

The Use Of Plastic Objects And Their Environmental Consequences In Bamenda II Subdivision, North West Region Cameroon

Marcel DOUMTSOP (Ph.D)

Lecturer (Ph.D.), Department of Geography and Planning,
University of Bamenda-Cameroon

Abstract: *This study is meant to examine the use of plastic objects (single use plastic diapers) found in Bamenda II subdivision and their environmental consequences. It also seeks to assess the various types of plastic diapers found either on the environment or in streams in Bamenda II subdivision. However, carrying out this research was for the fact that plastic objects in Bamenda II municipality is still of great concern despite the prohibition of some single use plastic bottle in Cameroon following law No 004/MINEPDED/ MINCOMMERCE of October 24 2012. Following the research carried out on plastic diapers, it indicated that the demand for their uses still increases as the population of this subdivision increase year in year out. Several types of single use plastic objects were identified. For single use plastic bottles we have HDPE (High Density Polyethylene), LDPE (Low Density Polyethylene), PET (Polyethylene Terephthate), PVC (Polyvinyl Chloride), PP (Polypropylene) and PS (Polystyrene). On other hand for single use plastic diapers which was the main core concern we have; Pampers, sweat baby, best baby, Huggies, sun free and others such a solfcare. All this constituted almost half percent of the municipality solid waste. However, form the field it was noticed that, this objects are of great implications to the Bamenda II environment and therefore recycling and the reuse concepts should be encouraged by the government, environmental agencies and the municipality itself to properly management their adverse Environmental consequences.*

Keywords: *Environment, Management, Plastics objects, Pollution, Solid Waste.*

I. BACKGROUND OF THE STUDY

Plastic objects are used all over the world today. Plastics objects refers to a synthetic material from a wide range of organic polymer such as Polyethylene Terephthalate (PET), Polyvinyl Chloride (PVC), and Nylon that can be molded onto shape while soft and then set into a rigid or slightly elastic form. Also, plastic objects can be defined as polymeric material that has the capability of been molded or shaped, usually by the application of heat and pressure. According to (Ferdinand Rodriguez.2021), there are five types of plastic which include the following: Polyethylene Terephthalate (TEP), High Density polyethylene (HDPE), Polyvinyl Chloride (PVC), Polystyrene (PS), and Low Density polyethylene (LDPE) away from plastic bottles there are

single use plastic objects such as diapers Which is going to be the core concern of this projects. Plastic objects today is one of the greatest environmental problem or is one of the major problem that the world is facing today. The amount of plastic objects found both on land and in oceans keeps increasing day in day out. The (UN.2018) stated that there will be more plastic objects in oceans than the fish by the 2050s. This plastic objects how ever has great environmental impacts of threatening aquatic and human life as well, blocks gullies and also destroys ecosystems this is according to (UNEP.2018).

The environmental consequences of plastic objects arise since the 1950s and this has kept increasing from then till today. As long as the population increases, the demand for plastic objects also increases. This has posed a threat to the environment not only in Africa but in Cameroon as a whole.

(Achu in 2017) made mention that plastic objects has become the main achievement of the twentieth century. Plastics are used for several purposes: cars, food packaging, juice, toys and hospital equipment. Since most of this plastic objects are single use, they are deposited at the dump site were wind and runoff carries them from one place to another thereby causing pollution (land and water pollution). Most of this plastic are eroded into oceans, lakes, rivers, reservoirs and canals which has a great influence on marine or aquatic live. They also block gullies which eventually leads to over flooding. The once on land impact human health negatively when there are burned and also since there are non- biodegradable, they instead break into smaller particles that makes telling difficult. In Cameroon non-biodegradable plastic objects are not produce but the use of this objects increases day in day out in Cameroon and in Bamenda II as a whole.

