

POOR HOUSING CONDITION AND HEALTH RISK IN DOUALA V MUNICIPALITY, LITTORAL REGION OF CAMEROON

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Abstract

Housing and health takes a more and more important place in the reflections and approaches of the public health policies worldwide. In Douala V municipality, demographic changes have resulted to increased demand for housing and rentable accommodation. The lack of competent planning, coordination, and monitoring of building construction has led to poor housing practices in most residential areas of urban centres. Due to increased demand and high cost of building land in urban areas, households are acquiring land even in areas officially forbidden for human settlement. The goal of this study was to investigate the relationship between poor housing conditions and health risks in Douala V municipality. To achieve the objective stated above, data was collected from primary sources using questionnaires, interview and field observation. Secondary sources were collected from published and unpublished articles, text books, journals and internet. The data collected from the field were analyzed using both descriptive and inferential statistical tools. Data collected from the field was sorted and computed using the statistical package for social sciences vision 21 (SPSS 21). Findings revealed that Informal settlement account for Poor housing condition in Douala V, since the p-value is 0.041 and is less than 0.05. and the study finds out that there is a positive relationship between health risk and poor housing condition in Douala V Municipality, since the correlation coefficients was 0.285 and is greater than the table value critical T_{α} value of 0.139. This study, therefore, recommends socio-economic revitalization, public enlightenment, environmental and health education, enforcement of environmental sanitation laws and re-introduction of old sanitary inspectors as follow-up strategies to sustain any renewal efforts being proposed in the area.

Keys words: *Housing conditions, health risk, Douala, Littoral region, Cameroun.*

Introduction

Healthy housing is shelter that supports a state of complete physical, mental and social well-being. Healthy housing also refers to the physical structure of the dwelling, and the extent to which it enables physical

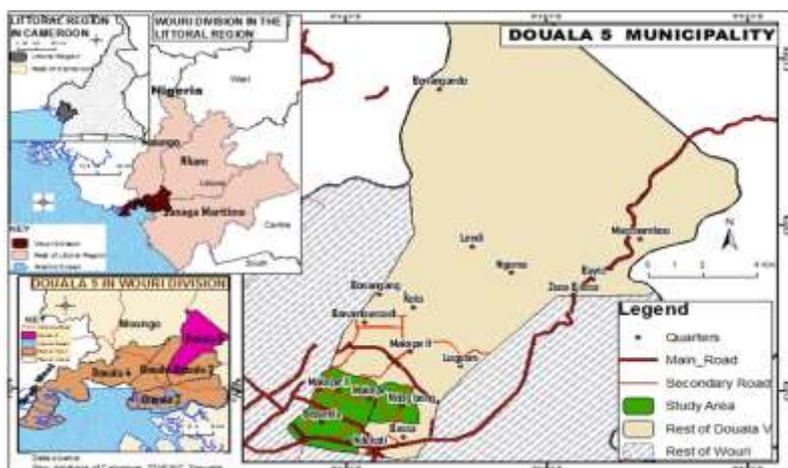
health, including being structurally sound, by providing shelter from the elements and from excess moisture, and by facilitating comfortable temperatures, adequate sanitation and illumination, sufficient space, safe fuel or connection to electricity, and protection from pollutants, injury hazards, mould and pests. Whether housing is healthy also depends on factors outside its walls. It depends on the local community, which enables social interactions that support health and well-being. Finally, healthy housing relies on the immediate housing environment, and the extent to which this provides access to services, green space, and active and public transport options, as well as protection from waste, pollution and the effects of disaster, whether natural or man-made (1). Housing in slums (the preferred term of UN-Habitat) and informal housing pose particular risks to health. Currently, around 1 billion people live in slum conditions today (2), which often develop due to exclusion from planning processes. According to UN-Habitat, a “slum household” is a group of individuals under the same roof, in an urban area, lacking one or more of the following: durable housing (housing which fails to provide shelter from the elements); sufficient living space; security of tenure; sanitation and infrastructure; and access to improved (uncontaminated) water sources. Slum dwellers are therefore exposed to many of the risks associated with housing, such as structurally defective dwellings, inadequate housing facilities and overcrowding, but also face particular health risks from poor sanitation and unsafe electric connections, toxic building materials, unvented cooking facilities, and unsafe infrastructure, including roads. In addition, such settlements are sometimes in locations that are more likely to expose occupants to hazards such as landslides, floods and industrial pollution. In relation to well-being, the lack of legal title to homes is stressful and can expose slum dwellers to the risk of forced eviction (3). In Douala V Municipality, the economic capital of Cameroon, rapid urbanization have resulted to increased demand for housing and rentable accommodation, inadequate or poor housing systems, overcrowded dwellings, high rate of pollution, inadequate household facilities, congestion of buildings. Due to the fact that the area

is poorly planned, the drainage of the area is poor; frequently such ways from people’s toilets and bathrooms often flow into rooms of some residents as it is the case when heavy rainfalls leading to continues floods resulting to loss of property. Also, the poor waste disposal system and consequently making the area a fertile ground for the breeding of mosquitoes, widespread of water borne disease. Therefore, this study has as main objective to examine the link between poor housing condition and its health implication in Douala V Municipality.

