble or conflict, every step of the burial process should be fully explained to the family, and none of the steps should take place until agreement is obtained. Without sacrifices and contributions from all stakeholders, local and international, successful control of the Ebola outbreak would not have been possible. While maintaining an enthusiastic spirit of sacrifice, it is time for us to strengthen our surveillance and preparedness in the event of another outbreak and design the theory-based framework further to supplement community-tailored communication strategies to save more precious lives in the future. When each of us understands and acknowledges the dignity and respect of the deceased in Africa, deadly infectious diseases such as Ebola will be successfully contained in the earliest stages.

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Supplement 1. Search strategy for PubMed, MEDLINE, Web of Science, and Scopus.

PubMed search term

(Africa[Mesh:noexp] OR “Africa, Northern”[Mesh:noexp] OR “Africa South of the Sahara”[Mesh:noexp] OR “Africa, Central”[Mesh:noexp] OR “Africa, Eastern”[Mesh:noexp] OR “Africa, Southern”[Mesh:noexp] OR “Africa, Western”[Mesh:noexp] OR Albania[Mesh] OR Algeria[Mesh] OR Angola[Mesh] OR Benin[Mesh] OR Botswana[Mesh] OR “Burkina Faso”[Mesh] OR Burundi[Mesh] OR Cameroon[Mesh] OR “Cape Verde”[Mesh] OR “Central African Republic”[Mesh] OR Chad[Mesh] OR Congo[Mesh] OR “Democratic Republic of the Congo”[Mesh] OR “Cote d'Ivoire”[Mesh] OR Djibouti[Mesh] OR Egypt[Mesh] OR Eritrea[Mesh] OR Ethiopia[Mesh] OR Gabon[Mesh] OR Gambia[Mesh] OR Ghana[Mesh] OR Guinea[Mesh] OR Guinea-Bissau[Mesh] OR “Equatorial Guinea”[Mesh] OR Kenya[Mesh] OR Lesotho[Mesh] OR Liberia[Mesh] OR Libya[Mesh] OR Madagascar[Mesh] OR Malawi[Mesh] OR Mali[Mesh] OR Mauritania[Mesh] OR Morocco[Mesh] OR Mozambique[Mesh] OR Namibia[Mesh] OR Niger[Mesh] OR Nigeria[Mesh] OR Rwanda[Mesh] OR Senegal[Mesh] OR Seychelles[Mesh] OR “Sierra Leone”[Mesh] OR Somalia[Mesh] OR “South Sudan”[Mesh] OR Sudan[Mesh] OR Swaziland[Mesh] OR Tanzania[Mesh] OR Togo[Mesh] OR Tunisia[Mesh] OR Uganda[Mesh] OR Zambia[Mesh] OR Zimbabwe[Mesh] OR Africa[tiab] OR Algeria[tiab] OR Angola[tiab] OR Benin[tiab] OR Botswana[tiab] OR Burkina Faso[tiab] OR “Burkina Fasso”[tiab] OR Burundi[tiab] OR Cameroon[tiab] OR Camerouns[tiab] OR Cameron[tiab] OR Camerons[tiab] OR “Cape Verde”[tiab] OR “Central African Republic”[tiab] OR Chad[tiab] OR Congo[tiab] OR “Democratic Republic of the Congo”[tiab] OR Zaire[tiab] OR “Cote d'Ivoire”[tiab] OR “Ivory Coast”[tiab] OR Djibouti[tiab] OR Egypt[tiab] OR Eritrea[tiab] OR Ethiopia[tiab] OR Gabon[tiab] OR “Gabonese Republic”[tiab] OR Gambia[tiab] OR Ghana[tiab] OR Guinea[tiab] OR Guinea-Bissau[tiab] OR “Equatorial Guinea”[tiab] OR Kenya[tiab] OR Lesotho[tiab] OR Liberia[tiab] OR Libya[tiab] OR Madagascar[tiab] OR Malawi[tiab] OR Mali[tiab] OR Mauritania[tiab] OR Mauritius[tiab] OR Morocco[tiab] OR Mozambique[tiab] OR Namibia[tiab] OR Niger[tiab] OR Nigeria[tiab] OR Rwanda[tiab] OR Ruanda[tiab] OR “Sao Tome”[tiab] OR Senegal[tiab] OR Seychelles[tiab] OR “Sierra Leone”[tiab] OR Somalia[tiab] OR “South Sudan”[tiab] OR Sudan[tiab] OR Swaziland[tiab] OR Tanzania[tiab] OR Togo[tiab] OR Togolese Republic[tiab] OR Tunisia[tiab] OR Uganda[tiab] OR Zambia[tiab] OR Zimbabwe[tiab]) AND (“Medicine, Traditional”[Mesh] OR “Funeral Rites”[Mesh] OR “Burial”[Mesh] OR “Cemeteries”[Mesh] OR “Embalming”[Mesh] OR “Mortuary Practice”[Mesh] OR “Bereavement”[Mesh] OR “religious practice*”[tiab] OR “spiritual coping”[tiab] OR “traditional medicine”[tiab] OR “indigenous medicine”[tiab] OR “ethnomedicine”[tiab] OR “funeral rite*”[tiab] OR “burial”[tiab] OR “funeral ceremon*”[tiab] OR “mourn*”[tiab] OR “bury*”[tiab] “cemetery*”[tiab] OR “embalm*”[tiab] OR “funeral”[tiab] OR “ceremonial behavior”[tiab]) AND (“Methods”[Mesh] OR “Social Behavior”[Mesh] OR “Health Services”[Mesh] OR “Delivery of Health Care”[Mesh] OR “Communication”[Mesh] OR “communication program*”[tiab]) AND (“Communicable Diseases”[Mesh] OR “Infectious Disease Medicine” [Mesh] OR “Hemorrhagic Fever, Ebola”[Mesh] OR Zoonoses[Mesh] OR “communicable disease*”[tiab] OR “infectious disease*”[tiab] OR Ebola[tiab])