To make sure that these plastic objects are reduce, the government of Cameroon through the Regional Delegation of Environment, Protection of Nature and Sustainable Development (MINEPDED) and the Ministry of Commerce (MINCOMMERCE) signed a joint order prohibiting the production of plastic objects less than 61microns in diameter in October 2012 and this order became more effective in October 2014. Despite this bands, the use of plastic objects In Bamenda II Subdivision Is still pre-existing. This study therefore is meant to examine the use of plastic objects and their environmental consequences in the Bamenda II Subdivision.

II. STUDY AREA

Bamenda II subdivision is located in the North West Region of Cameroon, precisely in Mezam - Division. The precise location of Bamenda II falls geographically, between longitude $10^{\circ}-08'-0''$ to $10^{\circ}-12'0''$ East and latitude $05^{\circ}-55'-0''$ to $6^{\circ}-10'-0''$ N and covers a surface area of about 79.23 km². Bamenda II is bordered to the north by Bafut as its neighboring boundary, by Bamenda I and Bamenda III to the East, Bali and Mbengwi to the West, and finally Santa to the Southern part. Bamenda II Subdivision has the total population of about 184,277 people and with the total surface area of about 172.6/km² with the population Density of about 1.068/km² following the census that was conducted in 2005.

A. PHYSICAL ASPECTS OF THE STUDY AREA

a. ALTITUDE

Generally, Bamenda II subdivision is found in the Bamenda high Land, it lies directly at the foot of the Bamenda escarpment. Bamenda II is located on a plain at the foot of the escarpment with an altitude of 1220.00/ 4002.62m above sea level.

b. CLIMATE AND RELIEF

Bamenda II Municipality is a subdivision under Bamenda city and has the tropical climate. Like any other area of the North West Region, climate in Bamenda II subdivision is

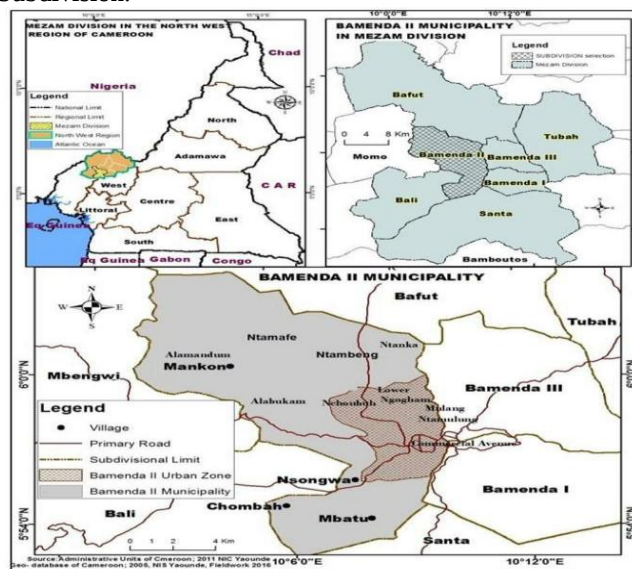
generally cold and pleasant with moderate temperature of about 26°C and the annual average precipitation in the raining season ranges from about 1700mm-2824mm with yearly fluctuation (Achi, 2000). This climate is very conducive and has given rise for settlements. The relief of this area is generally rugged with undulating hills, escarpment and plains .this relief has a hilly and Rocky structure. The topography is rugged with hills (superieur of 2000m altitude), steep slopes and u-shaped valleys (Morin, 2014).

c. HYDROGRAPHY

The mean annual river draining the town is a second-order perennial stream fed by several other small stream, most of which originate from the Bamenda escarpments. They form a dense dendritic pattern. The major winds affecting this areas are harmattan (that bring the dry season) and the monsoon (that bring rain). Rainfall is heavy and often destructive. The hydrological process includes surface runoff which divided into surface runoff and river flow. River water has currents that have enough energy to carry waste (Mua and Shende 2019).

B. HUMAN ASPECT OF THE STUDY AREA

Bamenda II subdivision has the total population of about 184,277 people. This population is engaged in farming and commercial sector activities. However, the commercial sector is the most dominant of all, most of the population are entrepreneurs of their own businesses created. This commercial and agricultural operation have contributed in improving the socio-economic conditions of the population. The figure below show us the location map of BAMENDA II Subdivision.



