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Impact of Filling Station on the Resident's Livability in Ogbomoso, Nigeria

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Abstract

The paper examines the impact of filling station on resident's livability in Ogbomoso, Nigeria. The study took the inventory of filling stations in the study area, appraised residents' livability in the area and examined the impact of filling stations on the resident's livability. With the aid of Rasta map, four perimeter circular zones were established marking the ones that are 5m, 10m, 15m and 20m radius close to each filling station. The number of houses found within each of the four radii zones forms the size of sample for the questionnaire survey. The number of houses at each radius determines the number of questionnaire administration. Houses in the study area were sampled purposively. Hence a total of 213 houses were sampled and an adult representative responded to the questionnaire. The data was analyzed with statistical package for social scientists (SPSS). Chi-square was used to test the impact of filling stations on the resident's livability in relation to their distance to home. Findings showed that there are both positive and negative impacts on residents. Factors such as market opportunity, easy assess to fuel, security at night, increase in physical infrastructure are refer to as positive impact while the problems are traffic delay, environmental pollution, fire hazard and motor accident. It is however recommended that adequate guide should be provided for Ogbomoso Town which should guide the development of filling station.

Keyword: Impact, filling station, environment, resident.

INTRODUCTION

Energy in terms of fossil fuel especially petrol, diesel and kerosene have become indispensable to our domestic, industrial, mobility and other issues that are central to livability of our environment (Knowle and Wareings, 1980). The selling points of this petroleum would be desired by the residents to be closer to homes for easy access. Again, the seller would want to maximize their market by siting filling station in the area of high threshold, where should be requisite for human habitation. So that people would not have to travel far before they can buy the product. While describing the location characteristics of the facilities within the environment, Eldranderly (2003) state that one of the most critical decisions is to find an efficient location that will best support the proposed facilities. But siting filling stations within the residential neighbourhoods may be inimical to the lives of the residents of the area.

Petrol is a highly inflammable liquid and gives off flammable vapour even at very low temperatures. When this vapour is mixed with air in proportions between 1% and 8% a risk of fire or explosion exist (Aghlico, 2020). Petrol vapour is heavier than air and does not disperse easily in still conditions. It tends to sink to the lowest possible level of its surroundings and may accumulate in tanks, cavities, drains, pits or other depressions that is hazardous to lives. This can contaminate underground water and lead to water diseases such as cancer.

Petrol is classified "Harmful by ingestion" owing to this aspiration hazard i.e. the risk of chemical pneumonitis, and not because of its acute toxicity i.e. poisoning properties. Petrol is also classified as a skin irritant, due to its potential to cause dermatitis. The presence of up to 5% benzene means that it is carcinogenic. Therefore, residents are put at great risk when these petroleum products are very close due to

this fact, filling station must not be located near the residential neighbourhood.

Therefore, in order to minimize negative environmental impact when siting the station, there is a need for decision making on land allocation for diverse uses because one of the land uses that required appropriate decision is filling station. Hence, this research work will present the existing situation of filling stations in Ogbomoso town, appraise the residential livability, examine the impact on the resident and make a relevant suggest toward siting and management of filling station with the aim of using GPS for co-ordination value and field survey to gather data, SPSS to analyze and discuss the impact of filling station on the residents because location of filling station in human environment is a decision that needs to be adequately guided due to its crucial impact, it is bound to have on man and his environment.

STATEMENT OF PROBLEM

City expansion that have gapped residences from places of work, multiple connection with different parts of the expanded and yet expanding cities; the cities are increasing a very high rate of filling station establishment in recent times, a larger percentage of filling stations are found on the major street of most south western cities such as Lagos, Ibadan, Ogbomoso among others (Alabi, 2023). The location of filling stations has extended in the city interior where it is meant for human habitation. For instance, 25% of filling stations in Ogbomoso are within the residential neighbourhoods. The consequence of this is not farfetched; many people have lost their lives in fuel related accidents in most Nigerian cities. There has been news of petrol stations catching fire and the fire spreading to nearby residence thereby causing havoc to many residents (Olokesusi, 2000).

