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# Community Perceptions on Health and Environmental Implications of Poor Management of Solid Waste Materials around local Dump Sites in the Buea Municipality, Cameroon

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## ABSTRACT

Numerous urban areas are today faced with many challenges posed by poor waste management and disposal especially in the developing countries. Analogously, these challenges are faced by urban dwellers in the Buea Municipality. The study aims at assessing the health and environmental implications of poor waste management in the Buea Municipality. It is an observatory and interrogatory study with a cross-sectional research design and dealing with 250 household dwellers selected through the simple random sampling technique. Primary data were obtained through questionnaires, interview guides, and field observations, supplemented with secondary data from magazines and published articles. Data collected were added codes and themes and inputted on Excel Version 17 and SPSS Version 13. Descriptive and inferential statistical techniques were adopted to establish percentiles, frequencies and magnitudes. Findings revealed that the siege population in the Buea municipality lacks adequate waste management facilities and this has pushed a significant proportion of them to always dump their waste materials generated from their booming domestic and economic activities into drainage channels, roadsides, and pits. The poor management of these waste materials has resulted to the occurrence of water and airborne diseases such as diarrhea, dysentery, cholera and typhoid fever affecting the population. Portable water sources and homes are also polluted by effluence from these waste dump sites. Urban dwellers adapt by boiling water from contaminated sources and cleaning up of nearby dirty gutters but their efforts are unfruitful. The work concludes that the Buea Municipality offers perennial and inter-generational opportunities to its population and recommends that holistic and bottom-top approaches such as daily clean-up campaigns; provision of trash-cans as well as the sensitization of the general community must be implemented in order to provide a congenial environment for the population.

## INTRODUCTION

Solid waste management (SWM) refers to the activities designed to effectively collect, transport, treat and dispose waste due to public health concerns, aesthetics, natural resource conservation and other environmental considerations (Munala and Moirongo, 2011). The principal aims of SWM are to protect the environment and safeguard the health of the population. Unfortunately, many cities especially in developing countries are grappling with high volumes of solid waste and face vast inadequacies with their management (Gutberlet *et al.*, 2017). Throughout the world, all human activities result in the generation of waste. According to the United Nations Populations Fund, UNFPA, (2008), about 3.3 billion human populations live in towns and cities and this number is expected to increase to about 5 billion by 2030

Countries with fast growing urban populations face serious waste disposal problems mainly because the rate of waste generation is often not matched by improvement in management and disposal of the waste materials. According to Boadi and Kuitunen (2002), large amounts of garbage generated in urban settlements mostly come from households, schools, medical facilities and industrial activities. According toZerboc (2003), significant factor that contributes to the problem of solid wastes in a developing country scenario is the lack of proper collection and transportation facilities. Improper planning coupled with rapid growth of population and urbanization serves to add congestion in streets, and as a result the waste collection vehicles cannot reach such places, thus allowing filth to build up over time. Lack of monetary resources, at times, results in improper or no transportation vehicles for waste disposal adding another dimension to the ever-rising cycle of problems.

In 2012, 1279 illegal waste dump sites were shut down, compared with 759shut down sites in the previous year inUK. Hazardous waste was found in the illegal sites. 1/20 of them encompassed asbestos in waste, 1/5 contains chemicals, fuel and oil. Each year, illegal waste dumping costs UK tax payers £1 billion (DEFRA, 2015). In Ethiopia, less than half of the solid waste produced is collected and 95 percent of that amount is either indiscriminately thrown away at various dumping sites on the periphery of urban centers or at a number of so-called temporary sites and typically empty lots scattered throughout the city Abiye *et al.*, (2008.).

The open dumping of waste is a major source of land contamination, water and air pollution, environmental

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degradation and health hazards (Omoleke, 2004). The principal impacts from the open dumping of waste include the contamination of groundwater, surface water and soil due to leachates from solid waste dumps (Firdaus& Ahmad, 2010). The same issues emerging from poor waste disposal have been so astronomical in most towns in Cameroon such as Yaounde, Douala, Bamenda and particularly in the Buea Municipality and this paper is to address these issues.