Materials and methods

Study Area: This research was carried out in Douala V Municipality (figure 1), the economic capital of Cameroon. Created by Decree No. 093-321 of 25th November 1993, Douala V has an estimated surface area of 21,000 hectares with a population density of 145 inhabitants/sq.km. It is the second largest Municipality after Douala III, bounded by the Nsape Drainage Basin to the North, Douala II and the Wouri River to the West and Douala III to the East and South. The landuse is mainly residential with commercial activities around the CBD.

Figure1: Location of the study area



Source: Geo data base of Cameroon (2017) NIS Yaoundé, Field work 2019

Study Design: Design for this study is a cross-sectional survey, conducted from November 2018 to May 2019.

Target Population and Sampling Size: In the framework of this study, our target population consisted of all people living in the urbanized area of Douala V municipality, and using the purposive simple random sampling technique, our sampling size was estimated at 147000 individuals.

Study Participants: The study population consisted of the 150 individuals willing to participate. From this, a sample size of 10%, amounting to 150 was selected randomly for questionnaire administration. In selecting the respondents, every 5th house in Douala V municipality was taken for interview, usually a household head per building.

Data Collection and Management: materials used for data collection include, mainly, the questionnaire administration, interview guide and camera for observation. Secondary data, involving health records and administration of environmental management were sourced from various institutions, ministries and establishments.

Data collections from primary sources include field observation, interview and the administration of questionnaire. Field observation was undertaken in two phases to cover both the rainy and dry seasons which characterized Douala V Municipality. The first phase ran from November to December 31st 2018. During this period the study area was visited with focus on Ndog-Bong, Maképé and Bépanda in Douala V Municipality. This was aimed at having a first-hand appraisal on the housing condition in Douala V. The second phase of field survey was under taken between March to May 31st 2019 which helps in understanding the causes of poor housing conditions in Douala V Municipality. It involved movement to Douala V councils and Sub Divisional Delegation of Urban Development and planning to inquire from key stakeholders on the types and states of houses in Douala V. In this light, there was a useful observation of the types of health problems related to poor housing condition in Douala V Municipality. Direct interviews consisted an important source of information with regards to the appropriate measures put in place to resolve the problem of poor housing condition to ameliorate health hazards in Douala V. Discussions

with resource persons from Douala V Councils, Sub Divisional Delegation of Urban Development and Town planning helped to identify housing conditions in Douala V Municipality. Key informants helped in providing information on the strategies put in place to provide standard affordable houses and the identification of issues raised. These include interviews with the Sub Divisional Delegate of Urban Development and Town planning, the Chief of hygiene and sanitation in Douala V. These were aimed at examining how they ensure sustainable provision of standard affordable houses in Douala V. The Mayor of Douala V was also interviewed on the activities pertaining to housing condition in the Area. From these discussions, information was collected on the settlement patterns and housing condition in Douala V. Questionnaires were used as tools for data collection. Both open and close ended questionnaire were used and they were subdivided into four sections. Section A was mainly for identification and section B, C and D to acquire information that will help attain the stated objectives. A total of one hundred and fifty (150) questionnaires were administered and distributed to the target population living in Douala V Municipality. Questionnaires were used to obtain information from individuals on the state of housing conditions, health risk related to poor housing condition and measures put in place to resolve the problem of poor housing condition to ameliorate health hazards in Douala V Municipality. Secondary sources of data constituted already existing data that was collected from published and unpublished articles, text books, journals, internet, maps and thesis. This enabled the researcher to evaluate what other authors have written in relation to the State of housing condition and health problems related to poor housing condition. The internet was also consulted for the review of relevant literature on strategies to improve poor housing conditions. This enables the researchers to have information on the characteristics of standard affordable houses and its contribution in improving living conditions. The data collected from the field were analyzed using both descriptive and inferential statistical tools. Data collected from the field was sorted and computed using the statistical package for social sciences vision 21 (SPSS 21).

Findings

Household Income and Housing Conditions in Douala V Municipality

Households with higher income levels are in a better position to employ the use of an improved housing condition which was scarce and few in most households during field interviews in Douala V Municipality. This means that those with low monthly incomes are less likely to improved their housing condition than those who are moderately poor (Table1).