Today, we are exposed to environmental pollution caused by petrol and the filling stations that sell the product. Just stand at the side of a busy road and watch you being covered in fumes from a motorbike, car, bus or trunk (Ikporuko, 2017). Also, fume from busy vehicle in and out of the station as well as exhaust from filling station generator. This is in addition to traffic congestion as well as road accident that are associated with the incessant development which has continued to frustrate the livability of the residents. These become evidence with residents living closer to the filling station, which pose dangers to lives and properties due to the high inflammable nature of petroleum product.

Also, an estimated 60 million Nigerians now own power generating sets for their electricity due to the erratic power supply in the country. This has made the petroleum sector an area where the industrialist of the society is eager to invest in, thereby increasing the number of filling station in the neighbourhood and resulted in polluting our environment (MEWR, 2021).

No matter which activities during the day or night keeps us busy, we are always consuming oxygen and producing carbon-dioxide. So, when we breathe, we breathe in pollutants that might be present in the air. If these are the risks that we are exposed to, we therefore need to understand how the location of filling station pose impact on resident's livability and find out the precautionary measures to combat the ill-effects of gas on the environment as well as on the people living in the area.

Therefore, this research is indispensable to achieve the goal of creating a conducive, functionally, efficient and aesthetically pleasing environment for living, working and recreation (Keeble, 1969), which are the main aim of urban planner.

AIM AND OBJECTIVES

The aim of this research work is to access critically the impact of filling station on the resident's livability of Ogbomoso with a view to make recommendations towards a sustainable environment. However, to achieve this aim, its objectives include:

- Take inventory of filling station in Ogbomoso.
- Appraise resident's livability in the study area.
- Examine the impact of filling stations on the resident's livability.
- Make recommendations toward improving the effects that could cause.

Research Hypothesis

There is no significant impact of filling station on residents' livability.

Study area

Ogbomoso is one of the most important towns of Oyo state and in Nigeria. It is the second largest town in Oyo state after the capital city and lies approximately 8d07' north of the equator and 4d15' east of the Greenwich meridian. (BATC, 2004). The town now lies within the derived savannah region, and it is a gateway to the Northern part of Nigeria from the south. Ogbomoso is 57 kilometres South-west of Ilorin (Capital of Kwara state), 53 kilometres Southeast of Oyo, (important town in Oyo state), 58 kilometres north-west of Osogbo (Capital of Osun state) and 104

kilometres north- east of Ibadan (Capital of Oyo state).
The Northern and Southern parts of Nigeria are linked majorly by trunk 'A' road.

