REFUSE DUMP AND WASTE DISPOSAL AS AN ENVIRONMENTAL PROBLEM (CASE STUDY: TUNGA AREA OF MINNA)

BY

ELETU MOHAMMED TAJUDEEN
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DEPARTMENT OF GEOGRAPHY,
FEDERAL UNIVERSITY OF TECHNOLOGY,
MINNA, NIGER STATE.

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CERTIFICATION

This is to certify that this research work has originally carried out by ELETU M.T, Reg, No PGD/GEO/2003/2004/297, and approved as meeting the requirement for award of postgraduate diploma in Environmental Management of Department of Geography, Federal University of Technology Minna.

..... 4/01/05

Project Supervisor
Dr P.S Akinyeye

Date

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H.O.D
Dr M.T Usman

Date

....

External Examiner

Date

....

Dean

Date

DEDICATION

This project is specially dedicated to my Brothers and Sisters.

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This project copy is a result of the effort and contribution of many people and organizations.

My sincere appreciation goes to my able and hardworking supervisor, Dr P.S Akinyeye who painstakingly went through the manuscript of this write-up, offering corrections and advises with ingenuity. Similar gratitude goes to other member of staff of Geography Department who also assisted me in one way or the other, especially the course coordinator, Mallam Salihu, Dr Halibu, the H.O.D and the host of others. To them all I say thank you !!.

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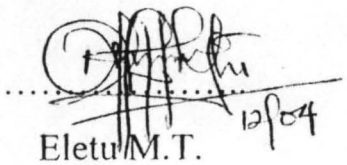
Above all, I am eternally grateful to Almighty God for his infinite mercies, guidance and strength, and to all my family and friends too numerous to mention, who offered words of advice and encouragement when needed most.

BLESS YOU ALL!!!!



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ABSTRACT

For decades, solid waste has been regarded more as a nuisance and private problem rather than as a major public problem requiring critical solution. Efforts are being made in the world today to control and managed the physical environment.

However one area which has not been given adequate attention in most urban areas of developing countries like ours, is detailed information about solid waste generation. Without adequate data on solid waste generation, no management planning can be done toward its disposal. This desire forms the basis of this study.

The study examined the existing solid waste management practice and the associated problem in Tunga area of Minna. Observations of waste dumpsites were also undertaken in other to assess the effect of uncontrolled waste disposal on the environment and man.

Domestic waste account for the greatest type of solid waste (about 60%) in the study area. The main method of disposal presently in use is open dumping.

This work concluded by making some recommendation towards more effective and environmentally friendly method of solid waste collection and disposal in Tunga area.

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CHAPTER ONE

1.0 INTRODUCTION:

1.1 BACKGROUND INFORMATION:

The need for better environmental management strategies in Nigeria grows with increasing urgency of the perceived environmental problems, and the progressive nature of the threats to sustainable development that these problem pose (Olokesusi, 1994).

Environmental management is not "management of the environment". It is management of the activities within tolerable constraints imposed by the environment itself, and with full consideration of economical factors (Beale, 1980).

However, the influence of man on the environment has brought about the struggle for survival. In the pre-historic period, little or no problem were imposed on the environment, but today the reverse is the case. Man's unguarded development and ineffective waste management especially in urban centers of the country have resulted in degraded environment and outbreaks of epidemics. This problem has progressive worsened judging by the trend.

Solid wastes are numerous and occur daily. Unlike polluted air and water, obviously does not move across the nation. Usually arises from mans domestics, social commercial, institution and industrial/Agricultural activities in increasing quantity and variety as a result of increasing population, standard of living, technological development, sanitation habit of the people and the general neglect of the population to environmental issues.

The world's attention is now focused on solving environmental problem. Solid waste been one major pollutants of the environment therefore requires proper management.

This study is carefully chosen to examine the past and present dumping sites and the mode/procedures of final disposal of solid waste in TUNGA Area, and to proffer better management.

