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Environmental risk perceptions of residential and commercial neighborhoods of petrol stations in Maiduguri Metropolis, Nigeria

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Abstract

Environment for decades has been subjected to varied degree of degradations majorly by anthropogenic activities at the detriment of its full potentials. In light of this, the paper evaluates environmental risk perceptions of residential and commercial outfits in the neighborhoods of petrol stations in Maiduguri metropolis. Data were collected quantitatively and qualitatively with the aid of questionnaires, interview schedules and literatures. Seventy (70) residential houses and 28 commercial shops within 100m radius proximity to 14 petrol stations were targeted at random; given 5 houses and 2 shops around each sampled station picked along 7 routes. From each sample, 1 respondent was picked purposively and issued questionnaire or administered interview. The results as revealed, 73.5% respondents complained of persistent inhalation of fuel-polluted air at their location due to their close proximities to the facilities. Whilst 67.5% claimed they do not derive benefits directly from the neighbourhood facilities. However, 81.9% respondents were compelled to live with the risk and hazard challenges perceived to be associated with the neighbourhood facilities, since they lack effective voice that could help to make a change. Given this, location and activities of petrol stations within human settlements are playing significant role in adding pollutants into the environment. Consequently, it seems obvious that in most of urban Nigeria, location of many obnoxious facilities like petrol stations have compromised stipulated guidelines; thereby heightening challenges confronting the weak. As such their presences are evidently chaotic and this is likely to continue without regards to basic environmental best practices.

Keywords: Environmental risk, Neighborhood, Perception, Petrol station, Regulations

Introduction

Environment for decades has been subjected to varied degree of degradations majorly by anthropogenic activities at the detriment of its full potentials. In effect, the degraders (humans) and incidentally the major beneficiaries of its resources ironically most times, are caught in the web of needless risk and hazards feedbacks (Leiserowitz, Weber, Hsee & Welch, 2001; World Health Organization, 2013). Environmental Risk is the actual or potential threat with adverse effects on living organisms and the environment through discharge of toxic effluents, emission of pollutants, wastes disposal, or resource depletion defined by extreme anthropogenic activities (Tordoff, 2008; Sun et al., 2009). Exposures to risk and hazards have the potential of inducing forces that can adversely affect soil, water, air or an entire ecosystem, with impacts on health and economic wellbeing of its victims

(Harvey, 2012). Industrial developments are evident contributors to the environmental risks; as their activities normally lead to soil, water and air degradation; thereby giving room to flourishing dreadful diseases (Panientong, Maleehuan & Chamchod, 2012). Environment generally, is the common heritage of mankind; and needs holistic approach for its preservation. However, anthropogenic induced pollution is a major index of man's failure to achieve the desirable through his untiring efforts in its exploitation. Although the enactments of Environmental Laws by nations could be seen as steps towards bringing sanity to this menace, and guarantee good quality of life for humans, still, much is expected (Ayuba, 2005). Human development processes which are expected to genuinely correspond with the concept of sustainable development as enshrined in those environmental laws seem faulty at the detriment of the environment (Nour, 2012). Environment therefore, require strict protection just as other commonly agreed values such as right to property, health and life enjoyed by individual humans (Abdul, 2013).

More so, most major global environmental problems fall within resource utilization, ever increasing population, and rising demand for land. Environmental costs most times occur at the detriment of public safety and quality of life; as evident in the number of clean air days and levels of wastes management (Abdul, 2013). In evaluating petrol stations location and activities in the context of this developmental stride, a large number of them are located within human crowded settlements despite being obnoxious and playing significant role in contributing pollution across communities particularly in urban Nigeria Afolabi, Olajide, & Omotayo, (2011). Using the case of Maiduguri, location of petrol stations in the metropolis particularly is guided by Guidelines domiciled in the Department of Petroleum Resources Procedure Guides (2010). This guideline with reference to location buffers requirement stipulates where and how petrol stations should be located. However, the responses of many of these facilities to the location guidelines in the metropolis are observed to be determined by the entrepreneur's decisions. As such, their location decisions are influenced by their individual preferential choice of sites; majorly for huge market patronage (Ayuba, Mshelia & Dami, 2013; Taylor et al., 2016). However, considering the environmental problems associated with the location of these obnoxious facilities, this paper investigated the environmental risk perceptions of residential and commercial neighborhoods of petrol stations in Maiduguri metropolis, Nigeria

Literature review

Nature is the common heritage of mankind; but needs holistic approach for its preservation. However, anthropogenic induced pollution is a major index of man's failure to achieve the desirable, through his untiring efforts in exploiting the environment. Although the enactments of Environmental Laws by nations could be seen as steps towards bringing sanity to this menace and guarantee good quality of life for humans, still, much is expected (Ayuba, 2005). According to Damborský, 2007; environment requires strict protection just as other commonly agreed values such as right to property, health and life enjoyed by individual humans. The concept: Environment protection, evolved in 1970s when it was clear the ecosystem as a fragile asset, has become vulnerable to human degradation activities. The need to strike balance between improving the quality of life alongside protecting this asset for generations to come therefore, necessitated the awareness termed: sustainable development. As acknowledged in 1992 Rio Earth Summit, the social and economic welfare of humans were observed to be linked to the environment (Taylor, Sichinsambwe & Chansa, 2016). Consequently, any form of change in the former fields, could invariably create impact

on the later, either positively or negatively, immediately or eventually. In many cases, such changes are negative and difficult to remediate (Abdul, 2013).