Table 1: Household Income in Douala V Municipality

Household Income	Frequency	Percentages
0-25000	9	6.0
50000-75000	30	20.0
75000-100000	30	20.0
100000-125000	81	54.0
Total	150	100.0

Source: Field work, 2019

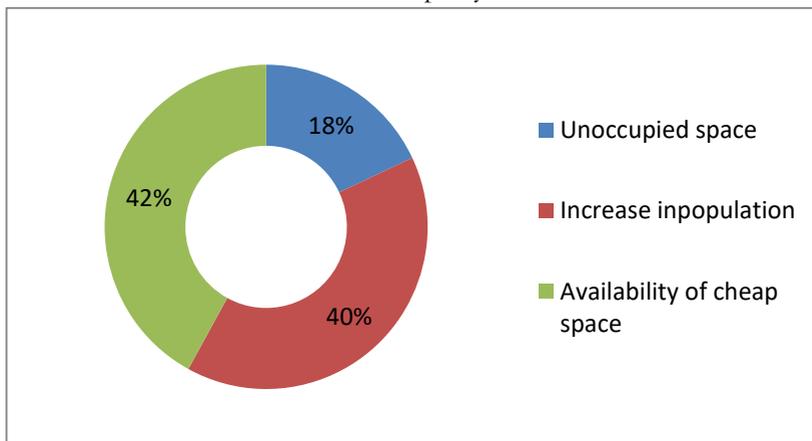
From Table 1, the majority of income earners were those who earn about 100.000-12500FCFA roughly 54% mostly civil servants and some large-scale traders in the study area. It is evident that decent housing is a major problem of informal settlement dwellers. From the analysis, it can be argued that the wealth status influences the type of houses in Douala V Municipality which in turn determines the housing condition. This is largely due to their low level of financial capacity coupled with inefficient land administration system which have further exclude them from urban life and increased their vulnerability to eviction, disaster and environmental health problem.

Factors Influencing Settlement Pattern in Douala V Municipality

Anarchical settlement and colonization of space is characteristic of some parts of Douala, with the case of Douala V municipality being very

preoccupying. Uncoordinated expansion has affected the development of the Douala urban area as the continuous occupancy of space in the midst of increasing economic hardship has resulted in an uncontrollable spatial layout of urban settlements. Space colonization by settlement area remains an unescapable process in the urbanization of Douala V Municipality. The consumption of space leaves much to be desired as its occupation in Douala V is done in a disorderly manner. The population remains the principal actor behind this disorder as the forest reduces due to the continuous advancement of man. This, in other words, reveals that the human pressure on the available space from population growth is on a perpetual rise in Douala V Municipality. The rate of progression in the Douala V municipality shows that the built-up area has increased by 60.18% for the past forty years (1975 to 2015). The built-up annual encroachment rate by the area is 1.50%, considered to be rapid. This rapid rate of increase is as a result of high population movement into Douala V from neighboring areas due to availability of cheap and unoccupied space, as well as low government control (figure 2).

Figure 2: Factors that influence settlement pattern in Douala V Municipality



Source: Field work, 2019

Figure 2, shows that 42% of the Factors that influence settlement pattern in Douala V Municipality is as a result of available cheap space and 40% as a result of increase in population as well as 18% is due to unoccupied

space. The Douala V local council is therefore in-filled with a cosmopolitan population that has colonized the space and is rapidly changing. The unoccupied urban space has regressed due to the colonization of the space by the built-up area. The occupation of space at post-independence in Douala V was unidirectional and concentrated in the south western part of the area. By 1975, the urban space encroached into the vegetation, thereby, transforming the land into a settlement zone. The 1975 Landsat Image revealed that only 810 hectares of land were occupied by built-up at the time. The built-up was mostly concentrated in the Bepanda, Cite CICAM, Ndogbong, Cite SIC and Ndogbati neighborhoods, which were identified as the sprawl areas at that time. The degraded forest in 1975 was 2073 hectares and that of the natural forest was 2933 hectares. The degraded forest was invaded by farming and other agricultural activities, indicating that the area had less built-up and more farmland. Such characteristics reveal that by 1975, Douala V was more rural than urban. The built-up area covered 14% of the total surface while farmland in the area covered 36% of degraded forest. The unidirectional and continuous wave of the sprawl pattern was concentrated in some six to seven neighborhoods of Douala V. The sprawl pattern of the Douala V municipality in 1995 became polydirectional and had increased in scope contrary to that of 1975. The sprawl tongues no longer concentrated only in the south western part of the area, but extended to the south east and parts of the central zone. An examination of the 1995 Spot Image revealed an increase in the built-up area from 810 hectares in 1975 to 2218 hectares in 1995. Unlike in 1975 where the natural vegetation and degraded forest occupied more space than the built-up area, the reverse was produced twenty years later in 1995. The degraded forest reduced in area from 2073 hectares in 1975 to 923 in 1995. The natural forest covered 2933 in 1975 was only 1009 in 1995. An unoccupied urban space emerged and was covered by farmland, enabling an increase in the agricultural activity space from 00 to 1678 hectares of land in 1995. These changes provoked the sprawl to neighbourhoods such as Beedi, Malangue and Ndoghem towards the south east of the front; to Makepe, Bonamoussadi and Bonangang towards the North West and central zone of the municipality. By 2015, the sprawl pattern in the Douala V municipality took significant poly-directional proportions. The sprawl spread into three directions of the south, west and east sections of the municipality, with a slow movement

towards the north. The Landsat Image of 2015 revealed an increase in the built-up area from 2218 hectares in 1995 to 4310 in 2015. This represents an increase of 35.97% in twenty years. This indicates significant increases in the built-up area, representing 1.50% annual average increase.

