

**Ebola, Informal Settlements and the Role of Place in Infectious Disease Vulnerability:
Evidence from the 2014-2016 Ebola Outbreak in Urban Sierra Leone**

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Abstract

Often studies of vulnerability focus on the differential susceptibility of marginalized groups to the effects of disaster. In this paper, we consider how vulnerability is also associated with the characteristics of place, especially the social setting of the informal settlement. In this light, we consider specifically how the cultural, historical and political economic forces have resulted in increased vulnerability to Ebola Virus Disease (EVD) within informal settlements in Sierra Leone during the 2014-16 epidemic. Based on key informant and community member interviews and focus group discussions in two communities, we have found that increased EVD vulnerability could, at least in part, be attributed to a set of place-based social factors pertaining to “Community Beliefs and Practices” and “Structural Poverty and Low Socio-Economic Status”.

Keywords: disaster vulnerability, Ebola; epidemics, informal settlements, Sierra Leone

Introduction

The 2014-2016 West African Ebola Virus Disease (EVD) epidemic in Sierra Leone, Liberia and Guinea was both severe and alarming. By the time that the World Health Organization (WHO) declared the pandemic over, the three countries combined had recorded more than 28,600 cases and 11,325 deaths (Ripoll et al., 2018). The previous EVD outbreaks that unfolded in Eastern and Central Africa over the last few decades were largely limited to rural, sparsely populated and remotely isolated areas, all of which helped to intrinsically limit the spread of the virus. The West African EVD pandemic however was notably different because the virus was able to take hold in major cities, including informal settlement (or slum) areas in highly populated urban and peri-urban districts. The urban dimension of the pandemic contributed to the high mortality rates and in Sierra Leone alone, a UNDP report (2015) estimated that Ebola caused over 3,900 deaths.

The question then arises as to what it is about urban condition that contributes to rapid and extensive infectious disease spread?

Frequently, explanations of the urban dimension of disease outbreaks tend to attribute cause of disease spread to the high population densities of cities and particularly informal settlement areas (Muggah and Florida, 2020). High density is thought to make social distancing difficult, while the lack of access to water and proper sanitation measures inhibit the adoption of preventative measures, such as maintaining good hand hygiene in urban slum areas. Such explanations however tend to neglect how issues of urban density and the lack of infrastructure and services are in reality, place-based emergent phenomena predicted upon historical processes. As such, these types of explanations require greater consideration of how social, political and economic preconditions contribute to a context in which vulnerability to infectious disease spread is enhanced. Currently, explanations based on concepts such

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as “density” or “poor infrastructure,” serve as proxies for a whole set of other contextual factors that influence disease spread. Notably, without consideration of these contextual influences, the analysis of outbreaks, as well as the development of response strategies, may result in an inherent Western bias that impacts the effectiveness of response. This is seen for instance in an overemphasis on a command-and-control approach (Ali et al., 2022; Clark-Ginsberg, 2020) that privileges strategies of containment and control over the provision of care and treatment – even though the latter represents the primary concerns of the local people most affected (Farmer, 2020). In this light, we investigate the question of what made urban and peri-urban informal settlement communities in Sierra Leone particularly vulnerable to EVD infection. Our approach is to develop a place-based perspective on vulnerability that demonstrates how multiple types of vulnerability based on social, political and economic forces may converge in setting of the informal settlement. Our context-sensitive approach is meant to provide a more critical intervention in public health policy that focuses on both the social and material structure of informal settlements, rather than conventional approaches that tend to focus on the exclusively behavioural dimensions of outbreaks. Further, our analysis contributes to the literature by offering an alternative approach to humanitarian analyses which tends to adopt a static model of a disaster, that conceives a disaster as a punctuated emergency rather than acknowledging and investigating how discrete disasters are occasioned by chronic crises.

Although numerous definitions of vulnerability have been proffered by disaster researchers (Bankoff et al., 2008; Phillips et al., 2010), for the purposes of this paper, we favour a more general definition that highlights the idea that vulnerability is tied to the *potential* for harm or loss. We thus adopt the definition put forward by Kathleen Tierney: “the concept of vulnerability represents the potential for experiencing damage and loss; that is, vulnerability represents a condition or state that may or may not be actualized” (2014, p. 166). Vulnerability therefore involves the future possibility of harm to individuals, groups or communities and in this way is related to the notion of risk. Following Tierney’s (2014, p. 11) definition, risk may be thought of in terms of answering three questions: What can go wrong? How likely is it? And what are the consequences? Thus, vulnerability and risk are interrelated because the likelihood of something going wrong and experiencing certain harm and consequences, will vary with the degree to which the individual, group or community is made susceptible to the hazards within the particular setting they are situated. Although this understanding of vulnerability appears to adopt a future orientation, it should be borne in mind, that the future potential for harm will vary with how past, historically based influences, have contributed to setting the stage for a community to be vulnerable to disasters in the first instance. This is our rationale for proposing a place-based perspective to vulnerability. As such, a key issue that arises is the question of how broader social forces make a community susceptible to the effects of particular hazards, such as earthquakes, coastal erosion, landslides, toxic chemicals, and so on, and for our study, EVD exposure.

In light of the above, to gain a more comprehensive understanding of community vulnerability to the effects of a disaster will therefore require a consideration of the broader historical context of place (Molotch, Freudenburg and Paulsen, 2000). As such, the orientation we will adopt for this paper is in line with the recommendation of Corburn and Karanja (2016) who propose a relational view for the study of health in informal settlements. With the relational perspective “place is understood as having physical and social characteristics, but that these characteristics are shaped by and given meaning through their interactions with politics and institutions, with one another and, most importantly, with

the people living in a place (Corburn and Karanja, 2016, p. 259). Specifically, by adopting this type of analytical orientation, we investigate the place-based characteristics of informal settlements that increase their vulnerability to EVD risk.

We begin our analysis by providing a brief overview and discussion of different approaches to conceptualizing informal settlements and vulnerability. This is followed by a brief historical contextualization of the development of informal settlements in West Africa more generally, as well as a discussion of more specific factors that influenced the proliferation of informal settlements in Sierra Leone. We then provide a description of our study sites and methodology before moving towards an empirical discussion of our findings. In our discussion, we examine the place-based factors and themes that our empirical analysis has revealed with respect to the relationship of informal settlement communities and vulnerability to EVD. The final section contains our concluding remarks.

