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Transformation of a precarious (unplanned) neighbourhood into a residential neighbourhood: Study of the sanitation problem of the "Koweit" sub-neighbourhood in the camp-military neighbourhood of the commune of Yopougon

Mutation d'un quartier précaire (non planifié) en un quartier résidentiel : Etude de la problématique de l'assainissement du sous-quartier « Koweit » dans le quartier camp-militaire de la commune de Yopougon

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Abstract:

The production and improvement of housing in precarious neighbourhoods are based on progressive and evolving processes that are governed by the needs and capacities of the inhabitants. For example, the 'Kuwait' sub-district in the Camp-militaire district of Yopougon is faced with a serious lack of liquid waste management facilities. Despite development actions by the population and the municipal authorities, the difficult management of liquid waste proliferates in the said neighbourhood, thus causing health risks to which the population is exposed. The objective of this study is to show the impacts of the defective management of liquid waste on the living environment and health of the populations in the study area. The methodology used to achieve this objective combines documentary research and field surveys. At the end of this methodology, the results of the study show the different types of habitats following spatial mutation, that the sub-district is unhealthy with nauseating odours in places and some environmental pathologies encountered such as Malaria (32.03%), Diarrhoea (30.45%), Thyroid Fever (16.48%), Acute Respiratory Infections (13.22%), Dermatitis (7.21%) and Other Environmental Diseases (0.61%).

Keywords: Yopougon; Koweït; Change; Sanitation; Health risks.

Résumé :

La production et l'amélioration de l'habitat dans les quartiers précaires s'appuient sur des processus progressifs et évolutifs rythmés par les besoins et les capacités des habitants. Ainsi, le sous-quartier « Koweït » situé dans le quartier Camp-militaire de Yopougon est confronté à un manque criard d'équipements de gestion des déchets liquides. Malgré les actions de développement par les populations et les autorités municipales, la gestion difficile des déchets liquides prolifèrent dans ledit quartier provoquant ainsi des risques sanitaires auxquels sont exposées les populations. L'objectif de cette étude est de montrer les impacts de la gestion défectueuse des déchets liquides sur le cadre de vie et la santé des populations dans la zone d'étude. Pour se faire, l'ossature de la méthodologie utilisée pour atteindre cet objectif combine la recherche documentaire et les enquêtes de terrain. Au terme de cette méthodologie, les résultats de l'étude montrent les différents types d'habitats suite à la mutation spatiale, que le sous-quartier est insalubre avec des odeurs nauséabondes par endroits et quelques pathologies environnementales rencontrées telles que Le paludisme (32,03%), la diarrhée (30,45%), la fièvre thyroïde (16,48%), les infections respiratoires aigües (13,22 %), les dermatoses (7,21 %) et les autres maladies environnementales (0,61 %).

Mots-clés : Yopougon ; Koweït ; Mutation ; Assainissement ; Risques sanitaires.

Introduction

The annual growth of the urban population in Sub-Saharan Africa is approaching 5%, a figure twice that of Latin America and Asia (UN-Habitat Report, 2008). Urban growth is a global phenomenon in an increasingly urbanised world. Today, it is the less urbanised countries that have the highest urbanisation rates. More than half of the world's population resides in urban areas as of 2008 and this rate is expected to reach 66% by 2050. Urbanisation in developing countries is of concern, as 150,000 people are added to the urban population every day, attracted by the promise of a better quality of life (Chevalier & Gosselin, 2003). With an average annual growth rate of 3.3% over the period 1988-1998, Côte d'Ivoire is one of the African countries with a high population growth rate. It is experiencing a very rapid urbanisation. The urbanisation rate, which was 12.7% in 1960, rose to 32% in 1988 and then to 42.5% in 1998 (INS, 1998). Today, this rate is 49.7% (RGPH, 2014). The strong demographic growth is accompanied by anarchic spatial development that escapes any control by the public authorities (Ngnikam et al., 2007). This poorly controlled growth is manifested by the proliferation of precarious neighbourhoods in the ten communes of the city of Abidjan (Atta et al., 2013). Moreover, as the commune of Yopougon urbanises, this phenomenon accelerates and modifies social and spatial relations and occurs at several speeds. On the one hand, the so-called 'formal' or modern neighbourhood, the engine of development and economic growth, inserted into a global economy producing uniform spatial expressions. On the other hand, the "informal" or "spontaneous" neighbourhood, where the vast majority of inhabitants live, suffers from a lack of access to basic infrastructure and the security of a decent home adapted to their needs. This makes the problem of urban sanitation management particularly complex. The lack of environmental management results in the development of an unhealthy environment in these neighbourhoods, which seriously affects the quality of life of the population (Dongo, et al., 2008). In addition, the inadequacy of urbanisation policies linked to the demographic context is the source of serious threats to the living environment, economic activities and the population. Several dysfunctions are therefore observed. The signs of this access in the urban landscape are manifested by the proliferation of rubbish dumps, the precariousness of the habitat, the run-off of waste water through the streets, the lack of equipment and infrastructure and the emergence of environmental pathologies.

