IMPACTS OF HOUSEHOLD SOLID URBAN WASTE ON THE COAST OF NGOR (DAKAR / SENEGAL)

Ramatoulaye Mbengue
Faculté des Sciences et Technique/UCAD
SENEGAL

Mame Demba Thiam
IFAN/UCAD
SENGAL

Vieux Boukhaly Traore
Facultés des Sciences et Techniques/UCAD
SENEGAL

ABSTRACT

The waste is inseparable from human life; they are a marker of its activities. Urbanization and increasing population increase production of solid waste, dunghill. Studies on the treatment of solid waste are not consistent, first, the site of Ngor lack of infrastructure for storage of waste, on the other. The consequences of these residues on the living environment are worrying both for the municipality and for the people. This contribution retains few. In Senegal, waste management remains a concern for municipalities. Challenges remain to manage this service inherited laws of decentralization. Methodologically, several types of treatments are used. The statistical data used from Excel have achieved graphs, tables and figures. The Depiction relied on using Arc GIS software performance and field photographs have documented some facts observed on the sites. In Dakar, especially in Ngor, the problem of municipal solid waste is the same. Piles of garbage piling up every day in the empty spaces, disfiguring them, arising from a failure and irregular garbage collection by the city. The frequency of collection varies from one area to another in relation to the socio-economic disparities. Impacts also vary in space: this garbage affect the aesthetics and health.

Keywords: Impact, Waste Management, Environment, Coastline, Ngor.

INTRODUCTION

The environment (Environmental Code, 2001) is a fundamental pillar in the development process, we must focus on the degradation of the living environment and see their impact on nature. The degradation factors in Ngor are multiple: coastal erosion, domestic waste water, storm water drainage and solid waste. This paper analyzes the impacts of household waste on the environment before assessing the technical management methods of collection and the difficulties encountered in their implementation.

Currently, intensive and misuse of resources and discharge of waste into the environment (ONIBOKUM AG, 2000) contribute to the deterioration of our environment. This change has an impact on society, human health, economy, living species, food production, tourism and ecology. Every day, environmental pollution (MC Chao, 2011) increases, human health is increasingly endangered. This is due to the increase in wild junk deposits as well as the discharge of waste water that facilitate the development of disease vectors. The irregularity of the collection in some areas (MBENGUE R, 2010), the lack of collection and inaccessibility of Ngor village are the main explanations of the population. It is therefore important to consider the consequences that human activities have on the environment (O G ADEPOJU, 2001) and health. The proliferation of disease vectors such as flies, mosquitoes and worms (K ATTAHI., 1996) which is developing rapidly in waste under the influence of climatic conditions. The discharge of organic waste rotting in situ is a threat to the well being of populations. However, they attract rats and other disease carriers. The discharge channel rainwater is polluted domestic waste water, sludge and solid waste multiplying the

causes of diseases. Toxic residues discharged in nature cause air pollution and increase respiratory diseases in urban areas. The broken glass can present a danger to the safety of people and animals. Filth prevents the accessibility of a part of the tracks. Beach Khata Kheli (Municipality of Ngor) can not be visited by tourists or even by national visitors, reducing the tourism potential of the area.

The objective of this study is to follow the purpose of waste on the one hand, the impact on the environment and health, on the other. What justifies the methodological approach?

METHODOLOGY

Apparatus

Completion of this work required more hardware listed in Table 1.

Table 1. List of the various materials used

Materiels	Nature	Source	Year
Images	Quick Bird	DTGC, LERG	2003, 2009, 2010, 2012
GPS surveys	Illegal dumping , pickup point, followed Ngor	Ngor	2010
Georeferencing Digitalization Cartography	Quick Bird	DTGC, LERG	2010
Questionnaire	Households	Ngor	2013
Ealth data	Health Center	Ngor	2013
Interview guide	Municipality	Ngor	2013
Photos	Garbage, sewage	Ngor	2013, 2014

Table 2 contains the various tools used. These materials have helped to perceive the reality on the ground: floods and populations adaptation strategies.

Method

The method adopted was based on mapping images Orbview 2003 and 2009 available in the Directorate's database of Geographic and Cartographic Works (DTGC) and teaching Laboratory and Research in Geomatics (LERG) for Quick Image Bird, 2009.

In this context of this document, high resolution images have been targeted with Quick Bird images for better accuracy. The image processing method is made first by scanning and georeferencing using the Arc GIS software. This is complemented by GPS ground surveys. Map elements are used for georeferencing the Datum WGS 1984 (World Geodetic System) and UTM (Universal Transverse Mercator) in Zone 28 North and for Senegal. Air and space images have delineated the spatial features of the site and analyze the changes observed. The image acquisition was followed by field work for data up to obtain that authorized the drafting of this project. Data were obtained from the responsible for the collection of garbage: people, city, actors, etc. The counting of the survey data was performed using the Excel software that is also a treatment tool. Finally in situ shooting complement the illustrations of our object of study in the field (Figure 1).