**Statement of the Problem**

The recent ground breaking population growth alongside the multitudes of anthropogenic activities in the Buea Municipality have not been accompanied with adequate waste management schemes such as trash-cans, monitored waste dump sites and adequate collection points , that is, the population growth rate rose from 5.6% to 42% for the year 2005 and 2020, respectively (Buea Council statistics, 2021). These have led to the massive production of solid waste materials mainly from domestic activities, commercial centers and locally created micro industries such as bakeries. The inability of the population to effectively manage these waste materials has led to the creation of exposeddump grounds within the living environments where these waste materials are often disposedon daily basis. The inability of the local council, NGOs and waste management companiessuch as the Hygiene and Sanitation of Cameroon (HYSACAM) to evacuate these waste materials from such grounds indue times as stipulated by the United Nation (within 24hours) have therefore enhanced the fast transformation of these areas into favorable grounds for harmful parasites such as mosquitoes, midges and flies. More so, these sites are incubators of harmful illnesses such as cholera, typhoid, malaria and skin infection diseases coupled with the ever-empowering smells often emitted from suchsites. These sites are also volcanoes for the frequent pollution of nearby dependable streamsas well as pollutants toinhabited homes especially during torrential rainfall when the effluence is carried to nearby inhabited environments. The local populations have been grappling with measures to cope with this blunder but everything is seemingly futile. It is therefore in the consideration of these legendary issues that this paper attempts an examination of the types of waste materials and sources, theirchallenges and the mitigating measures.

## LITERATURE REVIEW

Mengistie & Baraki (2010) conducted a study on community based assessment on household management of waste and hygiene practices in kersaworeda, Eastern Ethiopia. In this study the researchers‟ objective was to assess the status of waste management and hygiene practices in KersaWoreda, Easteren Ethiopia. From the study they found that majority of the households (66%) disposed of their solid wastes in open dumps and 6.9% of the households had temporary storage for solid wastes. Furthermore, many scientific papers like those of Fitton *et al.*, (1982), stressed that most of the drinking water sources are oftentimes contaminated by water materials percolating from nearby waste dump sites.

**The Concept of Proper Waste Management**

Solid waste management is the collection, transport, processing or disposal, managing, and monitoring of solid waste materials. The term usually relates to materials produced by direct or indirect human activity, and the process is generally undertaken to reduce their effect on health, the environment, or aesthetics.

Proper waste disposal and management can be done by applying the Reduction, Reuse and Recycle (3R) method. Reducing means lessening the amount of trash/garbage produced. Reusing refers to using materials more than once while recycling means creating new material or product out of trash/garbage.

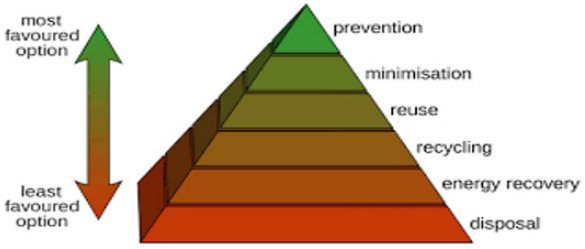


**Figure 1:** Waste Management Practices Davidson, G. (2011)

## MATERIALS AND METHODS

**Study Area**

The Buea Municipality is found in Fako Division, South West Region of Cameroon. It is situated between latitudes 4°3” and 4°12”N of the equator and longitudes 9°2” and 9°9”E of the Greenwich Meridian. It is situated precisely on the slope of the Mount Cameroon, which is the highest peak in West and Central Africa, at an altitude of about 4100m above sea level. Buea sub-division is bounded in the South West by a portion of the Atlantic Ocean and Limbe, South by Douala, Muyuka in the East and the North-Eastern part by Mount Fako. Figure 2 shows the actual layout of the Buea Municipality.

Given its mountainous location, Buea Sub-division enjoys a cool climate which is conducive for human habitation and the performance of human and economic activities such as agriculture and commerce. There exists a sub-tropical highland climate condition in the Buea Municipality. Because of its location on the slope, high elevated areas are characterized by intense cool while those at the lower elevation are face with some degree of elevated temperature. The area consists of steep sloping terrain with table lands at some point which have given rise to the development of human settlements. It is found within the tropical rainforest with vegetation ever green. There exists volcanic soil with few portions