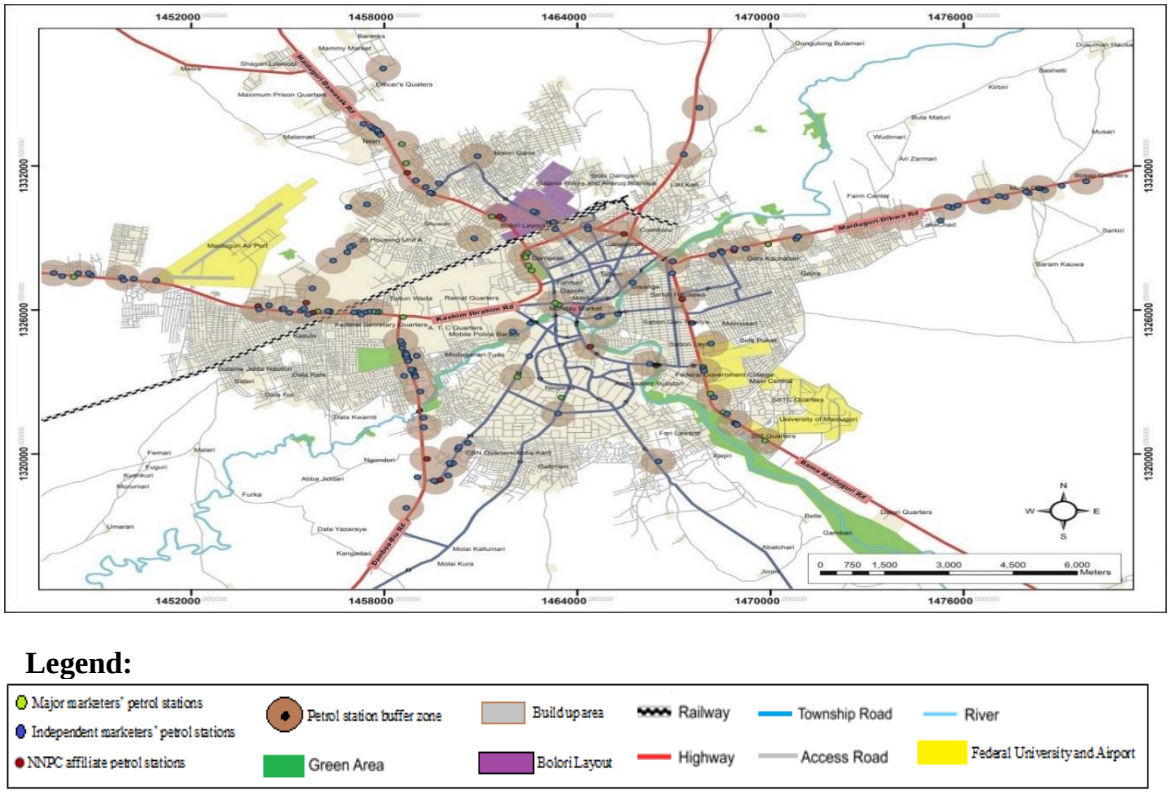
In the literature: Tragedy of the Commons, Hardin (1968) viewed the issue of pollution as Tragedy in the environment assumed by many as belonging to nobody; so are free to pollute it. By implication, it becomes not only the question of taking something out of the commons, but also putting something undesirable like sewage, chemical, radioactive, heat and other forms of wastes into the water, land and air. Given that, those polluting found, the cost of discharging their wastes into the Commons, is far less than the cost of purifying them before releasing into this Commons (environment). The result as always, are the current incidental human race towards locking-up itself in a system fouled by devastating pollutants (Hardin, 1968 in David et al., 1990). However, man can remedy the menace if only he will genuinely safeguard the environment is through putting in place and enforcing coercive laws capable of making it cheaper for polluters to treat pollutants before emit or discharge them untreated into the Commons than doing such untreated. Else, the Commons may continue to suffer Tragedy, with catastrophic collapse; if man continues to look the other way. This reluctance as observed in enshrined governance issue today, seem to be responsible for paving ways for most petroleum entrepreneurs and other structural property developers in Maiduguri urban to consistently exploit the environment for location of petrol stations or other structures indiscriminately.

