

Urban Growth, Fuel Service Station Disasters and Policy Compliance in Ghana

¹Ebenezer Owusu-Sekyere, ²Hamdiyah Alhassan, ³Enock Jengre

¹ Department of Environment and Sustainability Sciences, University for Development Studies, Tamale, Ghana. Tel: 00233-649925, E-mail: oseturbo@yahoo.com

²Department of Agricultural and Resource Economics,
University for Development Studies, Ghana

³Legal Resource Centre, Accra Ghana

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Abstract

Disasters associated with Fuel service stations (FSS) in Ghana have been debated severally and attracted policy attention, yet their mitigation strategies seem too far off and unimaginably unrealistic. Knowing that such disasters can limit enjoyment of citizenship rights, Ghana has developed safety standards geared towards mitigating their effects. Framed around the compliance theory and drawing on data from 150 residential owners located within 15.4m buffer zone and five state institutions, this article examined the extent of compliance with safety policies guiding FSS in Kumasi, Ghana. The results showed that compliance with safety policies was sinking into its bare existential levels as none of the facilities selected for the study passed all the 11 safety standards. The facilities also negatively affected residents who never considered their place of abode as perilous and that they live in zones of vulnerabilities. This situation it is argued, fundamentally affects development trajectory of the contemporary African city. It obviously obscures the realities of interrelated processes shaping urban disaster management. Even though the spring-up of FSS have catapulted economic growth, inherently they are also hazard-ridden. We suggest that in the broad scheme of urban planning, FSS safety policies must not be discussed in the margins.

Key: Compliance, disasters, fuel service station, nearest neighbor, urban Ghana

Introduction

Ghana joined the league of urbanized counties globally when the percentage of the population living in urban centers crossed the 50 percent threshold hold in 2010 (GSS, 2012). Unlike countries in the developed world where planning schemes

are able to respond adequately to the pressures associated with urban growth (UN-Habitat 2008; Twumasi et al., 2018), the problem with Ghana's urbanization is that the speed of the transition is far more than the planning schemes that have been put in place as response measures. The Ghana Statistical Service, for instance, observed that inadequate capacities, and resources capabilities have led to Ghanaian cities lagging behind the quest for proper, efficient, and effective urban governance structures and disaster risk reduction measures (UN-Habitat 2008; GSS, 2012). Songsore et al. (2009), also opined that the swift urbanization processes have created planning crises which in turn, are instigating disasters in Ghanaian cities. One of the challenges associated with the urban process is the burgeoning growth of disasters, both spatially and demographically. Of the many disasters, those relating to fuel service stations (FSS) are increasingly becoming a social and economic canker that is gradually eroding development gains and impeding human progress (NADMO, 2017). The regularity of such disasters is not only producing a geographic concentration of vulnerability throughout the cities but it is also thwarting the efforts of city authorities in building sustainable cities (Amoah et al., 2018).

Despite its lethal potent, the literature on urban disasters relating to fuel service stations (FSS) are only discussed in the margins. The limited attention giving to the subject in Ghana can be worrying given that there are ongoing debates on how cities in the country in particular and Africa in general, can achieve inclusivity and sustainability in their urban transitions (Brenner, 2018; Jazeel, 2018; Reddy, 2018). The limited scholarly writings within or beyond urban geographies on the subject matter fundamentally limits the understanding of the development trajectory of contemporary African cities. Indeed, to exclude disasters relating to FSS from Ghana's urban development discourse is to obscure the realities of the often interrelated processes shaping urban geographies. Scholars writing mainly on FSS disasters are saddled with the blatant noncompliance with nationally developed standardized rules and regulations on urban disaster prevention. The debate, though far from settled, only emphasizes the reformatory nature of the national disaster management policies. Even though Amoah et al. (2018) have noted that the spring-up of FSS on the urban landscape in Ghana has catapulted economic growth and development, inherently they are also hazard-ridden (Agbenorku et al., 2010). Knowing that such disasters can limit the rights of citizens, Ghana has developed safety policies geared towards mitigating their effects. However, despite being worthy of special attention, the extent of compliance with the policies is to date not

considered as an urgent research area in Ghana giving the plethora of urban studies literature already cited.

Guided by compliance theory and aiming to overcome the current polarization in the literature between limited social services and lack of economic growth, this study extends the scholarships on urban disaster events by exploring the extent of compliance with safety standards and nearest neighbors' concerns on siting and management of FSS using cases in Kumasi as examples. The arguments in the article reflect key questions as follows: What institutional frameworks guide the siting and management of FSS and how are these frameworks complied with? In answering these questions the concerns of nearest neighbors on the effects of FSS disasters were also explored? The study makes two contributions to scholarship. First, it highlights how non-compliance with disaster risk reduction measures associated with FSS can make African cities susceptible to preventable disasters. Secondly, it suggests measures that can be implemented to ensure compliance with national policies in general. The article is organized in the following order: The introductory section is presented in section one. Section two discusses the literature which dwells more on the relationship between urban growth and disaster debates. Section three provides a profile of the study site and the steps adopted for the collection of data. In section four, we present the empirical evidence from the field touching on the legal and institutional framework guiding FSS management and nearest neighbors' concerns. The final section is devoted to the conclusion and some policy recommendations.