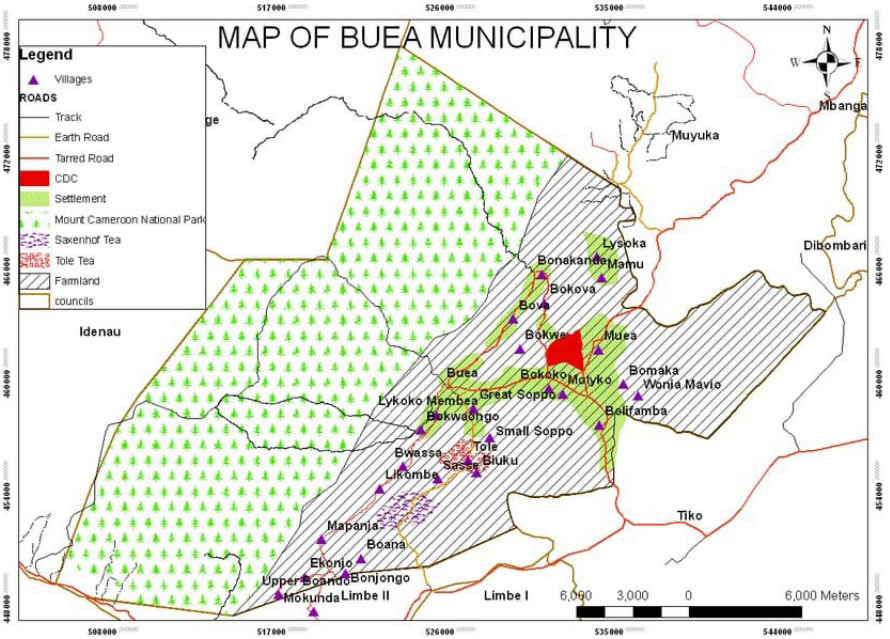


**Figure 2:** Layout of the Buea Municipality
*Source: Buea Council Archives (2020)*

of sedimentary soil due to the influence of weathering and climate elements. The population is growing in an alarming rate with developing nucleated settlements and linear settlement patterns. Approximately 70% of the population is into primary as well as secondary activities.

**Research Approach**

It was an observational and interrogatory study that adopted the cross-sectional research design. The aim of employing the observational research approach was to get an insight of the nature and the quantities of waste materials disposed by the population in the different quarters and the actual sites where these waste materials are being disposed. Furthermore, the interrogatory approach helped the research to inquire on the main factors that have instigated the monstrous deposition of waste materialsat unexpected points within the municipality as well as the effects that these uncontrolled waste dumpsites have on the population of the concernedareas.

A preliminary field reconnaissance survey was accomplished whereas, through the stratified random sampling techniques, 7 quarters in the Buea Municipality with population concentrations, lucrative business activities and active points such as markets and parks were mapped out. These quarters were Muea, Bomaka, Mile 16, Molyko, Bonduma, Bakweri Town and Buea Town. Within these targeted quarters, 250 persons were selected as key informants through the random sampling techniques. Furthermore, detailed observation which was done with the use of checklists was in order to examine the types and the spots where waste materials were being disposed. Interviews were also conducted within these quarters, especially with victims of such a phenomenon. A 500m Fabre tapewas used to measure the distance between some locally created waste dump sites to the main road and to the living environments. Interrogations and focus group discussions were other primary data options. As a concern, the secondary data, magazines, Newspapers, post related articles beside online and offline sources of materials on waste management were reviewed.

The qualitative data obtained from the field survey were assigned code and themes and later inputted on Excel version 17 and imported to SPSS Version 13 where they were checked for normality and analyzed through descriptive statistical techniques to determine their frequencies, mean, percentages and variances. For the quantitative data gathered in the survey processes, inferential statistical techniques such as chi-square and correlation were applied in analyzing them. Cause and effects as well as relationships were established through this method. An essential ethical consideration was the strict implementation of the measures against Covid-19 and the cholera pandemic. Respondent's information were highly kept confidential.

## RESULTS AND DISCUSSIONS

**Pattern of Settlements, Household Sizes and Type of Waste Materials**

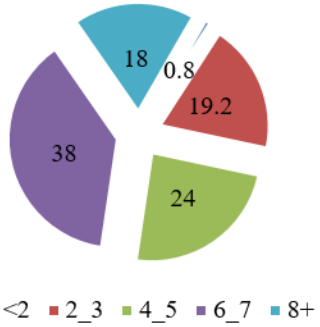


**Figure 3:** Household sizes in the Buea Municipality Fieldwork (2022)

The first aspect analyzed was the nature of settlements in the Buea Municipality. Field observations established that approximately 70% of houses in this municipality were clustered around areas of convergence or areas with economic opportunities or social facilities such as molyko, Muea, mile 16 and Buea Town. Also, there are areas where linear settlements have developed along the main roads such as parts of molyko. Investigations on household sizes as well as the types of waste materials generated by household dwellers revealed the following results as presented on Figure 3.

In line with the Information presented on Figure 3, a majority (38%) of the households contain 6-7 persons, 24% contain 4-5 persons while 19.2% contain 2-3. Furthermore, 18% contain more than 8 persons and the least (0.8%) are households with a single person.

