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Urban Wetland and Floods: Investigating Housing Conditions and Characteristics at Sepe-Buokrom and Dichemso in Kumasi

Twumasi–Ampofo, K.,[1] Decardi– Nelson, I.,[2] Asamoah, R. O.,[1] Ofori, P. A.[1] Solomon –Ayeh, B.,[2] Osei-Tutu, E.[1]

[1]Council for Scientific and Industrial Research, Building and Road Research Institute, Built Environment Division, Kumasi, Ghana

[2]Council for Scientific and Industrial Research, Building and Road Research Institute, Geo-Informatics Division, Kumasi, Ghana

Corresponding Author: **Twumasi–Ampofo, K.,**

Abstract

Once referred to as the "Garden city" of Africa, Kumasi is gradually losing her rich environmental features including trees and water bodies. This is largely due to increase in urban population leading to high quest for urban housing and infrastructure within the Metropolis. Moreover, lack of enforcement of by-laws concerning town planning regulations has allowed not only housing development but invasion of economic activities along wetlands in Kumasi. This paper is aimed at investigating conditions of houses in wetland areas of Sepe-Buokrom and Dichemso settlements in Kumasi Metropolitan area in the Ashanti Region. These settlements were used as case studies due to its regular high impact flood during rainy season. The study employed survey with photography, questionnaires and interviews to collect empirical data from households and property owners in the study area. It was revealed from the survey that, buildings have major structural defects with rising damp clearly visible on sand-cement rendered walls due to wet ground conditions. This has led to faster deterioration of building with maintenance issues. The study also revealed poor waste management and regular flood in the neighbourhood. The paper recommends that the city authority enforces regulations governing town planning to protect water ways and nature reserves in the city for sustainable development.

Keywords: housing conditions, environment, wetlands, nature reserve, Kumasi, floods.

INTRODUCTION

Wetlands are abused by society due to the ever increasing population in Kumasi, once referred to as "The Garden City" hindering sustainable urban development. Wetlands are areas where excess water is the dominant factor determining the nature of soil development and the types of animals and plant communities living at the soil surface (Cowardin et al., 1979). Most cities in developing countries have seen population growth exceed their capacity and ability to provide basic shelter. Ghana is no exception where the problems of population growth vis a vis limited housing production are starkly demonstrated. This has led to degradation of water ways and nature reserves. Many informal settlements have sprung up due to increase in urban population (Campion,2012; Muggah,2012;Chen et al., 2014; UN Habitat, 2016).

Housing the ever increasing population remains an important part of the Kumasi Metropolitan Assembly (KMA)and the conditions of residential units and their neighbourhoods reflect many issues including the personal circumstances of their dwellers, socio-economic status, histories, public health and in many cases their identity (Alnsour, 2011; Gibson et al., 2011). The problem of providing housing in sufficient quantities and quality to improve housing conditions is obvious in developing countries where population growth has outstripped the capacity to provide adequate housing in sufficient quantities (Konadu-Agyeman, 2001).Limited land resource coupled with increase in rural-urban migration in KMA have resulted in migrants acquiring and developing in unapproved areas including wetlands and nature reserves of the Sepe-Buokrom and Dichemso. This has led to perennial flooding of this area during rainy seasons making infrastructure provision to these areas a huge challenge (Campion &Owusu- Boateng, 2013). This buttresses Firdaus& Ahmad, (2013)assertion that millions of urban households today live in homes and neighbourhoods with little or no provision for infrastructure and services. Poor standards of housing exert major influences over a range of other issues affecting disadvantaged neighbourhoods (Rauh et al., 2002). The condition of buildings and their consequent maintenance is often associated with sustainability of the houses and wellbeing of their inhabitants (Alnsour, 2011).With the exception of Antarctica, wetlands can be found nearly everywhere in the world. Wetlands are generally defined as transitional area between permanently flooded deep-water environments and well drained uplands (Turner et al., 2000). Approximately, 4% to 6% of earth's land surface, which equals about 2 billion acres (approximately 800 million ha) is covered by