Poor Urban Planning

The urban planning policy of Cameroon and the execution lapses in Douala have led to wide spread anarchy in the city, especially in the Douala V municipality. Most towns in Cameroon suffer from serious urban planning problems due either to the lack, or non-implementation, of urban planning norms. These difficulties are recurrent in the expansion process of the towns. Urban anarchy in the Douala V municipality has influenced settlement. The pattern is more or less a non-organized or unplanned built-up surface rather than an organized or a planned one. The organized built-up constitutes 13.9% of the total urban surface, while the non-organized constitutes 56.1%. This is an indication that a greater part of the area is unplanned. This disorganized planning results from the non-respect of instituted urban laws by most urban inhabitants in the area. Plate 1, shows Anarchic Occupation of Space in Douala V.

Plate 1: Anarchic Occupation of Space in Douala V



Source: Field work, 2019

Plate 1: shows an Anarchic Occupation of Space in Douala V in which plate 5.1a shows standing water around houses and plate 5.1b shows

houses constructed closer to water channel or dum drills. The violation of town planning laws, therefore, has affected the urban settlement pattern of the area, thereby changing its morphology. Urbanization terms of reference in Cameroon require that planning comes first before settlement. The contrary is observed in the Douala V municipality where in the population settles before planning, thereby causing disorder in land occupation in the area. The inhabitants move into the area and settle without any respect of the law and little is done by the authorities to prohibit this type of settlement. The initial settlers on prohibited areas were to be ejected by the authorities. Rather, the authorities were lax and even became accomplices in the sales of plots. The population settled in a “try and see approach”, expecting a reaction from the government which never came. The general town planning and building rules of Cameroon clearly prohibit urban anarchy. Section 9 of Law No. 2004/003 of 21st April 2004, on rules of urban anarchy, stipulates that:

- Except otherwise or especially prescribed, any land in danger of a natural hazard such as flood, erosion, landslide and earthquake, portions of State land classified as such, as well as ecologically protected areas as defined by legislation relating to environmental management shall not be built on.
- Any land in danger of an industrial hazard or serious nuisances (industrial and noise pollution) and land likely to jeopardize public health or local cultural values shall not serve as a unit for habitation.
- Zones where such lands are located shall be defined by town planning documents or, failing that, by municipal order.
- Protected measures and the safety distances to be considered in drafting town planning documents shall be defined by the competent government services, particularly those in charge of mines, defense, the environment, tourism and lands (Law No. 2004/003 of 21st April 2004).

Considering the various prohibitions by the law, such anarchy would have been completely eliminated in urban spaces in Cameroon. The anarchy that reigns in the Douala V municipality in terms of urban space occupation has influenced land ownership and the quality of infrastructure in the area. The irregularities observed in the acquisition

of, and building on, land came from the fact that builders do not follow any organized format, leaving behind varied shapes and types of sub-standard buildings. A majority of the inhabitants of Douala V do not legally own the land they have constructed on. Of some 150 households in the area, 20 owned land titles, 50 were without land titles, and 80 were the households of tenants who remained indifferent in their responses. This represents 18.3% of the inhabitants owning land titles and 30.7% without land titles. The results clearly indicate that a majority of the population that resides in the Douala V local council are illegal residents.

Household Size and Housing Conditions in Douala V

The rapid urbanization process in Douala has its own consequences such as overcrowded dwellings, inadequate household facilities. Households in Douala V Municipality vary in sizes according to their income, the status and the occupation of each household member. Poor houses are mostly made up of large household size in Douala V (table 2).

Table 2: Distribution of Household Size in Douala V

Household size	Frequency	Percentage
0-5	60	40.0
6-10	81	54.0
more than 10	9	6.0
Total	150	100.0

Source: Field work 2019

Table 2 shows that about 40% of the households in Douala V Municipality are between 0-5 household while 54% are between 6-10 household. About 6% of the household are having a household of 10 and above. This indicates that a large proportion of household in Douala V Municipality are between 6-10. This size is because Douala V Municipality is more populated by young people who are pulled in this town because of the presence of tertiary activities.

Types of Accommodation in Douala V Municipality

Local housing and housing policy has a plethora of problems with the rapid population growth in Douala V Municipality. Despite this policy, accelerated and poorly controlled urbanization is a weakness in the implementation of the social production of housing strategy, continues to pose a thorny problem in terms of spatial planning and accentuates the exposure populations to the effects of natural disasters. The difficulty lies in the fact that the policies initiated are not followed and the laws in this area are weakly applied because of the inefficiency of the public institutions responsible for these missions. Figure 3 shows the type of accommodation in Douala V Municipality.

