Level of Compliance with Physical Planning Standards and Perceived Effects of Petrol Filling Stations Located in Residential Areas of Ibadan

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Abstract

The study investigated the level of compliance with specified physical planning standards and perceived effects of petrol dispensing stations located within residential areas of Ibadan, Nigeria. Both primary and secondary data were used for the study. The primary data were sourced through reconnaissance surveys, personal observations, physical measurement, questionnaire administration and key informant interviews. The physical enumeration of petrol stations undertaken in 2012 in the five urban local government areas (LGAs) revealed a total of 260 petrol filling stations. Plot size, setbacks and distances from intersections and between petrol stations were measured with a calibrated tape. A pre-tested structured questionnaire was administered to dealers/managers of 20% (52) of the petrol filling stations randomly selected in Ibadan North, Ibadan North-East, Ibadan North-West, Ibadan South-East and Ibadan South-West LGAs. Household heads in 312 residential buildings that surrounded the selected petrol stations were randomly selected and a structured questionnaire was administered to them. Key informant interviews were held with the Zonal Directors of Town Planning in the five LGAs. Secondary data were obtained from both published and unpublished sources. Descriptive statistics were used for data analysis. The study revealed that only 82.7% of the sampled petrol stations had approved plans and 14.0% of these did not comply with the planning specifications in the approved plans. Level of compliance with planning standards varied as: complied with 75m specification from road intersection (11.5%) (the least in the group); minimum distance of 500m from other petrol filling stations (46.2%); regulations on land size requirements (49.8%); and regulations on loading and unloading of passengers in the petrol filling stations (73.1%). The perceived environmental effects of petrol filling stations on residents of adjoining buildings included: water pollution (24.7%), air pollution (34.0%), fire outbreak (47.9%), security risk (62.5%) and traffic congestion (60.6%). The study concluded that there was a high level of non-compliance of petrol stations with extant planning standards and this constituted a source of environmental and safety hazards to surrounding residents. There is the need for political will for strict enforcement of extant planning regulations, sealing-up of contravening petrol stations, and promotion of public awareness to prevent further development in unauthorized places to safeguard the health of the city residents.

Introduction

Petrol stations are an important component of commercial land use in any settlement and deserve proper planning and same attention as with petro-chemical facilities under the industrial land use. The location of petrol filling stations in towns and cities is expected to take cognizance of Crystaller's theory of Ordering Principle– Market, Transport and Administrative. Crystaller (1933) states that service points should be distributed rationally according to the size, spacing or distance and population to be served. This means demand for products sold at petrol filling or dispensing stations would be satisfied by a system of service points at the central places. But the ultimate motives of suppliers of petroleum products are to ensure profitable returns on their investments, that is, to sell more gas, oil and other by-products or services available. In line with the profit motives of the entrepreneur, petrol stations are often located at where they will best serve the people and attract enough patronage. Hence, they are found to be concentrated along major roads where they are easily accessible to motorists and motorcyclists, who are their major customers. Ideally, petrol stations should depict the existence of controlling regulations in their locational, distributional and operational patterns.

It is an undeniable fact that the Nigerian economy and social development are being sustained by the revenue from crude oil. According to Nigerian National Petroleum Corporation (NNPC) (2012), oil extraction, processing, exporting, distribution and marketing are visible activities and the revenue from oil sales is the principal source of Nigeria's budget. However, the exploration of crude oil as well as its marketing is not without its negative effects. The exploration is often carried out with the sole aim of maximizing the economic benefits with the total neglect of socio-economic costs and effects on both the people and the environment. The marketing aspect generates serious environmental problems as a result of haphazard location and development of substandard petrol filling stations where the sale of petroleum and other crude oil products are carried out. The indiscriminate siting of petrol stations poses danger to lives and adjoining property considering its susceptibility to fire outbreak due to highly inflammable nature of petroleum products. This is in addition to traffic-jam and congestion as well as road accidents that are associated with such development, especially during the period of fuel scarcity that has continued to plague the nation intermittently. Personal observations and experience have shown that long vehicles carrying petroleum products to petrol stations experience hardship and create traffic hold-up or reverse into ditches, oncoming vehicles, electric poles and other road infrastructures while manoeuvring in and out of petrol stations that have substandard plot sizes.