Vulnerability and Informal Settlements

Various formal conceptualizations of informal settlements are given in the literature. For the purposes of this paper however, it will be sufficient to simply define some of the key characteristics associated with these forms of settlement. Wilkinson (2020) notes several characteristics that distinguish informal communities from other types of settlement patterns: they are not formally recognized by the local government; residents do not have a secure land tenure that prevents them from being forcibly evicted; there are significant inadequacies in the provision of infrastructure and services; they are located on land less than suitable for occupation, and residents live in overcrowded and substandard dwellings. Citing a UN definition, Corburn and Karanja (2016) add other characteristics associated with urban informal settlements, specifically with reference to what they lack: durable permanent housing that would protect residents against extreme climate conditions, sufficient living space (more than three people sharing a room), easily accessible and affordable safe water in sufficient quantity, and access to private or public toilets shared by a reasonable number of people.

Based on this diverse set of informal settlement characteristics, it is not difficult to see how those residing in such areas face circumstances that make them vulnerable to various types of hazards in different ways. For instance, colonial practices in Freetown based on racial segregation forced informal settlements to be situated in hilly regions more susceptible to landslides or those areas in which stagnant pools of water would accumulate, thus leading to greater risk of exposure to mosquitos carrying the malarial parasite (Lynch et al, 2020). Geographer Susan Cutter (1996) notes that vulnerability cuts across different sectors and contends therefore that a proper appraisal of what makes a community vulnerable will require a consideration of: (a) the physical dimension: buildings, infrastructure, critical facilities; (b) the social dimension: vulnerable groups, livelihoods, local institutions, poverty; and (c) the economic dimension. To address vulnerability along these different dimensions would require adequate and appropriate data. However, Wilkinson (2020) notes that a defining challenge in tackling the problems faced in informal settlements is the dearth of data about them – both prior to, and during an emergency: “Due to their illegal or informal status there are often no reliable data about the number of people who live there or their health. For COVID-19 the environment for policymaking is therefore doubly uncertain: both the new disease and the context are poorly understood” (2020, p. 2). For this reason, the lack of contextual data on informal settlements may itself contribute to disaster and outbreak vulnerability because without a proper understanding of

the true situational circumstances, the development of more effective disaster and outbreak management plans is severely hindered. In this paper we attempt to address this deficiency, at least partly, through qualitative data obtained from informal settlements. Through the analyses of these data, we hope to shed some light on the contextual circumstances of life in informal settlements and the relationship of these to outbreak vulnerability.

Situating Informal Settlement Development in Historical Context

As mentioned, vulnerability, as a state of existence is not limited to the present or the future but is equally, and intimately, conditioned by the past. Yet, a proper appreciation of how vulnerability is socially produced is often hampered by the lack of adequate historical contextualization (Ali, 2002). It is worth noting in this connection that the historical emergence of informal settlements is itself a significant trend in relation to urban settlement patterns in the Global South (Sanderson, 2020). For instance, Endjala and Botes (2020) note that by 2030 the number of informal settlement dwellers is projected to rise to 2 billion. Thus, it is not surprising to learn that currently three-quarters of the urban population of Sierra Leone live in urban informal settlements (Sanderson, 2020), while in Freetown alone, there are 68 informal settlements (Conteh et al., 2020).

The tremendous growth in informal settlements that we see today is a dynamic process informed by numerous developments. Ezeh et al. (2016) identify several of these: the in-migration of people from rural areas and other city precincts, the conversion of peripheral and often undesirable urban areas into sites for informal settlements, the natural increase from higher birth rates leading to crowded conditions, the deterioration in the provision of urban amenities in other parts of the city and the amalgamation of smaller towns into larger cities without a commensurate growth in public infrastructure investment. This last factor involving state neglect in infrastructure investment is a particularly important factor as it represents the root source of many of the everyday challenges faced in informal communities mentioned previously, such as a lack of: serviceable roads, access to drinking water and sanitation facilities, waste collection, and reliable electrical power. The dearth of such amenities and services has direct consequences for mounting an effective outbreak response. For instance, the lack of serviceable roads in the hillside regions of Freetown made it extremely difficult for residents to transport the ill to ambulances or Ebola Treatment Units; likewise inadequate water and sanitation supplies as well as poor housing and shelter structures made it very difficult to adhere to physical distancing and hand-washing protocols – all of which contributed to the outbreak vulnerability in informal settlements. The current plight experienced by residents of informal settlements can only be understood if one considers the historical influences on community and place formation and it is towards these considerations we now turn.

Despite gaining independence from Britain in 1961, Sierra Leone continues to endure the lasting effects of colonization. This is especially true in regard to the establishment of dependency relationships and predatory capitalist practices. Beginning in the 1930s, capital-intensive, foreign-owned mining of diamonds and iron together accounted for over 90 per cent of the overseas earnings (Howard, 2017, p. 28). Repeatedly over the course of the colonial period, the British refused to finance basic infrastructure services such as water and sanitation to reach those areas where most Africans lived, while instead investing only in those infrastructure initiatives that would support resource and commodities extraction for the gain of private interests. Thus, for example roads were not built to provide public

service for those in cities or rural areas, but for the purposes of providing exclusive transport of resources and commodity in the service of private (foreign) capital (Corburn and Karanja, 2016). The negative consequences of such circumstances were further reinforced and amplified by problematic formal land use planning in many cities of the Global South that were established as the product of imposed colonialism. Lynch et al. (2020) note that often the design of cities was pursued in ways that exclusively benefitted the colonial elite with respect to the provision of services, housing and infrastructure, coupled with frequent restrictions on the urbanization of indigenous people. In the case of Freetown, the weak economic basis, coupled with a lack of local planning expertise and a weakened local authority, resulted in severe environmental stress, poverty and the inability to manage informal growth in the city's slum settlements (ibid).