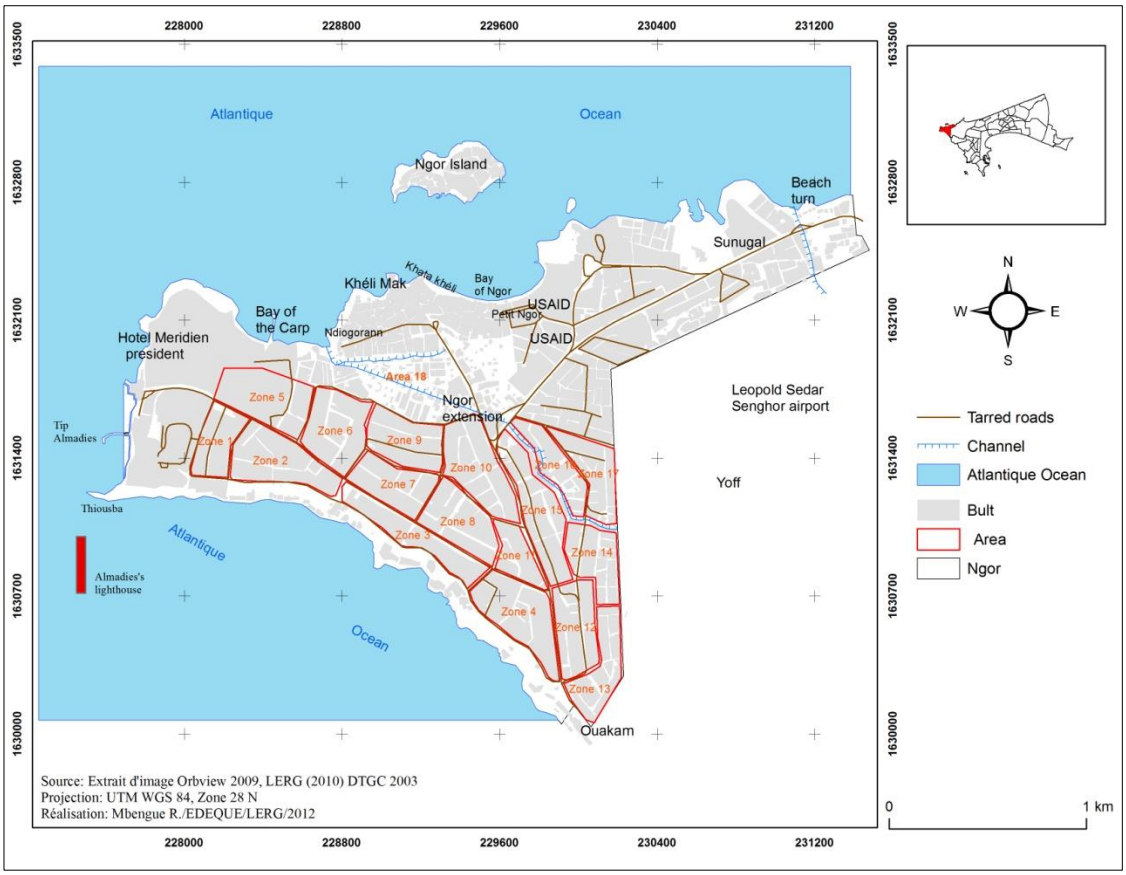

Figure 1: Presentation of the study area

The methodological approach has led to the isolation of the important results

RESULTS OF INVESTIGATIONS IN SITU OBSERVATIONS

Garbage collection in Ngor

Two dealers account for garbage collection. They attribute to the area tasseuses two skips, equipped April-May maneuvers, which proceed to the implementation or trash heap on the ground at a rate of one trip per day. There are two types of collection: the collection by voluntary contribution where the producer transports waste to bring them to the assembly points until the passage of the bucket. In the Municipality of Ngor, there is no longer space for assembly points, hence the abandonment of waste ground, creating illegal dumping. The home collection door to door removes household waste packaged in conventional trash cans, plastic bags and users utensils. It is done in passable areas: Residential areas of Almadies and Ngor Grand. The tasseuses skips circulate (Figure 2 zoning circuits garbage collection) in the streets and honking available between 3 and 4 times and usually lasts between 4 and 5 seconds. People sometimes come directly pay their trash in the dumpster.

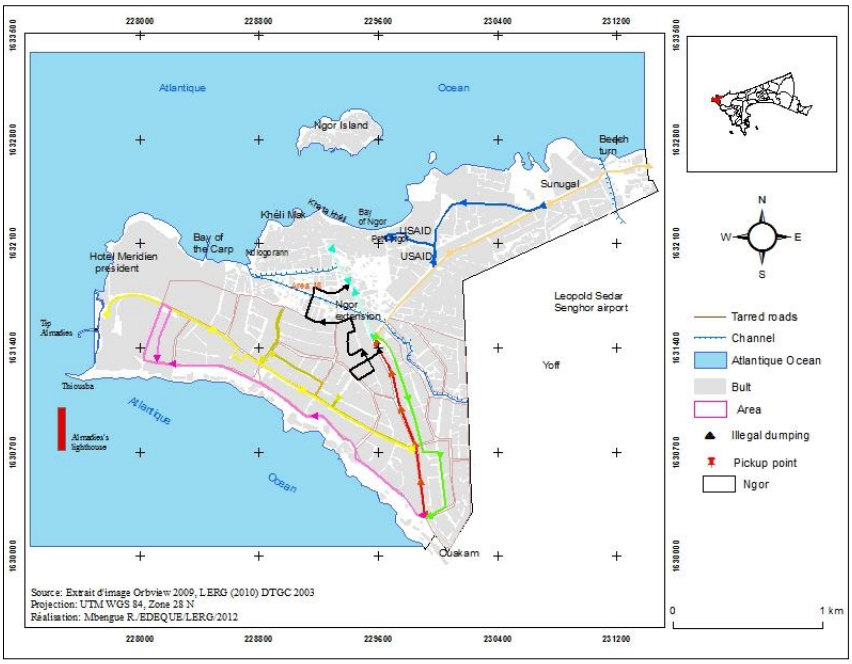

Figure 2: Zoning collection routes in Ngor

Surveys show that women have that load in most cases garbage disposal. This is for the majority of girls from 10 to 13 years followed by the age group 18-25 years and finally that of 28-45 years (Figure 3). Women aged 50 years out of the garbage in others.