Source; Bamenda II council 2024

Figure 1: Location Map of Bamenda II subdivision

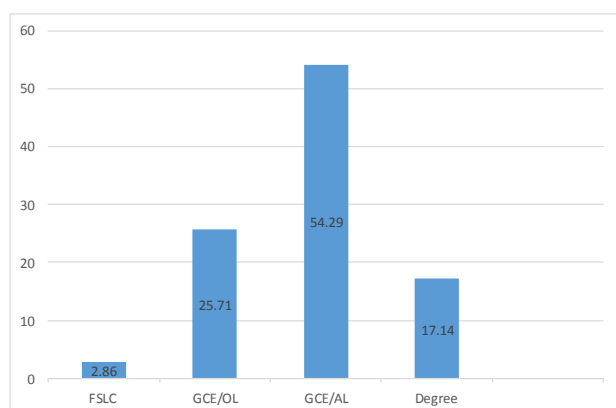
III. MATERIAL AND METHODOLOGY

The study was based on field surveys after consulting the documents dealing with the issue. 70 survey questionnaires were distributed in the neighborhoods of Bamenda II to residents using plastic objects, especially disposable diapers. The interviews were carried out with administrative authorities including mayor of the municipality of Bamenda II and the regional delegate of MINEPDED. Photos and surveys of the garbage sites were taken on smartphones using the GPS camera application. The information's obtained at NIS and CNI allowed us to complete the information on the field and produce the location map and the spatial distribution map of garbage deposits in Bamenda II. We also organized focus groups to appreciate and better understand the resident's point of view on the issue. For the cartographic work process is done using one main methods. This method includes, the GPS point inputted in the ArcGIS. It helps to produce the various dump sites or the exact location of the dump sites. Also, and absolute X, Y was used to create a point or the vertex using and exact X, Y location. With this process, we are able to detect the various quarters which are mostly polluted with plastic object.

IV. RESULTS AND ANALYSIS

A. LEVEL OF EDUCATION, MARITAL STATUS AND USAGE OF PLASTIC DIAPERS

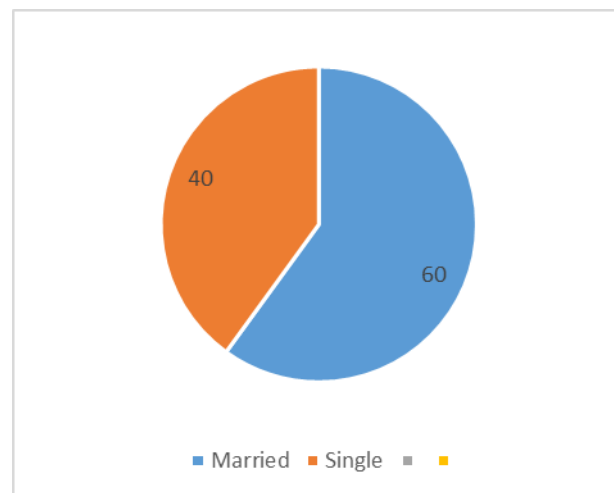
This however implies a low level of illiteracy, signifying that there is little or lack of sensitization to the population on the advantages of reusable plastic diapers over single use and the negative consequences or implications of these objects on the environment in Bamenda II subdivision. From the figure below, 2.86% of the respondents had FSLC, 17.14% were degree holders, 25.71% were holders of GCE/OL and 54.29% representing the majority are Advance level holders. From the above chat it can be analyze that majority of the population were advance and GCE holders followed by Bcs and FSLC. See figure 2 below.