Standards are the yardstick for measurement. Planning standards provide the basis for informed and objective decisions on planning and development applications and the conditions attached to planning permissions (Oyo State Urban and Regional Planning Board (OYSURPB), 2011). However, PFS developers are interested in plots of whatever size along major roads, irrespective of the required regulation and standards (Alabi, 2004). The indiscriminate location within residential areas and development of substandard petrol stations in Ibadan in contravention of the provisions of the Ministry of Physical Planning and Urban Development (MPP&UD) Law, 2012 (Oyo State of Nigeria, 2012) and the increased vulnerability of residents to possible fire hazard prompted the Oyo State Government to set up an 'Enforcement Task Force for Petrol Stations' in 2012 (MPP&UD, 2012). Akpofure and Ojile (2013) observe that the continued proliferation of substandard and defective petrol filling stations in Ibadan and its environs has created environmental challenges. The inability and seeming incapability of planning agencies to halt the proliferation of petrol stations in residential areas in Ibadan point to the fact that the existing planning regulations calls for investigation. This study, therefore, examined

the level of compliance with specified physical planning standards and perceived effects of petrol dispensing stations located within residential areas of Ibadan, and efforts of the regulating authority to curb the trend.

Materials and Methods

The Study Area

The study was conducted in the five urban local government areas of Ibadan which are experiencing high proliferation of petrol filling stations. They are Ibadan North, Ibadan North-East, Ibadan North-West, Ibadan South-East and Ibadan South-West LGAs. There are six other LGAs referred to as less city/rural LGAs, namely: Akinyele, Egbeda, Ido, Lagelu, Oluyole, and Ona-ara (Figure 1). Ibadan city is located in south-western Nigeria approximately on longitude 30°5' east of the Greenwich Meridian and latitude 70°23' north of the equator. The city ranges in elevation from 160 m in the valley area, to 275 m above sea level (Ayeni, 1994). Ibadan is also surrounded by ridges, such as Mapo Hill, Mokola Hill and Aremo Hill, which give the visitors the opportunity to view the whole city (Mabogunje, 1968). The Nigeria National Population Census of 2006 put the Ibadan city's population as 2,550,593, comprising 1,338,299 urban and 1,212,294 rural) Its projected population by 2010, using 3.2% growth rate, is about 2,893,137 (Wahab, 2011). The city is predominantly dominated by the Yoruba who are indigenes of the area and co-habit with some other ethnic nationalities, such as the Igbo, the Hausa and the Fulani, and some foreigners who have seen Ibadan as a conducive environment to live and transact their economic activities. As the economic hub of south-western Nigeria, next only to Lagos in economic importance, the city attracts and enjoys high population influx and proliferation of businesses and commercial activities. One of the booming commercial activities in the city is petrol dispensing. The data retrieved from the Ministry of Physical Planning and Urban Development (MPP&UD) in 2012 indicated

that, between 1951 and 1960, there were only eight (8) established petrol filling stations in Ibadan. However, the number increased to 29 in 1970, 61 in 1980, 87 in 1990, 110 in 2000, and 260 in 2012. This means that 260 petrol stations were built in Ibadan within a period of 61 years at an average of 4.3 new filling stations per year. This trend in the increasing number of petrol stations is a reflection of the rapid demographic growth and spatial expansion of Ibadan from a population of 627,380 by 1963 census (Federal Office of Statistics, 1963), to 1,829,202 by 1991 census (NPC, 1999), to 2,550,593 in 2006 and 2,893,137 in 2010 (Wahab, 2011), to 3,191,339 by 2013 (Agbola, 2013), and projected to grow to 4,237,000 by 2025 (UN-Habitat, 2013).

A major developmental challenge facing most cities of the world, particularly those within the developing countries, is how to cope with the increasing urbanization and minimize its adverse consequences on the cities' environment and promote the well-being of the people (Jiboye, 2011). As the population of Ibadan continues to grow, the available land space is intensely built-up to accommodate growing urban land uses. The seats of state and local governments, notable institutions, such as educational and research institutions, health facilities, business establishments, including publishing houses, radio and television stations, newspaper houses, financial establishments, stadia and relaxation centres, are crowded competitively with residential neighbourhoods within the urban land area that is not increasing in size. All these have contributed to the rise in the demand for petroleum products to run vehicles and other transportation facilities, electricity as well as generating equipment, in addition to kerosene for domestic uses and diesel to power industrial machines. The situation encourages petrol filling stations (PFS) to locate, through the process of urban in-filling, where the populations of consumers are concentrated, including residential neighbourhoods, in order to have maximum returns at the least cost.

However, the development appears uncontrollable as petrol stations keep springing up illegally in many cases, alongside incompatible

land uses and in unauthorized places, such as residential areas, where petrol stations are sandwitched and tucked in between residential dwellings and sharing common boundary walls. Data retrieved from the Control Department of the MPP&UD in June 2015 revealed that between January 2013 and June 2015, 157 applications to develop PFS were received, out of which only 24 (15.3%) met the required standards and were so approved, while 131 were rejected for being substandard. The ugly scenario is in total violation of Sections 12, 16, 18(1)(g), 21(c)(d), 28(a),39, 40, 41, 42 and 43 of the MPP&UD Law 2012 and Sections 10 and 14 of the space standard for physical development in Oyo state (OYSURPB, 2011). Section 12 provides that "any person who engages in a development without an approval, contrary to the physical development plan or approval of the Ministry commits an offence and on conviction shall be liable to N30,000.00 fine or 9 months imprisonment". This means that no person or group of persons or corporate organisations should locate and develop a PFS without the approval of the Ministry.

