

SLURC/DPU Action-Learning Alliance

Understanding urban risk traps in Freetown

MSc Environment and Sustainable Development
Practice Module 2018-19

POLICY BRIEF No 3: Exploring the Risk Accumulation Cycle of Fires in Freetown's Informal Settlements

Key points

- While data shows fires to be most prevalent in formal residential areas, it is likely that many cases of fires in informal settlements are unreported.
- Inadequate housing, caused in part by insecure land tenure, is one of the most contentious issues in Freetown. These issues can be seen as the root cause of fire risk in the informal settlements of the capital.
- Fires in informal settlements are often attributed to energy related issues including electrical faults and cooking fires. Energy poverty disproportionately affects residents of informal settlements.
- Adequate response to fires is weakened by limited resources both among public and private actors. Communities are often left to manage fire outbreaks independently, despite the best efforts of the National Fire Force.
- Merging knowledge and strategies among multiple actors including community groups can lead to a coordinated, cohesive response plan to mitigate fire risk accumulation.



Fire in east end of Freetown. Photo Credit: Abu Sorie, 2016.

Summary

This policy brief aims to explore the numerous factors that influence residential fire outbreaks in informal settlements. Emphasis is placed on the residents of informal settlements as they not only face more frequent fire outbreaks, but are also most vulnerable to the spread of fires. While data suggests that fires in Freetown are more common in formal housing areas, some reports show that they occur most frequently in informal settlements. This inconsistency points to the need to build visibility of the fire risk cycle in Freetown's informal settlements. The roles of and difficulties faced by response and recovery agents, including government workers and members of communities impacted by fires, are also examined, to understand how they can harness their capacities to overcome or work within existing difficulties which enhance the risk accumulation cycle of residential fires in Freetown.

Authors

Achilleas Vryniotis, Lokman Hadji, Xiaochen Cui, Yixuan Wang, Shuyi Liu, Pingzhang Luo, Kendra Haven, Juliette Ma

Exploring the Risk Accumulation Cycle of Fires in Freetown's Informal Settlements

Introduction

According to 2015 statistics from the United Nations International Strategy for Disaster Reduction (UNISDR), fires cause the largest economic and property loss of all prevalent disasters in Freetown (UNISDR, 2015). Despite their detrimental impacts, fire response and prevention is often under-prioritized and under-resourced, particularly in informal settlements. In addition, the predominant narrative of electrical theft as the root cause of fires in Freetown further undermines attempts at solutions. Instead, this policy brief argues that the fire risk cycle is best understood in a broader context of access to affordable and safe housing in Freetown.

A crucial step to successfully tackle the risk accumulation cycle of residential fires in Freetown is first to understand who is most vulnerable to fires, and the reasons for their vulnerability. As such, this document seeks to illuminate the real-life implications of these problematic housing dynamics and how they compound vulnerability for certain groups, particularly tenants, using the Cockerill Bay fire of April 2018 as a case study. Another necessary step in the process of successfully tackling risk accumulation is to clearly identify and understand existing barriers in prevention, response, and recovery. To this

point, the various actors within the fire risk cycle - including government bodies, NGOs, and community groups - must collaborate and merge their knowledge and capabilities in order to strengthen existing capacities, with the hope of delivering a long-term solution to Freetown's residential fire problem.

Fire triggers: energy poverty in the home

Issues of energy poverty are nothing new to Freetown policymakers. The National Fire Force has long recognised the danger in lighting and cooking practices as primary contributors to fires, in both formal and informal settlements (NFF, 2017). In many cases, fires can feed back into a cycle of energy poverty: generators providing stability, for example, can be lost in the flames. The causes of fires are often traced to electrical fault. However, with only approximately 9% of the Freetown population formally connected to the electricity grid supplying the city (as of 2011), many residents turn to alternative power sources for their homes, including candles or kerosene-based lighting, forged connections to a neighboring power source, and oftentimes, purchased connection through a landlord or neighbor (UNDP, 2012).

Access to electricity also varies in different sections of the same settlement; in Mafengbeh of Cockerill Bay, for example, some community members have opted to receive connection through a group fund. In this case, the community receives the money, which is then managed by the "14-men committee" - a community-organised authority that communicates with the chief in Cockerill Bay. Centrally managed access through community structures may offer a more convenient alternative to forged access, mitigating the prevalence of overloaded circuits and poor wiring causing fires.

Cooking areas are located both in and outside the home. In a fire in Mafengbeh in 2009, residents did not put out the charcoals after cooking with a charcoal stove and threw the charcoal out immediately after use. Safely storing cooking and lighting fuels, maintaining a constant watch on the stove while cooking, and only disposing charcoal after it has cooled are all precautions individuals can take on their own. Currently, only 26% of residents use firewood rather than charcoal in the home (RECP, 2018), marking a significant decrease from the last decade. In fact, landlords were instrumental in the shift from firewood to charcoal, highlighting their potential importance in improving fire practices. Having noticed the risk of smoke damage and fires to housing structures, particularly the flammable