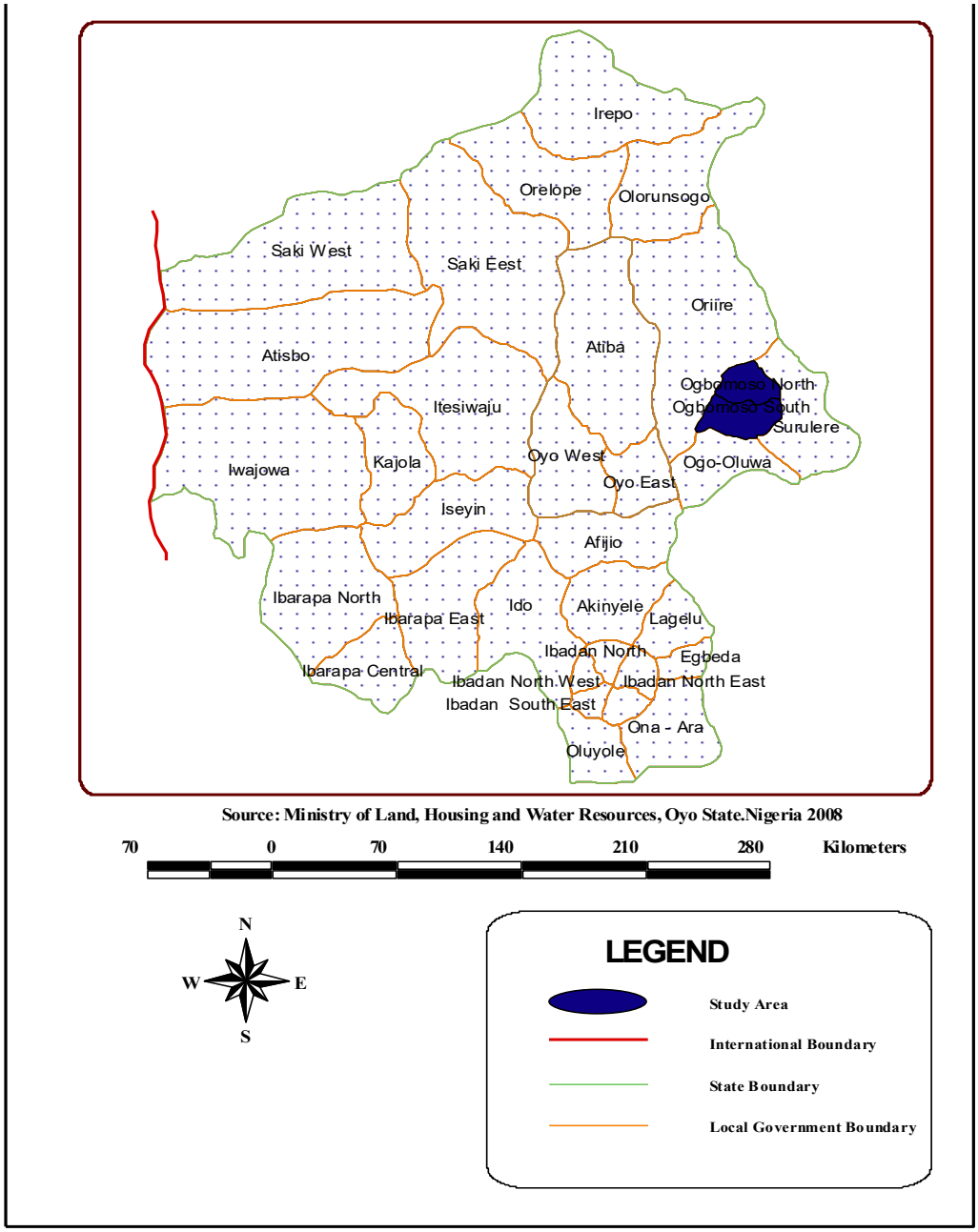

Figure 1: Oyo state showing the study area

METHODOLOGY

Ogbomoso region comprises of five local governments which are Ogbomoso South, Ogbomoso North, Orire Surulere and Ogo-Oluwa local government. But the major town is found in Ogbomoso south and north local government which will be used for this research. GPS and field survey was used to take inventory of spatial distribution of filling station within the study area and the co-ordinate gathered from using GPS was plotted on AutoCAD map software in relation to the buildings in the study area (Figure 2 and 3). This makes it easier to demarcate buffer zone so as to know how and whom to administer in the study area.

However, with the aid of Rasta map, four perimeter circular zones were established marking the ones that are 5m, 10m, 15m and 20m radius close to each filling station. The number of houses found within each of the four radii zones forms the size of sample for the questionnaire survey. The number of houses at each radius determines the number of questionnaire administration. Houses in the study area were sampled purposively. Hence a total of 213 houses were sampled and an adult representative responded to the questionnaire.

The data was analyzed with statistical package for social scientists (SPSS). Chi-square was used test the impact of filling stations on the resident's livability in relation to their distance to home.

Table 1: Number of houses selected in each radius

S/N	Selected Area	Distances/ radius				Total no of questionnaire
		5m	10m	15m	20m	
1	Takie	4	6	7	8	25
2	Apake	3	4	6	7	20
3	Caretaker	3	4	5	6	18
4	Idi-araba	4	5	6	7	22
5	Isale general	3	5	6	8	22
6	Ojatitun	2	4	5	7	18
7	Okeanu	3	4	5	6	18
8	Olopemarun	2	3	5	7	17
9	City area	2	4	5	6	17
10	Otito-ju	3	4	5	6	18
11	Odooru	2	3	6	7	18
Total						213