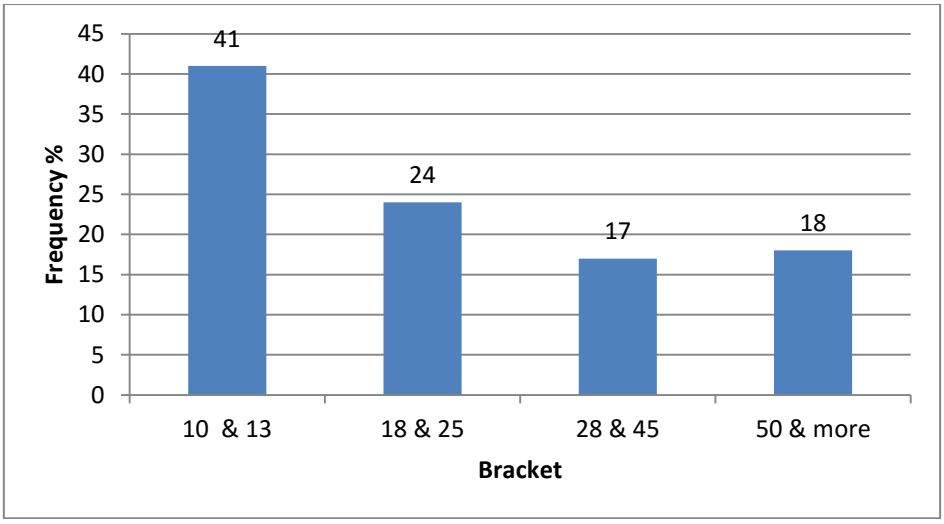

Figure 3: Responsible for waste disposal in Ngor

The carts also carry out the collection, mostly serving in areas where the collection is uneven. Populations inaccessible areas and feed the garbage carters (Figure 4).

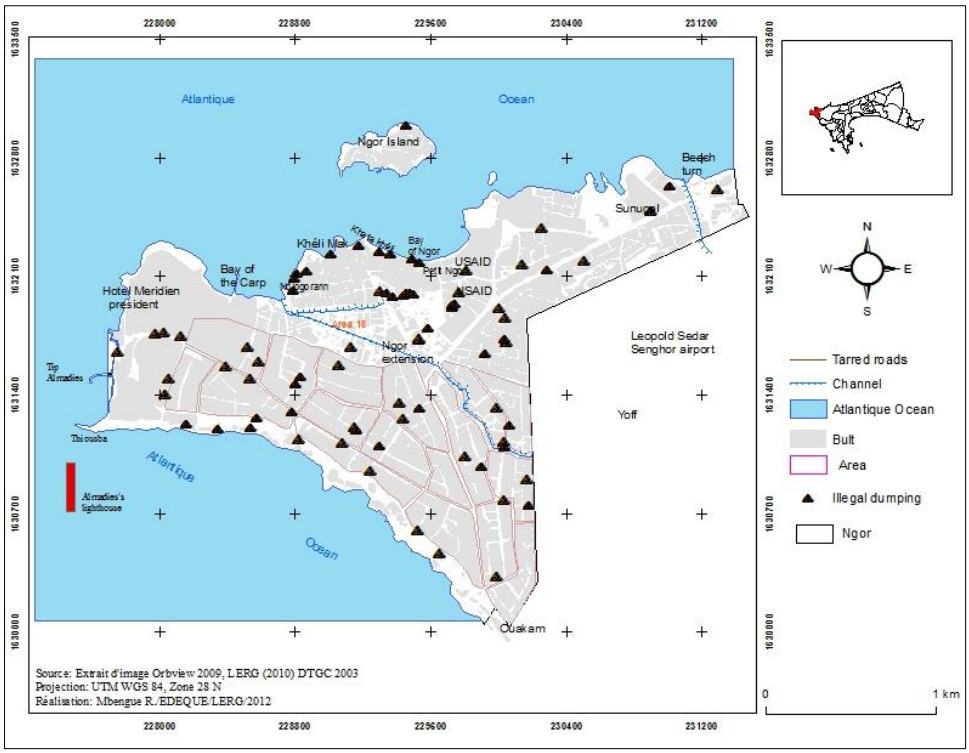

Figure 4: Location of wild deposits Ngor

The irregularity, inaccessibility and delays in garbage disposal are causing the proliferation of illegal dumping their pollution, which impacts on accessibility and on the aesthetics of the beach.

Impact garbage on accessibility and on the beach aesthetics

A beach needs to be maintained to contribute to local development (ecotourism). The waste that wash up on the coast are a nuisance for aesthetics and detrimental to the site. Thus the local authorities in Ngor by joint management installed a cleaning committee of the Commune in 2005. The surveys reveal that authorities extended by supporting the initiatives of some volunteers interested in protecting their environment. The impact of beach pollution by garbage causes a decrease in the visitors area. However, although sunbathers have managed to preserve part of the site to allow its accessibility, it is that the beach KhataKhéli in Ngor Village has become a dumping ground (photo board 1) where the majority of concessions located along the beach there throw their garbage. Residents face access difficulties, but seek any solution for waste management.

Photographic Plate 1: The large dump garbage on the beach of Ngor

Over 75% of people surveyed in the traditional village do not participate in the improvement of the living environment by participating in the implementation of remediation plans retained throughout their neighborhood. They continue to throw rubbish everywhere all along the beach. Besides dumps along the beaches, are added marine sand extraction.