As concern the types of waste materials and their sources, findings revealed that plastic waste materials and food residuals are the common types of waste materials produce in this municipality. Details of these are presented on Figure 4.

With respect to the information on Figure 2, 40% of the waste materials produce are plastic waste materials, 30% are food residuals while 15% organic waste materials. More so, 5% are metals while 10% is other type of waste materials such as leather bags and pieces of clothes. Figure 5 shows waste materials dispose in Molyko quarter in Buea.

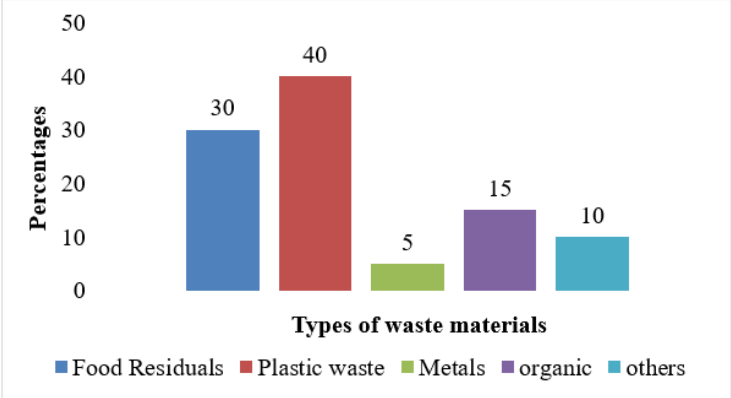


**Figure 4:** Types of waste materials produce in the Buea Municipality
*Source: Fieldwork (2022)*

**Figure 5:** shows waste materials dispose in Molyko and Buea Town quarters
*Source: Fieldwork (2023)*

**Methods of Disposal, Frequencies and Time Interval of Management**

During the course of the study, investigations were made on the methods in which household dwellers dispose their diverse waste materials. Details of these are presented on Figure 6

In line with the information presented on Figure 3, findings revealed that a majority (50.5%) of households dispose their waste materials just within their environments, 20% dispose in nearby drainage channels while 10% burnt their waste materials. Furthermore, 9% dispose their waste materials into nearby pits, 7.5% dispose in any nearby streams while 3% discard them directly into the HYSACAM trash cans. Figure 7 shows the different methods of wastes disposal in the Buea Municipality.

During the course of the field survey, investigations were done on the frequency at which individuals dispose waste materials in a week, and findings revealed the following information presented on Figure 8.

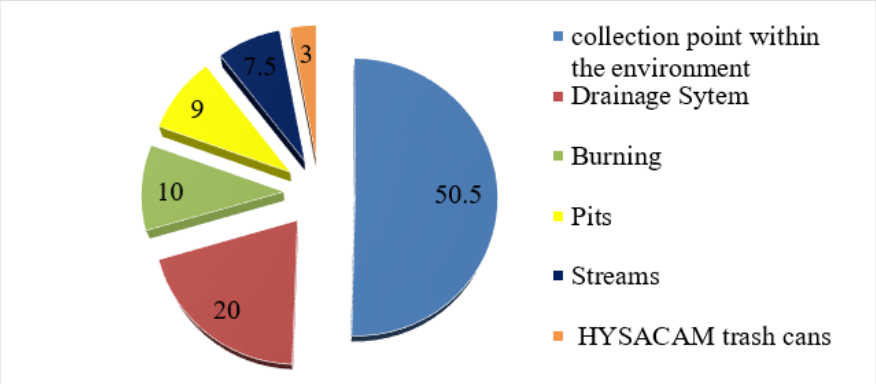


**Figure 6:** Methods of waste disposal by households in the Buea Municipality
*Source: Fieldwork (2023)*

**Figure 7:** Shows different methods of waste disposal in Soppo and Muea
*Source: Fieldwork (2023)*

In line with Figure 8, finding shows that close to a half (49%) of the population disposes waste materials approximately 4-5 times in a week, 30% disposes 4 times in a week while 11% disposes 2-3 times in a week. The least (10%) claimed that they dispose waste materials on daily basis.

In consideration of the monthly time intervals as to which waste management bodies/organizations manage the discarded waste materials from the centrally dispose sites, findings show that sometimes the waste materials are abandoned at the sites for about a month or more. Details of these were as presented on Figure 8.