Source: author's field work, 2025

Figure 2: Pictorial representation of the sampling

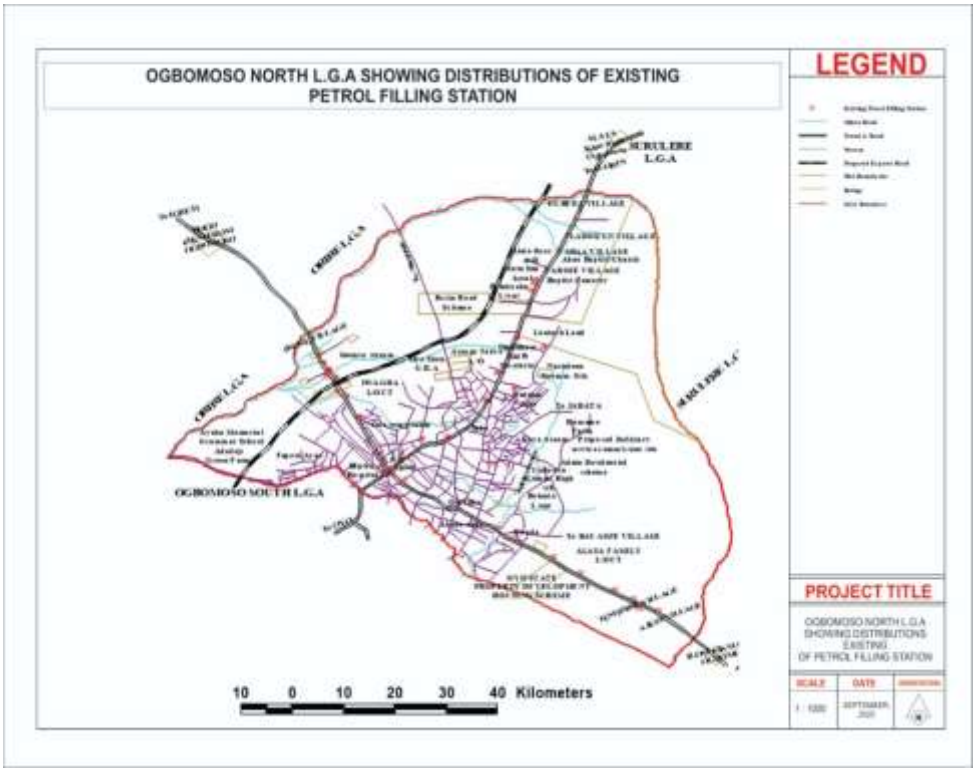

Figure 3: Map of Ogbomoso North LGA showing distribution of petrol filling station