Theoretical underpinning

In recent years, the compliance theory has been developed as a critical measure for unpicking the contested mechanisms through which urban disasters are studied (Li et al., 2010; Bulgurcu, 2010). The increasing application of the theory to diverse urban studies landscapes represents evidence of its conceptual ability for understanding the socio-natural politics of urban centers. Despite its popularity, compliance theory has yet engaged the attention of disaster management scholars in understanding the complex regulator – regulate relations in disaster policy enforcement. We argue in this article that employing the CT offers yet another opportunity for urban scholars and city managers to develop and enforce policies that can limit urban vulnerability. From the theoretical perspective, compliance has been defined by different schools of thought. The consensus from the literature, however, is that compliance represents agreement between the behavior of an actor or a product on the one side, and a well written and explicit rules, conventions, procedures or

standards on the other hand (Zaelke, et al., 2005; Kim, 2007; Foorthuis et al., 2009). For compliance to be fulfilled, there must be an actor, in this case referring to a person or organizational who behaves within an organization and is equipped with some degree of cognitive capabilities or preferences, or values, and has a certain degree of autonomy (Jones, 1991; Hollis, 1994). In this context, an actor can be a person, an organization, or a project. For this study, the actors are owners of FSS who are expected to conform to the laws and regulations concerning the management of FSS.

Another side of the concept of compliance as discussed in the literature are laws, principles, and guidelines, collectively describe as norms and prescriptions (Harris & Cummings, 2007). The norms are the legally required or voluntary behavior that an actor is expected to obey. When rules, laws, standards, principles, and guidelines are well documented they become policy (Zaelke, et al., 2005; Kim, 2007; Foorthuis et al., 2009). Actors are expected to abide by or conform to the rules and regulations for compliance to take place. However, in making sure that actors comply with the set rules, there must be instructions to the actors and these instructions ought to be applied appropriately. The instructions set out when and how the rules and regulations are to be obeyed. Again, the instructions must be relevant and should be able to address a need and achieve the intended laws. Thus far, for compliance to occur, there must be a regulatee (actor) who should respond to rules and regulations established by a regulator (Cleven & Winter, 2009) with the view to achieving some behavioral changes. If the actor or regulatee does not conform to rules set by the regulator then non-compliance is said to have taken place (Schapiro, 2003). A common form of non-compliance is transgression, which refers to a situation in which a law is deliberately not complied with (Kim, 2007). The main reason why an actor may break a law or rule is when there is no interest shown by the actor question in conforming to the specific rule or did simply not know how to obey the law. Another form of non-compliance is subversion, this sense an actor tries to undermine the entire compliance system or essential part of the system itself based on his interest.

Realizing the possibility of non-compliance with rules and regulations, Foorthuis (2010), suggests the adoption of compliance tactics which he describes as any measure or strategy that can be implemented to encourage compliance by regulatees. Such a mechanism it is argued can be a preventative, detective, and corrective (Sadiq & Indulska, 2008). The literature stresses that it is imperative to

adopt several of these tactics as one tactic may not be sufficient enough (Cleven & Winter, 2009). The consensus from scholars of compliance is that there is always the need to develop a proper strategy for compliance management and such a strategy should be in an integrated one. The integrated compliance management strategy should comprise several compliance tactics with the intention of bringing the organization to a sufficient level that is compliant with relevant laws. Such an integrated strategy will achieve holistic compliance and can address three issues: coherent and not fragmented compliance efforts (Volonino, 2003; Cleven & Winter, 2009), will achieve a far reaching scope (Sadiq & Indulska, 2008), and will cover multiple laws and internal procedures at the same time.

Urban Growth and Fuel Service Station Disasters: Literature perspective

Disasters involving FSS have in recent times, become a major talking point among residents in major cities in Ghana. There are increasing concerns among policymakers on how the risk associated with FSS affects communities hosting the facilities (Garau et al., 2005; Rahman, 2011). More generally, societal concerns for FSS are the dangers it presents to the nearby surroundings. The growth of cities in Ghana in terms of population and development has occasioned the rise in demand for vehicular numbers, a situation that has also led to high demand for fuel services (Khahro et al., 2014). Paradoxically, while petroleum products are an indispensable part of modern technological society by stimulating socio-economic growth and development, they also pose numerous risks and threats to humanity. Particularly, where the institutional requirements guiding FSS infrastructure are not followed through, not only is the health of workers affected but people residing close to FSS are threatened through a host of pollution pathways (Ahmed et al., 2014).