wetlands (Reddy and DeLaune, 2008). The term "wetland" has no single, scientific, universal meaning as it has been applied by scientists from different fields of study, resource agencies with varied interests, conservation organisations, and others to describe land that is wetter than dry land. Wetland is a generic term used to define the universe of wet habitants including marshes, swamps, bogs, fens, and seasonally waterlogged areas (Tiner, 2016). Wetlands include some of the most biologically and ecological important ecosystems on the face of the earth. While definitions vary throughout the world, it is generally agreed that they include ecosystems that are periodically to permanently flooded with shallow water or have substrate saturated for some period during the growing season (Mitsch, 1995).

Wetland refers to all the different kinds of wet habitants- implying that it is land that is wet for some period of time, but not necessarily permanently wet. Wetlands typically occur in topographic settings where surface water collects and (or) ground water discharges, making the area wet for extended periods of time (Tiner, 1996).The African region making up a total of 53 states has 23 Contracting Parties to the Ramsar Convention as of July, 2010. This convention defines wetlands as "areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salty, including areas of marine water the depth of which at low tide does not exceed six metres." (Ramsar Convention Secretariat, 2011). It has become unarguably clear that African wetlands include some of the most productive ecosystems in the world. These wetlands sometimes provide ecological infrastructure i.e. food and energy, medicine, building material, dry season grazing and transportation for large human populations. Ecological infrastructure refers to naturally-functioning ecosystems that generate and deliver valuable services to people and can be just as important for providing services and underpinning socio-economic development (CSIR, 2016).Even though most wetlands in the urban areas are used for human settlement in Ghana, the government recognizes the importance of wetlands as habitat for wildlife, maintenance of the water table, mitigation of flood conditions and water purification. The World Wetlands Day 2015 in Ghana was celebrated in the Afiadenyigba community at Keta, Ramsar Site Complex in the Volta region. The Keta Ramsar site is the largest in Ghana with an area of 38,110.86 hectares and has an open lagoon with brackish water influx from the Volta River. The area is also a potential site for tourism (bird watching, night turtle watching etc.). There are various forms of livelihood in the area namely: fishing, farming, craft making, salt winning and mangrove exploitation. The Afiadenyigba community, situated close to the Keta Lagoon has its inhabitants mainly dependent on the lagoon for their source of livelihood. Wetlands are characterized by the performance and seasonality of their moisture regime, the main vegetation and land cover types, and the resource pressure from humans. Rivers in Ghana could enhance water transport within cities and ultimately reduce atmospheric heat. On the contrary, wetlands have become an albatross around the neck of our cities; causing floods, killing innocent people, blocking roads and destroying property due to human activities with Accra witnessing loss of about 154 lives with over 150 persons sustaining various degrees of burns after the "OdoRiver" overflowed its banks on 3rd June, 2015 in one of the heavy flood disasters in Ghana's History. The "Aboabo River" in Kumasi over-flooded its banks and claimed about five lives in 27th June, 2015. The most recent incident happened in 29th July, 2018 when seven people were swept away by flood waters at Asabi in the Asokore Mampong Municipality and Aboabo after the "River Sissa", overflowed its banks with affected areas including Sawaba, Aboabo, Anloga, Kwadaso, Tafo SepeBoukrom, Dichemso (Airport- roundabout) and Asabi having a number of houses and major roads submerged following the downpour. (Twumasi-Ampofo et al., 2018). This seem to take a toll on these urban housing conditions.

