

## DISAMENITY HAZARDS AND RENTAL VALUES IN SURULERE, LAGOS METROPOLIS: A PERCEPTIONAL STUDY OF POWER LINES

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### Abstract

Power line and associate disamenities have posed great risks in human habitations in the built and natural environments with various degrees of contaminations and hazards ranging from electrocution to property diminutions. This current study identifies and evaluates the various risk elements and hazards attributable to the power lines situated in residential neighbourhoods within the metropolis of Lagos State via perception. Data was collected through questionnaires distributed to both Estate Surveyors and Valuers and residents within 200m to power lines in Surulere area of Lagos metropolis. Average response rate of 66.5% was achieved and the data were analysed using descriptive and analytical statistics. The study established that both residents and Estate Surveyors and Valuers jointly identified "Fear of Falling Wires", "Buzzing and Humming", "Property Stigmatization" and "Exposure to Electrical Radiation" from power lines as the four (4) major risk elements identified as having outstanding impacts on the rental value of residential properties. Perceived "Health Hazards" expressed by residents were further confirmed during the indepth interviews conducted with not only residents most proximal the Power lines but also the PHCN executives and field officers. The study suggests that locating all residential housing within the 25m Right of Ways in the state must be discouraged by the Power Holding Company of Nigeria and further concludes that the State government organise and enforce the continuous demolition drive of illegal structures already occupying the ROW in Surulere to protect lives and enhance income from residential real estate investments.

**Key words:** Power lines, Residential property, Rental Values, Perception and Estate Surveyors and Valuers.

### Introduction

The purpose of this study is to evaluate the hazards of power lines on the rents of residential housing as perceived by residents and professional Estate Surveyors and Valuers who manage properties in Lagos metropolis. Power lines are constructed to convey electricity to consumers in distant locations via remote areas and suburbs. As human population increased over time, these remote locations had to inevitably accommodate the homes of the teeming populace. Stretching of available land resource in the quest to acquire interest in land and landed properties at all cost encouraged dangerous proximal living to power line until mishaps began to occur.

On the 13<sup>th</sup> of February, 2010 in Port Harcourt, southern Nigeria, the BBC online news confirmed that at least ten people were charred beyond recognition while many other passengers were electrocuted when a power line cable snapped off a pylon hanger and fell on a commuter bus (BBC News, 2010). Following incessant

tragedy associated with power lines, substations and other electric power equipments, the PHCN was forced to embark on enlightenment campaigns via the electronic and print media about the hazards associated with power line and the need for people to observe the regulatory setbacks. All these generated controversial discussions as to the safety of lives and property around these electric power installations. This noted incidence in Nigeria brought to the fore the need to study the impact of power line hazards not only on residents living proximal power lines but also on property rental values. The quest to investigate rental values of residential properties proximal power lines evolved as power line hazards might well be connected in facilitating the effective demand needed to foster residing proximal to power lines.

Various authors and researchers have defined and viewed the term 'hazard' in various dimensions but notably, Alexander (1993) regards 'hazard' as the exposure to some risk of disaster in the pre-disaster situation, due to the presence of

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human population in hazard-prone areas. Deyle *et al.* (1998) opines that the consequences of harmful impacts of hazards include direct effects (injuries, deaths, health problems, and damage to personal property, public facilities, equipment, and infrastructure), and indirect effects (loss of jobs, business earnings and tax revenues, losses caused by business and production interruption, and the public costs of all phases of hazard adjustment). Invariably, the term “environmental hazard” implies the existence of potentially dangerous entities posing as contaminants in the environment. Such entities or “contaminants” therefore have the capacity to interact with the environment to produce unwanted outcomes in the built environment. Inevitably, environmental quality is endangered at the expense and existence of hazards which could take the form of man made disamenities in the immediate locality. Observers have noted that environmental disamenity such as power lines, landfills and other associate facilities have for sometime been thought to be major facilitators of potential dangers on the built environment.

Numerous early studies such as those of Kinnard (1967), Wertheimer and Leeper (1979), Colwell and Foley (1979), Savitz *et al.*, (1988) and those of recent times such as Chalmers and Voorvaart (2009), have sort to investigate both the impact of power lines on the property values and the effects of power line associated hazards on the health of residents proximal power lines and have concluded with varying degrees of findings as would be noted below.