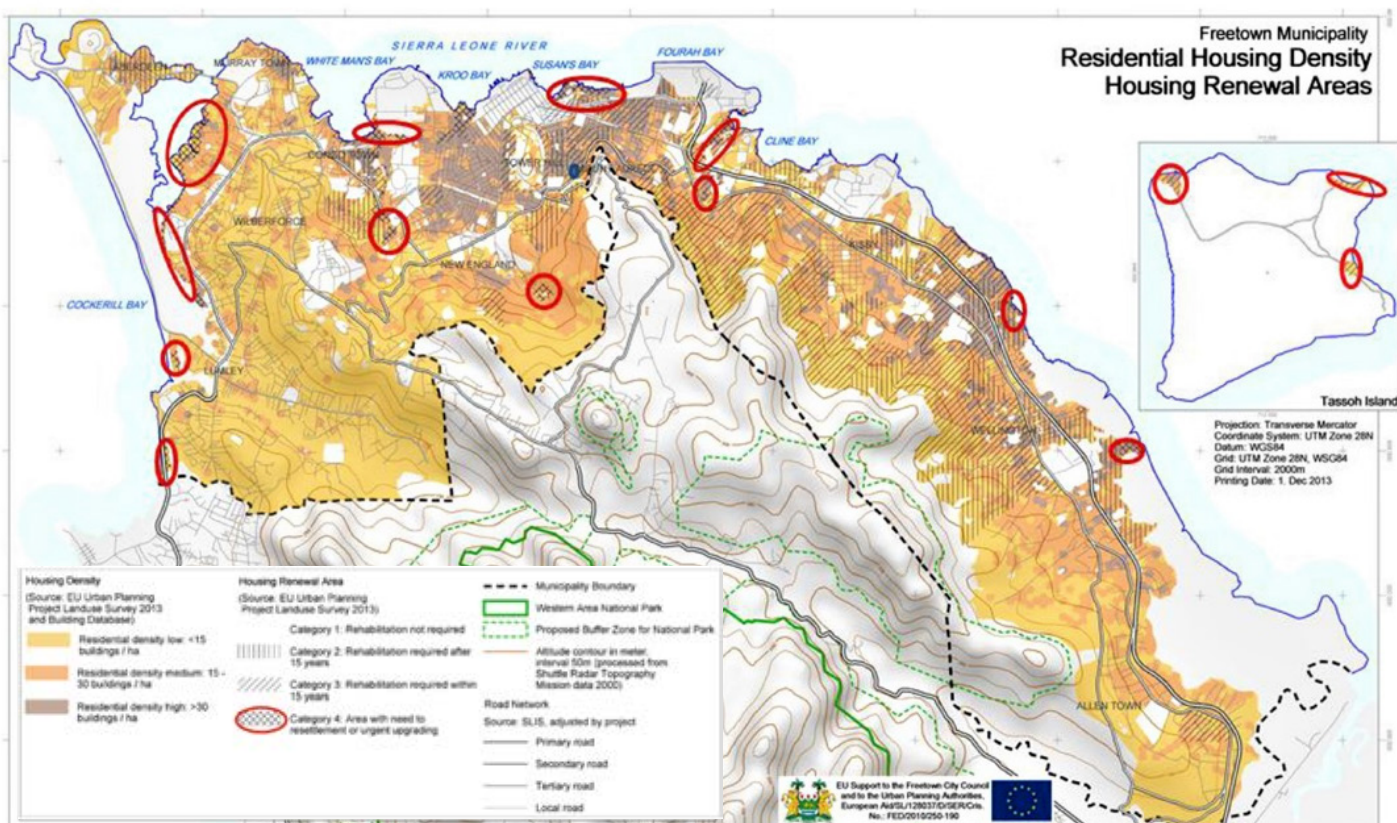


Figure 1: Fire Locations from 2006 applied to map from 2013 showing areas needing resettlement or urgent upgrading.

Exploring the Risk Accumulation Cycle of Fires in Freetown's Informal Settlements

structures of slums and informal settlements, they urged tenants to switch to charcoal (EFO, 2012). This brief will further explore potential avenues for fire risk education in Freetown, including the influential role of landlords, for whom fire prevention is a priority.

The foundation of the fires risk trap: housing in Freetown

Attempts to access electricity in Freetown exist in tandem with the city's rise in inadequate housing. As shown in Figure 1, the majority of fire locations occurring in 2006 correspond with areas of high density (more than 30 buildings/ha). In addition, red circles demarcate areas in need of resettlement or urgent upgrading, most of which have experienced fire events. The Electricity Offence Committee in Sierra Leone was launched to deal explicitly with dwellers who construct informal housing under the electric grid (Margai, 2016). In this way, informal settlements are unfortunately both invisible in the distribution of services and resources - such as insurance and affordable electricity - and visible in that they are disproportionately likely to be punished for seeking services, such as electrical connection.