Method and study area

Maiduguri metropolis is the capital of Borno State and the study area. Its absolute geographical location occupied Latitude 11^0 46' 18"N to 11^0 53' 21″N and Longitude 13^0 02' 23"E to 13^0 14' 19″E and landmass covering 137.36 sq km (Figure 1). Its spatial position and altitude lie within Lake Chad Basin Formation, on 320masl mean elevation. Founded by British colonial masters in 1905, and became the headquarters of Northeast Region of Nigeria in 1967 (Statistical Year Book Report, 2006; Nyanganji, 1996; & Waziri, 2009). Over the last decade, and consequent of the security challenges being experienced in the region, mass migration of people from other Local Government Areas of the State into the metropolis for safety were recorded (Ikusemoran & Jimme, 2014; Kaltho, Ibrahim & Mshelia, 2017).

Quantitatively, structured questionnaires were administered to 70 sampled residential houses and 28 commercial shops targeted at random. From each of the samples, a respondent was picked purposively. These respondents were deem fit to represent their individual residential houses or commercial outfits. The targeted houses and shops were sampled around petrol stations located within 100m radiuses along 7 out of 17 routes identified. These routes were arranged alphabetically, after which each was assigned numerical figure; and some with additional asterisks as marks of peculiar identity. Thus: **1**Airport–Kano route, *[**2**]Ali Kotoko route, **3**Baga route, *[**4**]Bama route, **5**Damboa (NNPC Depot) route I, *[**6**]Damboa–Biu route II, **7**Flour Mills Route, *[**8**]Gamboru–Ngala route, 9Giwa Army Barracks route, *[**10**]Gwange–Bulabulin route, **11**Lagos Street route, *[**12**]Maduganari by-pass route, **13**Old Maiduguri route, *[**14**]Pampomari by-pass route, **15**Polo route, *[**16**]Post Office Area, **17**Sir Kashim Ibrahim route were the identified. The routes with even numbers and asterisks formed the required samples. However, due to inadequate required numbers of petrol stations along route *2, it was screened out, leaving 7 routes used for the study. From each of the 7 sampled routes, 2 petrol stations were picked at random; given a total of 14 sampled stations. Around each of these sampled stations, 5 residential houses and 2 commercial shops within 100m radius were also picked at random. Out of each of the

affected houses and shops, 1 representative (a resident and a shop keeper where applicable) was/were picked purposively and issued questionnaire or interview. A total of 98 respondents were targeted. However, 83 were satisfactorily sampled and used for the study. The residential houses and commercial shops were sampled based on their vulnerability to potential risks and hazards associated with petrol stations location and activities due to their unfriendly proximities. Data obtained were organized in Microsoft excel, and analyzed using descriptive statistical in SPSS Version 19.0. The results are presented in frequencies and percentages on tables and charts in consonance with Rocha et al. (2014); Ayuba, Mshelia & Dami (2013).



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Sources: Fieldwork, 2020

Figure 1. Maiduguri urban showing network of its major petrol stations routes and neighborhoods' proximities

Results and discussion

Characteristics of petrol stations neighborhoods residential and shop occupants

Characteristics of petrol stations neighborhoods residential and shop occupants are presented in Table 1. Results as indicated in Table 1, shows 79.5% cumulative respondents to be between the ages 20-40 years as against 20.4% age bracket that falls between 41 years and above. Given this, it is clear the former age bracket shows highest responses came from younger adults who were either instructed by much older residents or shop owners to respond on their behalf, or were themselves the heads of the households or shop owners. Interestingly also, this may likely be that high population of the younger category was as a result that they were seen as more conversant with happening in their environments. Consequently, offered satisfactory judgment on the relationship between their immediate environment and the petrol stations located within those proximities. The 20.4% much older

respondents were those whom either preferred to handle the questionnaires or respond to interviews themselves, or do not have much younger adults to represent them.

Table 1. Socio-economic characteristics of petrol stations' neighborhoods

Respondents	Age range			Gender			Social status		
	Years	***Freq***	***%***	***Gender***	***Freq***	***%***	***Status***	***Freq***	***%***
Residents and shop keepers within 100m radius proximities to petrol stations	20 – 30	41	49.4	Male	72	86.7	Students	7	8.4
	31 – 40	25	30.1	Female	11	13.3	Applicants	27	32.5
	41 – 50	7	8.4	Total	83	100	Civil servants	18	21.7
	51 – 60	7	8.4				Technicians	10	12.0
	>60 yrs	3	3.6				Business	21	25.3
	Total	***83***	***100***				***Total***	***83***	***100***
	Duration of stay at location						**House and shop status**		
	Duration	***Freq***	***%***				***Occupants.***	***Freq***	***%***
	<5 yrs	13	15.7				Squatting	7	8.4
	5 – 10	40	48.2				Renting	35	42.2
	11 – 15	15	18.1				Personal	28	33.7
	16 – 20	4	4.8				Free offer	3	3.6
	>20 yrs	11	13.3				Family house	10	12.0
	Total	***83***	***100***				***Total***	***83***	***100***