Health impact

Our investigations have focused on the most common conditions that can be associated with the presence of municipal solid waste. Thus, the analysis of health issues related data were obtained from the archives of Ngor Health Centre. They identified the most important disease patterns throughout the year: malaria, skin diseases, conjunctivitis and diarrhea (Figure 5).

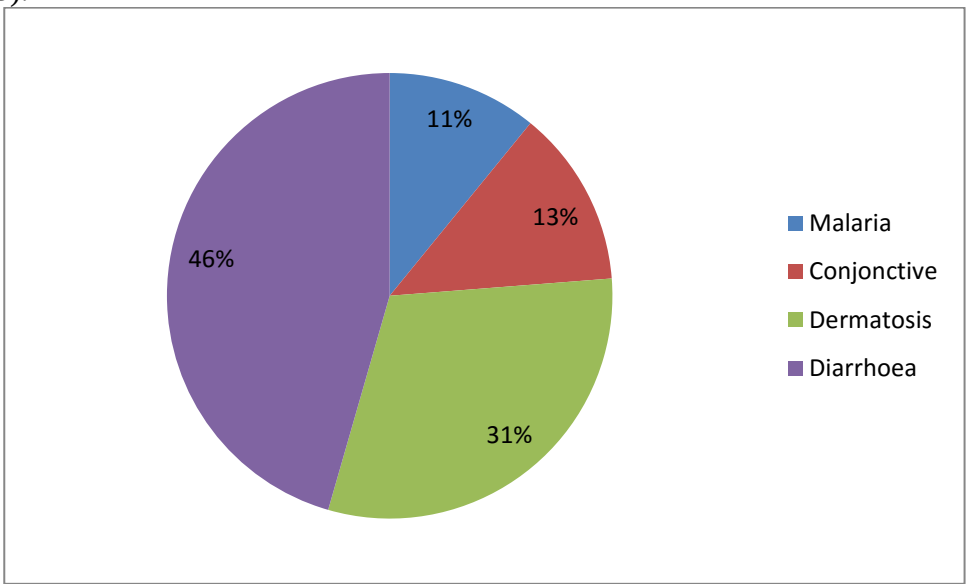

Figure 5: Distribution of major diseases in Ngor

Health data show that level of Ngor village, the grounds for consultation, morbidity concern malaria, dermatitis, diarrhea and conjunctival. The document lists the four most common reasons: dermatitis (46%), diarrhea (31%), malaria (21%), conjunctiva (12%). Unsanitary conditions in the area favors the development of mosquitoes causing persistence of malaria throughout the year.

Dermatosis

Skin diseases are a set of conditions which prevail in children. The channels are filled with filth playgrounds for children Ngor village. They come in search of places recoverable object that will serve as a toy. They are present in all seasons. This is due to made that the people of Ngor village are still in contact with wastewater and solid waste. These media are the favorite place of mosquitoes, flies, rats and insects. These sites are conducive to the spread of pathogens responsible for diseases. In 46% of cases of dermatosis was different according to age groups (Figure 6).

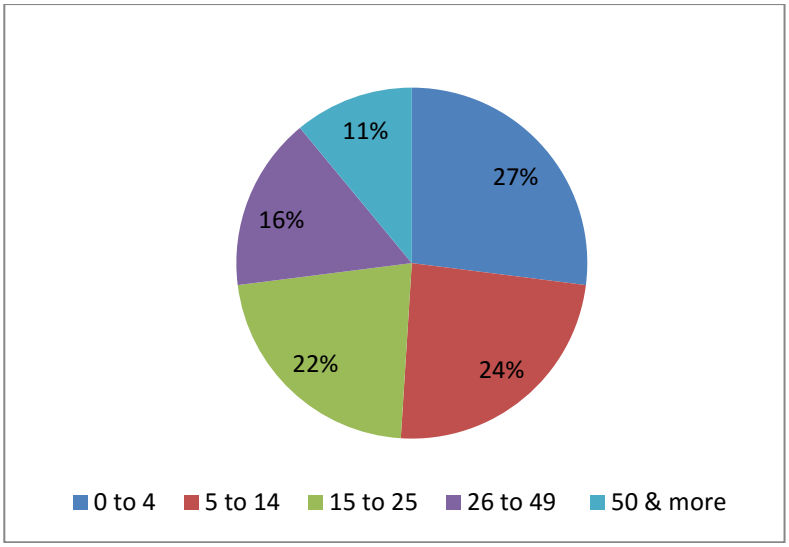

Figure 6: Distribution of cases of dermatitis by age

Dermatosis is frequent in the age group of 0-4 (6) with a proportion of 27%. At Ngor health post, children 0-4 years represent the highest reasons for consultation. This is because they play in unsafe areas (sewage and garbage) ignoring health risks. Ages of 5-14 years and 15-25 years were 27% and 19% respectively.

Diarrhea

Flies everywhere attend the filth in addition to domestic flies that feed on sweet juice and organic liquid garbage where they lay eggs. The hatching of the eggs is done after 2 hours under the influence of temperature. In countries in tropical areas such as Senegal, they grow more easily in contrast to temperate zones. In the Municipality of Ngor, temperature and humidity are favorable to the decomposition of waste. Flies with their great dispersal ability are mechanical transmitters of germs. They defile, at the time of taking food, human food by bacteria and viruses are stopped on their feet, their trunks and bodies. The microbes in their feces can transmit to humans cholera, diarrhea, typhoid fever, etc. In the sector Ngor village, diarrhea cases persist throughout the year (Figure 7).