The issue of inadequate housing in Freetown forms the foundation for the fire risk trap. The fact that less data focuses on informal settlements than formal residences highlights the invisibility of informal settlements. The formation of slums in the city dates back to British colonisation, with an increase after the Civil War (Cambayma, 2017). Population growth and weak economic growth have exacerbated the rise in slums: with five times the population than colonial times, land in Freetown has become increasingly scarce (Shack / Slum Dwellers International, 2010). In addition, the increasing population generates housing and land competition which leads to increased property and rental prices (UN Habitat, 2016). The housing deficit is currently 166,000, which could grow over 0.6% within 15 years (Hitchen, 2015). Moreover, the financing of housing in Freetown has been inconsistent and inadequate. The national government was the primary provider of housing in the 1960s and 1970s through a social-housing agenda aimed at clearing slums and providing decent housing for low-income segmen-

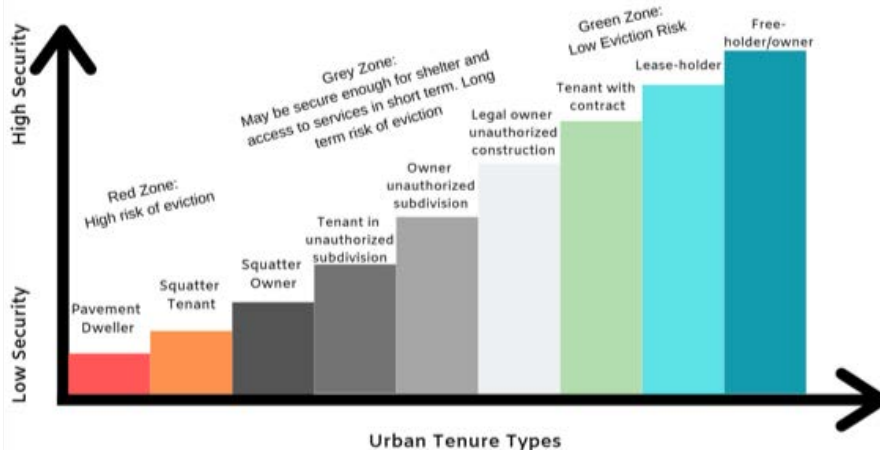


Figure 2: The Continuum of Urban Tenure Types and Tenure Security Zones. Source: UN Habitat, 2016.

ts of the population. Since most residents have limited financing, few could afford the \$100/month rent charged (Allen, 2017), which led residents to build houses with inexpensive, often disposable materials.

Issues of tenure in Freetown suggest that to date, there have not been any policies aimed at facilitating housing developing for the urban poor. The lack of capacity in land administration and management in Freetown has largely contributed to unequal land ownership structure as the non-recognition of informal settlements (both administratively and legitimately) continues to be the dominant narrative among the urban poor. Transactions of urban land (including negotiations of informal settlement boundaries) are managed by The National Ministry of Lands, Country Planning and the Environment. However, because there is no functional cadaster (an official register detailing ownership, value, and occupancy of land) in Freetown, this makes surveying and registering homes in informal settlements difficult (DAP, 2018). This has also led to single land purchases being sold to various owners. Ultimately, this land grabbing has forced the urban poor into slums while increasing the number of informal settlements. Even in cases where land titles are issued and registered, such transactions may not be recorded or updated - further showcasing the difficulties the urban poor experience in their integration to the city (Ibid, 2018). It is also important to note that there are different tenure forms that exist within a continuum. Referring to Figure 2, tenure can be classified into red, grey, and green zones - with the majority of Freetown's informal settlement dwellers falling under the red and grey zones. Land rights may also not distinctly fall into one category and may overlap (UN Habitat 2016).

A considerable proportion of land in Freetown is unsuitable for safe housing, including the coastline areas of Cockle Bay, Susan's Bay, and Portee-Rokupa (Leong et al., 2018). Land reclamation through banking, the process of constructing homes increasingly close to the sea, is prevalent in such areas. The formation of dense housing including through banking can increase the risk of fires spreading through the area. Residents and newcomers often attempt banking to become landlords, further illustrating the insecurity that tenants feel even with the opportunity to continue renting elsewhere. In fact, some residents feel banking actually intensifies eviction threat, and many think that forced relocation by the government would decrease if the process were to stop (Leong et al., 2018).

Certain characteristics of informal settlements lead to the prevalence of fires, like flammable materials, high density, and lack of roads in the neighbourhood. According to the UNFPA census (2017), houses in Freetown use easily combustible building material, like thatch and tarpaulin for roofing and wood for flooring, which increases the risk of fire. In the event of a fire, the congestion of houses also hinders the ability of firetrucks to reach the site (Campbell, 2017). In Susan's Bay, for instance, the high density of housing means that most fire incidents cannot be dealt with in time (MLCPE & FCC, 2014). Inadequate road networks exacerbate the problem of inconvenient transportation for firefighting.

When thinking about the economic losses due to a fire, it is critical to consider the livelihoods of the dwellers. In addition to the assumed damages to homes, residents can lose passports, licences, application forms or other essential documents vital in securing access to land.

Exploring the Risk Accumulation Cycle of Fires in Freetown’s Informal Settlements

In addition, many informal residents also belong to the informal economy as traders and street vendors and maintain shops in their homes selling food, cloth, tarpaulin, and wood products (all of which are highly flammable, thus likely to be destroyed). The enumeration process is therefore crucial not only to understand affected groups, but to document property loss. In Cockle Bay, post-accident interviews indicated that most of the households affected lost not only personal possessions but machines and items used to make a living, such as bikes, sewing machines, and small shops in their houses (Leong et al., 2018).