Interestingly, land use planning in the case of Freetown was historically influenced by the city's response to another disease, namely malaria. In 1899, as part of the Malaria Research Expedition, Dr. Ronald Ross conducted research in the city that uncovered important elements of the malarial transmission cycle and the connection between the parasite that causes the disease the mosquito that serves as the vector (Lynch et al., 2020, p. 6). On this basis, he made certain recommendations that were to have a significant impact on future urban planning in the Freetown. The most influential of these was the recommendation to segregate British settlers from the indigenous population. As a result, certain parts of the city were well-serviced while others were woefully neglected and notably, it was the latter areas that eventually hosted informal settlements. The lack of institutional and resource capacity to respond to infectious disease outbreaks that resulted from colonial land use planning practices were exacerbated by later day developments, most notably, the emergence of a fragile state and civil war.

A study by Ogbonnaya (2015) found that within the context of urban Sierra Leone, there existed a definite link between the civil war, political instability and corruption with vulnerability to infection during the 2014-2016 EVD epidemic. This was largely due to the negative impact of the civil war, political instability and corruption on the ability of the nation state to provide adequate health care. In this light, the challenges associated with the increased size and density of informal settlements spurred on by the civil war were exacerbated by the poor state of the health care system in Sierra Leone. During the period of civil wars between 1991 and 2002, many hospitals were ransacked and used as hideouts and strongholds for rebel groups, while those that were not used for this purpose were burned to the ground (Rami, 2017). At the same time, the country experienced a mass exodus of trained physicians and surgeons who fled the conflict zones. Such devastation in conjunction with the post civil war state's reduction in the funding of public services turned health into a commodity and ultimately led to the collapse of public health in Sierra Leone (Azétsop et al., 2020, p. 11). This resulted in a situation in which: "the growth of private health institutions and the decline of public health institutions' performance, the urban poor and the rural population were condemned to access second-level and informal healthcare services" (ibid, p. 11).

By the time Ebola struck, the country only had about 13,000 community health workers – two health workers for every 10,000 people – with two-thirds of these lacking training in modern Western medicine (Lahai, 2017, p. 18). Furthermore, there was a serious lack of health care facilities – only 1,264 public and private health facilities, and 23 government hospitals for the entire country (ibid). Consequently, the health system in Sierra Leone during the 2014-16 EVD crisis was simply not in the position to mount an effective response to the crisis on their own. The implications for informal

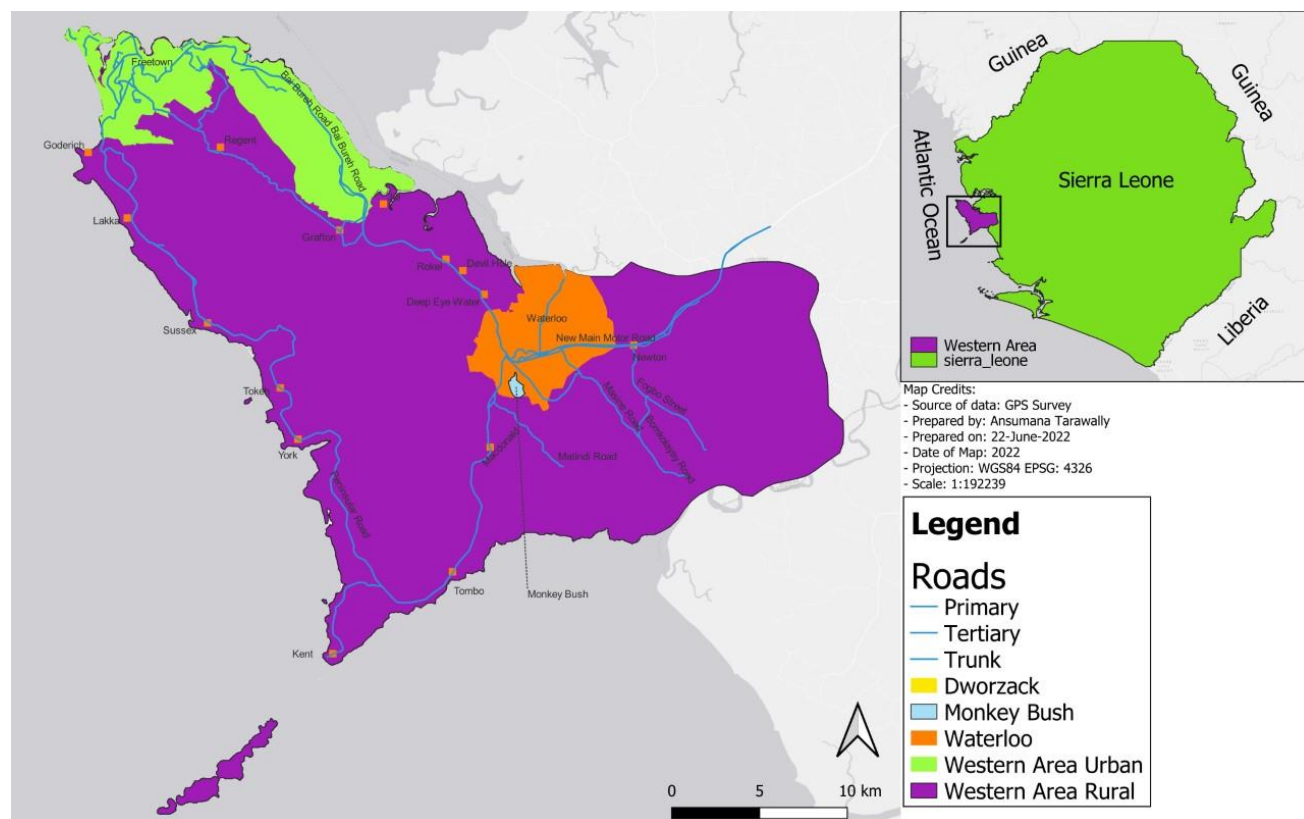
settlements during the outbreak were therefore particularly dire. In addition to the lack of physical infrastructure and services, the lack of an effective health system, collectively and significantly contributed to an enhanced and ensconced vulnerability of informal settlements to disease spread.