There are some literature on urban housing and the challenges of poor housing and environmental conditions in urban areas in Ghana focusing on large urbanised areas such as Accra, Kumasi and Tamale with emphasis on population growth trends and housing conditions, determining the extent of housing affordability, and examining the housing conditions of households (Konadu-Agyeman,2001; Boamah, 2010;Yakubu, et al., 2014). Moreover, some literature in the area of wetlands in Ghana's urban areas include wetland management(Anku, 2006), wetland ecology and floods (Campion, 2012), the political ecology of wetlands (Campion and Owusu-Boateng, 2013), Rainfall variability, floods and adaptations of the urban poor to flooding(Campion and Venzke, 2013),effects of informal activities along wetland area (Asamoah et al., 2016),challenges to resilient infrastructure delivery in wetland areas (Boateng, et al., 2017).In addition to the Sepe-buokrom and the Dichemso (Airport Round about area), wetlands in Kumasi can be found in over10 suburbs including; Atonsu Sawmill, High school junction, FRNR farms, KNUST Police Station, Family Chapel area, Sepe-Tinpom, Golden Tulip Hotel area, Kaase Guinness area etc. ((Mensah, 2014).Wetlands are protected by the national building regulations, 1996, LI 1630 of Ghana 13(2)—Site Requirements state clearly that, "No site liable to flooding shall be built upon without adequate provision for flood control". Regulation 20(2) further states that, "the subsoil of the site shall be effectively drained; or such other steps shall be taken to effectively protect the building against damage from

moisture where the soil is waterlogged, damp or susceptible to seasonal flooding or periodic elevation of the subsoil water-table during wet seasons". This paper therefore, presents a comprehensive assessment of conditions and characteristics of housing in wetlands of Sepe-Buokrom and Dichemso in the Kumasi Metropolitan Assembly amidst the problem of immense perennial flooding of these settlements.

THE STUDY AREA

The Sepe-Buokrom and Dichemso settlements are suburbs of the Kumasi Metropolitan Assembly. Kumasi Metropolis is the capital city of Ashanti Region is approximately 270km north of the national capital, Accra with a population of about 2,035,064people (GSS, 2014). Kumasi is thus the fastest growing city in Ghana with an annual growth rate of 5.4 which is far above the regional and national growth rates of 2.7 and 2.5 respectively (Cobbinah&Amoako, 2012).About 86% of the active population in Kumasi is economically active with an average number of households per house being 3.4 in 119 communities within ten (10) kilometres radius (KMA, 2014). These two suburbs (shown edge red)lie North-East of Kumasi along the Aboabo river basinnear the Kumasi Airport roundabout (Figure 1).