Mega petrol stations developed by the federal government agency (NNPC) are not exempted, according to Section 16, which provides that "Notwithstanding any provision in any law to the contrary, government or its agency involved in development of land shall obtain approval of the Control Department". Section 18 (1)(g) demands "a detailed Environmental Impact Assessment Report in respect of application for petrol filling and service stations". Table 1 contains the nine specified standards to be met by any application for planning approval to develop a petrol filling station. Any proposed PFS that falls short of any of the listed criteria is supposed to be denied planning approval and must not be implemented. Section 21(c) states that an application for development permit for a PFS may be rejected if "in the opinion of the Control Department, the development is likely to have a major impact on the environment, facilities or inhabitants of the community…" This is a critical provision of the law which prohibits the development of PFS in residential areas. The conformity of the sampled PFS was examined against the listed criteria.

Methodology

The study adopted a descriptive survey research design and made use of data from both primary and secondary sources. The primary source relied on the use of field measurement and personal observation, structured questionnaire and key informant interviews. The three sets of research questionnaire were pre-tested and administered to a pilot group of managers of five petrol stations and 15 heads of household in the study area. However, the pilot group was excluded from the final survey and data analysis. The physical count/enumeration of petrol stations in the five urban local government areas (LGAs) revealed a total of 260 petrol filling stations distributed as follows: Ibadan North, 65; Ibadan North-East, 50; Ibadan North-West 30; Ibadan South-West, 60; and Ibadan South East, 55. The figures were confirmed by officers in the Zonal Town Planning offices of the LGAs.

A total of 20% (52) of petrol filling stations in each LGA was randomly selected for questionnaire survey which was carried out by two trained field assistants. In selecting the sampled petrol stations (PS), the names of the PSs in each LGA were written on a piece of paper and all the papers put in a hat from which the required number was drawn. The simple random technique (lucky/blind dip method) was applied in selecting the buildings from which heads of households were interviewed to avoid biases. Plot sizes, setbacks and distances from intersections and between petrol stations were measured with calibrated tape.

A pre-tested structured questionnaire was administered to dealers/managers of 20% (52) of petrol filling stations randomly selected in the five LGAs. Questions asked included approval status, locational attributes and physical characteristics of the petrol stations, level of compliance with the existing standards and regulations relating to plot size, setbacks, distances to adjoining buildings and intersections, and problems

associated with the location and operation of the petrol stations in the study area.

Household heads in 312 residential buildings that surround the selected petrol stations were randomly selected and administered with copies of a structured questionnaire. The questionnaire was designed to obtain information on their socio-economic status and perceptions of the environmental effects of petrol filling stations located next to their houses had on them and their immediate environment in terms of water and air pollution, fire hazards, security and traffic congestion.

Results from the respondents' perception on water pollution, air pollution and traffic congestions were verified through the primary data collected by the researchers. Adopting the residents' perception approach is in tandem with previous studies on other topical issue where respondents perception constituted significant data input for the studies (Sanni, 2005, 2010; Sanni and Adewale, 2010; Sanni and Daini; 2014). Key informant interviews were held with the Zonal Directors of Town Planning in the five LGAs to obtain information on the trends of development of petrol stations, the numbers of applications received for planning permit on yearly basis, the required documents and the conditions to be met for development approval, the numbers approved, and factors responsible for the location of PS in residential areas. Secondary data were obtained from journals, newspapers, the Internet, other published and unpublished materials from the archives of Zonal Town Planning Authorities and Ministry of Physical Planning and Urban Development. Descriptive statistics were used for data analysis.

The purpose of the study was explained to all categories of persons interviewed. They were assured of the confidentiality of the data and their informed consent was obtained. The managers of the selected PSs were assured that the names of their PSs would not be reflected in the results in order to protect their identities.

Results and Discussions

The results of investigations in this study are presented under the following headings: obtaining and complying with the approved plan; compliance with the land requirements and required setbacks; and the effects of the petrol filling stations.

Obtaining and complying with the approved plan:

An approved plan is a development plan duly approved by the Ministry of Physical Planning and Urban Development (MPP&UD) or Local Planning Authority. Only 82.7% of the petrol stations (PSs) had approved building plans; 3.8% had no approved plans; while 13.4% did not provide information on their plan approval status (Table 2). Those without approved plan claimed that the eleven specified standards were too many and high for them to meet. One PFS manager had this to say: "how many developers can produce the 16 types of documents to be attached to every application for planning permit and the half a million naira approval fee?" The over four-fifths of the PFSs that had approved plan indicates a high level of compliance with Sections 15, 16 and 18 of the Oyo State MPP&UD Law 2012 which mandates developers to seek and obtain planning approval before commencing physical development.