Thus, fires not only occur more frequently in informal settlements, but they may come with greater economic loss for poor residents given the nature of their livelihoods.

Case study: Cockle Bay fire of 2018

Cockle Bay is an informal settlement along the west coast of Freetown. The land and housing conditions reflect many of the key challenges in informal settlements, including overcrowding and the threat of eviction, all of which are exacerbated by the temporary land tenure system. Banking represents a particularly contentious issue for

dwellers in Cockle Bay: in addition to developing their own

bylaws to prevent it, the community has begun to advocate for a physical wall that would inhibit new houses being built past a certain point. The proximity of the houses to the seafront introduces risks of floods, fires, and poor sanitation. Most buildings are temporary structures without foundation or with low-level foundation. Preventing banking is difficult, as dwellers tend to think the use of stone and cement makes Cockle Bay one of the safest places to build new structures.

The fire in Cockle Bay started in the Kola Tree neighborhood in the early morning of Wednesday, 25 April 2018 (Allen, 2018). It affected 97 people, with widespread property damage and livelihood loss. The flames were contained by burying them under the collapsing structures. While the fire brigade arrived to assist the residents in putting out the fire, no other external intervention was able to help in response, except the team from the Development Planning Unit (DPU) at University College London and the Sierra Leone Urban Research Centre (SLURC). One of the first actions of the DPU and SLURC was to conduct an enumeration process to determine who was affected. The survey of victims was then handed to the Federation of the Urban and Rural Poor (FEDURP), which helped provide

temporary shelter. The likely cause of the fire was an electrical issue. In the area affected, 34 families were using two metered connections for electricity, highlighting rampant energy poverty in the community.

The figure below compares the fire accidents and conditions of Cockle Bay and Susan’s Bay, and offers several issues for closer examination, including response capacity and the critical role of community organizations.

A lack of external support for small disasters in informal settlements is common. Due to the limited resources of governmental and non-governmental institutions, priority has been given to severe disasters in the city. For instance, following the 2015 fire in Susan’s Bay, only 144 out of the 2048 victims received NGO assistance (Allen, 2018).

With insufficient external support, the responsibility to respond falls on the local community.

The fire in Cockle Bay reminds us of the systemic issues concerning the informal settlements and invisibility of certain groups in the city, like tenants. Initial estimates speculated that only 20 people were affected, but further collaboration with local communities revealed 97 were affected, with 80% being tenants and a third being children (Allen, 2018). This affirms how specific groups, particularly tenants and children in households are

A comparison of recent fires in Cockle Bay and Susan’s Bay		
	Cockle Bay	Susan’s Bay
Time	April 25th, 2018	April 3rd, 2017
Location	Cockle Bay, Kola Tree	Port Loko wharf in Susan’s Bay
Scale:	Eight compounds in a small area of about 100 square meters.	Nearly half of the Susan’s Bay area.
Casualty:	97 people were affected by the fire.	2048 people were affected by a large fire.
Direct Cause:	Possible electrical fault	Cooking fire
Building materials:	Corrugated iron sheet	Corrugated iron sheet
Community aid and roles:	<ul style="list-style-type: none"> The DPU/SLURC team - enumeration The Federation of the Urban and Rural Poor (FEDURP) - supply and support provision The Community Based Disaster Risk Management Committee - supply and support provision The Office of National Security (ONS) - identification of fire causes 	<ul style="list-style-type: none"> The national Fire Force - identification of fire causes The police office - shelter provision Limkokwing University of Innovation and Technology - supply provision
Land use:	Informal residents	Mix commercial with residential areas, and informal residents
Residential Density:	Majority mixed medium and low residential density (<30 buildings/hectare)	Majority of high residential density (> 30 buildings/hectare)
Road network:	Secondary and tertiary roads	Primary, secondary and tertiary road

Table 1: A comparison of recent fires in Cockle Bay and Susan’s Bay. Sources: Allen (2018) & Leong et al. (2018).

Exploring the Risk Accumulation Cycle of Fires in Freetown's Informal Settlements

Vulnerable Populations

Although more of a small-scale risk, fires present a severe threat to Freetown's urban poor whether they occur at the household or community level. From the environmental justice perspective, it is evident that certain characteristics make particular groups disproportionately exposed to environmental hazards. A number of variables such as age, gender, household size, and health status make certain groups more vulnerable to fires than others. According to the UN International Strategy for Disaster Reduction (UNISDR), vulnerability is defined as "the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard" (UNISDR, 2009). Vulnerability is a multi-faceted term that encompasses various aspects including physical, social, economic, and environmental factors.

Tenants, primarily women and the elderly, as well as children living in informal settlements, are among the most vulnerable groups. Since women are primarily responsible for cooking in the home, they are highly exposed to indoor air pollution from use of dirty fuels. Additionally, younger children who stay indoors and children who are carried by their mothers while cooking are also exposed to pollutants. In fact, studies indicate that children under five are the most vulnerable to pollutants from cooking fuels (Owili, Muga, Kuo, 2017). Indoor air pollution can cause premature deaths as a result of acute pneumonia and lower respiratory infections as well as other health impacts like impaired lung function (Ibid, 2017). Moreover, among the energy-poor, families will try to reduce fuel use by cooking less food (in some cases cutting down to one meal a day) and/or shifting to faster-cooking less nutritious meals (Satterthwaite, 2017). It is clear that energy poverty has extensive negative impacts on tenants even prior to fire outbreaks.