Source: Field Work 2023

Figure 2: Level of Education

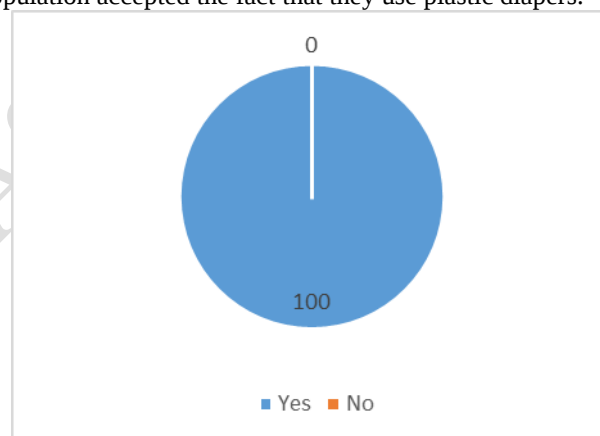
The figure shows that 60% of the respondents were married against the minority 40% that were single. Elsewhere, there was no divorce case or widow.



Source: Field Work 2024

Figure 3: Marital Status

In the field, it was noticed that the greater number of people who were using plastic diapers were mothers with children below 5years of age and a few population of the ageing. However, it can be analyze that 100% of the targeted population accepted the fact that they use plastic diapers.



Source: Field Work 2024

Figure 4: Usage of plastic diapers

Figure 4 shows the people who use plastic diapers.

B. TYPES OF PLASTIC DIAPERS USE AND NUMBER OF DIAPERS USED PER DAY

a. TYPES OF PLASTIC DIAPERS USE

The table below present information on the types of plastic diapers. From the above table, several types of plastic diapers were identified to be in use by the population. Some of them included: pampers, sun free, best baby, hunggies, sweat baby and many others. Information from the field shows that a greater number of population were using pampers with the percentages of about 40%. This indicated the best choice of diapers was pamper followed by best baby with 20%, sweat baby with the 14.29%. On the other hand the other types had 20% and sun free which with a 0% usage.

Type of diapers	Frequency	Percentage	Cumulative %
Pampers	14	40	40
Sun free	0	0	40
Best baby	7	20	60
Huggies	2	5.71	65.71
Sweat baby	5	14.29	80
Others	7	20	100

Source: Field Work 2024

Table 1: Types of plastic diapers Use.

b. NUMBER OF DIAPERS USED PER DAY

Based on the number of diapers used in a single day, table 3.2 above shows that 17.14% of the population sampled used two diapers and another 17.14% used five. 25.71% of the respondents used three diapers daily and 40% of them which represents the majority used four plastic diapers.

The analysis above explains the high rate of diapers increment in the various dumpsites in the Bamenda II subdivision. Analysis from the table above shows that, the greater number of diapers used per day was given to be four and also from the personal interviews with respondent it was realized that for a new born baby, 4diapers are used during the day and 4at night giving a total of about 8diapers for 24hours. This indicates that about 56diapers are produce in a week just for a new born without including the ones used by children of about 2months to 2years and the ageing. Added to that, it was notice that about 50% of the municipal solid was in Bamenda II subdivision was made up of plastic diapers and other plastic objects (single use plastic bottles and diapers).

Number of diapers	Frequency	Percentage	Cumulative %
Two	6	17.14	17.14
Three	9	25.71	42.85
Four	14	40	82.85
Five	6	17.14	100

Source: Field Work 2024

Table 2: Number of diapers used per day

C. REASONS FOR THE USE OF PLASTIC DIAPERS

Analysis from the above table shows that 11.43% of the respondents use plastic diapers because it is light in weight this means that they can be easily potable without any stress and easy to move with. 37.14% brought their reason that plastic diapers are user friendly and 52.43% used these diapers because they are cheaper to afford. Research observation and interviews signifies that a majority of the population prefer using plastic diapers because of it cheapness. They indicated that a diaper cost 100frs other than reusable diapers (napkin) which is a little expensive also, that these diapers are available everywhere and they could get it at any time and moment when needed.