In the last two decades, disasters relating to FSS have become common occurrences in Ghana and thus raising concerns among urban geographers, sociologists, and anthropologists, the media, and disaster managers (see Daily Graphic, 2013; NADMO, 2017). For instance, in the last eight years, the Nation has experienced not less than eight major cases of FSS explosion. Out of the eight explosions, the Greater Accra Region experienced six; Takoradi in the Western Region recorded one while Kasoa in the Central Region also experienced one explosion. Two of the explosions were recorded in 2014, the other two in 2015 with one in 2016 while in 2017, three explosions occurred in Ghana. Memories of September 3, 2013, are still fresh in the minds of residents of Wa Municipal of the Upper West Region where a fuel tanker got burnt at the point of discharge. Not only did the tanker burn but shops and

other infrastructure valued at millions of dollars were burnt. Table 1 provides a list of some FSS disasters In Ghana.

Table 1: List of current FSS disaster events in Ghana

Year	Death	Injuries	location and Region
September 2017	7	132	Atomic Junction, Accra
November 2018	2	10	Trinity Oil gas explosion Kumasi
May 2018	-	3	Tesano, Accra
June 3, 2015	150		Kwame Nkrumah Circle, Accra
Frebruary 26, 2017	-	-	Tema Tulaku on the Michel Camp road, Accra
August 4, 2015	2		Kasoa, Central Region
December 23, 2016	6	12	Trade Fair Centre in Accra
July 18, 2014	1	6	Nungua zongo, Accra
August 28, 2016	6	-	Tinga, Bole, Northern
November 14, 2018	-	-	Excel Fuel Station, Techiman
October 2019	-	15	Kpone, Tema

Source: Extracted from various web-based sources

From all indications, these reported cases are evenly distributed geographically as almost all regions of Ghana have had a fair share of FSS disasters. It is also evident from the literature that the disasters occurred in cities. Again, it is also important to emphasize that the described cases are the major ones that attracted media attention and that there are countless small-scale FSS disasters in small towns that were likely to be unreported. These repeated events show how past incidences have been handled. Studies show that past disasters were only responded to with strong emotions by political leaders; government representatives; non-governmental organizations and development partners probably to win public sympathy (Daily Graphic, 2013; NADMO, 2017; Twumasi et al., 2018). In a practical sense, however, nothing is done in terms of policy measures to make sure they do not occur in the future. For instance, the Atomic Junction FSS disaster which claimed seven lives and injured 132 people triggered an online petition by civil society groups. Nearly 1,500 people had signed by day-three after the disaster. In response to the petition, the government announced measures aimed at

reducing FSS disasters. Notable among them was the introduction of the Cylinder Re-circulation System. This policy so far is only at the conception stage. If the discourse is anything to go by, then it is obvious that it will take more than just legislation to ensure sustainable and inclusive cities in the country.

Methodology

Study Area

The study was conducted in the second-largest urban area in Ghana, Kumasi (Figure 1). In the last three decades, Kumasi has grown outwardly to encapsulate outlying communities that were hitherto not mapped. The city is home to a large portion of Ghana's traditional and craft industries. It also serves as the hub for branch offices of multinational companies as well as government ministries and educational institutions among others. The Kumasi Suame magazine, for instance, is described as the largest traditional automobile repair center in the West African sub-region (Amoah et al., 2018). The industrial hub employs conservatively over 200,000 people and attracts more than 300,000 clients every day. Apart from industrial development, the city's expansion is due to the movement of labour from the rural countryside into the city. Kumasi's population has increased from 346,336 in 1970 to an estimated 3,022,919 people in 2015 (Owusu-Sekyere et al., 2017).

The city also serves as the northern hotspot of Ghana's "golden triangle". It connects Accra the capital from the eastern side and also connects the port city of Sekondi-Takoradi from the west. The city has also benefited from a lot of infrastructural facilities due to its economic and cultural significance. In 1903, a railway line was constructed to link Sekondi to Kumasi and then to Accra in 1905. This phenomenal growth in transport infrastructure has resulted in an escalation in the establishment of several FSS in the already over-crowded and unplanned suburbs where about half of the city's population resides. Though the exact number of FSS in Kumasi is patchy because the rate of collapse and opening of new ones have tended to escape the lenses of national statistics, the Ghana News Agency quotes the National Petroleum Agency (NPA) sources that 88% of FSS are in high-risk zones (Amoah et al., 2018).