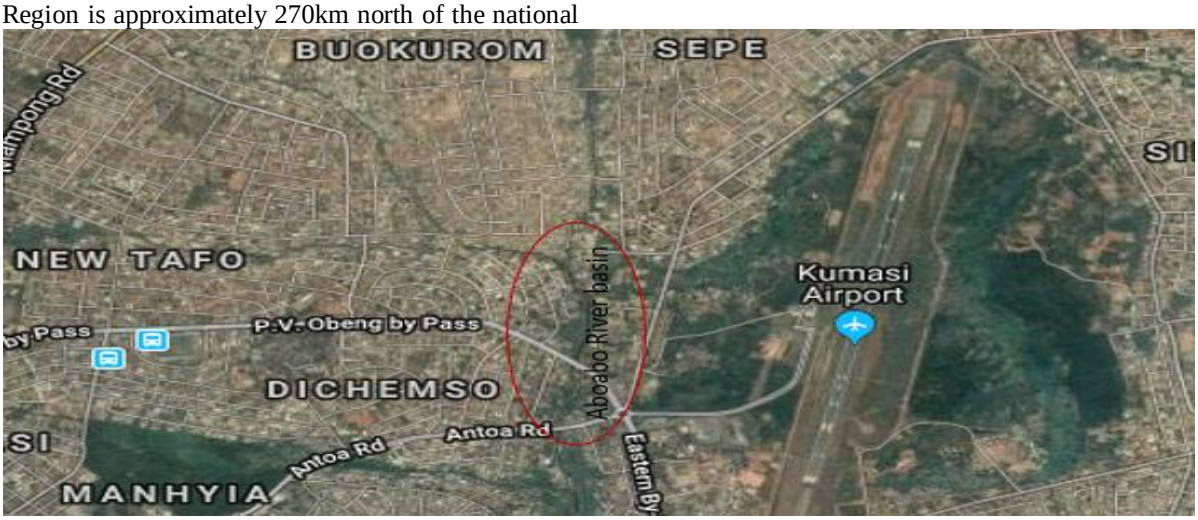

Fig. 1 Aerial view of the study area (Dichemso and Sepe-Buokrom) edged red.
Source: Adapted from Google Earth, 2018.

This area has come under immense floods during rainy seasons in recent times, usually rendering occupants of buildings on ground floor homeless till the floods subside. Some activities identified along the study area are housing, educational, religious, among other economic activities such as farms, washing bays, carpentry, auto mechanics and petty trading (Asamoah et al., 2016). Buildings in the study area (Figure 2) are not planned as per the building regulations with visible rising damp on most walls and poor access roads especially in the rainy season. Few drains constructed are not functional due to high water table resulting in gullies in most access roads.

Fig. 2 Some Buildings along the Aboabo River in the study area (Dichemso and Sepe-Buokrom) Source: Authors 2018.

METHODS

The study made use of data from both primary and secondary sources. Primary data were obtained using a structured household questionnaire. Qualitative data collection methods such as interviews and observation were also used to obtain primary information from residents of sampled houses. Photography was employed in observing the physical condition of buildings. Secondary data were reviewed and collated from existing housing records in the Kumasi Metropolitan Assembly and the Ghana Statistical Service. The purposive sampling method was used to identify the two sampled communities based on the fact that they exhibit definite characteristics that were identified in the problem statement. However, for the selection of the houses to be interviewed, the systematic sampling technique was used. An activity count was done in both Sepe-Buokrom and Dichemso to determine the houses consumed by the wetland in order to determine the sample size for the questionnaire administration. According to the activity count conducted in both Sepe-Buokrom and Dichemso, the houses were 404 and 96 respectively. The questionnaire was administered in 40% of the wetland settlements. Ratio and proportion was used to determine the number of questionnaires within the study area thus, the higher the number of houses in a particular area, the higher the number of questionnaire to be administered. The survey had a limitation of absentee heads of households and landlords in most instances and took persistence through several visits to meet them for relevant data.

Table 1

Name of settlement	Number houses	Sample size
Sepe-Buokrom	404	404/500*200 = 162
Dichemso	96	96/500*200 = 38
Total	500	100

Source: Field Survey, 2017

Table 1 gives a breakdown of how the sample size obtained from each of the settlements by the questionnaires was administered. It shows that, the total number of houses for Sepe-Buokrom and Dichemso are 500 (404 and 96 respectively). For the Sepe-Buokrom settlement, the sample size is 162 whilst that of the Dichemso settlement is 38.

ANALYSIS AND DISCUSSION

Types of Houses

The survey revealed that 50% of residents in Dichemso live in compound houses whilst 34% live in detached houses and 16% of respondents live in storey buildings. The compound house is the common type of housing in Ghana (Bank of Ghana, 2007; Oben-Odoom and Amedro, 2011;) mostly in traditional old suburbs such as Dichemso, Asafo, Bantama, Krofrom, Ashanti New Town, Sepe-Buokrom to mention but a few. It is therefore not surprising that the survey revealed that compound houses are the most dominant type of houses in the area. In Sepe- Buokrom, 38% of respondents live in compound houses whilst 34% live in detached houses, 12% live in story buildings and 7% live in semi-detached houses as shown in Table 2. It is interesting to note that 9% live in make-shift and extensions to main buildings.