Sources: Fieldwork, 2020

In terms of gender parity responses in the Table 1, the results revealed very high (86.7%) responses coming from male respondents. These results justified the assertion by Ayuba et al. (2013) that, in Maiduguri, like most other parts of northern Nigeria, culture and religion, particularly Islam, do not favour a situation where women freely mingle and interact with strangers especially male adults who are not closely related with them. This might have been the reason why many of the female residents or shop keepers acted in strict adherence to the doctrines; which contributed greatly to the female declining to avail themselves for the study. The 13.3% female respondents were those who were assumed to be liberal to the doctrine, non-Muslims, household heads or the commercial shop owners themselves. The social status shows 40.8% cumulative respondents were either students or graduates; 21.7% were civil servants, and 37.3% were either technicians or into businesses. These results therefore indicated that, bulk of the respondents were educated or enlightened. As such, possessed minimum understanding of environmental problems, particularly as it relates to petrol stations location and activities in their neighborhoods. In the case of residential houses or shops ownership status, 42.2% of the respondents were renting the houses or shops they were occupying. To 33.7%, the houses or shops are their personal property; 12% were living with their parents or relations; 8.4% were squatting; while 3.6% were given the houses or shops for free temporarily.

However, occupancy status within the 100m radius proximities to petrol stations could be view as a factor responsible for determining the in-depth perception on matters that have to do with challenges at the location or re-location. Given that, in as much as those renting which constitute 42.2% may decide to change location at their convenience, 57.8% of the cumulative respondents do not have such privilege. As a result, hang their fates on the factors of their residency or occupation status. Furthermore, the respondents' duration of stay at close proximity to the petrol stations also shows 15.7% to have spent 5 years or < at their locations, 48.2% lived at the locations for as long as 5 – 10 years, whereas, 36.2%

cumulative respondents have been occupying the locations for 11 years or >. By implication, it could be safe to assume that, perhaps, the occupancy of the residential houses or shops and the location of the petrol stations were done simultaneously. Consequently, many of those respondents were not better informed to provide information as regard which of the structures was defaulting in location regulations (Table 1).

Challenging experience of the occupants of neighborhoods of petrol stations

The challenges experienced by the occupants of neighborhoods of petrol stations within 100m radius proximities to petrol stations is represented in Table 2. The challenges residents and shop owners occupying sites were experiencing as revealed 68.7% perceived their present locations have no identified problems; hence, were comfortable residing close to the facilities. On the issue of pollution, 73.5% incidentally complained of persistent inhalation of fuel-polluted air emanating from the near-by petrol stations especially when they are actively dispensing fuels or off-loading products from fuel-laden trucks. By implication, this casts doubt on the earlier assertion by the 68.7% who posited that, their locations close to petrol stations were not threatened. This is as the later percentage (73% cumulative) defended their claimed that, living very close to the stations most times subjects them to restlessness and other health challenges such as headache, nausea and irritation. Subjecting these subtle protest to law scrutiny, the Environmental Impact Assessment (EIA) Act No.86 of 1992 was clear on its sympathy; as its state that, the involvements of general public to be affected by a proposed development with potential risk and hazards is necessary, and their opinions should be vital in decision making in that regard (Chris, 2013).

Table 2. Challenges associated with living or doing business within close neighborhoods of petrol stations

Challenges	**Responses**					
	Accept		Reject		Sum of Challenges	
	Freq.	*%*	*Freq.*	*%*	*Freq.*	*%*
Whether the respondents were comfortable residing or doing business at close proximity to petrol stations	57	68.7	26	31.3	83	100
Possibilities of petrol stations neighborhoods perceiving fuel-polluted air emanating from the stations' activities	61	73.5	22	26.5	83	100
Whether the respondents were contacted for EIA exercise before the closest petrol stations to them were located	2	2.4	81	97.6	83	100
Knowledge of the implications of residing or doing business within 100m radius proximity to petrol stations	27	32.5	56	67.5	83	100