Description of study sites

The larger study on which the present analysis is based was conducted in May 2019, in three EVD affected communities (i.e., Dworzark, Waterloo/Monkey Bush, and Moyamba Junction) limited to the Western Area (see Figure 1).

The communities were purposefully selected because they had been among the “hotspots” recording high rates of daily Ebola infections in the period between August and November 2014. These sites were deliberately selected because there was limited research done on Ebola hotspots in this region in relation to exploring the real lives and encounters of people in these types of settlements. For the present analysis we focus on two of the three sites because they represent informal settlements in areas that are urban and peri-urban (as opposed to somewhat rural in character). The selection of one urban and one peri-urban settlement allowed us to understand how the experiences compared or differed among the people.

Figure 1: Map of Western Area of Sierra Leone Showing Dworzack in Freetown and Monkey Bush in Waterloo



Dworzark: Dworzark is an informal settlement in Freetown located less than 2 kilometers away from the central business district. It is a hillside informal settlement that is rapidly undergoing unplanned

urbanization. The community has an approximate population of 16,500 residents, of which 65% are under the age of 30, with an average household size of 7 (Cumming, 2012). It is highly congested with many residents experiencing poor access to formal healthcare facilities, water and sanitation services. The steep slopes characteristic for this settlement disrupt movement, with limited access to formal road construction. Most residents are tenants living in poor dwellings with corrugated iron sheet roofs and walls made of concrete blocks or cement and mud mixture. (Koroma et al., forthcoming). A small minority of squatters live in corrugated shacks at the lower and upper reaches of the hill. Towards the low-lying area are a few high-rise buildings and dwellings made of cement. There is a main road connecting the settlement with the rest of the city. The most common livelihood activities in Dworzark include petty trade, stone mining and motor bike transportation (Koroma et al., forthcoming). Our researchers were told that the infection first appeared in the informal settlement when a Dworzark resident visited the mining town of Sierra Rutile, where he interacted with his quarantined girlfriend. He started displaying Ebola symptoms after his return and only after having contact with his family. Family members hid him from contact tracers and became ill themselves.

Waterloo/Monkey Bush: Waterloo is the biggest peri-urban town in the Western area district of Sierra Leone with a population of 213,778 and an area size of 613 km² and density of 724.8 per km² (Brinkhoff, 2017). The settlement is located about twenty miles east of Freetown. It is a major transport hub linking Freetown to the north and the rest of the country. It is one of Sierra Leone's most ethnically diverse towns, as it is home to many different ethnic groups, many of who settled there due to displacement from the civil war. Owing to its rapidly unplanned expansion, a few pocket settlements have recently emerged including Monkey Bush which was an Ebola hotspot and therefore, the main center for this study.

Monkey Bush is a rapidly growing settlement near Waterloo in the Western Area Rural District. The area was previously known for roaming monkeys, but it has slowly changed into a human settlement especially after the civil war in 2002. Its rapid growth has been driven by migration pressures on Waterloo especially by people from rural areas who took interest in cultivating the area's vast landmass. This was in response to the expanding market for fresh vegetables and fruits in Freetown and Waterloo. As the settlement grew, it became a major source of casual labor for much of the construction work in Waterloo and elsewhere. Alongside poor housing, Monkey Bush lacks access to basic facilities such as piped water, health, sanitation and electricity which particularly affect women and children in the community. Over the years, the community has been prone to numerous diseases such as malaria, cholera and dysentery. It is one of the areas that was severely affected by the Ebola outbreak in 2014 to 2016 as many families and their loved ones were either lost to the disease or quarantined. As the community continues to grow, most residents are still engaged in agriculture and petty trading as their main source of income. Living conditions in Monkey Bush are similar to those in Dworzark with overcrowding and poor sanitation.

Our team was told that the first case of Ebola in Monkey Bush was a man who went for a funeral in Kenema to pay respects to one of his relatives. As an active member of the local mosque, when he returned to Monkey Bush, this person interacted extensively with the Muslim community. When he fell ill, his family hid him, but the disease had already spread amongst his family and friends, eventually resulting in the community outbreak.

Methodology

Data collection procedures

Data collection was pursued through a series of qualitative data collection approaches, including key informant interviews, individual interviews, and focus group discussions. These took place about three years after the end of the EVD pandemic in May 2019 and the data for our analysis are therefore based on participant recollections. We contend that this is not a severe limitation for the scope and purposes of the present study in light of Wilkinson's (2020) observation that a key aspect of disaster vulnerability is that the conditions or circumstances that contribute to vulnerability usually do not become apparent until problems appear and need to be confronted, or support systems fail. Thus, to a certain extent recall is always involved in post-disaster analyses. For our study, those vulnerability factors that were most salient in people's minds would more likely be retained and our research was directed at capturing these. Data were collected from different categories of participants. These were people either directly or indirectly affected by the EVD outbreak. A few people who had roles in the fight against the EVD outbreak were also included.

i. Key informant interviews: Five (5) key informant interviews were carried out in each of the two communities, making a total of ten (10). This involved collecting information from key people including community chiefs, local military/police commanders, heads of local health facilities, educational institutions, or the highest local governance actors within the locality. These participants were selected because of their direct or indirect involvement in the Ebola response.

ii. Individual Interviews: Thirty (30) individuals were interviewed per community, making a total of 60 interviewees overall. The participants included Ebola survivors, relatives of the deceased, caregivers, ambulance drivers, chlorine sprayers, community health workers, traditional birth attendants, security officers, community informants, contact tracers, local politicians, representatives of community-based organizations, and journalists.

iii. Focus Group Discussion (FGD): Two (2) FGDs were conducted in each community, one with the male and the other with female participants. Discussion participants had the same characteristics as those in individual interviews. However, participants were only allowed to contribute in one of the methods to enhance diversity. For example, a participant who took part in the individual interview, would not be allowed to participate in the FGD or vice versa. Each focus group comprised eight (8) participants with a total of sixteen (16) per community (8 males, 8 females). Overall, four (4) focus group discussions were undertaken in the two study communities.

Data transcription and analysis

Data collected were transcribed from Krio to English, with few others from Temne and Mende to English. Transcriptions were done by researchers from SLURC and Njala University. Specific letters and codes were assigned to participants for the purpose of identification and strict confidentiality. Analysis and discussion of data were done according to designed thematic order drawn from the data.