Table 2- House types

Type	Dichemso	Sepe-Buokrom
	Percentage (%)	Percentage (%)
Story Building	16	12
Compound house	50	38
Detached House	34	34
Semi-Detached house	-	7
Others	-	9
Total	100	100

Source: Field Survey, 2017

Age of Buildings

The survey (Table 3) revealed that majority(43%) of buildings in Dichemso have being in existence for 21-30 years whilst 29% of buildings have being in existence for 30-40 years, 15% completed recently less than ten years, 8% of buildings completed within 11-20 years and a minority 5% completed more than 40 years ago. However, majority of the buildings at Sepe-Buokrom were developed within the past 2 decades with 72% of buildings being in existence for 11-20 years whilst 12% of buildings have being in existence for 21-30 years, 11% of buildings have being in existence for less than 10 years, 4% of buildings had being in existence for more than 30- 40 years and 1% of buildings had been in existence for more than 40 years. It is worth mentioning that none of the buildings surveyed was designed by professionals such as Architect and Engineers with no construction permit certificate from the city authority.

Table 3- Age of Buildings

Age	Dichemso	Sepe-Buokrom
	Percentage (%)	Percentage (%)
Less than 10 years **(After 2008)**	15	11
11-20 years**(1998-2007)**	8	72
21-30 years**(1988-1997)**	43	12
30-40 years**(1978-1987)**	29	4
More than 40 years **(Before 1978)**	5	1
Total	100	100

Source: Field Survey, 2017

Extension of Houses

About 87% of household interviewed have not done any extension to their houses after construction whilst 13% have done extensions to their houses since construction at Dichemso. The extensions with buildings completed from 1988 to 2007. Similarly, in Sepe-Buokrom, 85% of household had no extension to their buildings since construction whilst 15% have made extensions to their buildings since construction (1988-2007).Households who had made extensions to their buildings did so by providing extra rooms as well as other facilities to be able to accommodate more tenants. This trend is not surprising at all, as Ghana's housing supply have failed to meet the current rate of population growth in the country(GSS, 2014). This has consequently resulted in a higher demand for housing facilities in the country especially within the Kumasi metropolis.

Housing Quality and Maintenance

Proper maintenance lead to high quality of a building. Maintenance activities are done to achieve a range of targets. Apart from improvement of the aesthetic value of the building, maintenance activities are done also to improve the safety of users of the building and to most importantly, meet statutory requirements for buildings in a country. The type of materials used in constructing the wall of a building goes a long way to determine whether or not a wall will be durable. It is always important to use the right type of materials at their required quantities to ensure that a quality wall is constructed to protect the building from external forces. The survey revealed that 89% of the walls of houses sampled in Dichemso are made of sandcrete blocks whilst 11% of the houses sampled are made of landcrete. In Sepe-Buokrom, the walls of 52% of houses sampled are made of sandcrete blocks whilst 31% of walls of houses sampled are made of landcrete, 9% of the walls of houses are made of clay with cement rendered and 8% other materials such as wood and metal sheets for walls (Table 4). It is evident that sandcrete blocks appear to be the most common type of material used for the walls of buildings found in the two communities.

Table 4 – Types of wall materials

Material	Dichemso	Sepe-Buokrom
	Percentage (%)	Percentage (%)
Landcrete	11	31
Clay with cement plastered	-	9
Sandcrete Blocks	89	52
other	-	8
Total	100	100

Source: Field Survey, 2017

When earth walls are exposed torains and become damp, they swell and then shrink upon drying,this process of expansion and contraction results in the development of minor and major cracks on walls and to the subsequent collapse of housing units (Gough and Yankson, 1997)Hence, the reason to use sandcrete/landcrete for housing in the study area. From the Interview, maintenance works are done after every flood incident to keep the buildings in good condition. A majority66% of walls in Dichemso are not in good condition with rising damp above window sills and hair-line cracks showing clearly with flaking paint on rendering whilst 34% are looks good. In Sepe-Buokrom, 65% of walls are not in good condition whilst 35% looks good after observation. The foundations of the houses from the two settlements were also assessed based on observation during the survey. From the survey (Table 6), majority (87%) of the buildings in Dichemso have foundations not in good condition in terms of exposure and cracks whilst 13% of the conditions of foundations seem good. Similarly, at Sepe-Buokrom, about 91% of foundations are not in good condition whilst a minimum 9% looks good. Overwhelming majority of walls and foundations are not in good condition largely due to high prevalence of dampness in the soil due to seemingly high ground water table.