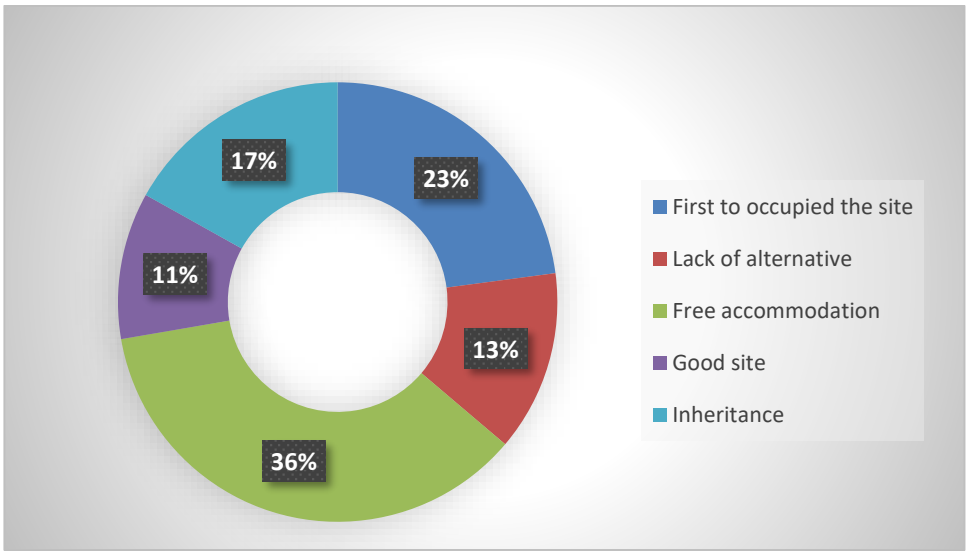
Sources: Fieldwork, 2020

In line with this, the situations in Maiduguri metropolis left more questions seeking for genuine answers. Given that, 97.6% of the cumulative respondents insisted that, no prospective petroleum entrepreneur, development agencies or consulting firm ever contacted them concerning EIA exercise with regard to location of petrol stations (Table 2). In effect, this is likely that, EIA act implementation as regard location of petrol stations location in Maiduguri was only paying lip-service, and the wellbeing of the general public might've been non-issue to the government. Additionally, 67.5% of the respondents (Table

2) claimed to have no understanding of implication of living within close proximities, especially within 100m radius to petrol stations. Disturbingly, these expositions showed that, most of the petrol stations close-by neighbor structures felt safe at their location. So, do not envisaged any damaging challenges emanating from the facilities' activities; either short- or long-term health implications. However, the few enlightened ones (32.5% respondents) who were conversant with such environmental implications felt sideline in the scheme by responsible parties and authorities on things that have to do with their health and the environment, as spelt out in the EIA Act.

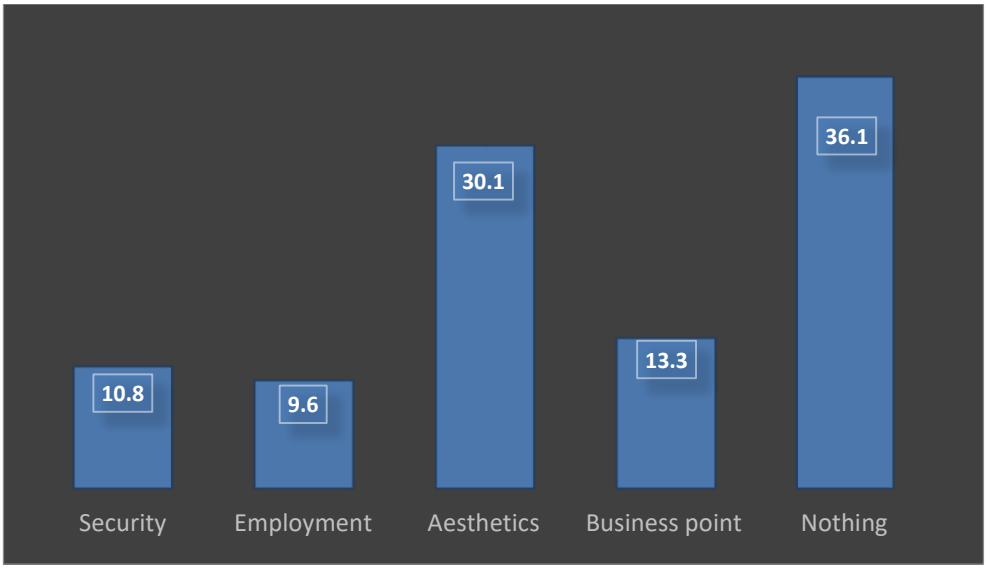
Reasons for residing at close proximity to petrol stations and the benefits derive

Figure 2 and 3 respectively depicted the reasons as well as benefits advanced by the residents at close proximity to petrol stations. It seems obvious the feelings and judgments of those occupying residential and commercial structures within 100m radius proximities to petrol stations in the metropolis do not all agree on issue of risk associated with their choice of action as shown in Figure 2. As 36.1% felt, their continuous occupation of the location was as a result of lack of alternative. Their argument lays on the fact that, though they were aware of the risk and hazards, lack of acceptable alternative location for relocation compelled them to embrace what they already have. To 16.9% respondents, the properties were inheritance by their family members, so it would be unnecessary or difficult to make individual decision as regard complex issues such as relocation based on perceived danger of residing close to petrol stations with the co-heirs; who may consider such as myth. Whereas, 10.8% attributed their reason to friendly terrain and physical developments attracted to the neighborhoods by the petrol stations, and proximity to main roads. These groups felt their respective areas are well developed and free from flash flood and other accessibility impediments; therefore, preferred to live or do business at the location, whilst dispelling the risk.