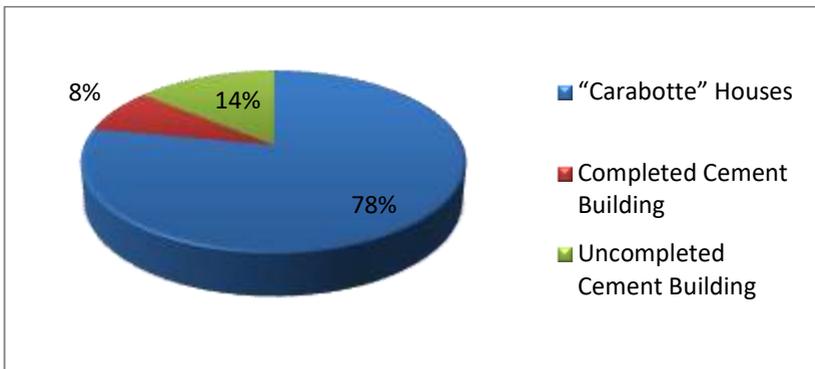


Figure 3: Types of accommodation in Douala V Municipality
Source: Field work, 2019

Figure 3 shows that 78% of the type of accommodation in Douala V Municipality is made up of "Carabotte" houses and 14% made up of completed cement buildings as well as 8% is made up of Uncompleted cement building. Since urbanization and industrialization have accelerated the growth in the population that moves into Douala in search of employment and better standards of living, those who cannot afford decent housing are left with no choice than to settle for the squatters and slums. Plate 2 shows the type of accommodation in Douala V Municipality.

Plate 2: Types of accommodation in Douala V Municipality



Source: Field work, 2019

Plate 2, shows a “Callaboot” house in the wet lands of Douala V and points out waste water to the front door of another resident in Douala V Municipality. The types of occupation in the city dictated the nature of housing accommodation. This is influenced by a poorly implemented land policy. Indeed, SIC builds housing for renting, selling or leasing primarily for employees in the public and private sector and other persons with considerable income. Crédit Foncier du Cameroun finances its activities, it grants loans to the SIC for infrastructure works, to MAETUR as well as to individuals, especially those employees for the construction of single-family houses. As a result, it does not take into account informal sector actors, but 70% of the city's heads of households work in the informal sector and 96.6% of the poor social class is employed in the informal sector.

Types of Materials Use for Housing Construction in Douala V Municipality

The non-respect of urban laws and anarchy have made some of the inhabitants of Douala V having no land titles and building permits to build temporary houses made out of locally fabricated material, sticks and mud. The few who own land titles and building permits live in permanent houses made out of modern materials of cement bricks and other standard items (table 3).

Table 3: Types of materials use for Housing construction in Douala V

Types of materials	Frequency	Percentages
Local materials	90	60.0
Modern materials	60	40.0
Total	150	100.0

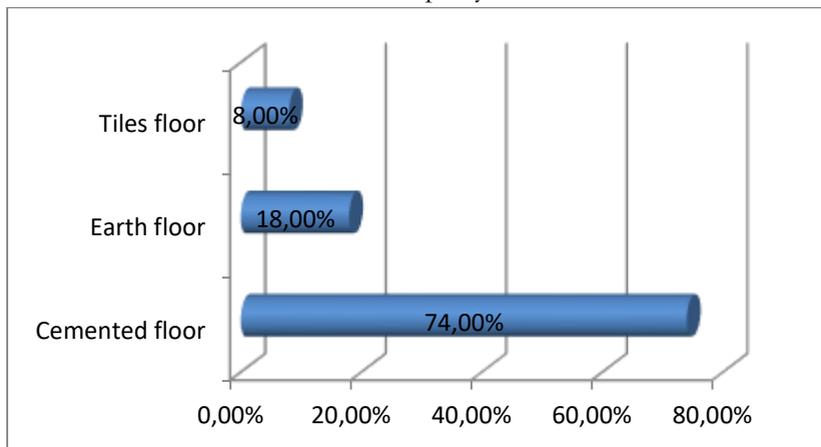
Source: Field work, 2019

Table 3 shows that 60% of the types of materials use for Housing construction in Douala V are local materials such as Mud and wood and 40% are modern materials such as cement. Of the 150 houses sampled in the area, majority of the temporary houses found in the area belong to inhabitants who have no land titles and building permits. Most of the houses as well are found in zones forbidden for settlement. As a result of the anarchy and for fear of demolition, inhabitants begin with the construction of temporary houses before transforming them into permanent ones later. This has led to reduction in the socio-economic development of Douala V Municipality.

Types of Materials on the Floor of Houses in Douala V Municipality

Many migrants who moved into Douala rushed there because of the available space in the municipality, thereby causing the population of the area to experience constant growth. The population of Douala V has experienced changes for the past 40 years with poor materials on their floor. Their choice of flooring materials is with respect to their income level. The types of floors in Douala V Municipality is made up of cemented floor, earth and tiles (figure 4).