Like the environmental problems experienced by the unplanned (precarious) neighbourhoods of the commune of Yopougon, the Kuwait sub-district of the Camp-militaire neighbourhood, although transformed due to the accelerated urbanisation of the said commune, is confronted

with housing and sanitation problems. The different ways of managing liquid waste expose the population to health risks. However, no specific study has yet been carried out on the said sanitation problem in a neighbourhood undergoing rapid residential change, which compromises the health of the surrounding populations of "Koweit" in the commune of Yopougon.

The health risks linked to insalubrity result from precarious housing conditions and poor management of urban liquid waste (Sy, 2006). An unhealthy space is a space that represents a health risk factor for the population. Faced with this living environment, the populations of the Koweït sub-district, and especially the children, are exposed to several environmental pathologies such as malaria, acute respiratory infections (ARI), diarrhoea, cholera, etc. The objective of this study is to show the impacts of the defective management of liquid waste on the living environment and health of the population in the face of a housing transformation in the "Koweït" sub-district located in the Military Camp district of the commune of Yopougon. Specifically, the achievement of this objective requires a rigorous methodology.

In order to carry out this study, the collection of information was based on documentary research and field surveys. The documentary research provided information on the impacts of demographic pressure on the living environment and health of the population despite the changes in the habitats observed in "Koweït". Then, the field survey, through direct observation, made it possible to identify the different types of housing and to realise the unhealthy nature of the neighbourhood. The observation also made it possible to delimit the areas facing sanitation problems, the areas of stagnation of wastewater and rainwater conducive to the development of vectors of diseases linked to the environment. The field surveys took place from September 2022 to December 2022. So, to better understand this study, this question is necessary: What are the health risks linked to the sanitation issue in the "Koweït" sub-district?

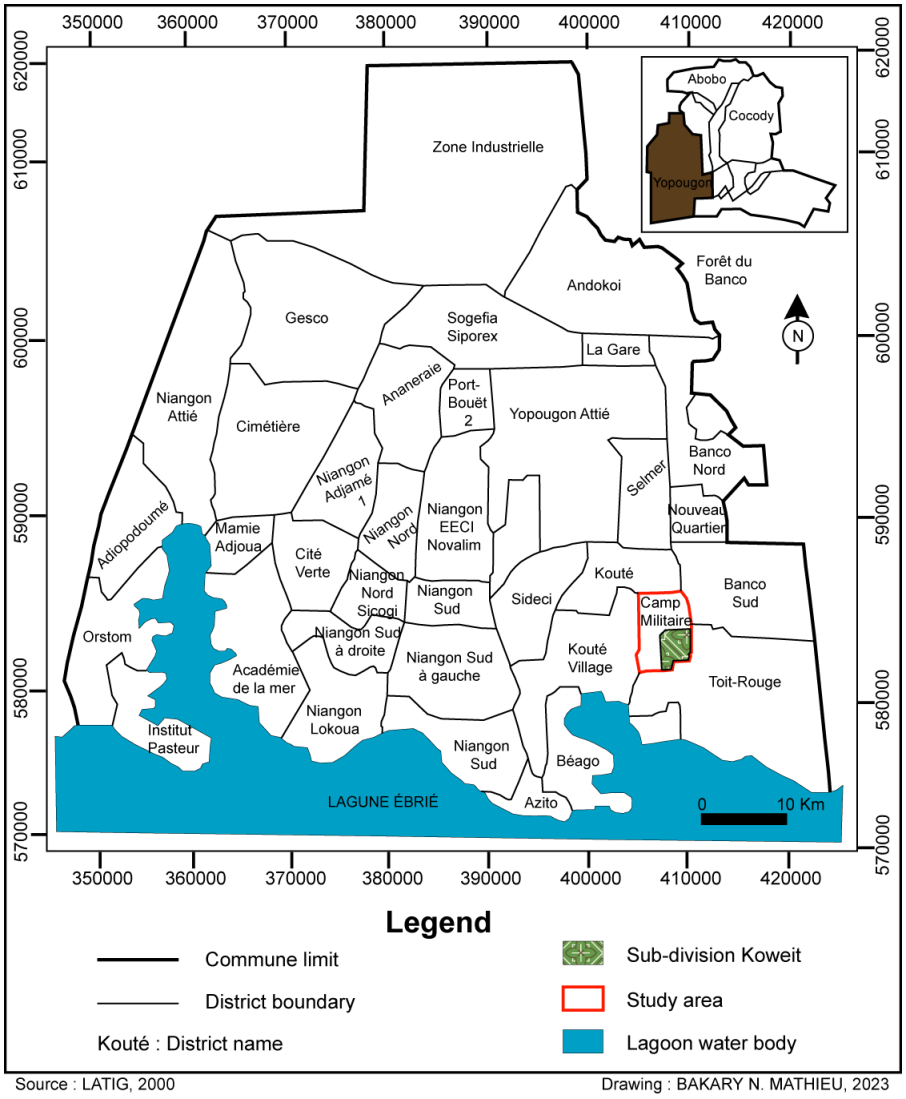
To answer this question, the article first shows the socio-demographic profile of the households surveyed, then the different types of housing in the "Koweït" sub-district: housing dominated by progressive dwellings, then the type of essentially autonomous sanitation, followed by the proliferation of disease vectors due to the anthropic behaviour of certain populations, and finally the health risks linked to the management of liquid waste in the Koweït sub-district.