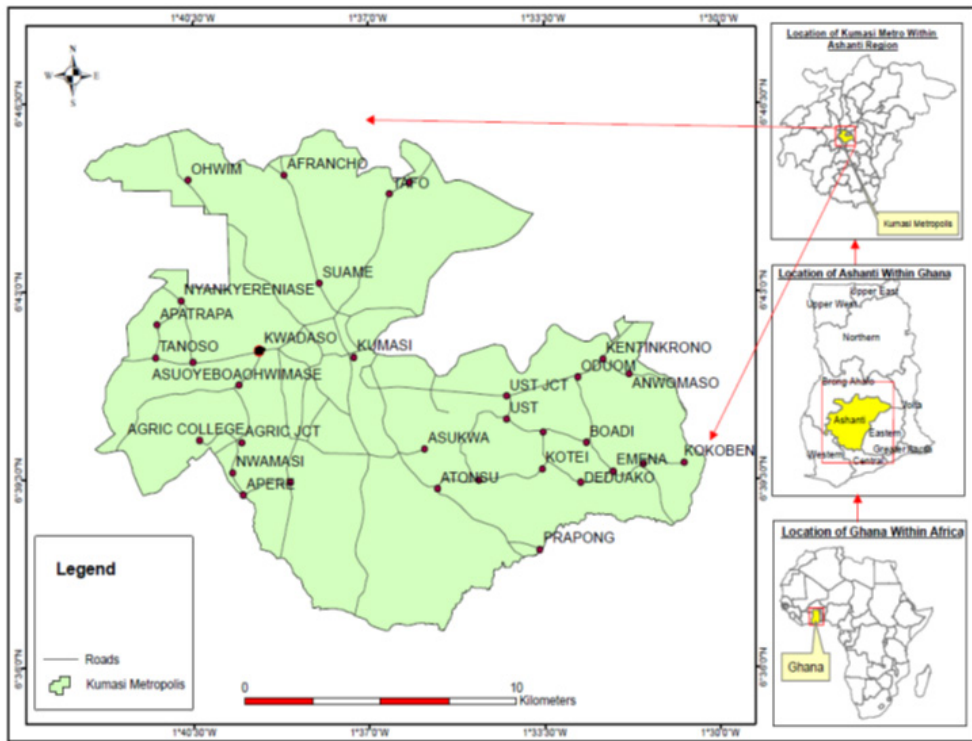


Figure 1 Map of Ghana showing Kumasi in the Ashanti Region

Source: Owusu-Sekyere et al., 2016

Throes of FSS disasters on Kumasi's landscape

Taking a retrospective look at FSS disasters in Kumasi, a painful reference has frequently been made of an incident that occurred on the 22nd of August, 2008 involving a fuel tanker that overturned at an FSS and its content spilled down. In the process, the tanker caught fire injuring eight people while two died instantly (Agbenorku et al., 2010). Similarly, on the 19th of January, 2015 an inferno gutted part of an FSS belonging to Shell Ghana at Asokwa, a suburb of Kumasi, and destroyed property worth millions of dollars. A similar incident occurred on the 20th of November, 2018 when Trinity Oil Gas station at Krofrom exploded at about 7: 40 a.m injuring twelve people. Several properties including mainly commercial taxi cabs were also burned to a crisp. These incidents provide a pivot on which safety regulatory bodies should conceive a renewed mindset towards ensuring safety in

the fuel sector value chain. The work of Akintoye and MacLeod (1997), affirmed that risk management is a continuing activity in project development thus it must be inbuilt in the project design, construction, and operational stage.



Data collection

The mixed-method design was adopted for the study. This design allowed for variation in collecting the data and as observed by Braun and Clark (2006), has the potential of leading to greater data validity. The last reason for adopting the mixed method design was to answer the research questions from different perspectives. According to NADMO (2017), Kumasi has over 142 fully registered FSS. Of this number, five FSS located within densely built residential communities were purposively selected for the fieldwork. All the five facilities had encountered protests from residents concerning their perceived negative impact and how they impend human activities. The selected FSS was owned by reputable oil marketing companies (OMC); had more than five dispensers and sold at least three different petroleum products – LPG, Super/Diesel, and Kerosene.

The first set of data were collected from residents staying within a 15.4m buffer area of FSS as prescribed by the Town Planning Department. This categorization is also described as nearest neighbors by the Environmental Protection Agency. The nearest-neighbor concept simply refers to the housing facility nearest to a locally undesirable facility like a filling station whose interest is supreme in the establishment of the project. Due to the challenge of obtaining reliable primary data on the population of nearest neighbors, a raw sample frame for the study

was determined by measuring a 50ft. distance (15.4m) from the edge of the fence wall of the nearest occupied house to the fence wall of the FSS. With the help of three research assistants, distances were systematically measured from the corners of the FSS walls to map out the required buffer between FSS and the nearest adjoining structures. Using this criterion, 150 houses were mapped and for each house, the landlord or one person who was the head was selected to complete the questionnaire designed for the study. The questionnaire protocol was made up of four main questions each with probes and prompts. While respondents' socio-economic characteristics were captured, the main sections of interest were respondents' perceived risk associated with FSS in their locality. They were given a 2-point Likert scale to obtain the perceived risk posed by FSS (1- Agree; 2- Disagree). This approach was deemed to be most appropriate that could provide insightful, revealing, and informative results when dealing with the research of this nature.