Due to the significant housing vulnerability in informal settlements, reconstruction of houses can take a very long period. In fact, houses that were destroyed in a Susan's Bay fire in April 2016 were still being reconstructed a year later in 2017 (Lacroix, 2018). This makes tenants even more susceptible to other urban risks - especially flooding. For tenants who typically are not concerned about the rain season, flooding becomes a huge concern since roofs are

customarily the first part of the home that is taken down to limit the spread of fire. Due to the lack of funds and materials, many tenants are not able to rebuild a solid roof to prepare for rain season (Ibid, 2018). Furthermore, after fires occur, safety becomes a serious concern, especially among women and children. In an interview with a woman from Susan's Bay, she revealed her door had been destroyed in a fire meaning she was not able to lock the doors in the aftermath (Ibid, 2018). As a result, it became easy for other dwellers to come into her home and she became extremely concerned for the safety of her family.

Although tenants have a higher vulnerability of fire risks, landlords that live in informal settlements are also highly affected in the aftermath of a fire outbreak. While figures may vary across the city, most landlords renting homes in Cockle Bay on top live in Cockle Bay. Because of the relocation of tenants after fires, landlords can lose a large part of their income from renting. In an interview with a woman who was a landlord in Cockle Bay, she described having approximately ten tenants prior to a fire outbreak, but this number reduced to three in which she was letting them stay for free after the outbreak occurred.

Moreover, not only do tenants suffer livelihoods and property loss, there are also physical and emotional health consequences associated with fires. Even if dwellers are able to escape, fires can leave residents seriously injured and disabled. Recovery becomes a great challenge to dwellers especially when there is inadequate treatment and/or lack of rehabilitation.

Children living in informal settlements are at high risk of experiencing injuries from fires and other household activities associated with energy poverty due to their physiology and limited ability to perceive and respond to danger (Kime-mia and Niekerk, 2017). An observational study of trauma and injury of Connaught Hospital in Freetown indicate that burn injuries were most common among children (Bundu et al., 2018). Although burn injuries constituted only 5% of all hospital attendances, 15% of children were affected from burn injuries. Traumatic events like fires can have long-term psychological impacts. However, emergency care capacity in Freetown is very limited and was signifi-

cantly disrupted by the Ebola crisis (Bundu et al., 2018).

In the aftermath of a fire, tenants can be left in highly vulnerable position. Although improving medical and emergency care services is important in the response and recovery phases after a fire, they are not always available, especially for those living in informal settlements. Therefore, developing support groups and support systems for affected dwellers is vital as they return to normal life. Identifying and communicating the needs of community members to relevant stakeholders can better facilitate support for vulnerable groups. Providing space for dwellers can share their experiences in fire incidents with other community members and stakeholders can empower affected residents to exchange ideas and take action to enhance fire safety in Freetown's informal settlements.

When considering the needs of the most vulnerable in regards to fire dynamics, it is vital to consider that the socioeconomic conditions that shape the lives of the urban poor are not immediately changeable. Therefore, it is key to strengthen capacities among the dwellers, particularly those who are especially vulnerable. A comprehensive response plan that is shared among actors, and which covers hazard monitoring, immediate response, and recovery options immediate enables dwellers to better prevent and respond to fires.

Response and Recovery

Response to and recovery fires are interrelated processes: a coordinated response will aid recovery, and a coordinated recovery, in turn, will help prevent reproduction of the risk cycle. While both processes attempt to interrupt the risk cycle of fires in Freetown, existing challenges are rendering them unsuccessful.

Residential fires continue to spread through informal settlements before they are stopped, and as victims attempt to recover over time, they become more vulnerable to further risks.

As seen in Cockle Bay, the main issue in response and recovery is a lack of funding and resources, both in the National Fire Force and among NGOs. In addition, actors involved in fire response tend to under-prioritize and/or misunderstand the prevalence of fires in comparison to other disasters. This results in incidents recei-

Exploring the Risk Accumulation Cycle of Fires in Freetown's Informal Settlements

-ing less attention than they should, as they are seen as a lesser priority in comparison to other disasters. These existing problems in response and recovery compound the inherent difficulties of dealing with a risk accumulation cycle as multidimensional as the fire risk trap.

One community member in Cockle Bay noted in an interview that many NGOs see Cockle Bay as an area highly prone to many risks. He went on to note, however, that in reality fires are the only truly common risk in Cockle Bay. While it is true that risks such as flooding are prevalent in Cockle Bay and can actually compound the impacts of a fire, the interview suggests that fires are the most commonly perceived or felt risk by the community. This type of generalization, reflects an inconsistency between communities and the actors responsible for responding to fires, further fueling the risk cycle. Nonetheless, despite the current difficulties, existing capacities can be harnessed to improve current response mechanisms. For example, a potentially promising solution for response and recovery is the merging of knowledge, abilities, and resources between (and amongst) government bodies like the National Fire Force (NFF), local community groups, and NGOs, in order to strengthen response and recovery attempts.