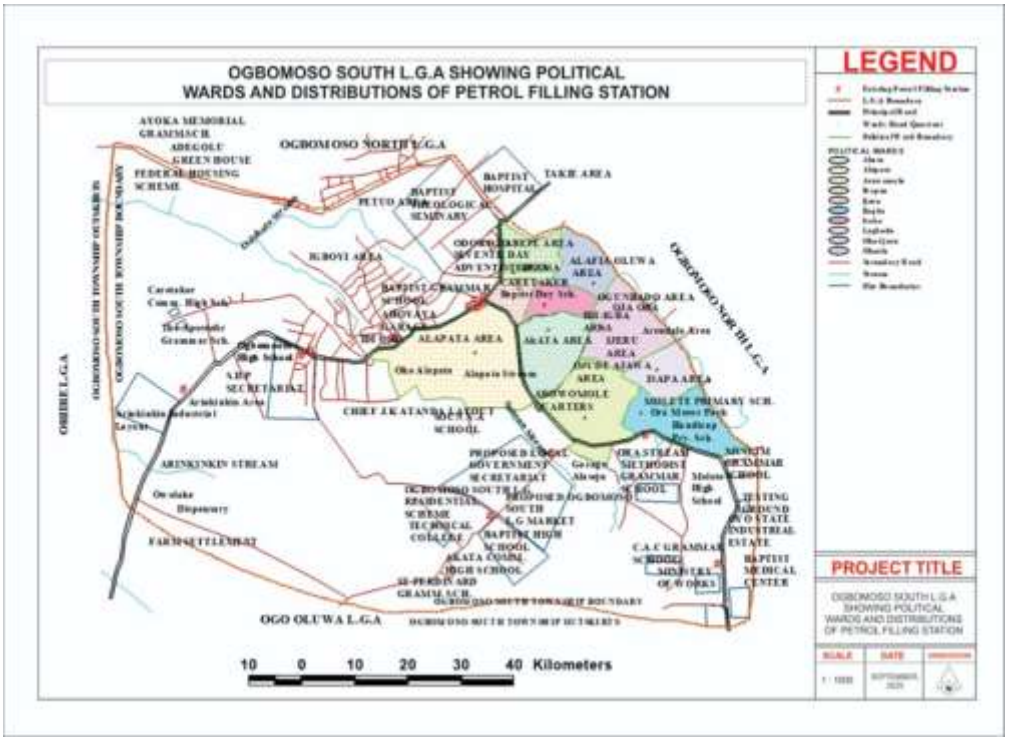

Figure 4: Map of Ogbomoso South LGA showing distribution of petrol filling stations

RESULTS AND DISCUSSION

Inventory Of Filling Stations in the Study Area

Table 2 and 3 reveal that the total number of filling station in the study area is 51 with Ogbomoso North local government has the highest number of (35) filling stations while the remaining 16 are found in Ogbomoso South. Most of these filling stations are located along the streets and within the residential areas in the study area which the study confirmed to be affecting people living near the

Table 2: Enumeration of filling station in Ogbomoso North local government

S/N	NAMES OF FILLING STATION	LOCATION	WARD	PETROLEUM MARKETER
1	AMSO GLOBAL	OKOBABA	AGUODO/MASIFA	INDEPENDENT
2	RUBBIE OIL	OKOBABA	AGUODO/MASIFA	INDEPENDENT
3	YOACO	YOACO AREA	AGUODO/MASIFA	INDEPENDENT
4	NNPC	ROYAL CROWN	AGUODO/MASIFA	MAJOR
5	SALAU AJADI	ISALE GENERAL	SABO/TAARA	INDEPENDENT
6	RUBBIE OIL	STADIUM ROAD	AGUODO/MASIFA	INDEPENDENT
7	S.A ADENIRAN TET	STARLIGHT	SABO/TAARA	INDEPENDENT
8	MODERN OPTION	OJA TITUN	AGUODO/MASIFA	INDEPENDENT
9	BUNVIC INVESTMENT	OJA TUNTUN	SABO/TAARA	INDEPENDENT
10	OANDO	APAKE	SABO/TAARA	MAJOR
11	NICHOLAS AND SON	TAKIE	OSUPA	INDEPENDENT
12	ABESE INVESTMENT	TAKIE	OSUPA	INDEPENDENT
13	AP	TAKIE	OSUPA	MAJOR
14	SOLA IYANIWURA	CITY AREA	OSUPA	INDEPENDENT
15	ADEOMI PETROL	ODO-ORU	OSUPA	INDEPENDENT
16	ADEKAITAN COMPANY	ODO-ORU	OSUPA	INDEPENDENT
17	LAIYA PETROL	FEDERAL	OSUPA	INDEPENDENT
18	BFB	IKOYI ROAD	OSUPA	INDEPENDENT
19	SILVER TOUCH	IKOYI ROAD	OSUPA	INDEPENDENT
20	OLUK OIL	IKOYI ROAD	OSUPA	INDEPENDENT
21	ABESE INVESTMENT	FEDERAL IKOYI ROAD	OSUPA	INDEPENDENT
22	OANDO	BABIE	OSUPA	INDEPENDENT
23	ALARI AKATA OIL	UNDER G. LAUTECH	AGUODO/MASIFA	INDEPENDENT
24	ABDON SYSTEM	OKE-ANU	AGUODO/MASIFA	INDEPENDENT
25	SHATA OIL	SEKONI	SABO/TAARA	INDEPENDENT
26	R.A OGUNRINOLA	SAJA/OWODE	SAJA/ISALE ORA	INDEPENDENT
27	SAIADI	OWODE	SAJA/ISALE ORA	INDEPENDENT
28	MODERN OPTION	OWODE IKIRUN ROAD	SAJA/ISALE ORA	INDEPENDENT
29	NAYONG	AGO-IRETI	SAJA/ISALE ORA	INDEPENDENT
30	S. OLAWUWO	ISALE-ORA	SAJA/ISALE ORA	INDEPENDENT
31	OLA CENTRAL	IRESAADU ROAD	SAJA/ISALE ORA	INDEPENDENT
32	MADAM ATOKE	IDI-ARABA	AGUODO/MASIFA	INDEPENDENT
33	A. AKANMU	IRESAADU ROAD	SAJA/ISALE ORA	INDEPENDENT
34	ALADE GLOBAL	ISALE-GENERAL	SABO/TAARA	INDEPENDENT
35	OLAKAITAN	APAKE	SABO/TAARA	INDEPENDENT