*n=83, % =100
Sources: Fieldwork, 2020

Figure 2. Reasons why neighborhoods reside or do business at close proximity to petrol stations



*n=83, % =100
Sources: Fieldwork, 2020

Figure 3. Benefits derived by petrol stations' neighborhoods

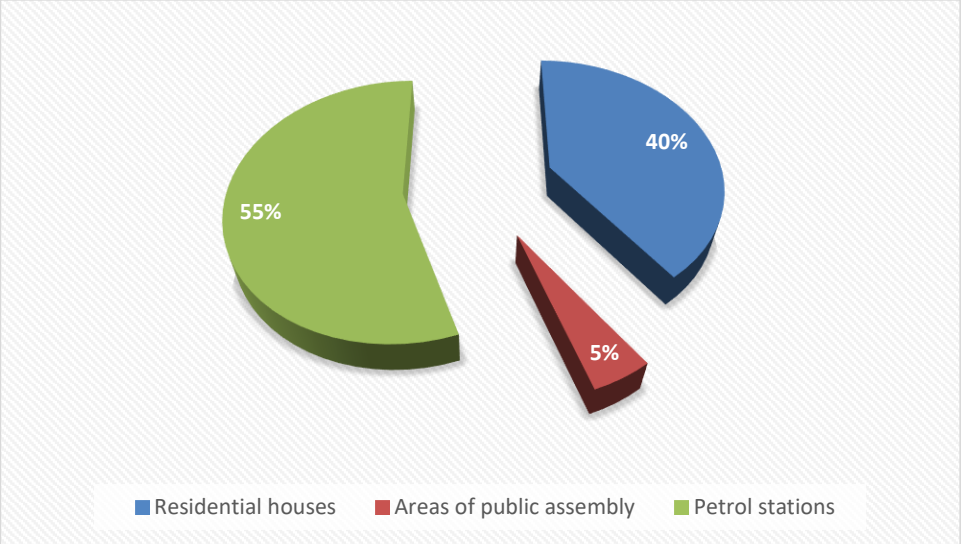
Furthermore, the Figure 2 also revealed respondents constituting 22.9% who put forth argument on a premise that, they were among the earliest occupants of the location before petrol stations proliferated the neighborhoods. Most of those petrol stations proprietors as they claimed, obtained their sites through purchase of existing residential houses or shops, then demolished them and converted the sites to petrol stations. Results summing-up to 13.3% alleged their continuous residency at the location is because houses or shops were given to them free for given periods. As some of them were very low-income earners who were helped by relations or fiends being, they were migrants from rural areas who moved into the urban as Internally Displace Persons due to security challenges in their communities. The likely benefits derive by living in the neighborhoods of the petrol stations as revealed in Figure 3, indicated 10.8% of the respondents as beneficiary of security services the stations are providing. This positive disposition as they claimed, are going a long way in complementing the general security apparatus put in place by the government in securing their neighborhoods; so, they are happy as neighbors to the facilities. Respondents constituting 9.6% alleged, the stations provide youth in the neighborhoods with employment; as location of new ones in their area are continual, and their management prefers workers living in the nearby due to the work schedules. The stations also serve as avenue for easy access to petroleum products to black marketers mostly within the environments based on familiarity as neighbors. While 30.1% were of the view that, the presence of petrol stations in their neighborhoods ushered-in new phase of physical development that add to aesthetic value of their environment, so are proud neighbors. Respondents constituting 13.3% affirmed that, the presence of petrol stations in their neighborhoods provided enabling environment for small scale businesses; as their premises serves as nodal points where people visit not only to buy fuel, but as meeting joints.

Consequently, 36.1% of the respondents observed that, the presence of petrol stations in the neighborhoods left them without benefit (Figure 3). From these results therefore, it is clear that, location of petrol stations within residential houses or close to commercial outfits, in as much as they are potentially risk facilities, yet, their neighborhoods derive some measures of benefits from them as indicated by the 63.8% cumulative benefits variables, as against 36.1% non-benefits variables. Importantly, these findings confirmed the assertion by Mark (2005) that, petrol stations are known to have been operating additional business such

as chain stores, supermarkets, discount superstores, warehouse or clubs at their premises; and also provides avenue for other forms of businesses to thrive. Interestingly, in Maiduguri metropolis, similar scenario is the case, as some of these facilities operates some of the aforementioned businesses, and also allow itinerants businesses in their premises; without consideration to the possible risk and hazards associated with their nature of occupancy.

Encroachment possibilities and neighborhoods' reactions

Perceived risk, hazards and health challenges experienced by stations neighborhoods occupants is presented in Figure 4. Figure 4 shows the encroachment possibilities and neighborhoods' reactions. Accordingly, 39.8% of the respondents argued that, residential houses in the neighborhoods of petrol stations are the default structures. The levels at which the three structural developments indices: *petrol stations, residential houses* and *areas of public assembly* in Maiduguri metropolis defaulted in location regulations stipulated by the Department of Petroleum Resources (DPR) Guidelines (2010); Borno State Development Control Department (BSDCD); and Ministry of Land and Survey (MLS) in terms of which encroached into the other's safety buffers environments, are shown in Figure 4. This argument was based on the premises that, given the periods many of the affected petrol stations were located, they were certain, most at the houses were non-on-sites at their current location. However, over the years, and coupled with population increase, pressure on land demand resulted in the continuous encroachment of residential houses and shops in defilement of the petrol stations safety buffers. To 4.8% respondents, their perceptions were, areas of public assembly particularly schools, markets, hospitals, hotels and super stores among others, were the structures that encroached, or are encroaching into already occupied residential buildings enclosed environments. In so doing, most times extend the encroachment into the petrol stations safety buffers.