However, 11.5% of the PFSs that had approved plans deviated from the contents of the approved plans and constructed what was not approved. This agreed with the findings of Wahab and Oladiran (2015) that 61.8% of the buildings in Ajoda New town, Ibadan, did not obtain planning permits before construction and 32.2% that had planning permits compromised the building standards and regulations during the construction process. This suggests lack of or inadequate monitoring and supervision of construction by the DC department of both the Ministry and relevant Zonal Town Planning Authorities (ZTPA). However, the development control officials complained of inadequate personnel, equipment, vehicles, finance and other logistics to undertake routine monitoring and or effect demolition of contravening structures.

Table 1: Spatial Requirements for Development of Petrol Filling Station (PFS) in Oyo State

S/No.	Planning Standard Criteria	Minimum Standard	Remark
1.	**Plot Size**	Minimum size of $1080m^2$ (2 standard residential plots)	Plot dimension should not be less than 45.0m (length) by 24.0m (width). Plot with irregular shape should be bigger.
2.	**Distance Between Existing PFS**	300m along the same side of the road	Opposite location or siting shall not be allowed
3.	**Distance from an Intersection**	500m	
4.	**Plot Frontage Width**	24.0m	
5.	**Plot Boundary Setback to:**		
	Dual carriage	45.0m	
	Trunk A	30.0m	
	Other roads	15.0m	
6.	**Setback of Service Station to the Centre of Adjoining Road:**		
	Expressway	80.0m	
	Trunk A	40.0m	
	Other Roads	35.0m	
7.	**Setback of Pumps to the Centre of Adjoining Road:**		
	Expressway	74.0m	
	Trunk A	30.0m	
	Other Roads	30.0m	
8.	**Driveway width (In/Exit)**	9.0m	
9.	**Radius of Kerb line**	6.0m	
10.	**Setback of Service Station to Dwelling House(s)**	7.0m	
11.	**Location in relation to Vertical or Horizontal Bend**	Site must not be on a curved (horizontal) bend and vertical (higher or sloppy) gradient	
12.	**Location in Relation to Power line, Stream etc.**	As required in space standard	Stream/river 15.0m-45.0m; canal 10.0m; pipeline 30.0m; railway 30.0m-100.0m; High tension power line 6.0m-30.0m

Source: Ministry of Physical Planning and Urban Development, Ibadan, 2015

Compliance with Land Requirement and Setback

Compliance with land requirements showed that only 49.8% of the PFSs met the minimum land area of 1,080m^2 (Table 2). While 100% of the major marketers complied with the regulation, only 16.6% of the independent marketers complied with the provision. Petrol filling stations belonging to independent marketers were generally small in size (270m^2 in some cases) and grossly deficient in required

setbacks (Plate 1). Alabi (2004) reported similar results in Saki, where 31.0% of PFSs met minimum land requirements and 69.0% did not. Some PFSs managers attributed high land prices in accessible locations as the reason for their inability to acquire adequate land for their PFSs. A manager asserted that: "I cannot afford the two standard plots because I bought over a mud house and the 262.5m^2 land on which it was built for N3,000,000.0 ($17,964.07 at N167/$) which was over 60% of what I spent to construct the station". Some development
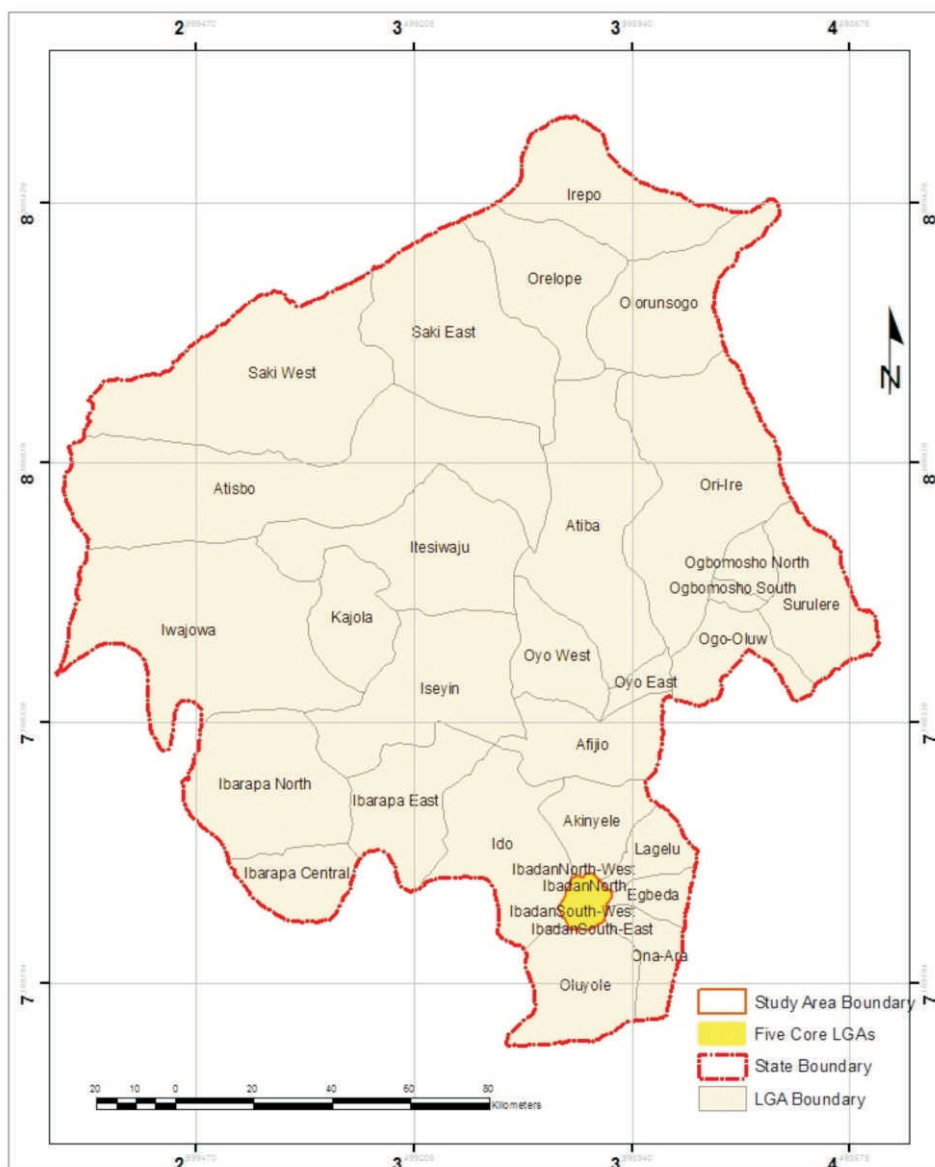