1. Materials and methods

1.1. Overview of the study area

The commune of Yopougon is located to the west of the city of Abidjan with an area of 153.06 km2 and an estimated population of 1,071,543 inhabitants (INS, 2014). It is one of the communes of the city of Abidjan located in the south of Côte d'Ivoire on the eastern coastline bordering the Gulf of Guinea, situated between 40 2 west and 50 19 north. Yopougon is the largest municipality in the city of Abidjan, ahead of Abobo. It is subdivided into 28 districts, including Camp Militaire, which is located in the south-east of Yopougon and within the Yopougon Kouté sector. It is bounded by Kouté and Banco Nord to the north, Toit rouge to the east, Kouté village to the west and Toit-Rouge to the south. The district covers an area of 21.8 ha with an estimated population of 46,932 inhabitants (INS, 2021), either. a density of 2152.84 inhabitants/ha. The strong demographic growth of this study area is linked to its strategic position as a population reception area for dormitories. The 'Koweit' sub-district is located in the Military Camp district of the commune of Yopougon. It is mainly inhabited by low-income populations whose majority housing type is precarious (see Figure 1).

Figure N°1: Location and presentation of the study area



Source : LATIG, 2000

1.2. Methodological approaches

Documentary research and field survey were used as a methodological approach. The documentary research focused on the mutation of habitats, the mode of wastewater management, the health risks resulting from anthropic behaviour through the libraries of the Institute of Tropical Geography (IGT), the central library of the University Houphouët Boigny of Cocody, the library of the Centre for Research and Action for Peace (CERAP), at the documentation centre of the Institute for Research and Development (IRD) and sometimes on websites. This documentary research (books, reports, scientific articles, theses and dissertations) provided information on the impact of demographic pressure on the living environment and health of the population despite the changes in the habitats observed in Koweit. Also, demographic and health data were collected respectively from the National Institute of Statistics (INS-RGPH, 1975, 1988, 1998 and 2014) and the Yopougon health

district. For the field survey, direct observation made it possible to identify the different types of housing and to assess the unsanitary nature of the neighbourhood. The observation also made it possible to delimit the areas facing sanitation problems, the areas of stagnation of wastewater and rainwater conducive to the development of disease vectors related to the environment. As for the choice of the sample size, it was based on the 2014 Ivorian population census provided by the INS. The military camp district (of which the sub-district 'Koweit', which is the subject of our study, is part) had 46932 inhabitants for 7822 households in 2021 (INS estimate, 2014). The number of households to be surveyed in the sub-neighbourhood "Koweit" was obtained using the following mathematical formula of Adil El Marhoum (1999) which is :

$n = Z^2(PQ)N/[e^2 (N -1) + Z^2(PQ)]$ where N = 7822 (Size of the parent population); Z = 1.96 (Margin coefficient (determined from the 95% confidence level)); e = 0.04 (Margin of error tolerated); P = 0.5 (Proportion of households assumed to have the desired characteristics) and Q = 1 - P.

The principle that prevailed in the constitution of the sample is that of information saturation. This method (Pires A., 1997) consists of continuing the interviews within each target group until the information saturation threshold is reached, which is the threshold at which the answers provided within a target group no longer vary. The respondents were selected only from among the inhabitants of the neighbourhood. Thus, a total of 295 heads of household constituted the purposive sample, taking into account the saturation threshold and based on criteria deemed relevant, such as at least five years of residence in the neighbourhood, age, place and type of dwelling and status as head of household. We also used the 5-step method to select the heads of households to be interviewed in the sub-neighbourhood.

2. Results

2.1. Socio-demographic profile of surveyed households

The characteristics of the households surveyed take into account the marital status, the professional status, the age of the heads of household, the level of education, the nationality and finally the status of the residents

2.1.1. Heads of household who are mostly single and live in the Koweit sub-district

Analysis of the socio-demographic profile of households involved in the management of Koweit's living environment through the sanitation of liquid waste provides eloquent information (see Tables 1 and 2; Figures 2, 3 and 4).

Table N°1 : Distribution of surveyed heads of household by marital status

Statutes		**Workforce**		**Percentage (%)**	
Singles	Concubinage	89	161	30,17	54,58
	Available at	72		24,41	
Married		86		29,15	
Divorced		21		07,12	
Widows		27		09,15	
Total		295		100	