Ethics

The Human Participants Review Sub-Committee of the Office of Research Ethics at York University (Toronto) as well as the National Research Ethics Board of Liberia and Sierra Leone reviewed and approved our research protocols.

Key Factors That Made Communities Vulnerable to EVD

The coding and analyses of our qualitative data revealed three main though interrelated themes pertaining to the vulnerability of informal settlement communities to EVD. Due to spatial limitations however, we will focus on the first two, and will develop the third theme separately in a future paper. The first theme pertained to the very nature of community life within informal settlements and how everyday social life, interactions and beliefs played a role in increasing the risk of disease spread. We refer to this theme as “Community Beliefs and Practices”. Falling within this theme were the following factors: respect for family ties; washing and burial of dead bodies; and traditional healing practices. A second set of factors that increased the potential for disease spread was classified under the theme of “Structural Poverty & Low Socio-Economic Status” and includes such factors as: poor health care facilities and the necessity for mobility during the pandemic for economic survival, and overcrowded conditions. Third, a set of factors related to the theme of “Distrust and Misinformation” was identified in relation to community distrust of the government response as well as the role that misinformation played in contributing to the increased risk of disease spread, but as alluded to above, we do not engage with that here.

I. Community beliefs and practices

It has been noted by McFarlane and Silver (2017) that informal settlements are more than just sites and shelter, they are actual urban places with lives and activities that go on much like any other neighbourhood. The lived every-day experiences within the informal settlement is what contributes to the sense of community life that is engendered there, and it is these types of daily taken-for-granted activities that contribute to the cultural fabric of that setting. Since infectious diseases such as EVD are spread through interpersonal contact, we must consider how the cultural context may facilitate disease spread.

I (a) Respect for family ties

Ebola has been described as a “disease of social intimacy”, because it is mainly transmitted from infected patients through social interactions, or from sick relatives to their caregivers (Grépin, 2017). Caring for sick relatives was one of the means through which many residents got infected. Community members considered leaving their sick relatives to die alone in the care of doctors and nurses as inhumane. Above all, the fear of losing loved ones in the treatment centers where many people were dying was an important reason for sick persons to be nursed at home by family members. For many people, caring for the sick at home was much better than the treatment centers where health workers were overwhelmed by looking after many patients. Therefore, many took the risk to be with the sick during their dying days without having proper personal protective equipment. A participant at Dworzark explains:

“The belief that we should not tend to our loved ones when sick was a big fact many people failed to believe at first. Some were saying “How will I not care for my husband or child when sick”.

I (b) Washing and burial of dead bodies

Many people in Sierra Leone got infected through religious and traditional practice of washing and burying dead bodies. WHO (2015a) estimated that about 80% of cases in the country were linked to these practices. It was reported that Muslim worshippers particularly believe that burial rites cannot be completed without performing rituals like washing of the body. A proper burial rite for them is deemed as last respect for the deceased. Despite restrictions on washing of the dead during the Ebola, this practice was prevalent in our study settings. For fear of having their deceased relatives buried without being washed, some residents washed their bodies secretly at night before pronouncing them dead in the morning. Some even smuggled bodies into the bushes to wash and bury them discretely. As explained by a Waterloo/Monkey Bush community member:

“Our burial procedures also contributed to the spread of the virus because for some people, they will say this person is my loved one and I should be the one to wash and dress the corpse, which also contributed to the spread of the disease. This was because people were proud to say I was the one who washed and dressed my mother, father, husband or wife when they died, and many people contracted the disease this way”.

1 (c) Traditional healing practices

Traditional healers have long been established and embedded deeply within the culture and history of Sierra Leone. So entrenched in fact that, after the EVD outbreak, efforts were made by the government to recognize the traditional healers’ association as an important element of the health system. These efforts were made because it was recognized that poor access to public health facilities made traditional medicine and self-medication preferred options for many people, especially the poor, and that the government should therefore attempt to regulate traditional medicine and enhance safety during patientcare (WHO, 2015b).

Our study found that traditional healing was still being pursued in communities even after it was reported that some practices by healers ignored precautionary health measures and were contributing to spread of the disease. At Waterloo/Monkey Bush, these practices were known to be widespread with herbalists and traditional healers treating their patients without proper safety precautions. Many of them were reported to have accommodated patients in their homes from within and outside of their communities to proceed with treatment procedures. Many herbalists and their households were exposed to risk of infection because they had no means of detecting whether their patients had contracted Ebola. A senior health professional at Waterloo/Monkey Bush explains here:

“Traditional healing was going on even when we heard about the disease. A herbalist in this community died while healing a man; two of his wives and two of his children died just after he died”.

Stigmatization of those infected with Ebola forced some people seek help from traditional healers even when they met the case definition for Ebola. A former contact tracer at Dworzark explains:

“The traditional healers were having the notion that they would heal people with Ebola, but when they died of the disease, their followers would say it was due to a traditional curse. What they did not realize was that in their attempt to cure the sick persons through the traditional ways, the disease to spread in the community.”

II. Structural Poverty & Low Socio-Economic Status

Low socio-economic status has been identified as major determinant of health by many studies and observers (Marmot, 2007; Fallah et al., 2015; Farmer, 1996). During disease outbreaks, different population groups are affected, but those with low economic status are affected most severely. This assertion is consistent with our findings, which show that in the study locations that were Ebola hotspots, the number of residents with low economic status was significantly higher than the wealthy ones. In Waterloo/Monkey Bush and Dworzark, most residents were engaged in low-income employments like small businesses, farming, traditional healing etc., with only a few engaged in formal employment. Most respondents reported that high level poverty was a factor that forced them to go out in public places to earn a living despite restriction on movement.

For many residents, the symptoms of Ebola were akin to the daily health experiences they have had in the past, such as flu or malaria. As such, many chose not to believe what the true causes of Ebola were. Consequently, during the initial period of the outbreak, many residents ignored all safety precautions (such as avoiding physical contact with the sick and the dead) until the disease took a toll on the community. A female FGD participant at Waterloo/Monkey Bush gives a rationale for such neglect:

“Most people are uneducated in this community, hence the constant denial of the sickness irrespective of the information provided through the radio. Ebola had strange symptoms some of which were similar to malaria; that was difficult to comprehend.”