Figure 1: Five Core Local Government Areas of Ibadan within the State Context
Source: Ministry of Lands and Housing, Oyo State, 2011

control officials interviewed attributed the high incidence of non-compliance with land requirement to political interference with planning activities and a major handicap in dealing appropriately with such substandard PFS.

Furthermore, 11.5% of the PSs complied with the required 75m setback from road intersection/junction, while 88.5% did not. This is the planning standard with the highest level of non-compliance in the study. This level of non-compliance agreed with the findings of Alabi (2004), in which 36.2% of the PFSs in Saki met the minimum setback of 45m to the road fronting them, while 63.8% did not. The non-compliance to this planning standards/regulation by some of the PFSs at road intersections was partly due to: i) the sub-standardness of their plots of land (less than the required 1080m^2) to allow them observe the specified setback; ii) their unwillingness to observe the maximum plot coverage regulation of 30% (Section 4 of space standard) permissible for buildings or structures and leave 70% of the plot free of any structures but used for vehicular circulation, parking and landscaping; iii) the chosen locations (cross-junctions) that require more land space to be observed as setbacks in order to promote safety and prevent accidents in return for the maximum accessibility that they enjoy. This confirmed Northam's (2001) assertion that "commercial activities like petrol filling stations usually benefit from occupancy of sites at or near the points of maximum accessibility within the city or thereof".

Similarly, Table 2 shows that 46.2% of the PFSs complied with the required distance of 500m from the nearest petrol stations to them, while over a half (53.8%) failed to comply. Alabi (2004) reported a lower level of compliance of PFSs in Saki, where only 24.1% maintained the 500m distance and 75.9% did not. The cause of the non-conformity may be attributed to the preference of the owners of PFSs for certain locations rather than others. This practice leads to the concentration and development of these PFSs in locations considered most suitable by their owners perhaps because the locations,

according to Aguda and Ibikunle (1997) and Ukwu (2001), ensure profitable returns on their investment.

Every approval for the erection of a petrol filling station contains a statement indicating that the approval of the siting of such PFS is granted on the condition that no petty trading, loading/unloading of passengers/goods from vehicles will be permitted. However, only 73.1% of the PFS complied with the loading/unloading regulations, while 26.9% violated it. Non-compliance can be attributed to the general lack of awareness of the hazards posed by the banned activities in petrol filling stations. Petty trading and loading/unloading of passengers/goods go on unhindered in PFSs located in Mokola, Challenge, Dugbe, Agodi Gate, Molete, Bere, Sango and other commercial areas within the city (Plate 2).