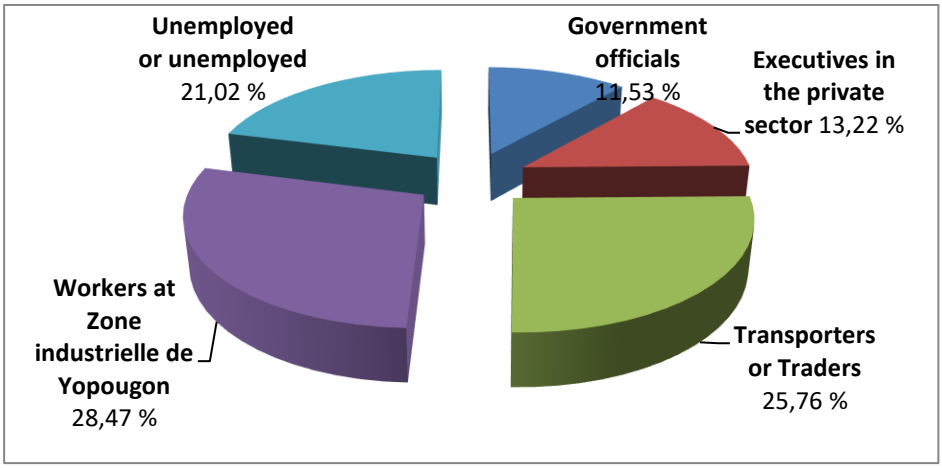
Source: Field survey, November 2022

The table shows that more than half of the households surveyed in the Koweit sub-district are single (54.58%), of which 30.17% of the respondents are single and living with a partner, and 24.41% of the single respondents have given birth to their wives. 29.15% are married, and another group of respondents (7.12%) have been divorced after several years of marriage. Finally, 9.15% of respondents are widows.

2.1.2. The professional status of the heads of household surveyed

The study of the professional status of the heads of household provides additional information on the identity of households in the study area.

Figure Nº2: Distribution of the surveyed population by professional status



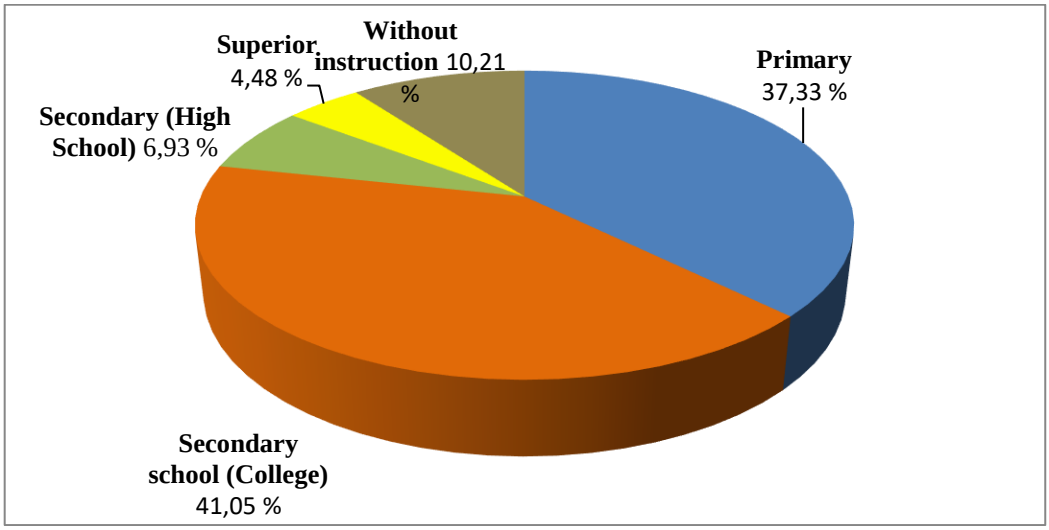
Source: Field survey, November 2022

The analysis of Figure 2 shows that workers in the industrial zone of Yopougon (28.47%) are the most numerous who live in Koweit. They are followed by transporters or traders with a proportion of 25.76%. The unemployed or jobless with a proportion of 21.02% come in third place. Private sector executives and civil servants close the circle with 13.22% and 11.53% respectively. This last stratum lives in villas and high-standard homes.

2.1.3. Contrasting levels of education for heads of household living in 'Koweit

The majority of the populations surveyed have more or less a level of education, as shown in Figure Nº3.

Figure Nº 3: Distribution of contrasting educational attainment of heads of households living in "Koweit"



Source: Field survey, November 2022

The results in Figure N° 3 show that the most numerous households surveyed have a secondary education (college) with 41.05%. They are followed by heads of households who have attended primary school. Those who have not had the chance to go to school come fourth with 10.21%. The households mentioned above live in precarious housing and in communal yards (evolving housing). Households with secondary (high school) or tertiary education represent 6.93% and 4.48% of all households surveyed in Koweit respectively.

2.1.4. Geographical origin of heads of household living in the Koweit sub-district

The distribution of the heads of household surveyed according to their geographical origin in the Kuwait sub-district provides interesting information (Table N° 2)

Table N°2: Distribution of heads of households surveyed according to their geographical origin in the Koweit sub-district

Statutes		Workforce		Percentage (%)	
Ivorians peoples	Aboriginal peoples	23	192	7,80	65,08
	Native people	169		57,28	
Burkinabes peoples		38		12,88	
Malians peoples		33		11,19	
Nigerians peoples		07		2,37	
Togoleses peoples		03		1,02	
Others		22		7,46	
Total		295		100	