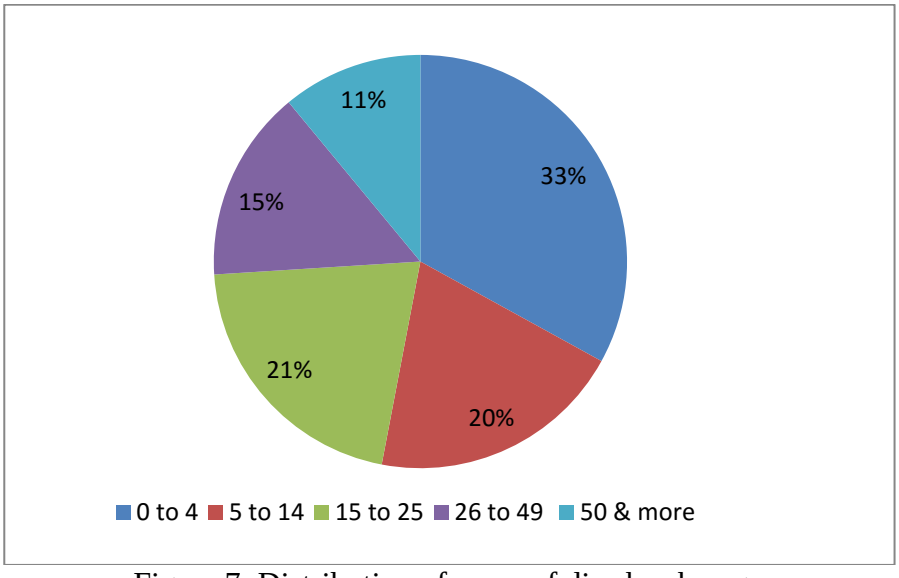

Figure 7: Distribution of cases of diarrhea by age

Diarrhea is among the top 10 reasons for consultation in Senegal. It is caused by bacteria. The doctor Major health center, revealed that there are several kinds of diarrheal diseases. Poorly cleaned channels, the large number of garbage in the area provide supportive environments for the proliferation of bacteria. Children age 0 to 4 years are exposed (Figure 7). Children 3 to 4 years are the most affected as they play with garbage in stagnant water. Indeed, Ngor village sanitation problems persist (domestic sewage and garbage coexist in the singular crowded spaces). During the rainy season, the children without playgrounds are found in stagnant water. That is why, children are the first affected by diseases due to unsanitary conditions.

Conjunctivitis

The conjunctiva and the skin disease, diarrhea diseases are under unsanitary conditions. Conjunctivitis represents 12% of the units of morbidity consultations Ngor village health center. It is present throughout the year, but still in the rainy season (August, September and October). Figure 8 shows the reasons for consultation in case of conjunctiva of different age groups.

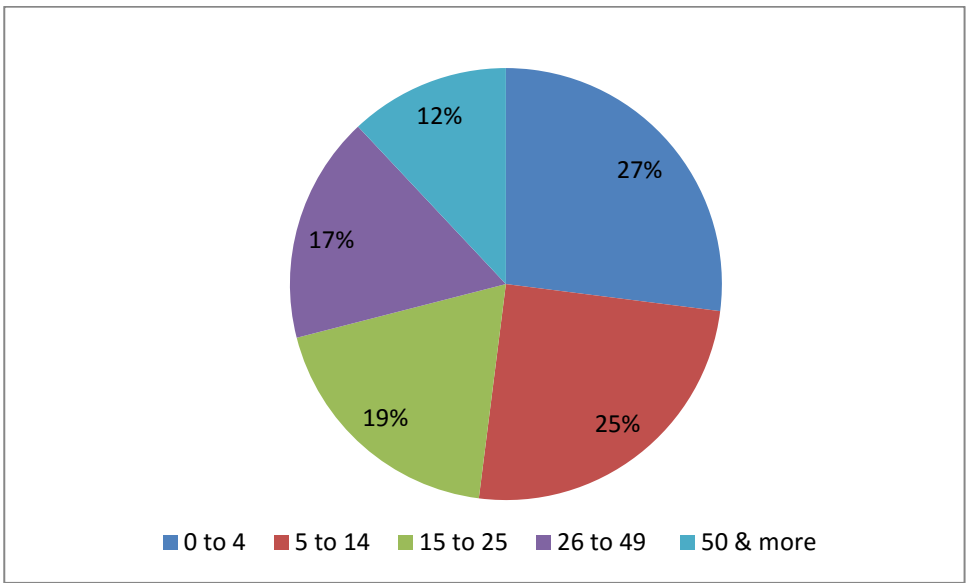

Figure 8: Distribution of cases by age conjunctiva

Figure 8 shows that the age group of 0-4 is the most affected, accounting for 27%, followed by that of 5-14 years (25%). The cumulative frequency between the ages of 0-4 and the 5-14 constitute more than half of the consultations patterns with 52%.

Malaria

Malaria is an endemic disease caused by the bite of the anopheles. It happens again in areas of poor sanitation in conctact between mixing sludge (waste and wastewater). The presence of open canals filled with garbage all year facilitates the breeding of mosquitoes that transmit malaria. It représnete the leading cause of morbidity and mortality in Africa in general, Senegal in particular. The malaria reasons for consultation are the order of 11% of the total by age (Figure 9).