Hamilton and Caruthers (1993) analysed a six year property market data. They found a diminution value of 5% on property proximal to power lines by 120 meters. Hamilton and Schwann (1995) surveyed 12,907 residential dwellings within four neighbourhoods in Vancouver, British Columbia within a period of 6 years (1985-1991). The two academics’ analysed results found a 6.3% diminution effect on properties located 100 meters to a 230Kv Power lines and a 1.1% diminution effect on properties 200 meters from another 500Kv Power lines. Complete removal of the pylon/power lines increased value by a 6.3% margin. Rosiers (1998), agreed with the findings of Colwell (1990) which portrayed a diminution of property values as a result of the visual effects of pylons and power lines. After a survey carried out

on 507 single family sales, analysis showed a lesser diminution value on a property physically closer to a HVOTL but with its glare shielded by a wood, unlike other less proximal properties which had the direct glare of the power lines unshielded.

In Sims (1996), professionals in the real estate industry were subjected to a psychometric test anchored on assessing their perception regarding contaminated land. Results showed that overhead power cables were perceived to be low risked. This differed from the study outcome of Slovic (1992) which indicated a greater perception of risk in this regard. According to Sims (2001), these studies enhanced media exposure on the issue of power-lines as they affect property values.

Des Rosiers (1998) looks at the impact of high-voltage transmission lines on surrounding residential property values using a micro-spatial approach. The research was anchored on a sample of 507 single-family houses in the city of Brossard, Greater Montreal, Canada; 257 of these town cottages sold during the study period between February 1991 and November 1996. The study area comprised three distinct neighbourhoods (R, S, and T) with a 315 kV transmission power line traversing through the center. The data bank includes 25 residential property descriptors relating to physical, environmental, neighborhood, access, fiscal and sales time attributes, as well as a series of power line related descriptors. Standard and stepwise regression procedures were successively used in the analysis. The model showed that a residential property both adjacent to an HVTL easement and facing a pylon would experience a drop in value due to visual encumbrance by approximately 9.6% of the mean house price. Residences located 1 to 2 lots away from a pylon were found to usually benefit from a market premium due to increased visual clearance and privacy. This premium, on average is within the range of 7.4% and 9.2% of the mean house price. A property located directly beneath the power line would suffer a decrease in value because of low minimal clearance of the lines foetering visual obstruction. This decrease is lesser and averages about 4.7% of the mean home price. Residences with a moderate rear or side view on a power line structure but not adjacent to the easement usually experience a market premium of 2.8% to 3.8% due to the improved visual clearance these residential properties benefit

from. The net visual encumbrance defined as the difference between proximity obstacles and advantages was found to reach its peak at about 50 to 100 meters away the easements' external boundary. It also diminished quickly and thereafter, entirely faded away 150 meters and beyond. Luxury home prices were also found to be more sensitive to the visual encumbrances of power line structures. However in-depth this study was, its methodology was based only on sales value and not the passing rent of residential properties. This current study initiates and facilitates the use of residential rental values in measuring power line effects.

Wolverton and Bottemiller (2003), an assenting study of an earlier research work by Cowger *et al* (1996). In this study, investigations were made as to whether the outcomes of the original study would hold while using more rigorous and analytical methodologies. Cowger's study used a paired sales analysis in determining observed differences in the sales price of properties adjoining transmission line ROWs in Portland, Vancouver, and Seattle, and similar properties located in the same cities but out of the view of power lines. Though, the original study did not control differences between the subject properties and their comparables Wolverton and Bottemiller attempted to surmount that setback using regression analysis. Analysis of covariance (ANCOVA) was made use of to determine how adjoining power line short change sales price. The data provided by the models did not support any price effect on residential property from being located adjacent to any power line. This affirms the conclusions of the original study of Cowger (1996), that sales prices of properties are not momentarily affected by the presence of a power line. Also, the data showed no discrepancy in appreciation rates between residences beside power line ROW and residences situated further away from the power line. This study was thorough in using paired sales analysis in line with regression in determining the impact of power lines on residential properties but this current study will be streamlined to utilising the passing rents of various cadres of residential properties in determining the effect of power lines on residential properties.

Chalmers and Voorvaart (2009) also addressed the issue of power line impacts on residential

property values and prices using a multiple regression framework. The study is anchored on the sales of residential properties (between 1999 and 2007) abutting a 345 kV transmission lines in Connecticut and Massachusetts. The authors investigated the influence of actual distance proximity and encumbrance on sales price and found proximity to have an insignificant effect on sales price. They concluded that "the only variable that appears to have any kind of systematic effect is the encumbrance variable," although its statistical significance varied and the effect was "generally small." The authors also addressed potential effects due to the visibility of the transmission line structures and found no significant impacts on sales prices. Though no statistically significant effect was found to on residential properties using sales price, this current study aims at determining effects via the use of rental values instead.