Source: author's field work, 2025.

Table 3: Enumeration of filling station in Ogbomoso South local government

S/N	NAMES OF FILLING STATION	LOCATION	WARD	PETROLEUM MARKETER
1	WASHKA PETROL	CARETAKER	IBAPON	INDEPENDENT
2	MOBIL	CARETAKER	IBAPON	MAJOR
3	TEXACO	CARETAKER	IBAPON	MAJOR
4	TOTAL	CARETAKER	IBAPON	INDEPENDENT

5	ALADE GLOBAL	OLOPE MARUN	IBAPON	INDEPENDENT
6	O.C. NIG. LTD.	IDI-ORO	ALAPATA	INDEPENDENT
7	S.A OLAOGUN	HIGH SCHOOL	ALAPATA	INDEPENDENT
8	AJE-IYA	ARINKINKIN	OKE-OLA/FARM	INDEPENDENT
9	ALADE GLOBAL	AROWOMOLE	AROWOMOLE	INDEPENDENT
10	TOB	OTITOJU	IBAPON	INDEPENDENT
11	ADEKAITAN PETROL	ARINKINKIN	OKE-OLA/FARM	INDEPENDENT
12	S. IYANIWURA	AROWOMOLE	AROWOMOLE	INDEPENDENT
13	ADEKAITAN	BAPTIST HIGH SCHOOL	AROWOMOLE	INDEPENDENT
14	ADEKAITAN	CARETAKER	IBAPON	INDEPENDENT
15	EMAAYO	OTITOJU	IBAPON	INDEPENDENT
16	SAMYUL OIL	ORA GARAAGE	ILOGBO	INDEPENDENT

Source: author's field work, 2025

Location characteristics of filling station

The survey conducted in table 4 shows both the good and bad perception of filling station in each zone. Respondents living at 5m and 10m to filling station indicated that the location of the filling station is bad. While respondents living at 15m and 20m to filling station indicated that the location of the filling station to their houses is good. This implies that residents are fully aware of the danger of living at close range to filling stations.

Table 4: Perception of filling station in relation to distance from home

Distance of home to filling station	Perception in %	
	Good	Bad
Zone 1 (5m)	17.9	82.1
Zone 2 (10m)	12.5	87.5
Zone 3 (15m)	53.8	46.2
Zone 4 (20m)	70.6	29.4

Source: author's field work, 2025.

Benefits of filling station located around residential areas

Table 5 depicts that most houses close to filling station enjoy increase in property value (32.5%), easy access to fuel (30.5%) and increase in business opportunities (26.7%). Therefore, considering these benefits, respondents embrace living near filling stations not minding the risk.

Table 5: benefits of filling stations around home

Benefits	Frequency	Percentage
Business opportunities	57	26.7
Increase in property value	69	32.5
Easy access to fuel	65	30.5
Security at night	22	10.3
Total	213	100

Source: author's field work, 2025.

Impact of Filling Station on the Residents Livability

This section explains the existence of problems and also explains which diseases are associated with filling location to know which distance is at risk.

Existence of problem

Table 6 shows that houses that are very close to filing stations are not secured from fire outbreak, noise pollution, change in water source and traffic delay. This implies that the location of the mast to the residences determines the level of noise pollution, water pollution, fire outbreaks generated in the area which might therefore be injurious to health.