*n=83, % =100
Sources: Fieldwork, 2020

Figure 4. Structures encroachment possibility at the affected environment

*n=83, % =100
Sources: Fieldwork, 2020

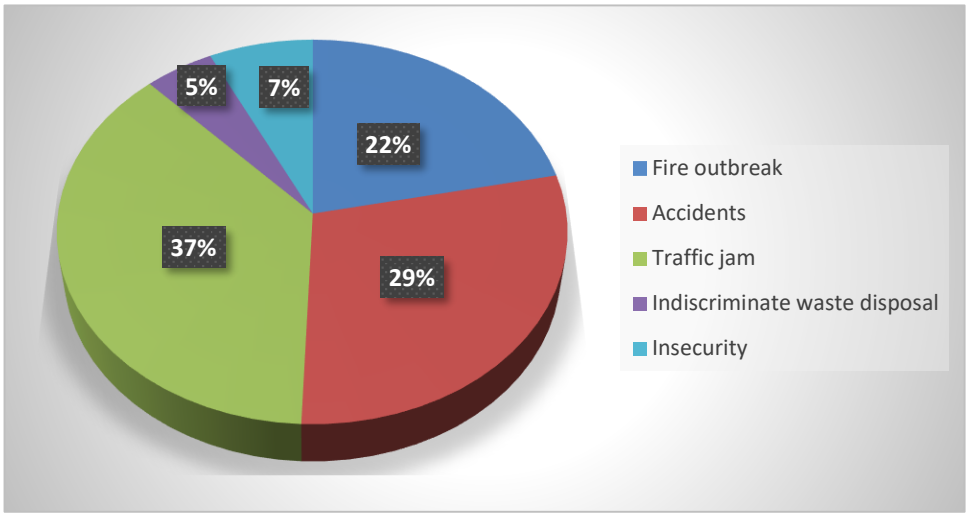
Figure 5. Action taken by neighborhoods due to location of petrol stations

From these results, petrol stations could be view as major encroaching facilities in the metropolis as their location within the human habitation environment seem to be growing unabated at the detriment of other competing structural developments, and environmental risk associated with them (Figure 4). The perceived actions taken by the residents for mitigating the proliferation of the petrol stations as indicated in Figure 5, revealed 50.6% complained against the influence of the petroleum entrepreneurs who abuse such privileges by engaging in indiscriminate location of petrol stations. As further posited by the respondents, these entrepreneurs are group of socially and politically higher elites who were either friends of government or political leaders themselves; so, it may be fruitless to revolt against their actions as they chose to violate the rules. To 20.5% respondents, their views on proliferation of petrol stations were only discussed at family levels, with friends and colleagues at work places, meeting joints and other informal places; but not to appropriated authority. Their assumptions were, their voices would not make a difference. The Figure 5 also revealed 4.8% of the respondents claiming to have on few occasions complained to the appropriate authorities, but such complained yielded no positive results, as no stations was sanctioned, and new ones keep springing up unabated. While 24.1% were forced to resigned to their fate without complaining after watching the trend of events; even as the challenges have to do with their health. More so, the situation was aggravated by the fact that, most of the environments where the stations proliferated were neighborhoods occupied by people whose voices hardly matter in influencing policy or law enforcement in the metropolis; citizens mostly of low social and political status. As a result, were forced to live with the facilities at the expense of their safety.

Perceived risk, hazards and health challenges experienced by stations neighborhoods occupants

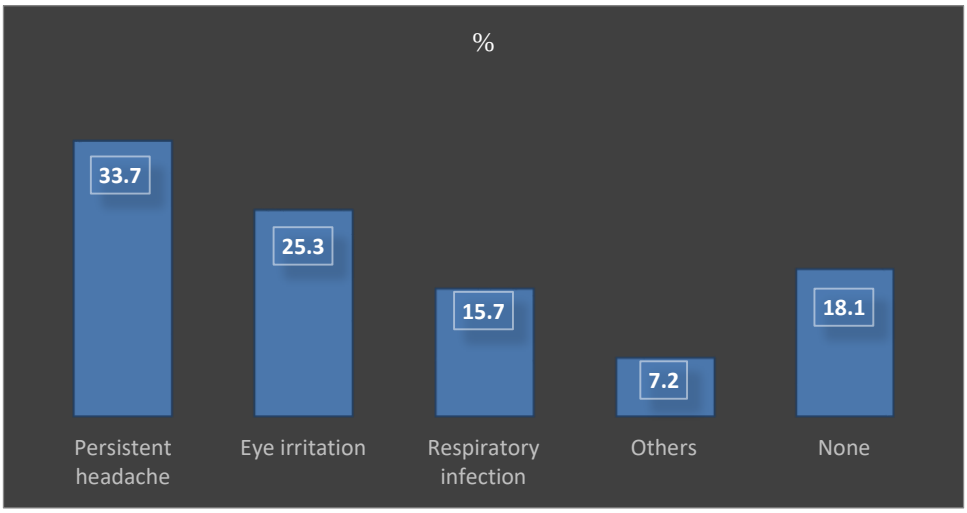
Perceived risk, hazards and health challenges experienced by stations neighborhoods occupants is presented in Figure 6 and 7 respectively. Risks and hazards experienced consequent of residing or doing business in the neighborhoods of petrol stations are matter of concern in the metropolis; being that, the facilities are perceived to be obnoxious. In view of this, 21.7% of the respondents as shown in Figure 6 continually nursed the fear of fire