Table 6- Conditions of building foundations

Condition	Dichemso	Sepe-Buokrom
	Percentage (%)	Percentage (%)
Good	13	9
Poor	87	91
Total	100	100

Source: Field Survey, 2017

Materials used for Roofing

Roofing materials for buildings in the study area include corrugated asbestos sheets, corrugated iron / aluminium sheets and plywood. The corrugated asbestos and corrugated iron / aluminium are usually found in the more traditional old towns. Table 7 indicates that, in Dichemso, 100% of houses were roofed with corrugated iron/aluminium sheets. On the contrary,Sepe- Buokrom, had about 56% of houses roofed with corrugated iron/aluminium sheets whilst 15% were roofed with plywood, 15% had thatch roofs and 14% were roofed with corrugated asbestos.

The condition of roofs within the two settlements cannot be ignored. The survey revealed that 87% of the roofing of houses sampled in Dichemso are in good conditions whilst 13% are poor. In Sepe-Buokrom, 50% of the roofing of houses sampled are in good condition whilst 23% are in poor condition and 22% constructed with plywood and thatch are in very poor condition. The roof types were assessed based on observation of the structure and leakages. Most households were generally satisfied with the corrugated iron / aluminium sheets citing its durability and affordability in the country.

Table 7- Roof Materials

Material	Dichemso	Sepe-Buokrom
	Percentage (%)	Percentage (%)
Corrugated Asbestos	-	14
Corrugated Iron/Aluminium	100	56
Plywood	-	15
Thatch	-	15
Total	100	100

Source: Field Survey, 2017

Length of Stay in Houses

From the survey, a majority45% of the sample interviewed in Dichemso have been living in their houses less than one year, 17% have been living in their houses between 1 and 5 years, 16%between 6-10 years, 8% have been living in their houses from 11 to 15 years, 11% have lived in their abode between 16 and 20 years while 3% have spent more than twenty years in their houses. In Sepe-Buokrom, 56% of the sample interviewed have been living in their houses for less than one year whilst 15% have been living in their houses from 1 to 5 years. 10% of the sample interviewed have been living in their houses from 6 to 10 years, 9% have been living in the in their houses from 11 to 15 years, with a minimum 5% each have been living in their houses from 6 to 10 years and over 20 years respectively.