Figure 4: Types of materials on the floor of Houses in Douala V Municipality



Source: Field work, 2019

Figure 4 shows that 74% of the materials on the floor of Houses in Douala V Municipality are made up of Cement and 18% are just normal earth as well as 8% are made up of tiles floor. The rapid growth of urbanization in Douala V Municipality has affected the society, both positively and negatively. Urbanization has induced modernization to a certain level which has enabled the use of the modern methods of construction and equipment's in some areas of living and accomplishing day-to-day activities, both at work and at home; hereby enhancing the lives of the urban populace, from the rural to modern. It has also brought about an improved Socio-economic development in form of improvement in trades and industry which has in turn contributed to improvement in living standard. As a result, these improve the socio-cultural interactions and development among the population in Douala V Municipality. Table 5 shows the interactive effects between Informal settlement and Poor housing condition in Douala V.

Table 5: Interactive Effects between Informal Settlement and Poor Housing Conditions in Douala V

ANOVA					
Informal settlement and Poor housing condition in Douala V					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	24.992	1	24.992	3.863	.041
Within Groups	957.568	148	6.470		
Total	982.560	149			

Source: Field work, (2019)

Table 5, evaluates the interactive effects between Informal settlement and Poor housing condition in Douala V. The interactive effect between Informal settlement and Poor housing condition in Douala V is 3.863 with 1 and 148 degrees of freedom in which the p-value is 0.041. Since p-value is 0.041 and is less than 0.05, we validate hypothesis one of the studies which states that Informal settlement account for Poor housing conditions in Douala V

Poor Mode of Managing Water Supply Douala V Municipality

Access to safe drinking water remains one of the essential services for the population for whom significant progress is expected in Douala V Municipality. This water is both the place where people pour their garbage and fecal matter. Access to safe water supply is a basic human need which must be satisfied with adequate quantities that comply with minimum health standards. Regardless of the fact that Douala V Municipality is blessed with abundant water resources, many some of it quarters are faced with acute shortages of safe drinking water (Table 6).

Table 6: Poor Mode of Managing Water Supply Douala V Municipality

Poor management	Frequency	Percentages
Lack of maintenance	81	54.0
Poor quality of piped water	45	30.0
Poor locations of toilets	24	16.0
Total	150	100.0

Source: Field work, 2019

Table 6 shows that 54% Poor mode of managing water supply in Douala V Municipality is as a result of lack of maintenance and 30% as a result of Poor quality of piped water while 16% is as a result of Poor locations of toilets. There is a huge gap between demand and supply of safe, potable water as a result of urbanization because the majority of water *agencies/boards cannot cope in Douala V Municipality. Over the years, the argument has been that water supply was a social service, and subsidies were required to ensure access to water by the poor in Douala V Municipality. However, in practice, this has led to a situation where lack of maintenance and underinvestment have deprived many poor households access to water and/or forced the poor to purchase water at exorbitant prices from water vendors in lack of maintenance.

In Douala V Municipality, quality of piped water cannot be guaranteed, tend to be highly turbid with sediment and access to piped water whether in the household or public taps is often highly irregular. The most common source of improved water is tube-well or borehole water used by 44% of urban residents in Douala V Municipality. All these are compounded by the fact that the main supplies often fail for days or even weeks due to multiple problems of erratic power supply, inadequate revenue generation, and weak sustainability for Douala V Municipality, the quality of the water is substandard that it presents potential health hazards. In general, owing to lack of foresight, planning without hard data, political and administrative interventions, and financial constraints, Douala V Municipality water schemes have become under designed.

Urban poverty in Douala V municipality is the most important predictor of the environmental health risks because in its broadest sense it also includes other forms of deprivation such as physical assets, political influence, access to basic services, and access to social capital. Plate 3 shows Poor sanitation, unsafe water Sources.

Plate 3: Poor sanitation, unsafe water Sources



Source: Field work, 2019

Plate 3, shows well water Sources with algae and plate 5.3b shows well water Sources closed with rusted aluminium zing.

Poor Disposal of Wastes in Douala V municipality

In Douala V municipality sanitation facilities are not only poorly calibrated, but they are also considered in garbage dumps in the neighborhoods. This situation is more serious as the Douala urban community is not properly draining its environment. Based on findings and observations on the field, the state of hygiene and sanitation as a whole and waste management in particular is deplorable (figure 5).

Figure 5: waste Disposal in Douala V



Source: Field work, 2019

Figure 5 above shows waste deposition in Douala V this is illustrated by trash can, open space, along the road, and in bags. The irresponsible behaviour and civil disobedience of Douala V municipality city dwellers also distort the smooth management of waste such as some of the few streets that are taken care of by street sweepers. One can find waste on these streets few hours after they have been cleaned and swept by agents of the company. To better assess the civic irresponsibility of Douala V municipality city dwellers as regard waste management, the question to know where an individual would throw his peelings if the person happens to eat a fruit while out of home was asked to 150 individuals (Table 7).