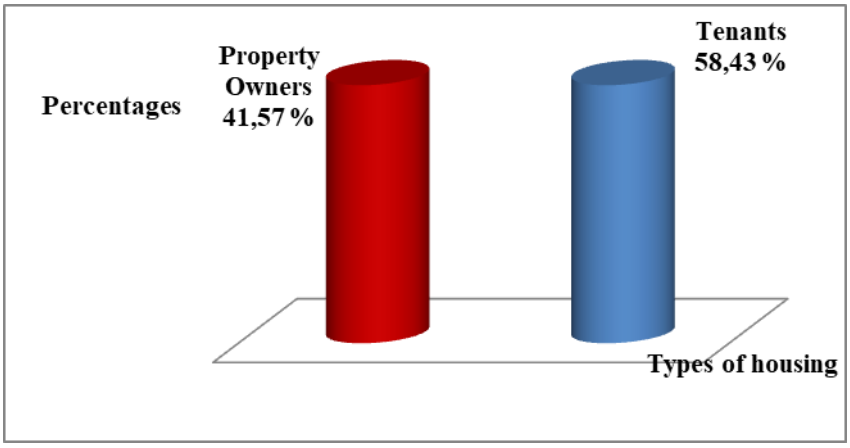
Source: Field survey, October 2022

Table 2 shows that Ivorians (65.08%) are the most numerous residents of Koweit. It is important to note that among the Ivorians, 7.80% are indigenous and 57.28% are non-indigenous. The Burkinabe come in second place with 12.88% of respondents, followed by the Malians with 11.19%. The other nationalities without distinction with 7.46% come after the Malians. Nigeriens and Togolese, with 2.37% and 1.02% of the population surveyed respectively, close the list.

2.1.5. Status of residents

The fieldwork revealed that the study area, which is the Koweit sub-district, is inhabited by both tenants and owners. The surveys reveal that 58.43% of the households surveyed are tenants as opposed to 41.57% who occupy their own dwelling (see Figure N°4). It is not far from the platform of the bus boats that allow easy access to the business district called Plateau. A fringe of the population goes to the industrial zone by means of transport commonly called "Gbaka" to carry out their daily work.

Figure N°4: Distribution by residence status of the surveyed population

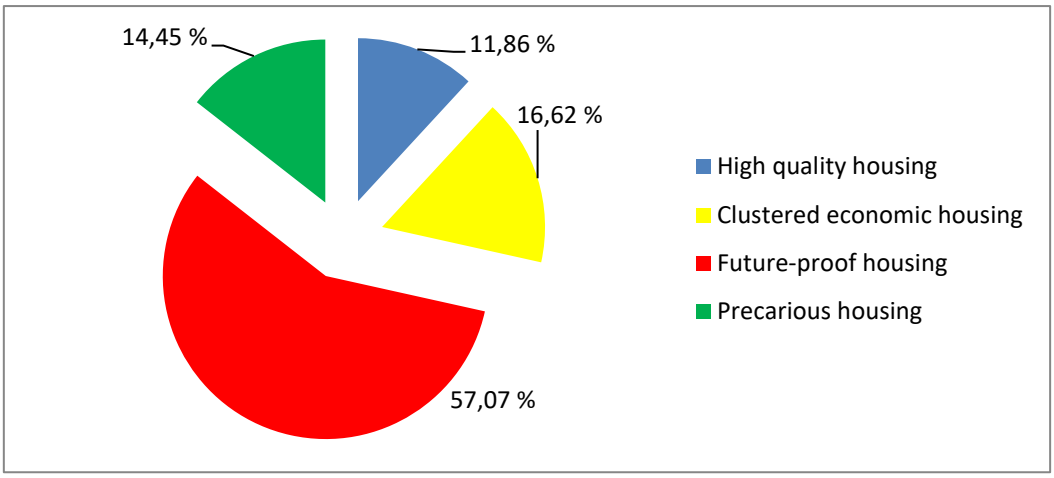


Source: Field survey, November 2022

2.2. The different types of housing in "Koweit": Housing dominated by progressive housing

The different types of housing in the Koweit sub-district of the military camp district are evolving, economically grouped and of high standing. However, there is also precarious housing, generally made of salvaged materials (see Figure N°5).

Figure N°5: Distribution by residence status of the surveyed population



Source: Field survey, November 2022

This figure shows that the majority of the housing in the Koweit sub-neighbourhood is of the open-ended type, with a proportion of 57.07%. It has toilets and showers in strips belonging to several households living in the same concession. This type of housing is generally occupied by middle-income populations characterised by a mode of organisation of space that is commonly the concession. The second type of dwelling is the grouped economic dwelling, occupied by 16.62% of the households surveyed. 14.45% of households in precarious housing types. They are built with salvaged materials. Lastly, high-standard housing, with appropriate sanitary facilities (presence of toilets and well-equipped WCs), is occupied by only 11.86% of respondents.