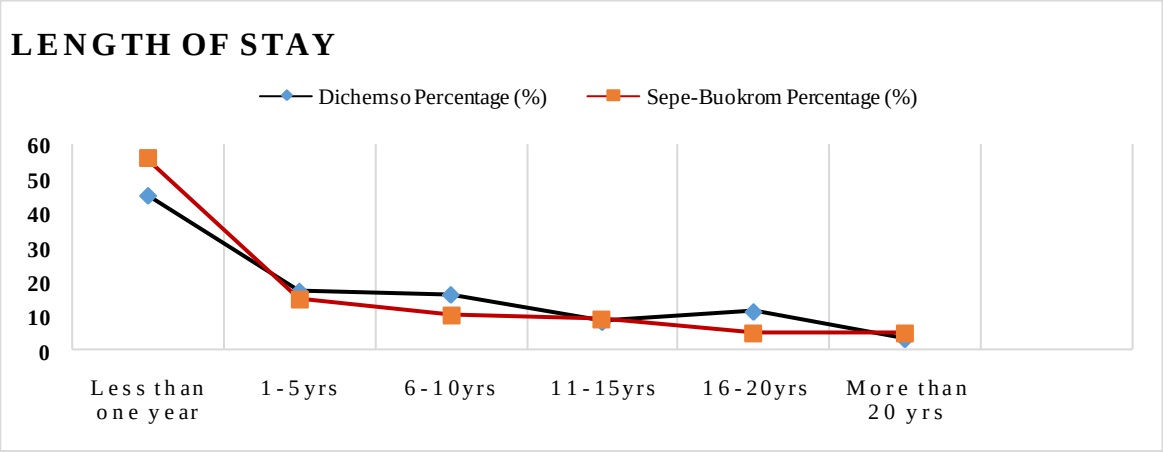

Fig. 3 Length of stay
Source: Authors 2018.

The graph (Figure 3) indicates a linear relationship between percentage respondents and length of stay. The longer the length of stay, the lesser the respondents. This situation in the study area has been attributed to old inhabitants relocating to other suburbs upon realising the adverse effects of the wet conditions while new tenants occupy. House owners of story buildings, with longer length of stay, rather move to first floor to save life and property from floods.

Maintenance activity on Building since Construction

Some maintenance activities undertaken include screeding of floors, rendering of cracked walls, re-roofing, filling of eroded portion of foundations in houses, etc. From the survey in Dichemso, it was revealed that 58% of respondents interviewed claimed that they undertake maintenance activities on their buildings from regularly whilst 42% do not. Elsewhere in Sepe-Buokrom, 55% of the sample interviewed do not undertake maintenance activities regularly whilst 45% stated they maintain their buildings regularly. The respondents in Dichemso who do not undertake maintenance activities explained that it is the sole responsibility of house owners and landlords. In Sepe- Buokrom, financial constraints came up strongly as the main reason why house owners do not undertake maintenance activities on their buildings. This is because maintenance activities are frequent (after every flood incident) and usually come along with a huge cost.

House owners, who stated emphatically that they did not employ professional designers and therefore have no building permit certificates, tend to ignore maintenance activities as a result of the perceived high cost.

Table 8 indicates that about49% of respondents in Dichemso obtained funds for maintenance activities from remittances from relatives, 39% obtained funds for maintenance activities from personal savings while minority 12% rely on loan from extended family members. In Sepe- Buokurom,53% of the respondents resort to their personal savings as their source of finance whilst 37% of the respondents resort to remittances as their source of finance and 10% respondents resort to loans from extended family members. It is obvious that none of the respondents access bank loan due to high interest rates.

Table 8 – Source of funds for maintenance

Source	Dichemso	Sepe-Buokrom
	Percentage (%)	Percentage (%)
Personal Savings	39	53
Bank Loan	-	-
Loan Extended Family	12	10
Remittances	49	37
Total	100	100

Source: Field Survey, 2017

In addition to the buildings, availability of utility services such as water supply, energy, toilet, waste management, telephone, good roads, drainage systems etc. are very essential to the well-being of households. Having access to clean and pure water promotes good health. The accessibility of households' consumption of water cannot be overemphasized. About 79% and 56% of the respondents from the survey in Dichemsoand Sepe-Buokrom respectively obtain pipe borne water from the main city supply whilst 21% and 17% obtain water from hand-dug wells in Dichemso and Sepe-Buokrom respectively. This means that inhabitants of these two settlements don't go through a lot of stress to have access to water for domestic and commercial purposes.