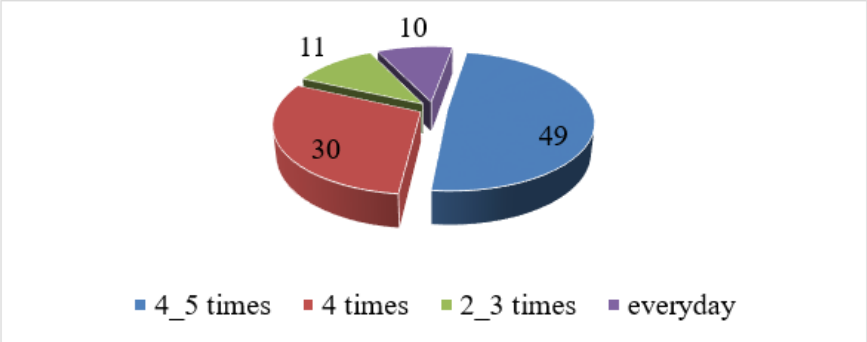


**Figure 8:** Frequency of waste disposal by households in the Bomaka Municipality
*Source: Fieldwork (2023)*

In relation to the information presented on Figure 9, a majority (38%) of the population said that the waste management bodies manage (carry away) the discarded waste materials in their locality after a period of 1 month, 24% said after 3 weeks, 18% said after 2weeks and 12% said after one week. Furthermore, 4% said that within 6-7 days, 2.8% said 4-5days while 1.2% said 2-3 days. Figure 10 shows the HYSACAM company managing wastes materials in the Buea Municipality.

In line with the lengthy periods of time (1 month) taken by the waste management bodies to evacuate the disposed waste materials, findings were done with regards to the

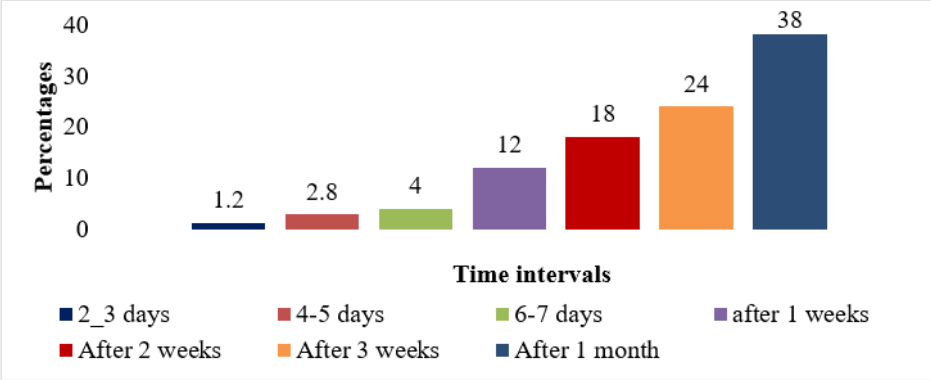


**Figure 9:** Time interval of managing discarded waste materials in the Buea Municipality
*Source: Fieldwork (2023)*

**Figure 10:** Shows the HYSACAM Company managing waste materials in Mile 16 and Muea
*Source: Fieldwork (2023)*

various bodies that manage waste materials in the Buea Municipality. In doing so, 82% of the population said that the main organization responsible for waste management is the HYSACAM Company while 13% said that it is the local council while 5% said that it is the local population. The fact that the HYSACAM Company solely manages most of the waste materials generated throughout the Buea Municipality therefore justifies the reasons for the poor management of these waste materials.

**Distance of Households to Locally Created Waste Dump Sites and Their Implications**

During the course of the investigations, in order to do a concrete analysis on the implications of the locally created waste dump sites within the localities concern, the distance between the local dump sites and household environments were taken into consideration. This was done on a distance ranges of <50m, 50-100m, 101m-200m, 201m-350m, 351m-450m and >500m. Findings therefore revealed that most of the locally created waste dumped sites were between 50m-100m from the living environment. Details are presented on Figure 11

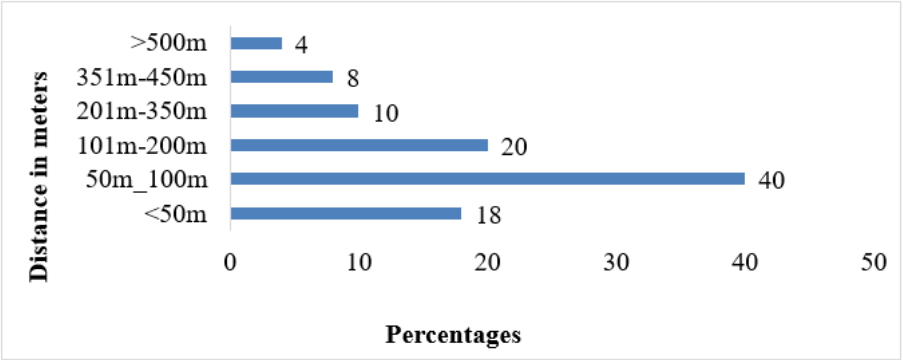


**Figure 11:** Distance of the local waste dump sites to household environments in the Buea Municipality
*Source: Fieldwork (2023)*