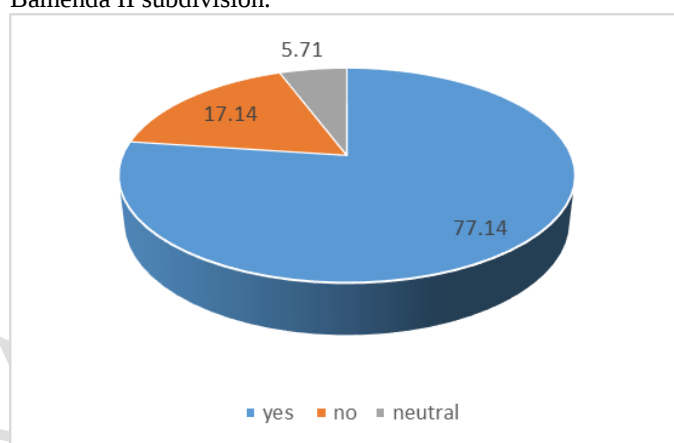
Reason	Frequency	Percentage	Cumulative %
Cheap	18	51.43	51.43
Light in	4	11.43	62.86

weight			
User friendly	13	37.14	100

Source: Field Work 2024

Table 3: Reasons for the use of plastic diapers

77.14% of the sampled population acknowledged that they are aware that diapers cause problems yet they still use it. 17.14% of them said they are not aware as opposed to the 5.71% which represents the minority that said they have no idea whether or not plastic diapers cause a problem. Some of this problems cause by plastic diapers where identify to be land pollution, water pollution and blockages of drains system. Disposable diapers are made of a combination of plastic wood pulp and other materials and they are designed to be thrown away after usage and thus has so many problems on the environment and the health of the inhabitants of the Bamenda II subdivision.



Source: Field Work 2024

Figure 5: whether diapers cause a problem

D. METHOD OF DIAPERS DISPOSAL.

Analysis from the method of plastic disposal shows that a majority of the inhabitants of Bamenda II deposit their used diapers at the dumpsite after usage. To confirm the information from the table below, some dumpsites were visited such as the savannah and the chongo street dumpsite in Bamenda II subdivision

Method of disposal	Frequency	Percentages	Cumulative %
Open dumping	19	54.29	54.29
Burying	13	37.14	91.43
Other	3	8.57	100

Source: Field Work 2024

Table 4: Method of diapers disposal

E. PROBLEMS CAUSED BY DIAPERS

Plastic object causes a lot of problems either to the environment (environmental pollution), on human health and on aquatic life's in water. Some Areas in Bamenda II subdivision such as the Savannah Street, the Chonjo's Street and many other are a victim to this problems because of poor disposition of plastic object or waste. Health problems and environmental degradation account the greatest problems caused by plastic diapers in the Bamenda II municipality

though blockage of drained systems was with a low percentage, it still a great problems caused by plastic diapers.

Problem	Observation	Percentages	Cumulative %
Health problem	13	37.14	37.14
Blockage of drainage	9	25.71	62.85
Environmental degradation	13	37.14	100

Source: Field Work 2024

Table 5: Problems caused by diapers

Health problems and environmental problems are the two most dominant issues raised from the use of plastic diapers with each having a percentage of 37.14. Blockage of drainage systems was another of the problems though with a representative percentage of 25.71. These plastic diapers turn to block drains systems such as gullies especially during a heavy down pour.

F. ENVIRONMENTAL DEGRADATION (POLLUTION).

Pollution is the contamination of land, air or water due to the influence of human activities. Pollution was identified to me one of the major problem posed by plastic objection in the Bamenda II municipality. Air, water and land pollution were identified to be one of the major problem posed by plastic diaper to the environment in Bamenda II subdivision.

a. AIR POLLUTION

Plastic object cause air pollution this is because when they are incinerated, the released toxic air which is a major pollutant including dioxins, furans, and volatile organic compounds (VOCs) which causes respiratory diseases and also results to climate change. Also the odor released from these object produce poor air quality which has greatly influence the inhabitant of Bamenda II.

b. WATER POLLUTION

From the field it was noticed that water pollution was another problem caused by plastic diapers in Bamenda ii subdivision. It was noticed that most of the used plastic object are not disposed properly which end up in water ways which harms aquifers and has contributed to water pollution especially around the Miss Ngen junction where we have a branch of the flow of river mezam. This water body has highly been polluted by plastic diaper resulting to poor water quality. Also, the absorbent minerals in this objects has contribute to the released of harmful substances such as sodium Polyacrylate into this water body which is a major pollutant. Added to that, the leachate of from this diapers to the water bodies which are the continuation of river mezam has greatly resulted to water pollution.