Akinjare *et al.* (2012) again addressed the impact of power lines on residential properties in highbrow metropolitan Lagos, Nigeria via ANOVA multivariate analysis. Within a perpendicular distance of 200m from abutting power lines, findings revealed that rents values increased as distance from power-lines increased averagely by =N=5,000.00 and a mean value impact of =N=786 on neighbourhood rental value was ascertained.

In a related study Oluwunmi *et al.* (2012) ascertained the pattern of rental values around power line facilities still within a 200m perpendicular distance of power lines in Lagos metropolis and also discovered an homogeneous trend in residential property value and neighbourhood characteristic. The studies urged the government to opt for buried armour cables instead of powerlines and the strict enforcement of ROWs within Lagos metropolis where power-lines already exist, in a bid to abate the effect of power line on property investments.

This current study identifies the absence of Nigerian literature on the subject of the dangers and nuisance associated with power lines and seeks to not only compliment existing studies internationally but also to investigate the peculiarity of rents within power line characterised residential neighbourhood in a peculiar real estate market such as that of the Nigeria.

**Study Area**

The history of Lagos State is traceable to 1472 when the Portuguese first visited the old Yoruba settlement known as Eko and named it a port for ferrying both human and material cargo to Europe, the Carribeans and America. By 1861, Lagos was annexed by the British who at this time opposed slavery sternly and governed it as a crown colony. In 1914 Lagos became the capital of the Colony and Protectorate of Nigeria. In 1960 the city became the capital of independent Nigeria. As Nigeria’s oil industry boomed in the early 1970s, Lagos began developing rapidly. Located between latitudes 6° 21’N and 6° 34’N and longitudes 3° 01’ E and 3° 27’E, Lagos State is located in the South-Western region of Nigeria and is bounded in the North and East by Ogun State, south by the Atlantic ocean and West by Cotonou in Benin Republic.

Located on a total landed area of 3,345 sq km (1,292 sq mi) on four principal islands and adjacent parts of the Nigerian mainland, the islands are connected to each other and to the

mainland by bridges and landfills. This represents 0.4% of Nigeria’s territorial landmass (Esubiyi, 1994). Major sections of the old city include Ebute-Metta, Yaba, Surulere, and Somolu, which now serve as the commercial district, on western Lagos Island; Ikoyi Island situated just East of Lagos Island and joined to it by a landfill; Apapa, the chief port district, located on the mainland; residential Victoria Island; and industrialized Iddo Island. Importantly, mainland suburbs which formerly were part of the old western region, were incorporated as part of the city in 1967. These areas included Agege, Ikeja, Alimosho, Alakuko etc. (Microsoft Encarta, 2008).

Deductions from the result of the 2006 population census, indicates that Lagos state is believed to be the most populous state in Nigerian after Kano with a population of over 9 million people even though the result was refuted by the then Lagos State Governor who conducted a separate census exercise for the state resulting to a population about 14 million people (Sandra Yin, 2007).



**Figure 1:** Map of Metropolitan Lagos.  
**Source:** Lagos State Ministry of Information

**Methodology**

Primary data were collected through questionnaires distributed to Estate Surveyors and Valuers, residents within 200m to power lines in Surulere area of Lagos State. The study sampled every other residential building within 200m distance from the four power line routes namely: Akangba-Ojo, Akangba-Isolo, Akangba-Ijora and Akangba-Apapa routes (all emanating from the Akangba PHCN substation) and a total of 267

registered estate surveying firms in Lagos state as retrieved from the 2009 edition of the Nigerian Institute of Estate Surveyors and Valuers (NIESV) directory.

A response rate of 56.8% and 53.47% was achieved for Surulere and Alimosho areas respectively while a total of 203 questionnaires (76.19%) were retrieved from Estate Surveying and Valuation firms. Inclusively, an indepth interview with the manager and field officers of the Akangba PHCN sub station was conducted to

ascertain facts from literature and for the purpose of this research. In all, the survey recorded an average response rate of 66.5% and collated data was analysed using the descriptive and analytical statistics. Since the impact of a power lines on the rents of nearby residential properties were not expected to be uniform as rents were presumed to increase with distance away from the power line, a four point distance range in the order of 0-50m, 51-100m, 101-150m and 151-200m was adopted as opined by Chalmers *et al.*, (2009) in analysing

the impact power line on the rents of residential properties.