**Figure 12:** People selling around waste dump site in the Muea quarter in Buea
*Source: Fieldwork (2023)*

In line with the statistics presented on Figure 6, 40% of the population said that locally created waste dump sites are 50m-100m away from their living environments, 20% said that they are 101m-200m away, 18% said that they are < 50m while 10% said that they are 201m-350m away. Furthermore, 8% said they are 351m-450m away and the least (4%) said they are above half a km (500m) away from their homes. Figure 12 Shows people selling around waste dumped site in the Muea Quarter.

As concerned the implications of these locally created waste dump sites, 2 aspects were used in analyzing them, that is, the health and the environmental implications. As concern the health implications, the following results as presented on Figure 13 were noted in the field.

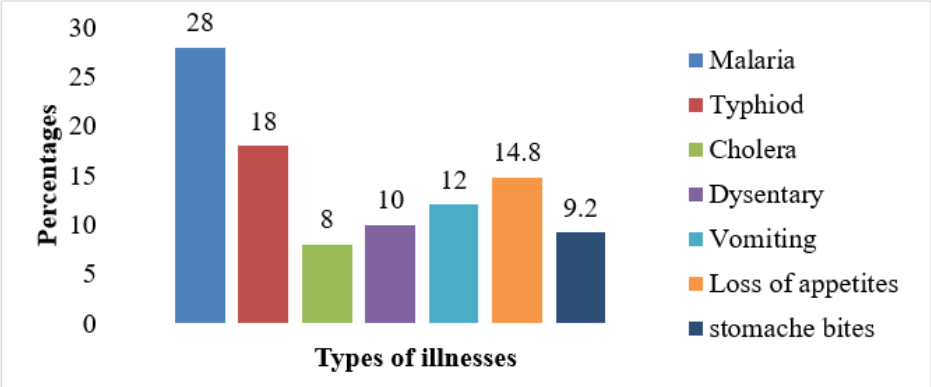


**Figure 13:** Health implications of uncontrolled waste dump sites to the population
*Source: Fieldwork (2022)*

In line with the information presented on Figure 13, as concern the health challenges, a majority (28%) of the population complained that they are usually face with malaria, 18% pointed at typhoid fever, 14.8% compliant of loss of appetites while 12% said vomiting. Furthermore, 10% attributed the occurrence of dysentery to these local dump sites, 9.2% made mentioned of stomach bites while 8% revealed that they are faced with cholera diseases. It was however noted during the field survey that most of the dump sites are highly characterized by harmful parasites such as mosquitoes, midges, and flies which are good recipes for malaria transmission.

In order to scientifically prove that poor waste disposal and management affect the health of the populations, through a dependent t-test analysis, the dominant illness which is malaria was analyzed with respect to the cases observed during the rainy season when the waste materials are poorly managed with the cases in the dry season when they are fairly managed. This was done within a period of 8 years, that is, from 2015-2022 with data collected from two prominent health units located in Molyko and Muea localities. The test was statistically significant at 0.005% and with a t-test value of 8.2. Detailed results of the analysis were as presented on Table 1 and 2

**Table 1:** Paired Samples Statistics

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Rainy_season_malaria | 129.75 | 8 | 17.790 | 6.290 |
| | Dry_season_malaria | 76.75 | 8 | 19.278 | 6.816 |

**Table 2:** Paired Samples Test

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Rainy_season_malaria Dry_season_malaria | 53.000 | 18.283 | 6.464 | 37.715 | 68.285 | 8.199 | 7 | 0.000 |

About the result on Table 2, the test was statistically significant at a degree of freedom of 7 with a test value of 8.2 and at siginificance of 0.05%, that is t (7)=8.2, p=0.005. with respect to the means of the malaria occurrence for the two season, we concluded that there was statistically significant reduction in malaria cases from 129.75 in the rainy season to 76.75 cases thus, resulting to a difference of 53 cases with an increasing cases in the raining season and decreasing cases in the dry season. From this result, we draw our conclusion that the huge amount of waste materials amassed on roadsides, streams and on the environment are the direct causes of the emerging and multiplying cases of malaria in most of the quarters

As concern the environmental implications of these dump sites, it was noted thatmost of the areas where these dump sites are located are characterized with multitudes of environmental challenges which range from pollution, contaminations and smells. Details of these environmental challenges were as presented on Table 3.