Table 7: Poor Disposal of Wastes in Douala V Municipality

Disposal of waste	Frequency	Percentages
Open dumps	63	46.0
Trash can	69	42.0
Dump on the road	15	10.0
Put in bag and throw	3	2.0
Total	150	100.0

Source: Field work, 2019

From Table 7, most city dwellers in Douala V Municipality have as preference open dumps to throw their peelings or dirt generated out of home. This is verifiable from the fact that 46% of individuals in Douala V municipality choose to do so in the street. Also, 42% will throw their peelings in a trash can if they happen to have any around their home. Mindless of the presence of a trash can, 10% of the city dwellers attest that they would do it on the road. Only 2% will accept to put their peeling in their bag and throw it later at an appropriate site. At the level of households, waste is also dumped in random dumps, streams, pits farmlands and back yards. Photo 1 shows Household wastes dumped in along the roadsides in Douala V Municipality.

Photo 1: Household waste dumped in along the roadsides in Douala V Municipality



Source: Field work, 2019

Douala V Municipality city dwellers tend to choose their own dumpsite as a function of distance from their houses without respecting the official

dump sites. AS such diverse dump sites are being used by the inheritance which is a challenge to the society as it retards proper waste management by the company. The choice of dumping site has much to do with the distance separating the various sites from households. The population in most cases has the tendency of choosing dumping sites that are not far away from their households. The choice of any dumping site is therefore a related to the distance an individual will cover for him or her to meet a dumping site.

Poor Maintenance of Drains

However, the cleaning of drains and streams is done at a very irregular frequency due to budgetary inadequacy. However, an exception is made for watersheds in which in case of flood, floods are likely to cause significant damage. Thus, drains and waterways traversing spaces charged with human issues (high human concentration), economic stakes (investments, means of production and distribution) or infrastructural issues (strategic roads in urban transport) are priests at an annual frequency. This explains the fact that some drains, such as Tongo-Bassa concreted collectors under construction and certain portions of watercourses crossing a road are listed as priorities and others not. According to the testimony of the population, these drains were once maintained by the population themselves who were organized as part of human investments. Plate 3 show the poor maintenance of some drains in Makepe Missoke. Plate 4 shows Obstructing drain with solid waste and grass, Makepe

Plate 3: Obstructing drain with solid waste and grass, Makepe



Source: Field Work, 2019

Plate 3 shows Obstructing drain with solid waste and grass, and obstructing drain with solid waste in Makepe. Despite the awareness raising efforts that the actors are making, they continue to leave the garbage bins to dump their garbage in the channels and beds of the waterways. In the plate 3, we first observe a completely blocked river because of the plastic bottles; it is enough of a less rain so that the waters overflow this river. In the second image, we can see this river with the green coloring. This coloration comes from the dumping of waste from the company GUINNESS located upstream in this watercourse. Photo .2 shows Disposal of Solid and Liquid Waste in river Beds.

Photo 2: Disposal of Solid and Liquid Waste in river Beds



Source: Field work, 2019

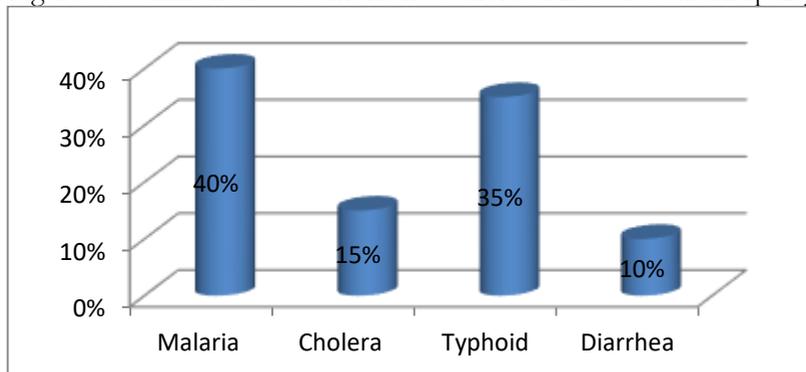
Douala V municipality City does not have enough driveways, especially in sloping areas and low-lying floodplains. Having declared these areas non-buildable, the urban community does not do enough to clean up. Population deposits their garbage in the drains hoping that they are evacuated by the flows. As a result, the hydraulic capacity of almost all the collectors is reduced by this solid waste retained in their race by the alluvium and colluvium and also by a vegetation of "*Phragmites australis*", family of *Gramineae*, commonly called reed. This hygrophilous invasive plant with stagnation capacity is very common along the waterways of the city and is a real natural obstacle. It follows the clogging of the watercourse and scuppers of rainwater by solid waste (plastic bottles, shoes, worn clothing and other bulky objects) trapped by vegetation.

This situation contributes to conferring bad flow conditions on rivers and drains. The sometimes-violent flooding of the resultant river bed overflow is exacerbated by the increase in runoff rates due to the increased surface area impregnated by the densification of the habitat and the construction of paved roads such as the urban axis from Bepanda Yonyong to Bonamoussadi, the urban axis from Makepe Missoke to Makepe St Tropez and the urban axis from Carrefour Zachman (Ndogbong) to Makepe Missoke.