**Results and Discussion**

In an attempt at appreciating the residents’ different levels of dispositions to the various environmental hazards associated with power lines, residents were asked to rate the various nuisance elements as perceived by them. The ratings so obtained are as shown in Table 1.

Table 1 Percentage (%) Evaluation of Risk Elements of HVOTL on Residents.

	1	2	3	4	MEAN RATING.	RANKING
POTENTIAL NUISANCE	NO IMPACT	LOW IMPACT	MEDIUM IMPACT	HIGH IMPACT		
Buzzing & Humming	0	11.9	14.58	73.51	3.62	2nd
Visual Unsightliness	0	29.17	34.52	36.31	3.07	7th
Fear of Falling Wires	0	1.19	14.58	84.23	3.83	1st
Fear of Electrocutation	0	21.13	39.88	38.99	3.18	6th
Exposure to Electrical Radiation	0	14.29	20.54	65.18	3.51	4th
Property Stigmatization	0	12.20	15.77	72.02	3.60	3rd
Electrical Fire Hazards	14.28	34.82	28.87	22.02	2.59	9th
Health Hazards	0	23.51	30.95	44.94	3.20	5th
Electromagnetic interference with other daily activities.	0	31.85	35.12	33.03	3.01	8th

Table 1 brings into the fore two distinct areas of analysis. The first contains columns dealing with resident respondents’ percentage rating of the impacts of power lines on residential property values while the last column contained mean values of reating in absolute terms. In the above Table, nine potential risk and health problems were rated by residents living within 200m distance of the HVOTL in the study areas under this research. The results of the survey showed that four major areas nuisance and health risk were identified as most critical. “Fear of Falling Wires” constituted the greatest problem to the residents along power line axis as respondents rated the

same as having a high impact (84.23%). The next three significant risk elements were the “Buzzing and Humming” noise of from the power line, “Property Stigmatization” and “Exposure to Electrical Radiation” such that both recorded 3.62%, 3.60% and 3.51%. “Health Hazards”, “Fear of Electrocutation”, “Visual Unsightliness” and “Electromagnetic Interference with other Daily Activities” all fell under medium impact as respondents rated them 3.20%, 3.18%, 3.07% and 3.01% respectively. The nuisance of “Electric Fire Hazard” which came least was rated 2.56% by respondents making it tend towards being a medium impact nuisance.

The study attempted to maintain a balanced view by asking Estate Surveyors and Valuers to rate the risk elements as perceived by them. This was to corroborate the perceptions of residents in

order to appreciate synchronisation or divergent views from both stakeholders. The perception of Estate Surveyors was shown in Table 2.

Table 2 Frequency Distributions of Risk Elements Perceived by Estate Surveyors and Valuers (% in Parenthesis)

RISKS	HIGH	MEDIUM	LOW IMPACT	NO IMPACT
Buzzing and Humming	8 (50)	4 (25)	4 (25)	0
Visual Unsightliness	7 (43.75)	6 (37.5)	3 (18.75)	0
Fear of Falling Wires	11 (68.75)	5 (31.25)	0	0
Fear of Electrocutation	16 (100)	0	0	0
Exposure to Electrical Radiation	13 (81.25)	3 (18.75)	0	0
Property Stigmatization	16 (100)	0	0	0
Electrical Fire Hazards	3 (18.75)	5 (31.25)	8 (50)	0
Health Hazards	7 (43.75)	8 (50)	1	0
Electromagnetic interference with other daily activities.	5 (31.25)	7 (43.75)	4 (25)	0

Table 2 shows the risk elements perceived by Estate Surveyors and Valuers across the two study areas within the Lagos metropolis. Three major areas of risks have been identified namely: “Fear of Electrocutation”, “Property Stigmatization” and “Exposure to Electrical Radiation”. “Fear of Electrocutation” and “Property Stigmatisation” ranked highest at 100% each while 81.25% of the respondent attested to the fact that “Exposure to Electrical Radiation” was a second major risk. “Fear of Falling Wires” was judged third most impactful risk as 68.75% of Estate Surveyors responded to its impact. The “Buzzing and Humming” noise of power lines was considered the fourth most impactful risk element with a response rate of 50%. “Health Hazard” was

judged first on the medium impact with a response rate of 50% while “Electrical Fire Hazard” was judged to have low impact. Ranking the risk elements therefore, “Fear of Electrocutation” and “Property Stigmatization” (100%), “Exposure to Electrical Radiation” (81.25%), “Fear of Falling Wires” (68.75%) and “Buzzing and Humming” (50%) were the critical impacts exerted on rental property values by power lines.