The low socio-economic status of those in informal settlements further compounded the vulnerable status of such individuals because it served as the foundational influence on the type of life chances possible. For instance, as will now be discussed, low socio-economic status influenced the access and type of health care that informal settlement community members could receive during the EVD outbreak; it influenced their patterns of movement, and in particular, economic necessity and the need to maintain a livelihood meant that many had to travel to do trade, thus hindering their ability to quarantine or self-isolate.

II (a) Poor Health Care Facilities

Service provision and utilization, especially healthcare deteriorated significantly during the Ebola epidemic. The government of Sierra Leone estimated that health service delivery in the country decreased by 23% during the outbreak (Government of Sierra Leone, 2015). The impact on the capacity of the country’s healthcare delivery was particularly severe due to a weakened health system. The health system struggled immensely to control the crisis due to a poor health infrastructure, and limited resources to fund the massive health operations required (Raven et al., 2018). The situation was further escalated by the government’s late response to the crisis and lack of accountability (Walsh and Johnson, 2018). The relative novelty of Ebola virus in the country, coupled with limited knowledge to manage it partly delayed the response (ReBUILD Consortium, 2016). Moreover, the response situation became dire when the country’s only specialist for viral hemorrhagic fevers Dr. Sheik Umar Khan succumbed to the disease during the early stage of the response in July 2014 (Raven et al., 2018). Death rates among health workers were high. By January 2015, 221 health workers in Sierra Leone died of Ebola (Government of Sierra Leone, 2015) significantly impacting the capacity of country’s health workforce.

In light of the above conditions, it is not surprising to learn that the communities in our study faced significant challenges in accessing functional healthcare facilities. Challenges included rough

spatial terrain in the case of Dworzark, and in some sections of Waterloo, including hotspot areas like Monkey Bush, where there was a complete lack of a public health facilities. Many participants expressed the view that the lack of health care facilities exposed them to risks by forcing them to seek care from more distant locations which themselves had limited experience and safety procedures. A female FGD participant at Waterloo expressed how frustrated she was:

“The health facility in this area is very poor. See Monkey Bush for example; since this community was established years ago, the community still lacks a government health center”

At Dworzark, many participants expressed that having only one health centre was a factor that exposed them to risks since the facility was over-stretched far beyond capacity, causing the overcrowding of patients. The situation was compounded by the poor road infrastructure which forced residents and families to carry their sick relatives to health facilities themselves, even when they were required to call for an emergency ambulance service. A participant explains further:

“Most of the homes were not easily accessible especially by vehicles or motorbikes and having one health center, not even a hospital in the entire community made Dworzark even more vulnerable to the disease. The health center was far from most houses and could not provide the space and services required. We never had immediate means of providing initial curative treatment for people infected”.

Despite these challenges, some people continued to visit health facilities when they fell ill.

II (b) Mobility during the EVD epidemic

In addition to the need to travel to receive health care, travel was also necessary for other reasons. During an epidemic, mobility facilitates disease spread, hence the recommended public health measure of limiting travel through quarantine and isolation. Yet, at the same time, those who self-quarantine or self-isolate must be cared for by others, and for this reason, immobilization may also ironically contribute to disease spread as well. This is especially true because EVD is most transmissible when the person is most ill and a person in that state is very likely to be non-ambulatory (unlike for instance in relation to COVID-19 where mobile non-symptomatic individuals could spread the disease). Thus, although it was likely that the transmission risk was highest for those caring for the ill or tending the deceased, the possibility for EVD to enter other communities through travel was still very real and significant, as seen for example by the entry of the disease into our study communities. Specifically, the Dworzark resident who visited his quarantined girlfriend in another town before returning home or the individual who attended a funeral of a relative in Kenema before returning home to Waterloo/Monkey Bush. These examples illustrate how vulnerability to EVD is also a function of the mechanisms that drive geographic spread.

Richards et al. (2015) notes the pattern of geographic spread of EVD involved spread through large jumps from town to town along the main road system, as well as spread into the interior that led to infections in isolated and disconnected villages where the disease was little noticed (and therefore not reported or acted upon), until it reached a larger town or market center. Such a “pendulum swing between roadside locations and buffer villages in the interior” (ibid, p. 5) may be understood if one considers the kin-based mobility patterns in West Africa more generally. As Zulu et al. (2016) observe, contrary to popular opinion, informal settlements are not homogeneous residential entities, but are in

fact highly dynamic and heterogenous settings because of high levels of population mobility. In part, this is a result of Wilkinson's (2020) observation that those in urban informal settlements often maintain strong ties with home regions that are sustained through frequent visits between urban and rural settings for work and social reasons. In addition, Azétsop, Lado and Fosso (2020) notes that the desperate may often travel to urban centres to seek help because of the lack of available social services and health facilities in the rural regions. According to Wilkinson (2020), the reasons behind this type of urban-rural "pulse dynamics" must be considered in developing more effective infectious disease control strategies.

The relationship of mobility and geography contributed to EVD vulnerability in both the Monkey Bush community of Waterloo and Dworzark, albeit in different ways. As mentioned earlier, Waterloo is a major gateway with transport links to the rest of the provinces. Travelers to and from the provinces often make a stopover at Waterloo to buy cooked food, fruit and vegetables. Some also transit to transfer to other vehicles for further travel to remote villages that have limited transport links. Apart from the transport links, Waterloo also serves as a major business hub where trade fairs take place, accommodating large gatherings from large towns and villages in the interiors. Despite being a small town, Waterloo accommodates a huge ethnic mix of people mainly from the rural peripheries of the north and southern regions of the country with different belief systems about health and healthcare utilization. A political representative from Waterloo explains further:

"If you can closely look at Waterloo community, you can observe it is a central location. If someone comes from the provinces or Freetown, he or she will arrive here first or go through the community, which made it vulnerable."