Photo Nº1: High standard housing in the Koweit sub-district.
(Shot by: BAKARY Nambahigué Mathieu, October 2022)

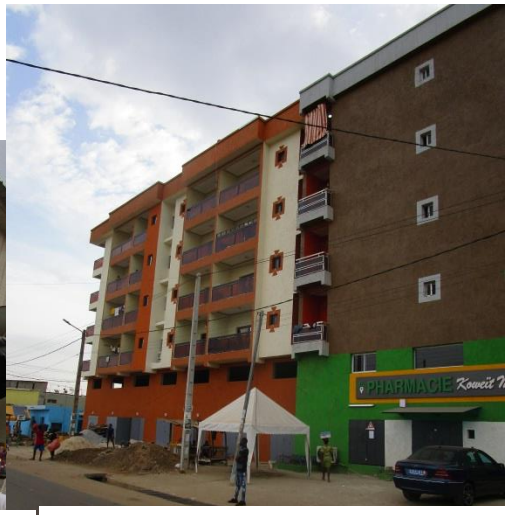


Photo Nº. 2: Grouped economic housing in the Koweit sub-district. It was built by a private individual to make up for the lack of houses
(Shot by: BAKARY N. Mathieu, 2022)

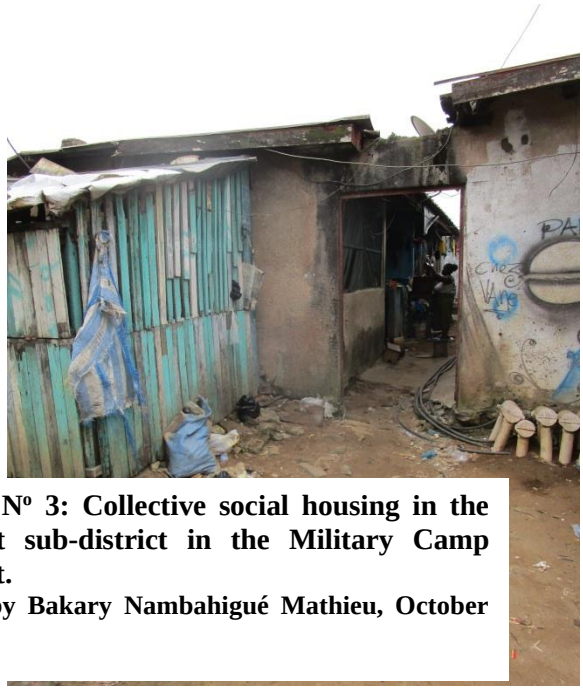
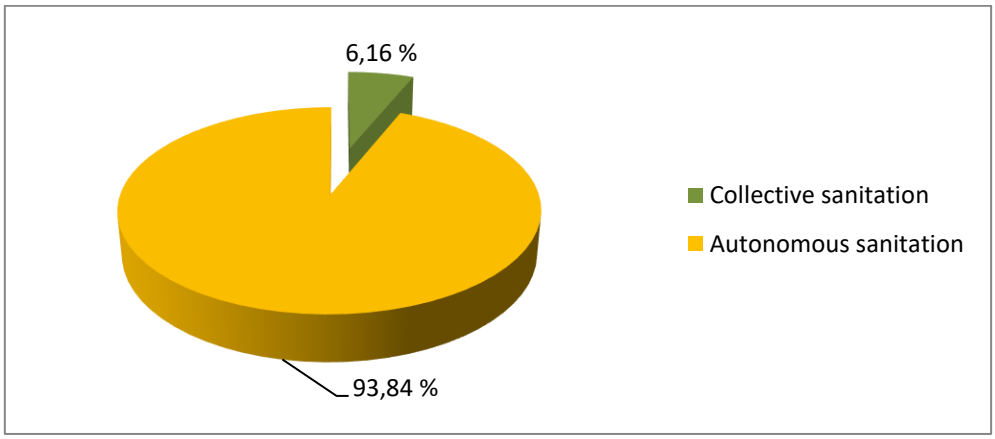


Photo Nº 3: Collective social housing in the Koweit sub-district in the Military Camp district.
(Shot by Bakary Nambahigué Mathieu, October 2022

2.3. Type of sanitation - mainly on-site

Deficiency in excreta management exposes the population to disease risks. Figure Nº6 shows the distribution of the sanitation system used by households in Koweit

Figure Nº6: Distribution of the sanitation system used by households in Koweit sub-district



Source: Field survey, October 2022

Two sanitation systems are used in Koweit. These are individual or autonomous sanitation with a septic tank latrine and collective sanitation with extremely low coverage. Individual sanitation is used by 93.84% of the households surveyed while collective sanitation is only used by 06.16% of the respondents.

Photo N°.4: Stormwater circulation on a street with no sanitation facilities in the Koweit sub-district of the Military Camp district.
(Shot by Bakary Nambahigué Mathieu, October 2022)

2.4. Proliferation of disease vectors due to the anthropic behaviour of certain populations

The field survey shows that the water that drips out of the pits identified during the survey is a breeding ground for various vectors responsible for environmental diseases. The distribution of these disease vectors is shown in Table N°3

Table N°3: Distribution of disease vectors according to the respondents

Disease vectors	Number of heads of households	Percentage (%)
Rodents	37	12,54
Mosquitoes	196	66,44
Others (salamanders, cockroaches, flies, etc.)	62	21,02
Total	295	100

Source: Personal survey, 2022

The survey revealed that mosquitoes were reported by 66.44% of heads of households, while rodents were reported by 12.54%. Flies and cockroaches were the last group of vectors mentioned in this study. Their presence was reported by 21.02% of the respondents.