From Table 1, nine potential nuisance were rated by residents living within 200m of the power lines under this research. The results of the survey showed that 4 major areas of nuisance and health risk were identified as most critical. The composite table presenting the percentage rating of both parties were shown in Table 3.

Table 3 Perception of Nuisance from HVOTL by Estate Surveyors and Residents in Percentages

Respondents	Buzzing and Humming	Visual Unsightliness	Fear of Falling Wires	Fear of Electrocutation	Exposure to Electrical Radiation	Property Stigmatization	Electrical Fire Hazards	Health Hazards	Electromagnetic interference with other daily activities.
Residents	73.51	36.31	84.23	38.99	65.18	72.02	22.02	44.94	33.03
Surveyors	50	43.75	68.75	100	81.25	100	18.75	43.75	31.25

Table 3 displays in a concise form the perception of each group as regards the nuisance elements. The rating of by both residents and Estate Surveyors appeared more realistic because they were directly affected overtime unlike the responses of surveyors which were extreme on two occasions. From Table, 3, residents and surveyors identified four major nuisance alike: “Property Stigmatisation”, “Exposure to Electrical Radiation”, “Fear of Falling Wires” and the “Buzzing and Humming” sound of power lines. The responses of both respondents appear to tally realistically except for the extremely opposite responses in the area of “Fear of Electrocutation” in

which the residents response rate was 38.99% while that of the Estate Surveyors 100%. As managers and not affected residents along the power line axis, the surveyors had a good idea of the attendant hazards and risks faced by the residents of the study areas as reflected in their response but not as realistic as the residents. This evidently was the reason for the extremely positive response relative to the residents.

The different percentage level of risk elements expressed by Estate Surveyors and Valuers inclusive of residents is illustrated in histogram in Figure1.

Figure 1 Nine Major Sources of Risk Elements

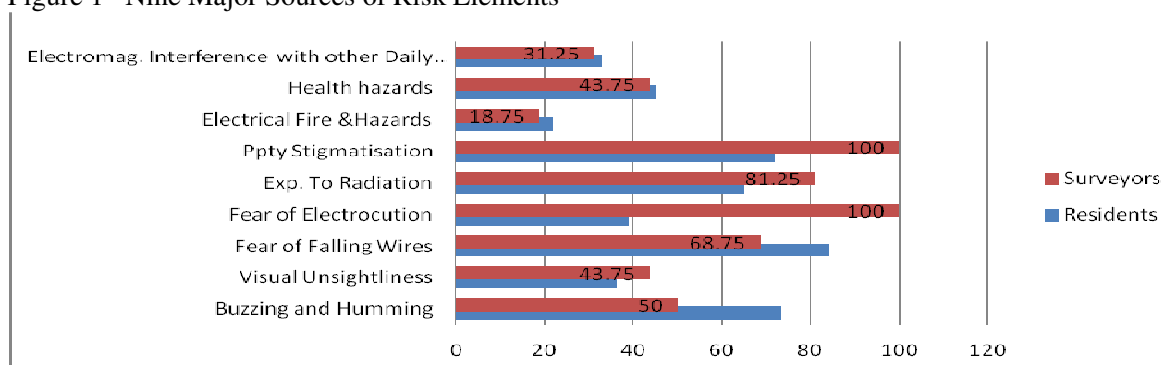


Figure 1 show in histogram nine (9) major sources of risk elements from which four (4) outstanding ones are identified.

### Conclusion

This current study has established that both residents and Estate Surveyors and Valuers jointly identified “Fear of Falling Wires”, “Buzzing and Humming”, “Property Stigmatization” and “Exposure to Electrical Radiation” from power lines as the four (4) risk elements identified as having outstanding impacts of on the rental value of residential properties. Perceived “Health Hazards” expressed by residents were further confirmed during the indepth interviews

conducted with not only residents most proximal the Power lines but also the PHCN executives and field officers.

Interestingly, power lines have been found to affect rental values in Highbrow Lagos Metropolis but since man cannot but do without electricity, definitely, power lines have come to stay. Amelioration of power line associated hazards seem to be the only possible solution and for this reason, the approved 25m setbacks (Right of Ways) from these structures in Nigeria must

unavoidably be adhered to strictly, for the preservation of residential property investment. Therefore, locating residential housing within the 25m Right of Ways must be discouraged by the Power Holding Company of Nigeria. Inclusively, the government should organise enforce the continuous demolition drive of illegal structures already occupying the ROW in Surulere, Lagos in order to sanitize the interception of the built and natural environment.

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