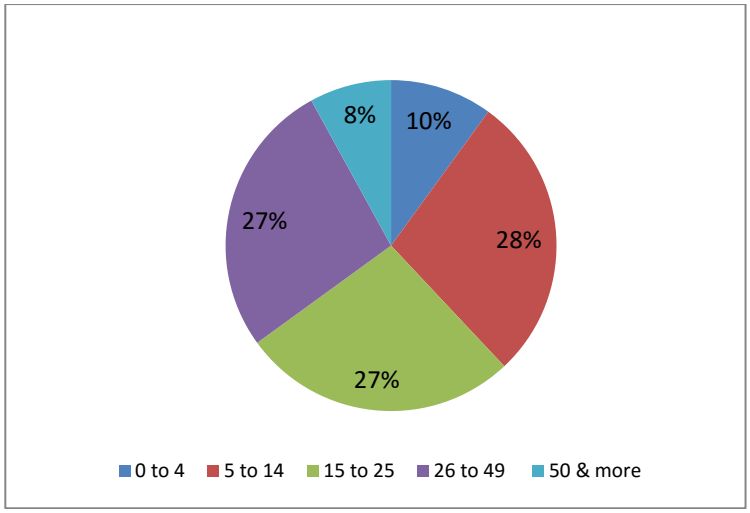

Figure 8: Distribution of malaria cases by age

Malaria strikes ages of 5-14, 15-25 and 26-49 years with a total of 82%. The age range of 0-4 and the 50 and successively represent between 10% and 8% of all the reasons for consultation at the health center.

The lack of household solid waste management public health consequences. It promotes the development of breeding grounds for mosquitoes and rats. There is also the spread of odors, pollution of air and water. To this is added, dust and fumes coming from the garbage and which is carried by the wind. They can be a source of nuisance and cause respiratory diseases. Garbage, when they are compared with the feces may provide parasitic diseases. Cases of diarrhea are reported by the people of Ngor village. Most children who frequent the beach in cohabitation with garbage, have skin disease. The presence in the waste of some substances batteries, pharmaceuticals, plastic, batteries, and various cylinders can be harmful to humans.

Indeed, garbage are microbes hangouts and places of reproduction and multiplication of flies, mosquitoes and even rats who find their shelter and food in the many piles of garbage in the city. Mosquitoes and flies are attracted by garbage where they find their niches. Organic waste thrown to the ground and left to rot in the streets threaten health. The waste such as broken bottles, syringes or scrap pieces also cause risk of injury to people beachgoers, especially children. Furthermore the decomposition of organic waste produces unpleasant odors, amplified by the heat especially heat period.

Impact on the toilet garbage Plan

Issues of public health and hygiene are of paramount importance for the City authorities. However, the budget allocated for hygienic services is lower. On an investment budget of 45,004,002 CFA francs, about 14,625,324 CFA francs are devoted to the health sector. Funding for health services comes second after education. The garbage is mixed with domestic wastewater coming from pits and flows everywhere on the streets. It was noted the presence of waste in many forms. The waste stored in bags on the floor and in trash bags abandoned in the streets or empty spaces (photo board 2).

Photo board 2: Waste abandoned on the streets

On the hygienically, we took the example of garbage Mame Ndague that lack of personal protective equipment (proper equipment, gloves, scarf, shoes and outfits). They face the risk of accidents where the need to protect the hands and feet. Frequent accidents are recorded in handling of sharps. To this end, these workers require to improve their working conditions (poorly paid, no medical protection). TB cases are also noted among the agents. People in the neighborhood with the filth complain about the unsanitary condition of their neighborhood is even the root causes. 10 and 11 reflect the response percentage of households Ngor.