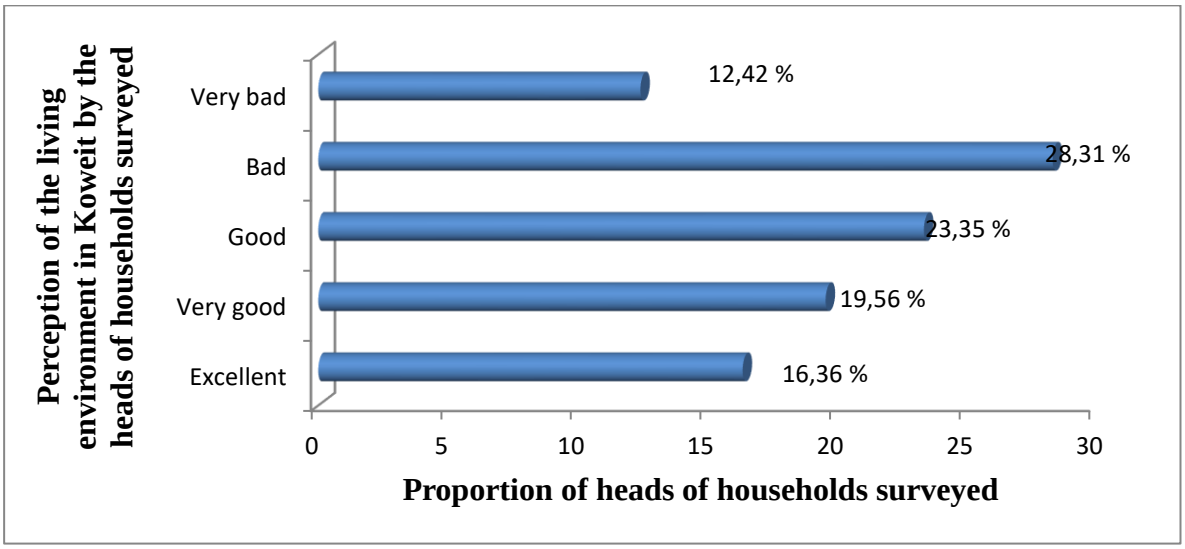
Photo N°5: Stagnant wastewater in a gutter serving as a breeding ground for mosquitoes in the Koweit sub-quarter of the Military Camp district.
(Photo taken by Bakary Nambahigué Mathieu, October 2022)

2.5. Health risks related to liquid waste management in the Koweit district

2.5.1. Perception of the living environment linked to the defective management of liquid waste

The perception of the environmental framework of the Koweit sub-district is illustrated in Figure N°7. This is the opinion of the heads of households surveyed. It shows the degrading aspect of this area, which is undergoing rapid change in the Military Camp district.

Figure N° 7: Distribution of the surveyed population by residence status



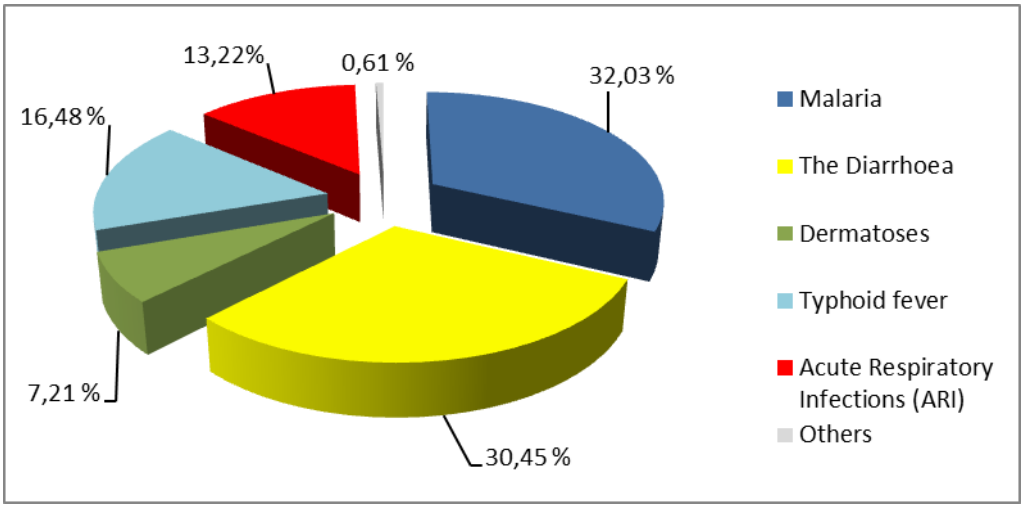
Source: Field survey, November 2022

The results in Figure N° 7 show that 19.56% of the heads of household consider the environmental setting of their neighbourhood to be very good. In addition, 16.36% of the respondents found "Koweit" to be an excellent neighbourhood for living and commuting to the plateau or the industrial area. In addition, 23.35% of the heads of household think that the living environment is good for carrying out several commercial activities in the vicinity of their homes. Unfortunately, 28.31% and 12.42% of the respondents find the neighbourhood environment bad and very bad respectively. These evaluations of the environmental framework of the 'Koweit' neighbourhood help to understand the massive presence of the population.

2.5.2. Vulnerability of the population to environmental pathologies in the Koweit sub-district

The way in which household wastewater is managed can affect the health of the population, especially when the disposal method is inadequate. In fact, in the Koweit sub-district in the Military Camp district of the Yopougon commune, it should be noted that the management of liquid household waste is linked to diseases such as malaria (wastewater serves as a breeding ground for mosquitoes), diarrhoea, dermatitis, typhoid fever, ARIs etc.