G. AREAS MOSTLY POPULATED WITH DIAPERS IN BAMENDA II

Area	Observation	Percentages	Cumulative %
Beaches	2	5.71	5.71
Parks	6	17.15	22.86
Waste dumping sites	20	67.14	80
Crowded residential areas	7	20	100

Source: Field Work 2024

Table 6: Areas mostly populated with diapers in Bamenda II

Some areas polluted by plastic object were visited such as the chongo and the Savannah street waste dumpsites and there it was noticed that almost 50% of the waste in these streets of Bamenda II subdivision are plastic object (single used plastic diapers which have been use and dumped there for several years.



Photo 1: The Savannah street waste dump site. Source: field work 2024

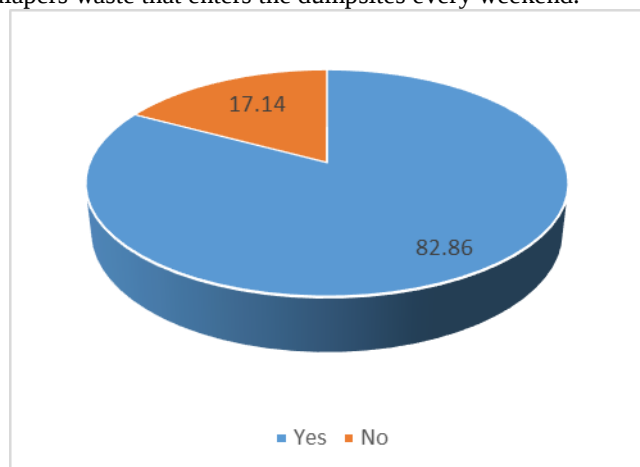


Source field work 2024

Photo 2: The Chenjo's street waste dump site in Bamenda II

Waste dumping sites are areas with the highest amount of plastic diapers with a representative percentage of 67.14. 20% of the population said crowded residential areas have diapers thrown around. 17.17% of them said diapers are commonly found in parks and only 5.71% spoke of beaches. Some of the most polluted dump site in Bamenda II subdivision were visited and Based on the observation above, majority of the population displace their diapers at the dumpsites which

indicates the increased in the percentage of plastic diapers found in every dumpsites that were visited in Bamenda II subdivision. This however shows the rate of environmental pollution in Bamenda II municipality following the quantity of diapers waste that enters the dumpsites every weekend.



Source: Field Work 2024

Figure 6: Awareness of the Environmental effects of diapers

The figure above shows that 82.86% of the respondents said they are aware of the environmental effects of plastic diapers as opposed to 17.14% which denied to be aware. It was observe that a greater number of the inhabitants of Bamenda II subdivision are aware of the environmental consequences of plastic object and yet still use diapers. This however indicates low level of sensitivity and campaign of environmental cleanups in this subdivision

H. SOURCES OF INFORMATION ON ENVIRONMENTAL EFFECT OF DIAPERS

The various source of information for the environmental effect of plastic object. It is certain that the greater source where people learn about the environmental effect of this object is in school meilures the subject environmental issues and developmental issues is thought. Secondly, television and newsletter is also another great source of provision valid information about the various polluted area. Also, professional, social media and great personnel have also been a great source for the environmental effect of plastic object (single use diapers).