Table 6: existence of problem

Problem	**Existence**	**Zones in percentage (%)**				
		5m	10 m	15 m	20 m	Total
Water pollution	Present	85.7	87.1	64.9	45.2	70.7
	Not present	14.3	12.9	35.1	54.8	29.3
Noise from station generator	Present	84.5	73.2	61.4	32.8	62.9
	Not present	15.5	26.8	38.6	67.2	37.1
Noise from moving vehicles in the station	Present	89.3	82.7	67.8	55.9	73.9
	Not present	10.7	17.3	32.2	44.1	26.1

Fire outbreak	Present	88.1	86.6	67.7	60.9	75.8
	Not present	11.9	13.4	32.3	39.1	24.2
Traffic delay	Present	74.1	68.3	56.4	41.8	60.1
	Not present	25.9	31.7	43.6	58.2	39.9

Source: author's field work, 2025.

Incidence of problem

Table 7 shows that respondent living at zone 1 and zone 2 indicated very high in all the problems. Residents living in zone 3 indicated that the incidence of all the problems is moderate in their area while respondents in zone 4 indicated that incidence of these problems are low in their area.

Table 7: Incidence of Problem in Relation to Distance of Home to Filling Station.

Problem	Incidence	Zones in percentage				
		1	2	3	4	TOTAL
Noise from station generator	V.high	58.6	25.9	13.6	3.3	25.9
	High	6.9	29.6	0.0	3.3	10.2
	Moderate	10.3	14.8	27.3	0.0	12.0
	Low	0.0	22.2	27.3	10.0	13.9
	V.low	24.1	7.4	31.8	83.3	38.0
Noise from moving vehicle in the station	V.high	44.4	58.1	11.5	6.3	30.9
	High	2.9	9.7	0.0	6.3	4.9
	Moderate	35.3	16.1	30.8	28.1	27.6
	Low	11.8	0.0	34.6	15.6	14.6
	V.low	5.9	16.1	23.1	43.8	22.0
Fire outbreak	V.high	25.0	4.3	0.0	0.0	6.7
	High	5.0	30.4	17.6	20.0	18.9
	Moderate	0.0	0.0	11.8	6.7	4.4
	Low	0.0	0.0	0.0	10.0	3.3
	V.low	70.0	65.2	70.6	63.3	66.7
Road accident	V.high	2.8	41.9	0.0	3.2	12.3
	High	22.2	16.1	20.8	19.4	19.7
	Moderate	30.6	6.5	41.7	19.4	23.8
	Low	19.4	22.6	16.7	6.5	16.4
	V.low	25.0	12.9	20.8	51.6	27.9
Traffic delay	V.high	17.4	40.0	11.5	8.8	19.5
	High	39.1	23.3	15.4	20.6	23.9
	Moderate	21.7	20.0	23.1	17.6	20.4
	Low	0.0	10.0	23.1	11.8	11.5
	V.low	21.7	6.7	26.9	41.2	24.8

Source: author's field work, 2025.

Health And Environmental Effects

Table 4.8 presents the results of Chi-square tests examining the relationship between residents' closeness to the filling station and their experience of various problems. The table includes Chi-square values (X^2), degrees of freedom (df = 1), sample size (N = 200), p-values, and effect sizes (φ).

1. Statistical Significance (p-values)

All the tested variables have p-values < 0.05, with most showing p < 0.001, indicating statistically significant associations. This means that residents' proximity to the filling station is not random in relation to the problems they report — there is a real, measurable relationship between closeness to the filling station and these issues.

2. Effect Size (φ)

Effect size values range from 0.27 (medium) to 0.67 (very large) according to Cohen's (1988) guidelines.
This suggests that closeness to the filling station has a moderate-to-strong effect on residents' experience of problems. The largest effects were observed for: Smoke from station generator (φ = 0.67), Noise from station generator (φ = 0.61), Odour from station toilet (φ = 0.50), Road accident incidence (φ = 0.50). These results highlight serious environmental and health concerns for residents living near the filling station.