It is interesting to know that even though there is access to water supply, water closet present in various households is rather few. The survey in this regard revealed about 18% and 36% presence of water closet among households in Dicheso and Sepe-Buokrom respectively. These water closets have a problem of septic tank malfunction due to the high level of ground water table in the area. This has resulted in majority of households resorting to the use of dry public toilet facilities. This is starkly indicated by 82% of the households in Dichemsousing pit latrines while a total of 64% of households also resort to pit latrine (26%), aqua privy (24%) and Kumasi Improved Ventilated Pit - KVIP (14%)in Sepe-Buokrom. Whereas 100% of the households in Dichemso have their toilet facilities, less than half (36%) of the households in Sepe-Buokrom have toilet facilities in their homes with 64% resorting to the use public toilet facilities provided by KMA. Conditions of these toilet facilities were assessed considering cleanliness of the squat slabs, walls, and the waste disposal systems available.

Electricity supply is entirely (100%) from the national hydro and thermal power grid to households in Dichemso while (96%) households enjoy power from this source in Sepe-Buokrom with 4% yet to be connected and therefore rely on diesel generator sets for power as and when needed.

Handling in-house refuse can be a clear epitome of the marked differences in the quality of household environmental management practices across these two different settlements that are suburbs of Kumasi metropolitan area. The result shows in Table 9that, 79% of the residents in Dichemso use house-to-house collection of refuse as their means of disposing off solid waste by refuse trucks which cart to a central disposal point away from the communities, 13% burn refuse including paper and plastics whilst 8% use open dump site within the community as their means of disposing off solid waste. In Sepe-Buokurom, 35% of the respondents use open dump site as their means of disposing refuse, 27%rely on house-to-house refuse truck collection as their means of waste disposal, 24% use burn refuse including paper and plastics whilst 14% use skip containers located at vantage points for later collection by trucks. Unfortunately, it was observed that pieces of paper and waste plastics including polythene and Polyethylene Terephthalate (PET) bottles are left unattended to in drains and along pathways.

Table 10- Refuse Disposal

Means	Dichemso	Sepe-Buokrom
	Percentage (%)	Percentage (%)
Skip Container	-	14
House-to-house collection	79	27
Burning	13	24
Open Dump Site	8	35
Total	100	100

Source: Field Survey, 2017

Bathrooms

From the survey, 100% of the respondents in Dichemsohave their bathrooms in their dwellings. Contrary to this in Sepe-Buokrom, 14% of the respondents have their bathrooms out of their dwellings i.e detached from the main buildings and a majority 86% have their bathrooms within their dwellings. 95% of bathrooms in Dichemso is constructed with sandcrete blocks including some detached bathrooms whilst wood were used in the construction of the 5% minimum (all detached). In Sepe-Buokurom, 79% of the bathrooms are constructed with sandcrete blocks, 20% of the bathrooms are constructed with wood and 1% is constructed with landcrete.

CONCLUSION

The study has established a strong evidence of the links between the problems of housing conditions and health of residents in wetland areas. Some houses do not have toilets, bathrooms with poor solid and liquid waste disposal system. There is a problem with solid waste disposal with regards to septic tank and other underground systems largely due to high ground water table. This has resulted in defects in soak-away systems in both communities. The discussions show

varying housing conditions such as waste management which have very serious implications for the health of residents. Residents in these two wetland settlements do not have utilities such as good roads, well designed drainage systems, telephones and constant supply of electricity. Ironically, most households are connected to the main water and power supply but the buildings have no permit certificate from the city authority. These settlements have numerous problems with poor housing conditions due to the fact that they are not well planned by the town and country planning department and eventually causing floods along the Aboabo river basin and nearby major roads.

It is highly recommended that the city authority enforces regulations governing town planning to protect wetlands, water ways and nature reserves in the city from being developed haphazardly by increasing the number and building capacity of building inspectors. This will lead to a sustainable national development with regards to the built environment. Land owners must desist from constructing houses without professional designs and instructions. Traditional leaders who act as custodian of lands in Ashanti region must ensure that there is an approved layout for their lands before any development is started to improve housing conditions and the entire built environment. Majority of these existing buildings must be demolished to allow proper drainage systems and landscape design for free flow of water especially during rainy seasons. These recommendations, if carefully followed, may bring the name "Garden city" back to Kumasi.

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