MEDLINE search term

1. Africa, Western/ or Africa, Northern/ or Africa, Eastern/ or Africa/ or South Africa/ or Africa, Central/ or "Africa South of the Sahara"/ or Africa, Southern/
2. Attitude to Death/ or Bereavement/ or Funeral Rites/ or Mortuary Practice/
3. "Delivery of Health Care"/
4. Communication/
5. Health Services/
6. Social Behavior/
7. 3 or 4 or 5 or 6
8. Communicable Diseases/
9. Hemorrhagic Fever, Ebola/
10. 8 or 9
11. 1 and 2 and 7 and 10

Web of Science search term

TOPIC: ("Africa") AND TOPIC: (("Burial" OR "Embalming" OR "Mortuary Practice" OR "Bereavement" OR "religious practice*" OR "spiritual coping" OR "mourn*" OR "bury*" OR "cemetery*" OR "embalm*" OR "funeral" OR "ceremonial behavior")) AND TOPIC: (("Methods" OR "Social" OR "Behavior" OR "Health Services" OR "Delivery of Health Care" OR "Communication" OR "communication program*")) AND TOPIC: (("Communicable Disease*" OR "Infectious Disease Medicine" OR "Infectious disease*" OR "Zoonoses" OR "Ebola"))

Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC.

Scopus search term

(TITLE-ABS-KEY ("Africa") AND TITLE-ABS-KEY (("Burial" OR "Embalming" OR "Mortuary Practice" OR "Bereavement" OR "religious practice*" OR "spiritual coping" OR "mourn*" OR "bury*" OR "cemetery*" OR "embalm*" OR "funeral" OR "ceremonial behavior")) AND TITLE-ABS-KEY (("Methods" OR "Social" OR "Behavior" OR "Health Services" OR "Delivery of Health Care" OR "Communication" OR "communication program*")) AND TITLE-ABS-KEY (("Communicable Disease*" OR "Infectious Disease Medicine" OR "Infectious disease*" OR "Zoonoses" OR "Ebola")))