The level of conformity with the stipulated minimum setback of 7m to the left, right and rear of residential buildings indicated that 42.3%, 34.5%, and 38.5% complied with the required setback to the right, left and the rear, respectively (Plate 2). Petrol filling stations in Saki were perceived by residents as too close to dwelling houses (Alabi, 2004). The high level of non-compliance with the setbacks is what the development control officials termed "administrative handicap/political interference". They claimed also that the stop-work notices that they served contravening PFSs were mostly ignored by developers who chose to work on weekends and public holidays. However, the residents who sold off their ancestral buildings and sites because of the high prices offered by petrol merchants were partly responsible. Adewunmi (2015) notes that the mouth-watering offers to owners of buildings converted to service stations have been too tempting for the owners to resist.

Effects of Petrol Filling Stations

The effects of petrol filling stations are discussed under two main sub-headings viz: socio-economic characteristics of respondents and their perceptions of the environmental implications of the petrol filling stations.

Table 2: Compliance of Petrol Stations with Planning Standards and Regulations

Status	Frequency	Percentage
Petrol stations approved and developed to specification	37	71.2
Petrol stations approved but not developed to specification	06	11.5
Petrol stations not approved but developed to specification	01	1.9
Petrol stations not approved and not developed to specification	01	1.9
Petrol stations with no current information	07	13.5
Total	52	100.0
Road Intersection Setback (75m)		
Complied	06	11.5
Did not comply	46	88.5
Total	52	100.0
Distance from nearest PFS (500m)		
Complied	24	46.2
Did not comply	28	53.8
Total	52	100.0
Land Requirements		
Complied	26	49.8
Did not Comply	26	50.2
Total	52	100.0
Loading and Unloading of Passengers		
Complied	38	73.1
Did not Comply	14	26.9
Total	52	100.0
7 Metres Compliance from the Dwelling House		
Houses on the right side		
Complied	18	34.5
Did not Comply	34	65.5
Total	52	100.0
Houses on the Left Side		
Complied	22	42.3
Did not Comply	30	57.7
Total	52	100.0
Houses on the Rear Sides		
Complied	20	38.5
Did not Comply	32	61.5
Total	52	100.0

Source: Authors' Field Survey, 2012.

Table 3: Socio-Economic Characteristics of the Residents

Characteristics	Respondent	Percentage
Sex		
Male	188	60.2
Female	124	39.8
Total	312	100.0
Age		
Less than 20years	27	8.6
20- 40 years	203	65.1
41- 50 years	28	9.1
51- 60 years	27	8.6
Above 60 years	27	8.6
Total	312	100.0
Marital Status		
Single	126	40.3
Married	142	45.5
Separated	13	4.3
Divorced	03	0.9
Widowed	28	9.0
Total	312	100.0
Educational Status		
No Formal Education	09	2.8
Primary and Secondary	105	33.7
Tertiary	198	63.5
Total	312	100.0

Source: Authors' Field Analysis, 2012.

Socio-Economic Characteristics of the Respondents

A total of 60.2% of the respondents were males, while 39.8% were females (Table 3). This result tallies with earlier study Fadayomi, (1988) who that males usually constitute the majority of household heads among the Yoruba. Most (65.0%) of the respondents were aged 20-40 years, while 26.3% were above 41 years of age. This implies that they were in their active ages and could provide reliable information for the study. About 40.3% and 45.5% "were 'never married" and "presently married" respectively. In the case of educational attainment, only 2.8% had no formal education; 33.7% had secondary education; while 63.5% had tertiary education. The high incidence of literacy in the city might owe much to the fact that free primary education was declared in Western Region in 1955 and Oyo State has been enjoying tuition free education in public schools since 1979. The respondents thus easily comprehended the purpose of the study, the contents of the questionnaire administered and provided reliable information.

Environmental Effects of Petrol Filling Stations

Five environmental effects of petrol filling stations identified by the sampled residents were: water pollution, air pollution, fire outbreak, security risk and traffic congestion at varying levels of perceived severity (Table 4). A total of 22.8% of the residents claimed to be affected and 1.9% "seriously affected" by polluted water, which they suspected to have been caused by the leakages of the underground kerosene, diesel and petrol tanks. There is also oil spills from over-filled vehicle tanks. The leakage, they claimed, resulted into the flowing of petroleum products from the PFS into their wells and nearby thereby constituting danger to their health. An elderly woman said: "*emi ati awon omo mi okunrin meji ati obinrin kan ni a gbe aisan inu rirun nigbati a mu omi kanga wa losan ojo kan; ki nwon to so fun wa pe petiro ti wonu kanga wa*" (my two boys, one girl and I developed stomach disorder one afternoon after drinking water from our well only to be told later that petrol had seeped into our well).

This result agreed with similar observations of Oyinbo and Agbola (1984), Adeniyi (1984) and Adenikinju and Falobi (2006) that oil spills and leakages of refined petroleum products from underground of PFSs have given rise to cases of ground water contamination in various parts of Nigeria. Interviews with respondents revealed undocumented reports of alleged discovery of kerosene in wells and boreholes in Basorun area as a result of underground leakages of tanks of the then Agip Petrol Station, now Oando, at Basorun, Ibadan. Water pollution in the form of oil spilling into nearby wells in communities where well is the major source of drinking water poses severe threat to the health of the residents.