Source	Observation	Percentages	Cumulative %
Television	7	20	20
Professionals	4	11.43	31.43
Social media	6	17.14	48.57
Published material	1	2.86	51.43
School	17	48.57	100

Source: Field Work 2024

Table 7: Sources of information on environmental effect of diapers

I. REASONS FOR THE INCREASE IN THE USE OF DIAPERS

Research done indicated that the use of plastic diapers is increasing day in day out this is because as the population keep growing rapidly, the number of newborns increases which results to a corresponding increase in the demand for this plastic diapers. Others indicated that this diapers are cheap, durable and available everywhere and at any time when need which account for the crease it use.

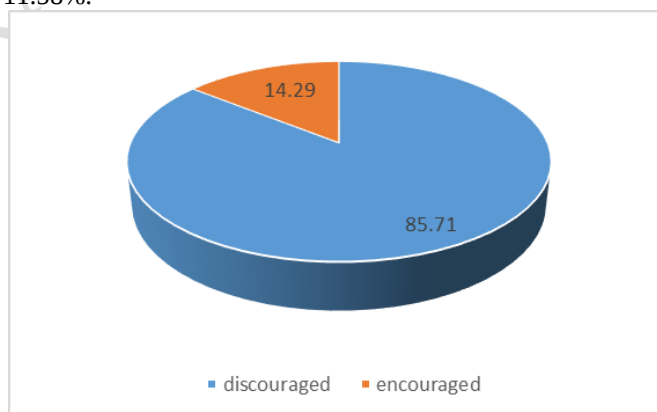
Reason	Observation	Percentages	Cumulative %
Cheap	10	28.57	28.57
Durable	4	11.43	40
Availability	21	60	100

Source: Field Work 2024

Table 8: Reasons for the increase in the use of diapers

Analysis from table 3.8 above shows that the main reason for the Increase in the use of this plastic diapers is because of it cheapness, which makes it affordable for each and every individuals. 28.57% of the respondent stood for the fact that plastic diapers are Cheap given that a diaper is a 100 FRS which the can easily afford.

Majority of the respondent stood for the fact that plastic diapers are available everywhere and at any time needed with 60%. This means that the main reason for the increase use of plastic diapers in Bamenda II subdivision is because of it availability. As opposed to the minority who said that plastic diapers are increasing in use because of their durability with 11.58%.



Source: Field Work 2024

Figure 7: whether plastic diapers should be discouraged or not

J. RESPONSIBILITY FOR THE EXTINCTION OF PLASTIC DIAPERS

Based on the respondent ideas to the questionnaires administered, it is the government that is in responsible for the extinction of single use plastic object. Though the government of Cameroon long banned single use plastic object is less than 61 microns in diameter, their use still increase day and night. Some proposed that Environmental agencies organizations such as the RD-MINEPDED can also be of great importance in the extinction of plastic diapers (non-biodegradable disposable diapers). The community of Bamenda II subdivision itself can also extinct single use plastic object by

(Carl Lehrburger 1991). Sensitization and cleanup campaigns should be organized by the local community of Bamenda II subdivision and environmental agencies or organizations to increase more awareness on the economic benefits of reusable diapers (biodegradable) and also on the negative implications of single use plastic diapers. Single use diapers and bottle producing industries should be completely banned and also a polluters pay should be imposed on any individual cut using single use plastic object.

Source: Field Work 2024

K. DISTRIBUTION OF DUMPSITES AND POLLUTED SITES IN BAMENDA II MUNICIPALITY

VI. CONCLUSION

[illegible]

Source: Field Work 2024

Figure 8: Distribution of dumpsites and Polluted sites in Bamenda II Municipality

In order to mitigate the environmental consequences of plastic diapers and other single use plastic object in Bamenda II subdivision , it is important to reduce their usage and to promote the use of sustainable alternatives such as cloth napkins which can be washed and reused or by using biodegradable dispensable diapers made by natural materials . This will reduce their adverse environmental consequences and will promote a more sustainable future for Bamenda II and its inhabitants. Plastic object such as diapers should be included as part of the municipal solid waste management program that emphasize waste reduction as the preferred option. However, the use of reusable diapers over single use is a great or a major reduction option that should be encouraged.

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