3. Implications of Each Variable

Perception of Filling Station Location (φ = 0.27) – Residents' perception of the filling station's location is significantly associated with their proximity, meaning those living closer are more likely to perceive the location negatively.
Incidence of Fire Outbreak (φ = 0.27) – Proximity increases the likelihood of reporting or experiencing fire outbreaks, indicating heightened safety risks. Water Quality Issues (φ = 0.35 – 0.44) – Closeness to the filling station is strongly linked to reports of odour, colour, and taste changes in water sources, suggesting possible contamination risks. Air and Noise Pollution (φ = 0.49 – 0.67) – Smoke and noise from the station's generator and vehicles are strongly associated with proximity, pointing to environmental pollution concerns.
Traffic and Accident Risk (φ = 0.46 – 0.50) – Residents closer to the station are more likely to report traffic delays and accidents, implying road safety and congestion issues.
This table provides compelling evidence that living close to the filling station significantly increases residents' exposure to a range of health, safety, and environmental problems.
The medium-to-large effect sizes indicate that these associations are not only statistically significant but practically meaningful the problems are substantial and likely affect residents' quality of life.

Table 8: X^2 of the effect of problem in relation to the closeness to the filling station

S/N	VARIABLE	X^2	Df	N	P value	Effect size	REMARK
1	Perception of filling station location	14.734	1	213	.002	0.27	Significant

2	Incidence of fire outbreak	14.728	1	213	.002	0.27	Significant
3	Incidence of odour change in water source	38.769	1	213	.000	0.44	Significant
4	Incidence of colour change in water source	24.509	1	213	.000	0.35	Significant
5	Incidence of taste change in water source	27.155	1	213	.000	0.37	Significant
6	Incidence of smoke from station generator	91.060	1	213	.000	0.67	Significant
7	Incidence of odour from station toilet	49.980	1	213	.000	0.50	Significant
8	Incidence of noise from station generator	74.323	1	213	.000	0.61	Significant
9	Incidence of noise from moving vehicle in the station	47.457	1	213	.000	0.49	Significant
10	Incidence of traffic delay	42.175	1	213	.000	0.46	Significant
11	Incidence of road accident	50.353	1	213	.000	0.50	Significant

Source: author's field work, 2025.

SUMMARY OF FINDINGS

This study has attempted to explain how filling stations are indiscriminately located in the residential area and how resident's livability of the residents living in the area is threatened. Findings showed that filling stations are more concentrated in Ogbomoso North with 35 filling station out of the total number of 51 while the remaining 16 are found in Ogbomoso South. This is the evidence that the filling stations in Ogbomoso are located along the streets, and the major streets are found in Ogbomoso North (i.e. Oyo-Ilorin Road).

The location and operations of filling stations are not without implications. The study investigated the positive and negative environmental impacts of filling station on the residents in the study area. Though, the positive impact noticed was minimal but relevant. Factors such as market opportunity, easy assess to fuel, security at night, increase in physical infrastructure are refer to as positive impact while the problems are traffic delay, environmental pollution, fire hazard and motor accident. These problems are more prominent especially during the problem of acute fuel scarcity and during peak sales. The adverse effects of these problems particularly on health of residents revealed by the residents are headache, taste in water source, lack of security among others.

RECOMMENDATION

- Adequate guide should be provided for Ogbomoso Town which should guide the development of filling station. This should be in form of zoning and regulation enforcement that will chase filling station out of residential area.
- The existing institutional standards for siting filling stations in the local government area and state should be updated. An approval should not be granted to any developer by state government, if a clearance has not been granted to such developer by Local Planning Authority which is closer to the developer's jurisdiction. This will make it possible and easy to guide filling stations development with relevant planning standards.
- The adoption of planning standard is an essential tool, which provide common frame of reference for the provision of infrastructural facilities. These will also discourage the ill-location of filling station in the study area and other part of the state. The set standard should be back up with legal force.
- Public participation should be encourage involving the residents so as to express their view concerning the development of filling station closer to the residence.

CONCLUSION

The study has been able to establish that there is impact of filling station on the nearby residents. The study has therefore recommended that the need for restriction of filling station within residential area should be thoroughly guide to reduce its adverse effect. It is therefore believed that, if the recommendation is taking seriously, there will be a better environment. This will reduce hazard and accidents caused by the location of filling station within the residential area, and people will be able to live peacefully.

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