About 20.5% and 13.5% of the respondents claimed to be affected and seriously affected by

Table 4: Perceived Environmental Implications of Petrol Filling Stations

Environmental Effects	Respondents	Percentage
1. Water Pollution		
Affected	71	22.8
Seriously Affected	6	1.9
Not Affected	235	75.3
Total	312	100.0
2. Air Pollution		
Affected	64	20.5
Seriously Affected	42	13.5
Not Affected	206	66.0
Total	312	100.0
3. Fire Outbreak		
Affected	150	47.9
Not Affected	162	52.1
Total	312	100.0
Number of times affected in the last five Years		
Once	83	55.3
Twice	38	25.3
Thrice	22	14.7
Four Times	07	4.7
Total	150	100.0
4. Security Risk		
Affected	135	43.3
Seriously Affected	60	19.2
Not Affected	117	37.5
Total	312	100.0
5. Traffic Congestion		
Affected	189	60.6
Not Affected	123	39.4
Total	312	100.0
Period of Effect		
Morning	119	63.1
Afternoon	12	6.2
Evening	58	30.7
Total	189	100.0

Source: Authors' Field Survey, 2012.

air pollution as a result of air-borne particles from evaporated vehicle fuels during loading and unloading of passengers, refueling and liquid spillages in the PFSs. The respondents'

health challenges associated with the polluted air are irritations of the eyes, nose infections and general inconveniences associated with the presence of petroleum in the air. . As reported by Doval, in a study of the effects of contamination at petrol stations in urban area of Murcia by scientists from the University of Murcia in Spain, air-borne organic compounds, such as benzene, which increases the risk of cancer, have been recorded at petrol stations at levels above the average for urban areas (Doval, 2011, cited in Daily Mail *Reporter, 2011). Living near a petrol station is a health hazard, as dangerous air-borne fuel pollutants from fuel stations and garages could contaminate buildings from between 50m and 100m away. The distance of polluted air is influenced by the number of petrol pumps, the volume of fuel dispensed, traffic intensity and the structure of the surroundings and weather conditions* (Daily Mail Reporter, 2011).

Results showed that 82.2% of the petrol stations lacked canopy to shield pumps/nozzles and workers. Apart from the negative effect of weather on the people, high intensity of sunlight exerts a tense pressure on both the underground tanks and nozzles.

Fire outbreaks were experienced by nearly half (47.9%) of the respondents in the last five years caused by the operations of the PFSs in the vicinity of these people. 55.3% of the affected respondents witnessed fire hazard once, 25.3%, 14.7% and 4.7% experienced fire outbreak twice, thrice and four times, respectively, in the last five years. Residents of wards 2, 3 and 9 in Saki West Local Government of Oyo State identified fire risk as one of the problems associated with the location of PFS in their built-up areas (Alabi, 2004). Fire outbreak sometimes arises when petrol tankers, in the process of discharging fuel into underground tanks, slip and fall thereby emptying their petroleum products (kerosene, petrol, diesel) on the road and such flows into nearby buildings. A large proportion of residents in the area practised open-air cooking with firewood, which makes them vulnerable to accidental fuel spill from PFSs into their houses. The effects of fire outbreak in terms of monetary loss and psychological trauma are better imagined than experienced.

About 43.3% and 19.2% of the respondents,

Plate1:JIN JOFES petrol station with less than 7 meters from a residential building
Source: Authors' Field Survey, 2012

Plate 2: Loading/Unloading of Passengers/Goods at ConOil Petrol Station, Mokola area, Ibadan
Source: Authors' Field Survey, 2012

claimed to have been affected and seriously affected' by security risks associated with PFS as they narrowly escaped being killed by armed bandits who came to rob the workers and their customers. The respondents suffered from panic (52.4%), heartbeat (24.6%), restlessness at night (18.9%) and lack of sound sleep (4.1%). One elderly male respondent narrated how he was so heavily traumatised by the robbery attack at the PFS next to his house. Two years before he stayed away from the house for a week and, on return, had to live in utter fear and panic for several months, anticipating that the robbers would stage a comeback. Fawole (2010) and *Osun Defender* (2012) reported that daredevil armed robbers struck at different filling stations in Ibadan, made away with huge amounts of money and killed security men, thereby throwing residents into panic. Traffic congestion emanating from the operations of PFSs affected 60.6% of the residents. Traffic congestions were perceived to be more severe in the mornings when most of the household members would be journeying from home to work or school and in the evenings when almost everybody would be home-bound.