The second set of data collection involved in-depth interviews with five heads of state institutions responsible for safety standards at FSS were interviewed to obtain qualitative data. The state institutions included the Kumasi Metropolitan Assembly (KMA); Environmental Protection Agency (EPA); Lands Commission (LC); Town and Country Planning Department (TCPD); and Ghana National Fire Service (GNFS). The heads of the state institutions that took part in the study were first provided verbal or written consent to participate in the research. The interview guide focused on policies, legal frameworks, risks, and issues on compliance. Together, these institutions provided 11 safety compliance checklist guides for FSS to comply with. The 11 safety compliance indicators required of every FSS were: the existence of smoking detectors; fire extinguishers; availability of canopies and presence of hydrants. The 11 safety compliance indicators were then used to develop a standardized questionnaire with support from the experts from the institutions for the selected FSS managers to complete.

Data analysis

The qualitative data obtained from the interviews were transcribed verbatim. Braun and Clark's (2006), deductive thematic analysis framework was used to analyze and report the themes that emerged from the interviews. For ease of quantitative analysis, the five FSS were coded as FS₁, FS₂, FS₃, FS₄, and FS₅. The coding was to allow for easy analysis as to the level of compliance of the 11 indicators among the FSS. Compliance was calculated based on an estimation of the average compliant percentage point (CPP) of 9.1% for each of the five FSS calculated as $(1/11 * 100 = 9.1\%)$.

Where 1 represents each of the 11 safety compliance indicators required of every FSS. Compliance percentage point represented the threshold value.

Results and Discussions

Institutional Responsibilities for Operating FSS

Ghana is a signatory to many international frameworks on disaster management. In 2005, Ghana joined the rest of the world to activate the Hyogo Framework for Action which has its overall goal of achieving a considerable reduction of losses associated with disasters (Oteng-Ababio, 2015). Again, as part of the global effort in achieving sustainability, Ghana has graciously appended signature to the urgencies of appreciating the risks associated with disasters and firming disaster risk governance as prescribed by the Sendai Framework (NADMO, 2017). As a way of actualizing these frameworks and similar others, the state has designed several institutional and legal frameworks aimed at ensuring that institutions comply with safety standards guiding FSS operations. For instance, articles 266 and 267 of the 1992 Republican Constitution of Ghana provide the ways by which land should be acquired and used for any development purpose without compromising the quality of the environment.

Again, the Spatial Planning and Land-use policy as well as the Lands Commission Act, 2008 provide the basis for enforcing a comprehensive town/city plan in such a way that development contradictions can be rejected (MLGRD, 2010). Additionally, the national urban policy of 2012 sets out a context within which cities in Ghana should be managed to enhance sustainable growth and development. It is instructive to note that a central theme of the policy is warning urban developers to ensure that projects involving land use do not lead to environmental deterioration. The Ministry of Interior and other allied ministries have also developed legislative instruments for regulating land use. The creation of the National Disaster Management Organization (NADMO) prescribes the legislative basis for disaster prevention. The NADMO is given the task of championing and coordinating disaster activities with various stakeholders. Additionally, local government authorities have also been playing a supporting role in guiding the planning of cities and towns through controlling and monitoring urban projects that involve the modification of the physical environment (Oteng-Ababio et al., 2015). Ghana's urban policy, the EPA, and the TCP have together developed institutional responsibilities intended to regulate the construction, operation, and management of FSS (see Table 2).

Table 2: Institutional Role in FSS Establishment

INSTITUTION	RESPONSIBILITY
EPA	Sales of the application form to the proponent (EA form 1); reviews completed application form upon submission; checks relevant requirement such as site plan and building plan (EA form 3); vets application form by the technical committee which comprises officials from TCPD, GNFS, EPA, LC, and KMA. Finally, issues or declines permit depending on the recommendation of the committee.
TCPD	Ensures the developer produces building drawings for the proposed project which must include the site plan indicating where the station will be sited. The site is then inspected; conveys a technical committee meeting to examine all documents and if the requirements are met, a permit is issued.
GNFS	Checks the appropriateness of FS location; checks the availability of site plan; checks the presence of hydrants/standpipe; ensures developers must hold EPA permit; and finally, issuance fire permit.
KMA	KMA registers the project and leaves the rest of the work to the TCPD.
LC	Inspects land for the construction of FSS to authenticate their rightful owners and to advise the EPA.