outbreak likely to emanate as a result of faulty activities, equipment or accident at the petrol station.



*n=83, % =100
Sources: Fieldwork, 2020

Figure 6. Risk and hazards experienced by petrol stations' neighborhoods



*n=83, % =100
Sources: Fieldwork, 2020

Figure 7. Health challenges experienced by petrol stations' neighborhoods

Though the incident were not frequent as reported; yet, dreadful information available to these respondents on such occurrences elsewhere have left them with persistent fear and restlessness especially when fuel-laden trucks are offloading products at the stations. To 28.9% respondents, accident involving vehicles in the neighborhoods with children falling victims most times, were the main concern. As advanced by these respondents, during fuels scarcity, few stations with petroleum products normally records high turnout of automobiles. In many cases, these vehicles and tricycles engaged in rush towards such stations using shorter routes within the neighborhoods at dangerous speed, which usually results in accident with aged persons and children falling victims. As further revealed in the Figure 6, 4.8% perceived potential risk and hazards experienced were largely

dependent on the methods most petrol stations adopted in disposing-off their wastes in the neighborhoods. Some of these stations usually disposed liquid wastes in shallow drains provided within their premises or nearby drains which are normally connected to the public drainage network. In an event of rainfall, such wastes are wash-off into the neighborhoods through run-off and causing serious inconveniences. Whereas, their solid wastes are disposed-off at designated points within the stations which most times end-up in public waste disposal sites or litter the neighborhoods. To respondents constituting 7.2%, insecurity was the nightmare; as the presence of petrol stations in the neighborhoods usually attracts insecurity. Their suspicion rest on the premise that, some of the people who walk into the facilities are not customers; rather, having criminal tendency, and are prone to violence at the slightest opportunities. This usually results in spill-effects into the neighborhoods directly or indirectly (Figure 6).

The neighborhoods residents to petrol stations also posited claims of living with varied health challenges perceived to be consequent of inhalation of fuels polluted ambient air. As evident in Figure 6, respondents constituting 33.7% complained of persistent headache whenever fuel-laden trucks are off-loading products in the facilities; or when the stations are actively dispensing fuel. Buttressing the claim, they reported their neighborhoods ambient air to becoming foul with fuels odor, leading to discomfort to those allergic-to the odor (ATSDR, 2004). Perception of 25.3% dwelled on irritations whenever the emissions get into eyes thereby reddening them, and drawing excessive tears. While 7.2% revealed complications ranging from nausea to restlessness. However, 18.1% felt the situation always remains normal, as they were not affected in any way. It is therefore evident, given the results, periodic fuel polluted ambient air at petrol stations and their neighborhoods could be considered as unfriendly; as most of the respondents (81.9% cumulative) have over time developed phobia or other challenges perceived to be due to the activities practice at the facilities. Although, there could be other factors triggering such health challenges, the perceptions of most of these respondents insisted on the facilities as the major antagonists.

Conclusion

Despite the relevance of petrol stations in providing easy means of livelihoods across spectra of human survival and endeavors, their location within human settlements alongside their activities are playing significant role in adding pollutants into the environments with eventual risk and hazards. Their proliferations particularly in Maiduguri metropolis have shown unfriendly violation of the basic requirements needed for their location and operations. Even with the enactment of environmental protection laws in Nigeria, Borno State government whose responsibility among others, is to encourage machinery for their enforcement, and unfortunately seems reluctant. As a result, many of these facilities posed environmental risk. The general public in spite the current democratic civilization and improved quality of education, yet, many still perceived risks associated with proliferation of petrol stations as mere assumption and myth. This is clear as most of the neighborhoods displayed little or no understanding of the implications of living or doing businesses at their respective locations. The enlightened ones, who were expected to be conversant with such environmental implications, expressed sense of helplessness, as they perceived to be sidelined in the scheme of things that have to do with their environments and health; in contrast with regulatory requirements. Consequently, residential houses and commercial shops continue to share unsafe neighborhoods with petrol stations with little or no resistance; since most of the parties involved in the petroleum business are seen as influential personalities.

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