Conclusion and Recommendations

This study examined the level of compliance and effects of petrol dispensing stations located within the residential areas of Ibadan. There has been a steady increase in petrol-station siting from a mere eight in 1960 to 260 in 2012, owing partly to the increasing administrative status of Ibadan from a war camp to a state capital and the attendant urbanization. As a marketing strategy, petrol stations in the city are deliberately concentrated at locations with prime accessibility, such as major road junctions/ intersections, as well as central, commercial and residential areas where consumers of petroleum products are found in large numbers. The scarcity of vacant land along major roads in the five urban local government areas has resulted in petrol stations replacing residential buildings through the process of change of land use and urban in-filling.

Based on the results of this study, it was shown that, although the existing planning standards/regulations for siting petrol stations in the state are adequate, weak enforcement and poor implementation of such have led to haphazard and unwholesome location of petrol stations all over the city. The study revealed a high level of non-compliance of the petrol stations with the extant planning standards, as seven of the nine standards guiding the location and development of petrol stations in the state were violated, while only two were fairly complied with. Some petrol stations had no approved plans, while some that had deviated from the contents of the approved plan. Development control and monitoring by the officials of the MPP&UD and ZTPAs were weak and ineffective, and contravention notices ignored by developers owing partly to "administrative corruption". The litigations on petrol station businesses in the study area relate to locational problems; while some got settled amicably by planning institutions, others ended up in the courts of law.

The study concluded that petrol stations located in residential areas of Ibadan were largely substandard, did not conform with planning regulations and had significant planning and environmental effects both on the environment and residents of the study area in terms of traffic congestion, water and noise pollution, fire hazard and security, all of which endanger lives and property.

The following recommendations are made to facilitate wholesome location and development of petrol stations in Ibadan and other parts of Nigeria.

1. Oyo State Government needs to prepare, as a matter of policy, a strategic physical development plan for the orderly development of petrol stations in all parts of the state. The plan should be an integral part of the proposed master plan for the Ibadan metropolis (under the World Bank-assisted Ibadan Urban Flood Management Project) and have the inputs of urban planners, architects, environmental health professionals, Directorate of Petroleum Resources, communities and other relevant stakeholders for effective implementation.

2. Good governance is required through the provision of appropriate urban planning machinery and logistics that ensure adequate monitoring and prompt removal of illegal and unwholesome PFSs. Section 14 of the Space Standards dealing with development of petrol and gas filling stations (OYSURPB, 2011) should be strictly enforced by the Zonal Town Planning Authorities in the eleven LGAs in order to prevent further development of obnoxious petrol stations at incompatible locations, thereby reducing the effects on people and environment.

3. The existing setback of 7.0m between PFS and residential buildings is grossly inadequate to safeguard the health and safety of residents. This should be increased to a minimum of 50.0m and 100m for vulnerable facilities such as schools, health centres and hospitals in line with the suggestions of the urban Murcia researchers, Spain *(Daily Mail Reporter, 2011).*

4. Petrol stations built within the statutory setbacks to dwelling houses, roads, railway, high tension power lines, drainage channels, canals, water bodies and flood plains (Section 21(d)) or approved based on false information by the developer during application (Section 25(c)) should be demolished and their sites acquired without compensation (Section 28(a)) and used for societal good in order to bring sanity to the city.

5. Deviant owners of contravening petrol stations should be prosecuted and appropriately sanctioned, in line with Sections 40, 41, 42 and 43 of the MPP&UD Law 2012, to serve as a deterrent and henceforth facilitate conformity by future developers of petrol stations in the state. However, adequate consideration should be given by the government to the regularization of the contravening petrol filling stations where the defects are not of any serious danger to the safety and health of the public in order to minimize the adverse effects on the owners' sources of livelihood.

6. The MPP&UD should investigate any abuse of planning standards/regulations, lapses in the operations of its development control department, especially the issue of "approval in error" of substandard and illegal petrol stations, and allegations of shady deals with developers or corruption involved in granting planning approval, and sanction erring officers appropriately.

7. Intensive public awareness of the environmental and public health consequences of development of petrol stations within the urban landscape needs to be undertaken by the MPP&UD and its 33 Zonal Town Planning Authorities using the prints and electronic media, and traditional information dissemination mechanisms.

8. Periodic environmental audit of petrol stations should be enforced by the Oyo State Ministry of Environment and Habitat in collaboration with the representatives of other relevant ministries, departments and agencies.

9. Oil-marketing companies should be fully involved in petroleum pollution matters through adequate monitoring of the activities of petrol service stations. They should also collaborate with the Nigerian National Petroleum Corporation and physical planning authorities to enforce land use planning and development regulations which prohibits the construction of petrol stations in residential areas to safeguard public health and environment.

10. The Petroleum Inspectorate (PI) should ensure that all marketing companies comply strictly with the petroleum regulations on the construction of petrol stations. In order to prevent underground tank leaks and avert pollution of well and borehole water, the PI needs to standardize all new underground tanks and strictly enforce its extant regulations and specifications on the construction, installation and periodic replacement of underground tanks for all marketing companies.

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