Figure N°8: Distribution of environmental diseases encountered in the Kuwait sub-district



Source: Field survey, 2022

Surveys of heads of households show that malaria is the main illness suffered by the population of the Kuwait sub-district, with 32.03% of those surveyed. Malaria is followed by diarrhoea, with 30.45% of the population having experienced this disease. In addition, 16.48% of households had typhoid fever. Subsequently, 13.22% and 07.21% of respondents were victims

of ARI and dermatitis respectively. Finally, other diseases, with a proportion of 0.61%, are in last place. These environmental diseases are generally linked to the space in which these populations live or carry out their activities. Plate 1, which includes three photographs, shows a degraded environmental setting, which is conducive to the development of diseases caused by defective sanitation

Photographic plate Nº. 1: Circulation of foul-smelling wastewater near houses on a street with no sanitation facilities in the Koweit sub-district in the Military Camp district.
(Shot by Bakary Nambahigué Mathieu, October 2022)

3. Discussion

The results of this study on the issues of sanitation in the 'Koweit' sub-district in the military-camp district of the commune of Yopougon showed that the study area is faced with a serious lack of liquid waste management facilities. In fact, the majority of the housing in the Koweit sub-district is of the progressive type, with a proportion of 57.07%. It has toilets and showers belonging to several households living in the same concession and 14.45% of households have precarious housing. They are built with salvaged materials. Similarly, the results of the survey conducted by Alla et al.,(2018) show that Andokoi's most dominant housing is low standard housing with a proportion of 58.05%. The study also shows that the area on which the work is conducted presents that individual sanitation is used by 93.84% of the households surveyed which is not adapted to the living environment while collective sanitation is only used by 06.16% of the respondents. This same observation was made in a study by Nikiéma (2005) in

which the author notes that individual systems are unsuitable for houses with small plots. The connection of several households to the same septic installation in the yards results in extreme pressure on the existing system. Furthermore, the lack of sanitation and wastewater disposal systems has an impact on the quality of the environment, the living environment and the health of the population (UN-Habitat, 2012). The reasons put forward by (Bakary, 2016) are that the material and financial resources of local authorities do not keep up with the quantitative evolution of waste, so the management of this waste is a cause for concern. In addition, the field survey shows that the water that drips out of the pits identified during the survey is a breeding ground for various vectors responsible for environmental diseases. It is in this perspective that WHO, 2006 quoted by Tuo (2007) states that the abandonment of septic tanks also becomes a condition conducive to the reproduction and development of vectors that are harmful to the health of the population. Surveys carried out among heads of households show that malaria is the main disease suffered by the population of the Koweit sub-district with 32.03% of respondents. Malaria is followed by diarrhoea, with 30.45% of the population having experienced this disease. In addition, 16.48% of households had typhoid fever. Subsequently, 13.22% and 07.21% of respondents were victims of ARI and dermatitis respectively. Finally, other diseases, with a proportion of 0.61%, are in last place. This is why Coulibaly et al., (2018) shows that in Daloa, 70.16% of environmental diseases are attributed to environmental degradation. In view of these findings, it is important that awareness campaigns are conducted among the population so that liquid waste is managed in a sustainable manner and the construction of sanitation facilities is planned by the municipal authorities in order to reduce the population's exposure to environmental diseases.

Conclusion

The "Koweit" sub-district is a precarious or unplanned district located in the military camp district which has experienced strong demographic growth accompanied by anarchic spatial development. Thus, the district has experienced a mutation of certain precarious habitats into modern housing. The study then reveals that "Koweit" is continuously suffering from environmental degradation due to household and black water. This environmental situation affects the health of the population. Malaria (32.03%), diarrhoea (30.45%), thyroid fever with a proportion of 16.48%, acute respiratory infections (13.22%), dermatoses (7.21%) and other environmental diseases (0.61%). These results allow us to state that the objective of this study,

which is to show the impacts of the defective management of liquid waste on the living environment and the health of the population in the face of a change in the habitat of the "Koweït" sub-district located in the Military Camp district of the commune of Yopougon, has been achieved. To achieve this objective, we opted successively for the descriptive method and the analytical method through documentary research and field survey.

The scientific implications of our study are the lack of a correlation line in order to show in an expressive way the link between the defective management of liquid waste and the resulting health risks in the "Koweït" sub-district by the populations. In addition, the difficulties linked to the emptying of septic tanks and the management of liquid waste are due to a lack of financial means, a lack of knowledge of their functioning and their consequences on human health. In order to obtain reliable information on the whole sub-district, we used the 5-step method to select the heads of households to be interviewed in the sub-district.

As far as the future is concerned, we will have to publish the results of the study to the university and political authorities so that appropriate solutions can be found for a healthy living environment for the populations living in the so-called precarious neighbourhoods. Furthermore, a similar study should be carried out in other Ivorian cities with the involvement of communal authorities, the State through its decentralisation structures and NGOs in the collection of liquid household waste with supporting means, the sensitisation of the population to the use of drums with lids and the construction of septic tanks to collect waste water, which will undoubtedly allow for the preservation of the environment, a guarantee of sustainable health.

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