1.2 DEFINITION OF BASIC CONCEPT:

Waste has been defined by various authors as "any unavoidable materials resulting from domestics activities or industrial operations for which there is no economic demand and which must be disposed off"

It must be regarded as useless, unwanted materials that arises from man's activities and not free flowing. Wastes come in variety of forms such as gaseous (e.g. carbon monoxide from car exhaust), liquid (e.g. sewage) and solid waste, also called REFUSE. Which consist of garbage and trashes.

Solid wastes are unwanted or undesirable product of life and range from leaves, animals' feaces, to metallic, plastic and chemical by product of manufacturing industries. Nowadays, solid wastes contains a lot of more papers and plastics materials, polythene bags, building debris, glass, tins, waste wood etc. (World book, 2001).

REFUSE DISPOSAL is the technique for collection and disposing of solid waste in a community.

1.3 STUDY AREA:

It is certain that every settlement must have a founder. The exact time and date people come to settle at TUNGA area of Minna is not really on record, but the period and the name Tunga could be traced out.

History shows that the First person to have live in the area was a leper named Tunga Dan-boyi, from whose name TUNGA was derived. This was dated back to early 50's. The choice of Tunga area by Dan-boyi and his entourage from Katsina was reported to be due to closeness of the area to the then Chanchaga Health-center, where there are leprologist that takes care of their illness.

1.3.1 LOCATION

Tunga area and its environs is situated at the Southeastern part of Minna town located at longitude 9*37 N and latitude 6* 33 E (Niger State Government, 1980 and

iloeje, 1981). It lies on a basement complex rock of mainly gnesis and magnetite situated at the base of hills to the North and East in an undulating plain (Lawal, 2000).

1.3.2 CLIMATE:

The areas enjoy a climate typical of the middle Belt zone. Annual rainfall is about 1334m (52 inches). The highest mean monthly rainfall occur in September with almost 300m (11.7 inches). The rainy season last between an average of 190-200 days. The monthly temperature is highest in March at 30.5*C (87*C) and lowest in August at 25.1*C (77*F)

Agricultural production is said to be viable in such climate condition and sub-humid nature of the area classified it as tropical wet and dry (Koppen, 1971).

1.3.3 VEGETATION AND SOIL:

The whole area lies in natural vegetation. The area is characterized by a predominantly woody and grassland scattered have and there. Typical guinea savanna vegetation composed of shrubs, few short tress, with grasses between the heights 1.5-3.5m. The trees have average height of about 16m. However, due to the population pressure of this area, human activities have fondly modified the local vegetation (Abba, 2000).

The area has mainly lateritic to sandy soil except along river channels, which has alluvial deposit. The soil has a fine texture, which relatively favours the growth of yams, Guinea corn and millet (Niger State Regional Plan, 1980).

1.3.4 LANDFORM / TOPOGRAPHY:

The area covered by this study is an area of low topography relief with intermittent hills. The highest points are the western part toward chanchaga with hills of about 250m above sea level and 60-70m above the country rocks (Minna: Master plan 1980).

1.3.5 LAND USE OF THE STUDY AREA:

Agricultural farming and cattle rearing were the major occupation of the initial settler in the area, this was attributed to the moderate climate condition of the area throughout the year and the fertile nature of the soil which makes agricultural productive.

Under this land use pattern, Flat to flat terrains are use to cultivate rice, maize, yams, guinea corn etc.

However, due to population growth and the rate of urbanization in the area, majority of the vast agricultural lands in the area have given ways to residential, commercial, public, recreational and educational activities.

1.3.6 POPULATION AND ECONOMIC BASE:

Tunga been one of the cosmopolitan areas of Minna. It covers places, which includes: Shiroro road via Niteco up to Low-cost area, Bay-Clinic road, Top-Medical and some part of the eastern by-pass road. The area has a predominantly living in the area are Nigerians of diverse ethnic, religious and cultural background. Among which are Gwaris, Nupes, Hausas, Tivs, Ibo, Yoruba, and Fulanis etc.