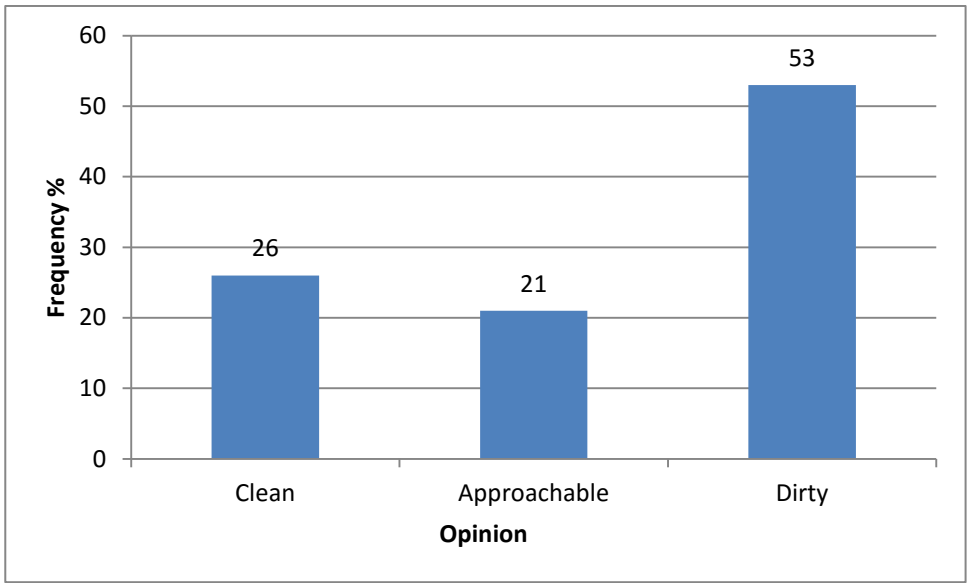

Figure 10: Level of hygiene in Ngor Village

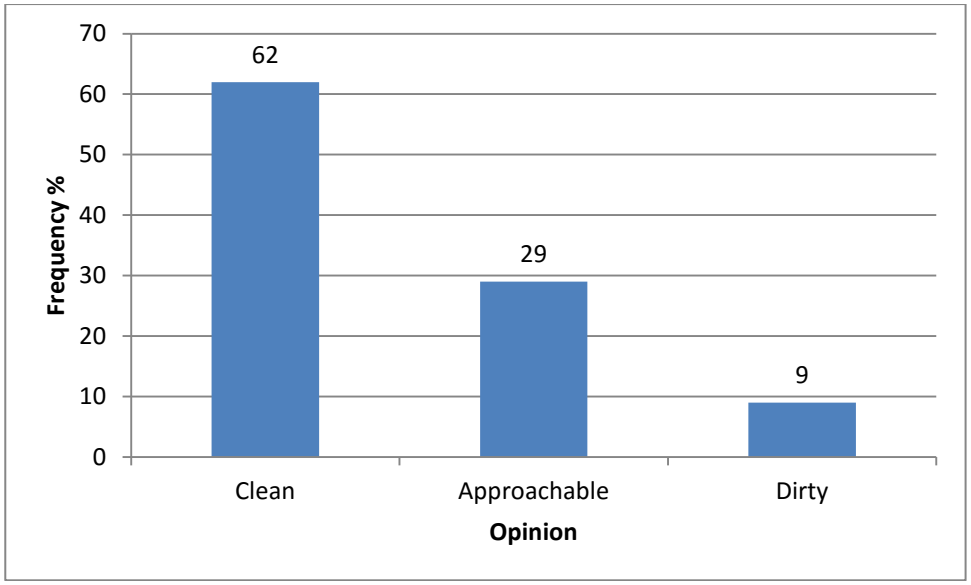

Figure 11: Level of hygiene in residential Quarters Almadies

Households lament the state of health (Figure 10 and 11) in their neighborhood. Thus, 53% (Figure 10) of households surveyed consider that their area is not clean. The notorious unhealthiness by respondents leads to the development of flies, mosquitoes and other insects that harm the health of people especially in the rainy season. In the residential district of Almadies, sparing them argue that their neighborhood is clean (Figure 11). However, they emphasize the existence of filth in some places. Only 9% say their spare area is dirty mentioning the existence of illegal dumping.

Impact on wildlife

Many marine species suffer from the presence of waste. Some are often unable to distinguish between waste and their usual prey. Turtles example may confuse plastic bags with jellyfish. Plastic sachets block the digestive tract of turtles once swallowed and cause their death. Other varieties of species are affected by the presence of waste especially the plastic bags. According to Mr. Samb, the unhealthiness of the beaches has led to the disappearance of crabs.

The plastic is not biodegradable. By mechanical action under the effect of temperature and UV, it will break up into fine particles. It is called plastic plankton. Besides the inability to remove these macro-waste in the marine environment studies Delbecq (2009) showed that the presence of these also blocks the digestive and respiratory systems jellyfish that ingest them. Turtles are unable to regurgitate the plastic they have swallowed. The latter (plastic) reduces the efficiency of food digestion, increases energy expenditure and sometimes led the animals to starve. Plastics are a negative impact on the marine environment.

Impact on business

Many coastal areas face implantation in the human population. Pollution linked to human activity are noted. It's about:

Fishing

Fishing is one of the key sectors of the economy of the city and its surroundings. Artisanal fishing employs many active and contributes significantly to the economy of the traditional village of Ngor. Wastes that are rejected on the beaches can be a major embarrassment for swimming and fishing. The existence of waste requires fishermen to change their fishing area as lines or nets hang them. They are required for this purpose, to go to the wide. Where a constraint for the exercise of this activity. Fishing nets back often waste. The other impact is that fish can swallow plastic bags mistaking them for food), resulting in their death; they fail on the beach. The photo board 3 shows the different types of waste removed during cleaning campaigns of the seabed along the coast of Ngor.

Photo board 3: waste collected during cleaning campaigns seabed

Tourism

In Senegal, tourism is a major industrial company. We noted that a large majority of the beaches suffer the intrusion of waste. Ngor has the assets on the regional and international market, but the tourism industry is experiencing difficulties. Much of the beach is lost by the existence of large wild garbage dump of "KhataKhéli". It is rare to see even indigenous frequent places.

A coastline littered damages the image of the site, especially as tourists are particularly sensitive to the quality of their vacation spots. The impact on the tourist frequency is important, what the municipality is aware. Thus, it tries to recover the beach by a cleaning operation with partners (ongoing project). The design of this range will contribute to revenue for Ngor. The high concentration of people in a coastal area also causes ecological destabilization, a de-configuration of the coast and reduced its attractiveness. Because of its economic, tourism development on the coast does not give importance to coastal degradation.

Impact on soil and water resources

Pollution increases mainly because of the rapid population growth. Every living being inevitably produces waste. The increasing production of waste is not accompanied by an appropriate collection system. This causes the uncontrolled discharge of residues in nature causing nuisance on the environment and the living environment of the people. Indeed, the filth in the empty spaces, along roads and canals cause decomposition and fermentation of biodegradable waste. They create situations. Among the pollutants, we have organic pollutants which are products rejected by creatures: excrement, food waste. They are biodegradable which is to say that they are phasing out in standing water naturally.

Microbiological contaminants that are pathogens can cause disease both for wildlife and for humans.