Health Risks Associated with Poor Housing Condition in Douala V

Douala V municipality urban areas have vegetations coupled with urban farming that provides ample aquatic habitats for mosquitoes. Added to this, the physical deteriorating environment (blocked and broken drainages, heaps of refuse, new constructions (excavations, building constructions, and irrigation schemes) and population dynamics increase opportunities for mosquitoes through the enhancement of shallow bodies of water and increase in number of artificial water collection reservoir. Consequently, with all these factors, as more people move into cities and industrialization proceeds, malaria is on the increase in Douala V municipality (Figure 6).

Figure 6: Common diseases in the household of Douala V municipality



Source: Field work, 2019

Figure 6 shows Common Diseases from poor housing condition and sanitation in Douala V municipality. Poor housing condition account to 40 % cases of Malaria and 35% Typhoid case while it has led to 15% cases of cholera and 10% cases of Diarrhea. The rapid urban growth in Douala V municipality and its unsanitary environment favor the proliferation of disease vectors and transmission of the neglected tropical diseases such as soil-transmitted *helminthiasis*, *schistosomiasis*, and *lymphatic filariasis*. *Lymphatic filariasis (LF)* is a disabling and disfiguring disease that results from a mosquito-borne parasitic infection. Douala V municipality urban environments provide potentials for malaria transmission as there are much stagnant water around homes that exposes the vulnerable individuals to mosquito bites. Photo 2 shows stagnant water around homes that exposes the vulnerable individuals to mosquito bites. Large health burdens arising from poor housing and sanitation, for low income urban dwellers with exposure to diseases, chemical pollutants and physical hazards in Douala V municipality being a significant contributor to premature death, injury and illness.

Discussion and conclusion

The built environment and especially human dwellings have long been identified as important social determinants of health on many levels (Robertson, 1919). Individual apartment characteristics, neighborhood characteristics, and social-structural factors such as urbanization are influenced by social, cultural, behavioral, economic, and environmental parameters (Rauh et al., 2008). The proliferation of shanty dwellings, squatter settlements and slums in most of our cities in the Cameroon and particularly in metropolitan town like Douala is attributed to a chain of factors. Basically, such factors are closely related with the housing and environmental condition and socioeconomic lifestyle of the inhabitants. Housing is adjudged to be one of the basic needs of man; it is central to man's existence, welfare and health. It is widely acknowledged as the most essential elements for good life; and form the basic requirement for efficient and satisfied labour force, thereby promoting the foundation of satisfying community life (4). Housing has been noted to be more than a mere shelter, as a unit of the environment. It influences profoundly the health, efficiency, social behaviour, satisfaction and general welfare of the community (5). Healthy housing and good environmental condition thus

remain critical to human health, comfort and general well-being of every man (6). Sop and Nguendo (2019), on their study found that analysis of the spatial distribution of smear-positive pulmonary TB (PTB) in Bafoussam highlights the existence of PTB cases clusters in some city health areas. Those clusters were favored by risk factors such as precariousness of housing, poverty, dwellings' overcrowding, smoking, alcoholism, late treatment of patients, difficulties of access to health care, and ignorance of TB by infected persons. The disorganize manner of settlement in Douala V municipality is mainly the consequence of administrative tolerance of the authorities in charge of urban planning in Douala. The study found out that Space occupation through the invasion and colonization of the land by the built-up area has increased overtime in the Douala V leading to substandard houses. These substandard houses are mostly occupied by the poor and 78% of the type of accommodation in Douala V Municipality is made up of "Carabotte" houses. Uncoordinated expansion has affected the development of the Douala urban area as the continuous occupancy of space in the midst of increasing economic hardship has resulted in an uncontrollable spatial layout of urban settlements. The study also found that Informal settlement account for Poor housing condition in Douala V since the p-value is 0.041 and is less than 0.05. The study found out that violation of town planning laws, has affected the urban settlement pattern of the area, thereby changing its morphology. Urbanization terms of reference in Cameroon require that planning comes first before settlement. The contrary is observed in the Douala V municipality where in the population settles before planning, thereby causing disorder in land occupation in the area. The study also found out that there is a positive relationship between health risk and poor housing condition in Douala V Municipality as the correlation coefficients is 0.285 and is greater than the table value critical T_{xy} value of 0.139. The main source of water supply in the study area is largely through private sector borehole and only few people have access to enjoy tap water, which is not regular. From this situation, the existing water supply does not guarantee quality water supply in the area, hence the people are at greater risk of contracting acute water borne diseases. It is interesting to conclude that, curbing poor housing condition in the Douala V local council seems to be a herculean task since settlement has preceded planning. Decision makers are finding it difficult to redress the situation because the inhabitants

have teamed up to raise a social problem of inadequate means to relocate. The authorities can therefore only succeed to curb poor housing at best if the State decides to sponsor the relocation. Also, the provision of adequate affordable housing for Douala v will initiate a notable growth as it will provide shelter for the people and also, bring about lots of infrastructural development, thereby meeting some of the social needs of the area. This achievement would, overall, be a driver for the nation towards development in a sustainable way; indicating that housing has significant effects on all the three domains of sustainable development.

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