Source: Extracted from various state documents.

Beyond the institutional responsibilities presented in Table 1, the Kumasi Metropolitan Assembly (KMA) has set out additional bye-laws including the steps and procedures for acquiring an FSS permit (see NADMO, 2017). With the implementation of many reforms in the public sector including the implementation of the National Building Code of 2012 and the removal of the many bureaucratic procedures for business registration, the expectation is that the process of acquiring an FSS permit should not exceed six months. This process includes getting the site registered, the structural plans, and the different layouts including nature and type structure as well as its design approved. Also, the putting up process of FSS facilities should be inspected and certified not less than five times from the construction stage to the completion of the entire facility (Oteng-Ababio et al., 2015). That is not all, the installation process of all equipment to be used by the FSS should be inspected and certified to be of the required standard. This is not only to prevent disasters from occurring but even if they do, their effects would be minimal.

A more nuanced analysis shows that the institutions have not been playing their roles as expected. For instance, the EPA has established a technical committee with the responsibility of ensuring that FSS comply with the usage of fire-resistant materials for the construction but the field evidence indicates show otherwise. The interviews with some of the disaster management institutions revealed that limited resources and administrative supervision hampered smooth operations. In some cases, we observed that fire hydrants designated and installed at strategic points were not functioning. Again, fire safety certificates for some of the facilities had not been renewed for the FSS though they had outlived their due dates. Another reason for the non-enforcement of safety standards was the limited institutional collaboration and coordination among the disaster management organizations. This was aptly captured by a NADMO official in an interview:

“We are unable to enforce the laws because we are not able to effectively coordinate with our collaborators. For us to enforce the law very well we must integrate and harmonize all the sectoral plans so that we can implement disaster prevention plans as mandated by law. You know we work with other state bodies but we have not sufficiently developed the links for us to enforce the laws. In the case of the hydrants, it is the responsibility of the Ghana Water Company while the responsibility of inspecting and recommending the approved fire extinguishers is that of the Fire Service. For us to enforce the laws would need the support of all connected organizations but as it is we are unable to due to many reasons including lack of funding”.

Another key informant from the Ghana National Fire Service corroborated the earlier position in an interview:

“Enforcing the regulations on FSS is not an individual affair but a collective responsibility of all mandated institutions. The current situation and legal regimes do not allow a designated institution to champion the role of coordinating all the disaster management activities in the country. This makes enforcing the standards on operating FSS a difficult task. For this reason, the political, social, and economic will to enforce FSS regulations almost absent”.

Interestingly, research participants were ambivalent about whether the Assembly itself incorporates fire disaster risk reduction strategies in its planning processes.

From the interactions with FSS managers, it was obvious that the institutions whose mandate is to ensure that the safety guidelines were implemented were not living up to expectation. These findings confirmed the many reports in Ghanaian media circles and investigative documents that the regularity of fire disasters at FSS are a result of the use of substandard construction materials which happens with the connivance of some corrupt public officials who provide approval and oversight procedures (Daily Graphic, 2013). The results unearth the general clear fragile state responsibility and governance structures concerning how urban disasters can be prevented or even if they should occur, how their impact can be minimized. The weak enforcement of the safety guidelines is also a reflection of the poor coordination that exists among and within disaster management organizations in Ghana in particular and Africa in general (Pelling, 2003; Chang-Seng, 2013; NADMO, 2017). These findings are consistent with studies of NADMO (2017) and Owusu-Sekyere et al. (2017). They observed that even though Ghana has national guidelines for urban disaster prevention, yet their enforcement remains a mirage.

Compliance with requirements guiding FSS management

Having obtained the 11 safety compliance indicators required of every FSS from the State institutions, a checklist guide for safety compliance for each FSS was drawn to examine the extent of compliance of requirement guiding FSS management (Table 3).

Table 3: Compliance percentage points for the selected FSS

Indicators	FSS 1	FSS 2	FSS 3	FSS 4	FSS 5
Fire extinguishers	9.1	9.1	9.1	9.1	9.1
Smoking warning signs	9.1	9.1	9.1	9.1	9.1
Availability of canopies	9.1	0.0	9.1	0.0	0.0
Presence of water hydrants	0.0	0.0	0.0	9.1	0.0
Proximity of residents	9.1	9.1	9.1	9.1	9.1
Proximity of businesses	9.1	0.0	9.1	0.0	0.0
Ingress and Egrets	9.1	9.1	9.1	9.1	9.1
50ft. distance from main road	0.0	0.0	0.0	0.0	0.0
Fence Walls	0.0	9.1	0.0	9.1	9.1
Sand Buckets	9.1	9.1	9.1	9.1	9.1
Not near to floodable areas	9.1	0.0	0.0	9.1	0.0
Total	72.8	54.6	54.6	81.9	54.6