Immediate Response

Direct response to fire incidents is difficult for its main actor, the NFF, especially when residential fires occur in the city's informal settlements. The largest problem in direct response is time delay, and there are multiple reasons for this (SLURC, 2018). As previously mentioned, inadequate road networks combined with traffic congestion cause a lack of accessibility to the site, delaying the response time of the NFF. A successful immediate response to contain the spread of a fire is therefore unlikely, since dwellers, community groups, and any active NGOs lack the necessary resources to put out fires. Another major problem is the lack of functioning fire hydrants: according to local sources, only two hydrants in all of Freetown can function simultaneously (Gooding, 2017), further increasing delays as fire trucks have longer distances to travel in order to access water. Upon reaching the fire, without piped water or a fire hydrant, the immediate focus is on stopping the spread. Sometimes, this

can mean knocking down the site of the fire and the surrounding houses. Thus in the case of a residential fire, it is not only the initial site in danger of destruction, but all houses nearby.

Additionally, the fact that the NFF became the responsibility of the Ministry of Defense and left from the authority of the Freetown City Council, systemic problems are posed for the NFF and Freetown itself. Being part of a national body and not a local body reduces the efficiency and suitability of the NFF in local scenarios. In other words, because Freetown lacks the authority and capability to adapt its fire force to meet local needs, its position in the face of fire incidents is disadvantaged. Furthermore, the NFF is one of the least funded departments of the Ministry of Defence (Karbgo, 2017) and its firefighters are under-insured, often having to cover health costs by themselves (DeVries, 2016). This creates an unfavorable situation in which those who are responsible for dealing with fires are themselves vulnerable, under-resourced, and disadvantaged, a fact which hinders direct fire response. This situation depicts the existing reality that those with the most capacity of the immediate response to fires (NFF fire fighters) are victims of a systemic disadvantaged position, which hinders their capability

to immediately respond to fires. Lastly, because funding for the fire department is centralized nationally, this means that the city lacks authority to increase funding and manage the fire departments of Freetown. Hence, the role of decentralized community organizations are all the more important in response.

Enacting A Community Plan

Community-based organizations and independent federations - such as the Federation for the Urban and Rural Poor (FEDURP) - can play a crucial role in all phases of a fire, from prevention to immediate response and long-term recovery. They also offer crucial insights in knowledge sharing that could lead to a coordinated, multi-actor response plan. Research has shown joint initiatives carried out by residents and city council or other public agencies to be particularly effective.

There are a myriad of community and civil-society actors lending to support to Freetown dwellers: FEDURP, for example, came out of the multi-year project by Y Care International that provided training and support for young people in Freetown's informal settlements, while also advocating for policies that consider the needs and rights of people living in slums (Y Care International, 2013). The end result included a national network of women's savings groups. In addition to



Figure 3: DPU on the site of the April 2018 Cockle Bay fire. Source: Leong et al., 2018.

Exploring the Risk Accumulation Cycle of Fires in Freetown's Informal Settlements

those of the Federation, local savings groups (Osusu) are women-led, include about 20 people, and offer weekly to monthly collections depending on the group (Leong et al. 2018). Some communities have also opted for small leadership committees that represent the diverse neighbourhoods within a settlement, discuss issues between the community, and bridge communication between dwellers and the chief or relevant authority. In one example of the need for effective resource and role allocation, the YMCA in Freetown ran out of resources in aiding victims in Susan's Bay before the Cockle Bay fire. Communication and collaboration between partners will mitigate the problem of resource shortage (Leong et al. 2018).

This suggests that, with the most knowledge of and connection to the local population, community associations are best suited to conduct awareness campaigns around various prevention efforts.

After prevention, the next step of a response plan is hazard monitoring; community-led efforts in hazard monitoring have also proven effective (Allen, 2018). Community groups, including designated leadership committees, can help build local capacity to detect potential risk factors, such as poor wiring and overloaded circuits. Building this capacity at the community level is especially significant given that families may hesitate to approach landlords or government agencies with concerns about risks in the home.

In the event of a fire, residents may immediately seize their most valuable possessions to take outside. However, reports of stolen possessions in the aftermath of a fire are common (Leong et al. 2018). Residents of Cockle Bay have

also indicated the lack of a designated evacuation point in the event of a fire outbreak. Thus, it could be helpful to establish a clear assembly point for family members so that they may find each other as quickly as possible, and to designate roles in response groups that arrive to the scene, including someone to stand by or relocate any salvaged possessions from affected households.

Following a fire outbreak, enumeration is key. This is something the community can help coordinate. Given that certain groups, such as children, are often unaccounted for when measuring the impacts of fires, a predetermined enumeration process would help build visibility of those most affected, and in turn, could lead to a more community-specific response mechanism.

Lastly, long-term recovery is key to preventing risk accumulation. Many fire victims in Freetown stay with families and friends before finding new housing, and it can take years to recover certain items that cannot be recovered via donations, like identification, livelihood possessions, or even a new bed (Leong et al. 2018). While savings groups would not be able to make up for the entirety of savings and livelihoods lost in a fire, they can offer a form of financial support and resilience.