Unlike Waterloo, the situation at Dworzark was different. The community is a mountainous urban settlement with only a linear gateway used by vehicles, motorbikes and tricycles to transport people and goods. Despite this spatial limitation to transport, the community is used popularly by pedestrians from the mountains as an easy access to the city center. For lack of proper transport infrastructure, sick people from the top of the mountains and adjacent communities were carried on the backs of young men to health facilities, which contributed to spread of the disease. Moreover, constant interactions in pursuit of livelihoods in a low resource setting left many people vulnerable to the Ebola virus infection, as explained by a female FGD participant at Dworzark:

"We only have one road dividing the community. Most of our movements within the community are between houses and compounds and our houses are very close to each other. We are constantly in physical touch with each other which made this community to have an easy spread of the disease".

II (c) Overcrowded Conditions

Informal settlements have been typically found to be ten times denser than neighboring areas of the same city (Muggah and Florida, 2020). Within this setting, increased vulnerability to disease transmission is likely facilitated by several interrelated contextual factors. In association with the poor housing conditions in informal settlements, the clustering together of rooms limits the practices associated with basic hygiene including the regular washing of hands using soap. Further, under such conditions it is difficult to follow good respiratory hygiene practices as social distancing is simply not feasible because the cultural norm of large families makes it difficult to separate the infected from

eating and sleeping in the same room as other household members. Further still, it is difficult to assign separate toilet/shower facilities to the sick, since these are often communal.

Those in informal settlements often also face the difficult choice between facing a greater risk of catching and spread disease by going out to earn a livelihood and obtain food, versus the certainty of hunger by staying at home (Gully, 2020). Lastly, as Wilkinson (2020) observes, during the outbreak, the closure of schools may increase household expenditures and add further pressures on strained and already crowded households. All of these factors, collectively combine to increase the vulnerability to infectious disease spread. The influence of such factors pertaining to overcrowding and the potential for EVD spread was not unknown to the community, as illustrated by the observational remarks below:

Head of chiefs: *“The Dworzark community is growing every day and we presently have more than 40,000 people. You will not know how populated the community is until you sit downhill and observe the movement of people going down for their daily activities and in the evening, it would appear as if “they were driven from the city center to return to Dworzark”.*

Member of Parliament: *“There is a particular area in Dworzark which was seriously affected. In that particular area you will observe that the persistence of the disease was not so much about the lack of awareness but the way the areas is structured; it so congested that it is difficult for one household to be infected without the other...the way houses are clustered in Dworzark is a significant reason why the disease spread in the community...the manner in which people are clustered could have contributed because in a compound there would be many single rooms rented by different people and most cases they all share the same toilet, so this often make them vulnerable to any outbreak.*

Discussion: Situating EVD Vulnerability in Informal Settlement Communities in Context

Wisner, Blaikie, Cannon, and Davis (2004) note that disasters are reflections of social failings and inequitable processes that place some at risk of hazards while sheltering others. This is no less true in relation to understanding the EVD epidemic as a disaster. What makes the EVD epidemic somewhat different from other types of disasters, however, is that the causative agent of the disaster is a communicable virus that is contagious, in contrast to other types of disaster agents such as those associated with natural hazards (e.g., hurricanes, tornados, tsunamis, etc.) or “technological disasters” (e.g., industrial explosions, chemical contamination events, train derailments, etc.). The fact that the infectious disease agent can be transmitted from person-to-person makes the social dimension of the epidemic-as-disaster have a greater significance in comparison to other types of disasters, especially in regard to the continual perpetuation of the hazardous condition. Indeed, this unique quality of the epidemic-as-disaster renders unique states of vulnerability – that is, vulnerable states that depend on the nature and types of human interactions and social contacts (i.e., the chain of transmission) - within a particular setting or place. Thus, we can speak of the vulnerability of place with reference to this characteristic intrinsic to the spread of EVD.

In reference to vulnerability of place, Wilkinson (2020) notes that several types of vulnerability to infectious disease may arise in the setting of the informal settlement-as-place. In her useful taxonomy, Wilkinson (2020: 3-9) identifies the following types of vulnerability: 1) epidemiological

vulnerability (due to parameters such as: health conditions, age and gender); 2) transmission vulnerability (due to: density, social mixing, housing and infrastructures); 3) health system vulnerability (lack of intensive care capabilities and particularly problematic accessibility); 4) vulnerability due to the implementation of control measures (such as quarantine, lockdowns, self-isolation, travel bans, and the closure of schools, markets, churches, mass gatherings, food outlets and social spaces) which may dramatically impact on the ability of informal settlement residents to physically survive and earn a livelihood to support themselves and family and 5) systemic vulnerability resulting from overlapping of different types of risks and issues – for example the interaction of: illness, social concerns (e.g. violence, persecution, intimidation, criminalization), natural forces (e.g. floods, rain, heat), technology and infrastructure problems (e.g. accidents, fires, building collapse). In our analysis we have identified many factors that fit into this taxonomy but what has been of interest to us, is how to contextualize such factors, that is, to situate them in a social and political economic context.

As an entry point to contextualizing the itemized factors identified by Wilkinson (2020), it may be useful to begin with a historical perspective of past social and political developments that could influence the vulnerability of communities to physical hazards today. Tierney (2014) observes that the consequences of the disaster are not due solely to the magnitude of the physical event at the time of occurrence, but perhaps more importantly, the scale of the impacts may be influenced by the various forms of vulnerability already experienced by those at a particular site. We would extend this proposition by noting that in the case of EVD, different types of vulnerability were brought together in the setting of the informal settlement by various historical and colonial-based processes. The legacy of colonialism, including the imposition of Western modes of living have impacted the vulnerability to EVD in informal settlements in various interrelated ways. Thus, for example, as alluded to in our introduction, this study has revealed that EVD vulnerability was inadvertently amplified during the early stages of the outbreak response because of Western bias that did not give due consideration to the perhaps greater, or at least different emphasis, given in West African culture to the importance of respecting family ties, proper respect for the deceased (including that proper washing and burial rituals are performed), social etiquette (such as the importance of shaking hands and embracing during funeral rites), and culturally informed mobility patterns for trade and maintaining family reasons. These forms of cultural bias helped render the earlier phases of the outbreak response less effectual because the response was simply not in tune with the beliefs and practices of those affected, thus making them more susceptible to EVD transmission. Our findings thus corroborate the anthropological work done on the EVD response (see for instance a review of such work by Abramowitz, 2017).