**Table 3:** Environmental challenges of locally created waste dump sites in the Buea Municipality

| | Environmental issues | Frequencies | Percentages (%) |
|---|---|---|---|
| **1** | Pollution of water sources | 40 | 16 |
| **2** | Creation of nasty and dirty environments | 50 | 20 |
| **3** | Disruption of environmental comforts | 45 | 18 |
| **4** | Hideout for harmful insects | 40 | 16 |
| **5** | Soil contaminations | 20 | 8 |
| **6** | Pollution of nearby environments with toxics | 55 | 22 |
| | **Totals** | **250** | **100** |

*Source: Fieldwork (2022)*

With regards to the information presented on Table 3, 22% of the population said that the most environmental challenges of locally created waste dump points are the pollution of nearby environment with toxic substances and the creation of nasty and dirty environment as support by 22% and 20%, respectively. Also, 18% said that they usually disrupt environmental comforts while 16% pointed at the challenges of water pollution and hideout areas for harmful parasites. The least (8%) attributed it to soil contaminations. Figure 14 show wastes materials discarded into streams in the Buea Municipality.

**Figure 14:** Show Waste materials discarded in some portable streamsin Soppo and Mile 17
*Source: Fieldwork (2023)*

**Indigenous Adaptation Measures to the Challenges Created by local Waste Dump Sites**

During the course of the field investigations, the multitude of issues identified necessitated investigations on their indigenous adaptation measures. Figure 8 comprises details of the challenges.

In line with the information on Figure 15, a majority (38) of the population said that they boil water from un-trusted sources before drinking, 22% said that they do visit the hospital for treatment of infections while 20% said that they do daily clean-up of the affected environments. Furthermore, 14% usually burn up the waste material while 6% transfer from the affected environments. Figure 16 shows indigenous adaptation measures to the challenges of wastes materials in some parts of the Municipality.

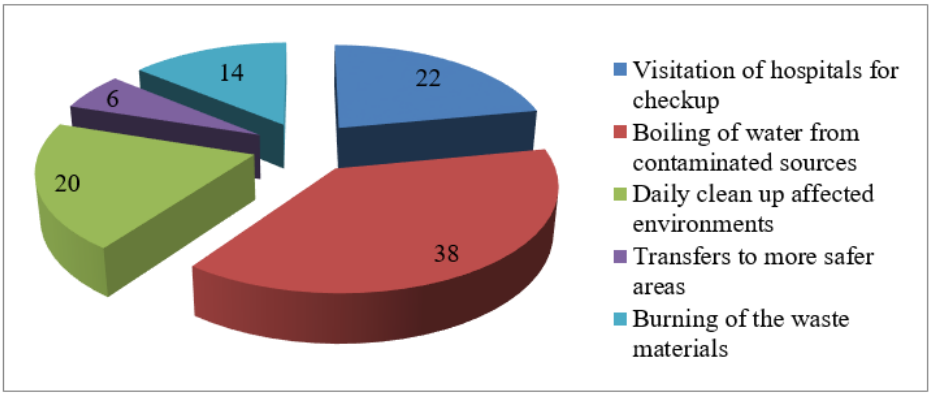


**Figure 15:** Indigenous adaptation measures to the challenges of poor water management
*Source: Fieldwork (2023)*

**Figure 16:** Individuals adaptation measures to poor waste management in Molyko and Mile 17
*Source: Fieldwork (2023)*

## DISCUSSIONS

Findings revealed that the house sizes in the Buea Municipality are well loaded with many people found in a single household. This isso because of the many people who are today found in the area. Most of the waste materials from anthropogenic activities are food residues, plastic materials and garments. These findings were in line with those of Kuitunen (2002), who in his scientific paper noted that large amounts of garbage generated in urban settlements mostly come from households, schools, medical facilities and commercialactivities.

Adequate waste management facilities have not been developed in the area and so, the skyrocketing populations scramble to dispose their waste materials. In the course of searching for ways to dispose their waste materials, they end up randomly dropping them around locally created waste collection points, drainage channels and streams. These findings were consistencewith those of Nabegu(2010) who noted that a majority of the people living in slum areas disposemuch of their waste materials just within their residential areas(pits, gutters and drainage channels) because of the distance to the nearby waste collection points which was often congested.