The results from Table 3 show that none of the FSS scored 100 CPP. This means that all the selected FSS did not comply with all the 11 directives guiding the managing of such facilities. With FSS widely described as hazard plants that increase the vulnerability of residents to fire explosion, a crucial finding was that compliance with the availability of hydrant scored only 9.1 percentage point. The provision of hydrants at FSS is fundamental to the requirement of GNFS. A hydrant at FSS leverages fire disaster minimization. It serves as a quick and ready water supply system for fire attendants and reduces the margin of time spent in search of water to quench the fire. Also, all the FSS failed to comply with the 50ft. buffer from the major road per the TCPD requirement. Again, all the FSS did not comply with the requirement of keeping a distance of 15.4m between the wall of the FSS and the nearest residential facility. This is an exemplar of residents' vulnerability to the risk of FSS disasters. On the compliance side, all the fuel stations had buckets stocked with sand to fight mild fires given the probability that it occurred. Again, all the FSS had properly installed fire extinguishers and had also conspicuously displayed their smoking signs that warn against smoking within the vicinity.

Weak compliance with policy directives as revealed by the study is not a novelty in Ghana. The literature is replete with such findings from many studies. For instance, Oteng-Ababio (2016) found that non-compliance with safety measures led to the collapse of a six-story Melcom shopping mall in Accra, a disaster that trapped more than 82 of its workers and hundreds of shoppers. The findings on the magnitude of non-compliance statistics as provided in table 3, gives a sober reflection, especially in the context of the quest to achieving sustainable cities where compliance with city planning schemes is expected to foreground city infrastructure. The empirical findings from the study indicate that owners of FSS did not comply with some of the policy directives, not because of ignorance of the law as postulated in the compliance theory (Cleven & Winter, 2009) but their non-compliance was a form of subversion, a situation in which the managers, on their interest decided to undermine the entire compliance system (Foorthis, 2010). There is enough evidence from the literature that those who do not follow laid down procedures in urban infrastructure development in Ghana are often punished (Owusu-Sekyere et al., 2017; NADMO 2017).

The repeated FSS disaster experiences are evidence of how non-compliance with safety protocols can affect city development. It also shows how previous disaster incidences have been handled: in most cases, the attention is on providing relief packages - very little on most cases to affected people without holding people accountable for how their (in) action may have contributed to a preventable

disaster. As typical of developing country situation state officials, public interest groups and philanthropic organizations only respond with sentiments during the disaster period. The whole episode is soon forgotten without investigating the non-compliance with disaster risk reduction measures that ought to have been put in place.

Nearest Neighbours' Concerns on FSS Management

The analysis here focuses on identifying the level of exposure of residents to the externalities associated with FSS within residential communities. One major concern of nearest neighbors was their non-involvement in the decision to build FSS in their neighborhood. For instance, an elected representative at Anloga Junction indicated in the interview session:

"We are not happy with the siting of the facility because we were not consulted before the construction and eventual operation began. They should have consulted us to pay the appropriate price for the land. You know the land was acquired for residential purposes so if the owner has changed his mind and is now using it for FSS we should have been consulted.

In-depth interviews with some experts in city planning conclusively revealed that FSS can decrease property values; increase neighborhood noise level; decrease ambient air quality and land uses may negatively be impacted. The expert interviews concluded that these disamenity effects compelled city managers to use zoning as a means to physically delineate land-uses with prescribed distances, setbacks, and buffers which are collectively referred to in planning cycles as green belts. The limited/lack of stakeholder involvement in the decision-making process of siting FSS; increasing population density in the communities, as well as the conversion of land for residential accommodations, were key to nearest neighbors' resentment on locations of the facilities. In Table 4, we present the results of the Likert scale on the perceived risks of FSS reported by research participants.

Table 4: Perceived Risks Associated with FSS

Items	Agree	Disagree
The FSS has effect on Human health	120 (80%)	30 (20%)
The FSS can affect underground water	110 (73.3%)	40 (16.7%)
The FSS has led to fire disasters	140(93.3%)	10 (6.7%)
The FSS has effect on land ownership	90 (60%)	60 (40%)
The FSS is poorly managed	120 (80%)	30 (20%)

A more nuanced analysis of Table 4 revealed that the majority of research participants (80%) agreed that the FSS was a major health risk to human health. Overall, 73 percent of research participants indicated that the FSS constituted source pollution to nearby water bodies; 93 percent indicated the facilities were a source of fire disaster while 80 percent agreed that the facilities were poorly managed risk. Findings gathered indicated that contrary to the literature (Akintoye and MacLeod, 1997; and UNISDR, 2011) that the perception of risk depended on respondents' level of education, the results showed that all the nearest neighbors interviewed (with or without formal education) concurred to the view that the FSS constituted a risk. Again, all research participants, irrespective of how long they had stayed in the community were unanimous that the FSS constituted a risk. However, there were variations in responses in terms of how long one had stayed in the community.