Soil pollution is caused by household waste and their infiltration into the soil pollutes groundwater. Pollution can be up to ten years or more to be more harmful. Water pollution is closely linked to that of the soil

Impact on the air quality

According to the report of a WHO expert committee in 1991, 500 million people in developing countries are at risk from air pollution in urban areas. Among the sources of this pollution include exhaust gas from anaerobic fermentation of organic matter from municipal solid waste. These gases are more or less loaded methane in sulfur gas or nitro may cause explosions or undermine the health of individuals. In addition to illegal dumping, packaging waste produced in households facilitates the production of gas by waste such as batteries, biodegradable. The act of burning the waste generate air pollution with the release of carbon dioxide.

Moreover, according to Chao (2011), the incineration of household solid waste emit more smoke, mineral fibers (sulfur dioxide, nitrogen oxide, hydrocarbons, hydrochloric acid etc.) that can be harmful to health when they are inhaled**.**

DISCUSSION

From this study, it appears that the environmental pollution situations allow think about how will be the future of our future generations? However, analysis of environmental impacts is not isolated and depends on several data including the rejection of solid waste on the environment, the development of disease vectors and the rejection of domestic sewage in nature. Climatic factors including temperature and wind play important roles in the development and spreading mosquitoes, smells and dust.

The presence of garbage containing mainly organic compounds having a same aesthetic aggression without decomposition. She participates in many of our cities and disfigurement causes a show for visitors. The solid residues contain biodegradable materials (organic) with their fermentation causes the formation of gas and foul smell. The limitations of this study lie in the lack of analysis of domestic wastewater to see their chemical composition and determine what forms of pollution generated. Fragmented into fine particles under the effect of waves, wind, sun, they are ingested by animals (Bocard C., 2006), which mistake them for plankton. They are then present throughout the food chain to man. This is a major environmental problem but also a health risk (Delbecq, 2009) because the plastic residues fix certain pollutants.

This study highlights the impacts of waste (Sidibé, 2013) household. Nevertheless, it has shortcomings. The physical environment for living environment to man requires a beauty and harmony. The beauty of the environment contributes to the well being of its occupants (Seck, 1997; Chao, 2011). For a Healthy Environment (UNIDO, 1983) and no negative impact on the population, it is mandatory to undertake effective strategies for collection and treatment of household waste and the infrastructure supporting them. The channels of the Commune should be priests each year, failing to close. To do this, we must define the role of each: administrative and political authorities, partners, citizens and stakeholders.

Requires effective political management of household waste, a synergy of action of the actors involved in this area, awareness of citizens to hygiene and sanitation practices.

The results suggest that everyone should reflect on its share of responsibility in the degradation of its environment in order to minimize its effects. Persistent unhealthiness to a source; the population growth must lead us to innovate or strengthen strategies against multiple nuisances to make pleasant part of life. This will also reduce health risks cause disease. For a citizen attitude, all take an active part in the defense of the environment of our communities. This allows for a framework quite healthy. For we have chosen to avoid throwing our garbage anywhere and keep them in good homes with possession of a conventional garbage. This means that the cleanliness of a living environment is a behavioral problem.

CONCLUSIONS

The Municipality of Ngor has experienced unprecedented development. The growth rate of the population has led to a rapid urbanization and uncontrolled growth of services. Ngor in infrastructure are facing a significant waste. They have difficulty securing garbage management services. The logistics are insufficient and outdated. This does not happen without consequences on the living conditions of the populations. Ngor is confronted with difficulties related to the protection of the environment with the problems of solid waste along the beach. Part of Ngorois coastline is remarkable for the great wild dump called "Khélimak". The numerical factors also constitute a brake for waste management to the extent that the behavior of each other is hardly identified

REFERENCES

G. O ADEPOJU, 2001, urban waste management. Solutions for Africa, and IDRC Ed Karthala, Paris, 250 p.

K. ATTAHI 1996 Problems of urbanization and challenges of municipal management in West and Central Africa, directed by Article BNETD and PGU, Abidjan, 23 pages.

C. BOCARD, 2006). Oil spills and soils polluted by hydrocarbons, Environmental issues and pollution treatment. IFP Publications, p. 195.

Environmental Code 2001, Act No. 2001-01 of 15 January 2001 on the environment code, Decree No. 2001-282 of 12 April 2001 on the implementation of the Environmental Code, the Ministry of Youth, Environment and Classified Establishments, GTZ, 79 pages.

Delbecq 2009, Waste and Pollution Health Effects. In studies of ADEME, Paris, 47 p.

M. DIOUF, 2007, The Local Development Practices in Sustainable Urban agglomeration of Dakar, Case of NGOR District of Commune. ENEA Department of Land, Environment and Urban Management (ATEGU) End of study thesis, 190 p.

R.MBENGUE. 2010, management and environmental impacts of solid household waste in the City district of Ngor, Master Thesis 2 GIDEL, University Cheikh Anta Diop of Dakar, Department of Geography, 74 p.

A.G. Onibokum 2000 urban waste management: solutions for Africa, IDRC - Karthala, 238 p.

UNIDO, 1983 environmental protection in the context of the work of UNIDO, United Nations, New York 71 p.

M. Seck, 1997 Waste Management in Dakar, perceptions and environmental effects .These Doctorate 3rd cycle. UCAD-Department of Geography 310. P

C.Sidibe 2013, Articulate conventional and unconventional waste management in the Dakar region: a contemporary challenge. Master Thesis 2; Geography and Planning University of Maine-Le Mans-Laval, Faculty of Arts, Languages and Human Sciences, 105 p.

M. C. Chao 2011 Contribution to the improvement of urban solid waste management system in the municipality of Lomé: case Gbadago district, 51 p.

and Future [Accessed 20th September 2009] Available from World Wide Web:http://www.esd.worldbank.org/html/esd/agr/sbp/end/ngo.htm