They also create space for members to form relationships and discuss housing concerns, as they include a mix of landlords and tenants. In settlements where participation in savings groups is low, one way forward is for community leaders, relevant NGOs such as PLAN International, and FEDURP to actively educate dwellers on the opportunities available. Increasing communication and collaboration between all actors, including NGOs and local groups, could help designate roles within a cohesive

response plan covering prevention, preparedness, response, and recovery.

Conclusion

In summary, this policy brief aims to clarify the numerous factors which influence residential fire outbreaks in informal settlements. Emphasis is placed on the residents of informal settlements as they not only face more frequent fire outbreaks, but are also most vulnerable to the spread of fires. While energy poverty contributes to the triggers most often causing fires, including candle and kerosene-lighting and overloaded circuits, fires propagate in the problematic conditions of housing access in Freetown. The most vulnerable groups, including children and tenants, are most susceptible to risk accumulation, as multiple barriers in response inhibit recovery. Opportunities such as greater coherence among the actors involved such as the NFF, local community groups, and NGOs show promise in resolving some of the current problems, and can strengthen attempts to interrupt risk accumulation. To conclude, a clear understanding of the fire risk cycle among the urban poor will contribute to transformational efforts in prevention, preparedness, and response, strengthening Freetown and its residents in the face of future disasters.

Acknowledgements

As a group, we would love to thank the faculty members from the Development Planning Unit of University College London for their support in providing us with the expertise and knowledge needed to publish this policy brief. We also give thanks to the SLURC, who provided us with information and data locally collected from Freetown. Finally, we express our gratitude for ESD Fire group of 2017, as they inspired us throughout the brief.

Exploring the Risk Accumulation Cycle of Fires in Freetown's Informal Settlements