Furthermore, because of the booming economic activities in the area and the operation of commercial activities by the population, most of them dispose waste materials at least 4-5 times on weekly bases. This means that the waste managementpersonnel/institutions must be effective and ready tomanagethese heaps of waste materials randomly disposed by the population. Agreater proportion of the population also leaves just 50m-100m from points where waste materials are being disposed. This goes further to giveproves of how vulnerable the population be affected by this uncontrolled sources. These findings were in line with those of Sule (2001)who in assessing the implication of waste materials in the Lagos and the Calabar states of

Nigeria. He noted that, most of the population who were affected were found closer to the waste collection points As concern the various health issues emanating from the poor disposal of waste materials within the environment, the population do suffer of malaria and typhoid fever since such points are favorable grounds for malaria parasites as well as transmitters of water borne diseases. Saheri *et al.*, (2009) in assessing the implications of waste materials on the population of Kuala Lumpur, the capital city of Malysia, noted that waste disposal grounds were well defined gateways to malaria diseases, typhoid and other water and airborne diseases. Some of these heath challenges have as well been mentioned in the recent articles published by the WHO (2021).

As concern the environment, findings had it that nearby portable stream sources were often polluted with most of the environments appearing nasty due to the poor spread of waste materials by wind and water. Around areas where there is market gardening, effluence from these waste dump points do pollutes the soil and marking it less productive. This finding was in conformity with those of Medina (2002) who noted in his study of poor waste disposalthat most water sources in the area of study were contaminated by polluted water that flows from the nearby unmonitored landfills.

As strategies to overcome some of the challenges emerging from these poorly disposed waste materials, most of the populations always use the local methods in boiling water for domestic uses, especially those from untreated sources. Furthermore, some wealthy individuals visit hospitals while a majority of the populations cleanup nearby blocked and dirty gutters in theenvironments. The European Commission (2014) has elaborately outline measures such as community clean up and sensitization on water use as effective measures to deal with the challenges of poor disposal of waste materials.

## CONCLUSION

The population in the Buea municipality has grown astronomical over the years with booming economic activities. On the contrary, adequate waste management schemes such as trash-cans controlled waste collection points and landfills have not been provided for the population. As a resultof such laxities, the population usually dumped their waste materials anywhere possible around the environment and in streams; drainage channels and sometimes burn them. The heaps of these waste materials have become grounds for harmful parasites such as mosquitoes, midges and rodents. With regards to the fact that the population livescloser to such contaminated grounds, they have been gateways to air and water borne diseases such as typhoid, dysentery, malaria and diarrhea and thus affecting a majority of the population who on daily basis spend colossal sums of money in the hospital for medications. As a resultof the unfriendly effects of these waste materials, the population cannot survive with them and in considering these challenges; they have been implementing multitudes of adaptation measures such as boiling of water and cleaning up of nearby gutters where waste materials are extremely dumped. However, since their adaptation measures are weak and there is no cooperation in the communities, most of their adaptation measures are usually futile and the situation has become normal in the area. Therefore, stakeholders and private organizations must take actions in the management of waste materials in this Municipality and if this is not effectively done, then the increasing population number in the area shall face a lot of environmental and health issues.

## RECOMMENDATIONS

In order to improve the level of waste management in the Buea Municipality and to create a more comfortable condition for the urban dwellers, the following should be put into practiced by the following personnel's/ organizations.

-The government can create many waste dump sites and train more persons who can effectively manage waste materials within the Buea Municipality

-The government can also fund the local council and other institutions in charge of environmental sustainabilityso that they will have the financial ability to carry out their activities.

-The government couldalso construct waste management institutions thatwill work in line with the current ones operatingin the area to ensure effective waste management activity in the area.

-The local council should control the careless disposal of waste materials; they should levy fines and penalties on those disposing waste materials recklessly.

-They mayalso installed trash-cans within the quarters for the population to also dispose their waste materials inthem.

-They canalso organize weekly clean up campaigns to clean areas where these waste materials are deposited.

-The council couldalso employand train workers who can assist in the management of these waste materials.

-NGOs couldhelp and sensitize the general public on the risks of poor waste disposal and also to train them on modern ways of managing waste materials.

-Theycould support the municipal council with funds in order to increase their financial ability to manage waste materials.

-As for the local population, could they should learn how to recycle waste materials and avoid using non-degradable waste materials such as plastics.

-They couldalso avoid disposing waste materials into drainage channels and dump them directly to HYSACAM.

-The HYSACAM company should make should that all waste collection points are visited on daily basis to collect the waste materials. More so, they should also employ many workers to assist them in managing these wastes materials.

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