Hirsch (2021) notes historically informed processes may also influence the development of certain types of risks and vulnerabilities associated with the EVD response itself. The most prominent example of this concerns how the long history of colonialism had perpetuated racial inequalities in ways that negatively impacted local people in the health care settings during the response. Hirsch notes that although not intentionally done by design, the international EVD response rendered a spatial organization in which there was a non-equivalence between the lives of mostly white international responders and mostly Black patients and local health care workers. Notably, no actions were taken in the international response to counteract this racial bias. The EVD response system differentiated between European-style treatment facilities in which mostly white health care workers had access to medical evacuation by plane or helicopter, whereas in contrast, their Black counterparts in locally run

facilities did not have such access. Consequently, a scenario developed in which, although it was the case that international and local healthcare workers were similarly exposed to the risk of EVD infection, the risk of death was greater for locals. For Hirsch (2021) this situation illustrated how places need to be understood as spaces that are shaped by and in relation to past antiblack violence in the forms of enslavement, colonialism and racism. In particular, the situation illustrates how racism translated into the inability of Black people to participate in placemaking, thus rendering them in a more vulnerable position. For the present study, Hirsch's observations reveal how the vulnerability of place during the EVD response was influenced by another dimension of the colonial legacy- namely the racial dimension.

Aside from cultural and racial bias, political economic factors also influenced EVD vulnerability. The most poignant aspect of this was the historical lack of government investment in the public health infrastructure – as mentioned, an already failing infrastructure that became further decimated by the civil war. The absence of a functional public health system may have led many to turn to traditional healers during the epidemic. Unfortunately, treatment from traditional healers in some cases led to heightened community transmission of EVD (Bah, 2017:61-62). As the outbreak response unfolded, the ineffectiveness of conventional approaches to curbing the epidemic spread was becoming increasingly evident. With this realization, novel community-based approaches to outbreak response predicated on a more active role for residents were adopted (Fallah et al., 2016). These quickly proved to be successful and as we argue elsewhere (Ali et al., 2022), such success was made possible because of the mobilization of the vibrant social infrastructure already existent in informal communities. As such, the effectiveness of such strategies was implicitly predicated on developing outbreak response protocols that took into account exactly those community-based vulnerability factors we have discussed in this paper. That is, developing outbreak response strategies that incorporated these factors in a context-sensitive way that was more acceptable to the informal settlement community-at-large.

Finally, in considering the two sets of place-based vulnerability factors that emerged from our field work analysis: (i) Community Beliefs and Practices and (ii) Structural Poverty and Low Socio-Economic Status, the former appears to be relevant to both formal and informal settlement settings. This is because the factors related to Community Beliefs and Practices – that is: respect for family ties, washing and burial of dead bodies and traditional healing practices – are likely to be universally accepted across the Sierra Leonean population more generally (while taking into account *ad hoc* variations due to ethnicity and culture in certain specific pockets of the country). On the other hand, the set of factors related to Structural Poverty and Low Socio-Economic Status – such as: poor health care facilities, patterns of mobility, and overcrowded conditions – may vary between the informal and formal settlement areas. This is because of the fundamental material differences between the two types of settlement. These differences are reflected in the set of vulnerability factors we have identified. Thus, as we have reviewed, informal settlements in our study areas either lacked health care facilities altogether, or those that did exist, severely lacked resources that a city hospital would more likely have (relatively speaking). Furthermore, as we have also discussed, much of the mobility of people in informal settlements was due to the need to travel to conduct business such as engaging in street trade in the city centre, whereas in formal settlement areas of the city, this type of mobility is less likely because of the differing nature of the engaged work (such as for example, jobs in the service industry, office work, retail, etc.). Lastly, as we have discussed, overcrowding occurs to a much greater degree in informal settlements relative to other parts of the city.

Richardson et al. (2017) note that many of factors related to suffering do not end once the “outbreak” is resolved. Many issues remain such as grief over the loss of family members, stigmatization and food insecurity. Providing forms of social protection – such as paid jobs – according to Richardson et al. (2017) will not only provide a source of income, purpose, and social and psychological well-being that can long outlast disease outbreaks. Such a strategy underscores the importance of addressing those place-based vulnerability factors related to structural poverty and low socio-economic status.

As a final point, it could be argued that on the basis of our study, those factors that uniquely contributed to vulnerability to infectious disease spread in informal settlements were more likely related to issues of structural poverty rather than culture *per se*. This was despite the fact that most international media attention sensationally focused on the ostensibly “exotic” cultural practices of Sierra Leoneans during the EVD epidemic, such as: bizarre healing practices, arcane funerary rituals, “secret societies” and eating “bushmeat” (Farmer, 2020:xx). In this light, our study suggests that future outbreak response should not focus exclusively on “culture” but should take into account matters related to structural poverty in relation to the provision of treatment and care.

Conclusion

Vulnerability to infectious disease should be considered as an emergent outcome of a more fundamental and underlying process that involves the dynamic interplay of a myriad of cultural, political economic and material factors. Specifically, the convergence of these factors may be facilitated through broader historical forces that contribute to the crystallization of a specific constellation of vulnerability-inducing factors at particular sites – such as in informal settlement areas. Hence, we may speak of the vulnerability of place to infectious disease. In our study we considered how these various types of vulnerability-inducing factors played out within informal settlements during the 2014-16 EVD epidemic in Sierra Leone. We identified and discussed two sets of such factors, namely, those related to “Community Beliefs and Practices” and “Structural Poverty & Low Socio-Economic Status”. These two sets of factors vividly illustrate how vulnerability to infectious disease is a complex, multi-faceted and processual phenomenon that subject certain places, such as informal settlements, to a unique set of challenges for those involved in outbreak response. In light of our findings, it may be argued that to build more effective outbreak response measures contextual issues pertaining to the vulnerability of place must be given serious consideration.

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Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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