References

- Allen, A. (2018). Living at risk in Freetown. Available at: <http://blogs.ucl.ac.uk/dpublog/2018/05/04/living-risk-freetown/>. [Accessed on 24 Dec. 2018]
- Allen, A. (2018). Policy Brief No.2. Urban risk trap: Dynamics in Freetown's informal settlement. SLURC/DPU Action-Learning Alliance [online]. Available at: https://www.ucl.ac.uk/bartlett/development/sites/bartlett/files/group_2_fires.pdf
- Brima, A. and McDiarmid, J. (2011). Housing in Sierra Leone: An uphill climb. [online] Aljazeera.com. Available at: <https://www.aljazeera.com/indepth/feature/2011/06/201167141524571154.html> [Accessed 13 Nov. 2018].
- Bundu et al. (2018). 'The burden of trauma presenting to the government referral hospital in Freetown, Sierra Leone: An observational study', *African Journal of Emergency Medicine*, pp. 1-5.
- Campbell, A. (2017). Sierra Leone News: Fire fighting is a challenge. [online] Awoko Newspaper. Available at: <https://awoko.org/2017/07/25/sierra-leone-news-fire-fighting-is-a-challenge/> [Accessed 13 Nov. 2018].
- Cambayma, B. (2017). Sierra Leone News: Freetown's Teeming Slum Dwellers. [online] Awoko Newspaper. Available at: <https://awoko.org/2018/01/04/sierra-leone-news-freetowns-teeming-slum-dwellers/>.
- DAP (2018). Sierra Leone Urban Research Centre Pro-Poor Land Rights and Informality. Sierra Leone Urban Research Centre. Available at: http://www.slurc.org/uploads/1/0/9/7/109761391/final_dag_report.pdf [Accessed Dec 20, 2018].
- DeVries, N. (2016). Lack of Gear, Water Shortages Plague Firefighters in Sierra Leone. [online] Vonews. Available at: <https://www.vonews.com/a/lack-gear-water-shortages-plague-firefighters-sierra-leone/3165373.html>
- Doughty, T. (2018). Living at risk in Freetown [web log]. Retrieved from <http://www.slurc.org/blog/living-at-risk-in-freetown>
- <https://www.desinventar.net/DesInventar/results.jsp>
- EFO (2012). The Domestic Trade in Timber and Fuelwood Products in Sierra Leone. [online] Available at: http://static1.squarespace.com/static/55b0533ce4b04e4467333254/t/567a33e0dc5cb468974ffb35/1450849248072/final_report_fuelwood_and_timber_trade_in_sierra_leone.pdf
- Gooding, O. (2017). Sierra Leone News: Freetown accounts for the highest fire accidents - Chief Fire Officer. [online] Awoko Newspaper. Available at: <https://awoko.org/2017/03/01/sierra-leone-news-freetown-accounts-for-the-highest-fire-accidents-chief-fire-officer/>
- Gooding, O. (2017). Sierra Leone News: Out of 10 fire hydrants only 2 functional. [online] Awoko Newspaper. Available at: <https://awoko.org/2017/03/06/sierra-leone-news-out-of-10-fire-hydrants-only-2-functional/> [Accessed 13 Nov. 2018].
- Hitchen, J. (2015). Flooding in Freetown: a failure of planning? [online] *Africa Research Institute*. Available at: <https://www.africa-researchinstitute.org/newsite/blog/flooding-in-freetown-a-failure-of-planning>.
- Kargbo, M. (2017). Government Budget and Statement of Economic Financial Policies For the Financial Year, 2018 Theme: "Strengthening Resilience For Inclusive Growth". Freetown: Government of Sierra Leone, p.vii-viii.
- Kimemia, D. and Niekerk, A. (2017). 'Energy Poverty, shack fires and childhood burns', *South African Medical Journal*, 107 (4), pp. 289-291.
- Lacroix, L. (2018). Email with Lea Lacroix, 29 Dec.
- LearnLine. (2018). Fire and Weather. [online]. Available at: <http://learnline.cdu.edu.au/units/env207/fundamentals/weather.html>.
- Leong, M., Kim, H., Liu, Y. R., Simpson, P. K., Tang, C. T., Chen, Y., & Vo, S. N. (2018). Cockle Bay: We Tomarra Bambai (our common future). Available at: <https://www.youtube.com/watch?v=275yISdEF0&feature=youtu.be>. [Accessed on 24 Dec. 2018]
- Leong, M., Kim, H., Liu, Y. R., Simpson, P. K., Tang, C. T., Chen, Y., & Vo, S. N. (2018). Cockle Bay Field Notes. DEVP0022: Environment and Sustainable Development in Practice. UCL, London. Available at: <https://www.dropbox.com/sh/uryw96q04yhj1e9/AAD8c-Sv3UUvzNPD-SX7LyBibka?dl=0&preview=Cockle+Bay+Field+Notes.pdf> [Accessed 3 Jan. 2019].
- Margai, J. (2016). Gov't wages war on electricity theft. [online] *Sierra Leone Concord Times*. Available at: <http://slconcordtimes.com/govt-wages-war-on-electricity-theft/> [Accessed 6 Jan. 2019].
- MLCPE & FCC. (2014). Environmental Assessment and Evaluation of Natural Disaster Risk and Mitigation in Freetown. [ebook] Freetown: Freetown City Council. Available at: http://www.slurc.org/uploads/1/6/9/1/16915440/environmental_assessment_and_evaluation_of_natural_disaster_risk_in_freetown.pdf.
- Owili, P., Muga, M., Pan, W., and Kuo, H. (2017). 'Cooking fuel and risk of under-five mortality in 23 Sub-Saharan African countries: a population based study', *International Journal of Environmental Health Research*, 27 (3), pp. 191-204.
- Rogers, S. N. (2016). 'Rethinking "expert sense" in international development: the case of Sierra Leone's housing policy', *Review of African Political Economy*, 43 (150), pp. 576-591. doi: 10.1080/03056244.2016.1169163.
- Satterthwaite, D. (2017). 'The impact of urban development on risk in sub-Saharan Africa's cities with a focus on small and intermediate urban centres', *International Journal of Disaster Risk Reduction*, 26, pp. 16-23.
- Shack / Slum Dwellers International (2010). Towards a Pro-Poor "Agenda For Change". [ebook] Available at: https://knowyourcity.info/wp-content/uploads/2015/04/Towards_a_Pro_Poor_Agenda_for_Change_-_FINAL_Dec_2010.pdf [Accessed 6 Jan. 2019]
- UNDP. (2012). National Energy Profile of Sierra Leone (rep.). United Nations Development Programme. Retrieved from http://www.undp.org/content/dam/sierraleone/docs/focus/area/docs/undp_sle_energyprofile.pdf
- UNDP (2016). Reducing charcoal use in Sierra Leone. [online] UNDP Sierra Leone. Available at: <http://www.sl.undp.org/content/sierraleone/en/home/presscenter/articles/2016/03/23/reducing-charcoal-use-in-sierra-leone.html>
- UNDP (2019). About Sierra Leone. [online] UNDP Sierra Leone. Available at: <http://www.sl.undp.org/content/sierraleone/en/home/countryinfo.html>
- UNFPA (2017). Sierra Leone 2015 Population and Housing Census - Thematic Report on Housing Conditions. [ebook] STATISTICS SIERRA LEONE (SSL), pp.10-17. Available at: <https://sierraleone.unfpa.org/sites/default/files/pub-pdf/Housing%20conditions%20Report.pdf> [Accessed 13 Nov. 2018].
- UN Habitat (2016). Framework for Evaluating Continuum of Land Rights Scenarios: Securing Land Rights for All. Available at: <https://unhabitat.org/books/framework-for-evaluating-continuum-of-land-rights-scenarios/>
- UNISDR (2015). DesInventar- Profile. [online]. Desinventar.net. Available at: <https://www.desinventar.net/DesInventar/profiletab.jsp?countrycode=sle&continue=y>.
- UNISDR (2009). 2009 UNISDR Terminology on Disaster Risk Reduction. Available at: https://www.unisdr.org/files/7817_UNISDR-TerminologyEnglish.pdf
- Y Care International (2013). Transforming Young People's Lives in Slum Settlements in Sierra Leone. Available at: http://www.ycareinternational.org/wp-content/uploads/2013/03/09/SL-Slums-Summary_Final_Web.pdf