Collectively, all study participants from the communities conclusively described the FSS selected for the study as constituting a locally undesirable facility that constituted a major risk to community members. Their description depicts what Moore (2012) describes as a parallax object: an object which disrupts the smooth running of society. They were concerned with the negative externalities - risk and its indeterminacy that is - disorder, out of place, and abject which distracts socio-spatial accepted practice. The concerns of the community are presented in Table 5.

Table 5: Nearest neighbors' concerns on the location of FSS

Community concerns	Perceived cause	Responses (%)
Human health	Inhalation fuel fumes	5
Water contamination	Leakage of storage systems	5
Fire disasters	Poor fire safety standards	45
Landlessness	Conversion of land reserves	10
Poor FSS management	Institutional failure	35
Total		100

The concerns in Table 5 present a snapshot of how projects are planned and implemented in a developing country city. It shows how risk is interpreted and tends to be relegated to the background as compared with other developmental needs that are deemed as more important (Bendimerad, 2010). The results also show that disasters are not prevented but are only conceived as a phenomenon that must be responded to after they strike, through emergency reactions and public-spirited support (World Bank, 2001). To this end, Oteng-Ababio et al. (2015), observe that the quest for building a city that can be resilient will not be achieved if issues of disasters in cities are discussed marginally. In light of this, it is advocated that national development strategies should incorporate disaster prevention-related activities (UNISDR, 2011).

From the findings, study participants believed that the FSS constituted environmental risk and indicated that the facilities had negatively affected the community through atmospheric pollution, risk of fire, and the scent of fuel. The participants also blamed the rising environmentally related diseases for the ambiance of the community. Undoubtedly, the problems associated with the siting of FSS within residential communities are not limited to Ghanaian cities alone but common across many jurisdictions globally (UNISDR, 2011). However, the literature posits that broadly, the extent of exposure to the effects of FSS on nearest neighbors depends primarily on the size of the facility, the distance between the facility and residential communities, and the number of years a resident has stayed near the facility (World Bank, 2001; UN-HABITAT, 2008; UNISDR, 2011). Even though residents expressed concerns over the location of FSS in their communities they had little power to negotiate with facility owners due to the land acquisition procedure. For many of the residents, they expected the Municipal Assembly to protect the community from possible risk from the FSS. The concerns of residents are deeply

rooted in the literature. For instance, Bendimerad (2003) opines that increasing population concentrations on lands with fatal flaws as well as the construction of highly risky facilities in residential neighborhoods has the potential to increase the fragility of such communities.

Conclusion

This study sought to examine the extent of compliance with safety standards regarding the operations of fuel service stations in Kumasi, Ghana. The outcome has shown that Kumasi's urban landscape is not new to disasters relating to FSS due to two fundamental reasons. First, the continuous occurrence of FSS disasters suggests some sense of institutional laxity, official incompetence, and complicities. The outcome of the study highlights the void between theory and policy practice. The existing policies so far are a pale shadow of the ideal situation. Inter-agency collaboration, an important pillar in disaster risk reduction was weakly manifested in FSS disaster prevention implementation activities. The findings should be a source of worry given that the nation as part of its international obligations has signed major international treaties mandating it to implement principles relating to urban disaster reduction and making urban centers inclusive as a way of achieving sustainability. It is for this reason that we argue for the need to revise the existing disaster risk reduction planning process such that inter-agency collaboration can be enhanced.

Second, there is a high non-compliance rate with existing safety policies by owners of FSS. The high incidence of non-compliance manifested in two forms; the first was a transgression. This form of non-compliance was shown when managers of FSS indicated that they had no interest in complying with the existing policies because enforcers themselves were not seen enforcing the laws. Secondly, other FSS managers also subverted some of the policies. In this case, managers blatantly violated the policies without any form of punishment. The lack of enforcement of the policies and the resultant non-compliance further makes the connection between FSS and the risk of disasters was extremely complex. The overall conclusion of the research is that even though Ghana has made significant progress towards urban disaster risk reduction in terms of policies, institutions, and organizations, the major constraint is translating this momentum into practical activities that can reduce the extent of vulnerabilities associated with FSS operations. Given the extent of complexities, there will be the need for city authorities to adopt multiple compliance tactics which the compliance theory describes as any measure or technique, or mechanism that can be taken to encourage compliance. This,

therefore, reaffirms the need for more attention in any policy debate. We argue that in the broad scheme of FSS management, risk must not be discussed in the margins. This can be achieved if all stakeholders agree to develop the political and legal muscles of city authorities and retool the technical capacities of disaster managers so that they can live up to the challenges posed by urban disasters.

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