Although the study area is situated in an agricultural belt, it should be noted that agricultural land use has tremendously reduced, while commercial land use is rapidly developing due to the population up surge in the area. Owing to the serenity nature of the environment, hospitality businesses are very much alive. The area also accommodates private firm, state ministries and other government agencies. This explains why majority of the residents today are civil servants.

Other economic activities in the area include among others carpentry, metal works, poetry and livestock raising and trading in agricultural products etc. The implication of all these to the physical environment is the increase in refuse generation from these activities, couple with that of the domestic source which usually record the highest tones of wastes.

1.4 STATEMENT OF THE PROBLEMS:

Man generates waste as a result of his daily activities in a bid to maintain his means of livelihood to enhance and make his life comfortable. Waste generation by man has an adverse effect on the environment and subsequently on man himself.

Unplanned dumpsites are ugly sights; they produce in most cases bad, uncomfortable odour. Many of these dumpsites are close to residential areas and as such block drainage, takes up street (road) spaces, especially when unchecked. Pollution can also result from

burning of refuse, contamination of ground water as well as out break of epidemics such as cholera, and typhoid are some of the environmental problem posed by improper refuse disposal and mismanagement. Indiscriminate dumping also negates the aesthetic standard mental and social well being of man. It also abuse the tourism potential of any community.

1.5 AIMS AND OBJECTIVES

The study is aimed at contributing to the already existing body of knowledge about good sanitary environment and aesthetic. The study will also endeavor to examine and analyzed the problem associated with the mode of collection and generated waste disposal.

However, within these broad aims, the specific objective include:

- To determine the rate of waste generation in Tunga.
-To determine the effectiveness of final disposal methods as well as the frequency and efficiency of refuses clearance in the area under study.
-To educate the general public on the need to imbibed the culture of environmental sanitation and proper ways of disposing domestics' waste.
-To make recommendation for better and future plans on environmental waste management for a sustainable development.

1.6 SIGNIFICANCE OF THE STUDY/JUSTIFICATION:

Due to rapid urbanization and population growth in developing world, refuse disposal and waste management has becomes a major problem. Man's activities will always results in the generation of solid waste and its associated problems. Therefore effective refuse disposal and waste management is very important for a healthier and cleaner environment, for environmental sustainability.

In curbing the menace of refuse, garbage and other solid waste, Environmental management comes to be accepted as a nation wide programme. That is why, public enlightenment through, Bills, adverts on Radio, televisions were been used by various public agencies to check proliferous nature of refuse and garbage materials in our society.

How frequently and effectively the clearance and disposal is done is very important. Comparing different methods of disposal being practiced now will help determine their efficiencies and thus to know whether the management is better or not.

This study will at the long run serve as a reference material to individuals, NGO's and public institutions.

1.7 SCOPE AND LIMITATION OF THE STUDY:

The study focuses on refuse dump and waste disposal problems in Tunga area of Minna and also seeks to find a physical planning solution to the issue.

The method used to classified waste in the report was basically on land use and mode of generation.

Because of the sensitive nature of the topic as regard the health and general well being of the people living around the targeted area of study. Most of the respondents were skeptical of the whole exercise for the fear of being reprimanded.

The whole of the area could not be covered; hence questionnaires were used, and as of the time of writing this report some questionnaire were yet to be returned.

1.8 ORGANISATION OF THE THESIS:

The thesis was organized into five chapters; chapter one entails the general introduction of the research work, study area, statement of the problem, aims and objectives, scope and limitation of the thesis.

Chapter two contains the review of the literature from various writers on general information covering solid waste. Chapter three contains research methodology, chapter four is for the analysis of the data's and result obtained in the course of carrying out this research work.

Finally, chapter five gives the summary of the findings, recommendations and conclusion. Bibliographic reference and appendixes covering the research work were also included in this chapter.

CHAPTER TWO

2.0 LITERATURE AND CONCEPT REVIEW:

2.1 INTRODUCTION: -

Generally, waste is either an asset liability depending upon our attitude to it. Solid waste comprises countless different materials: Dust, food waste, packaging in the form of paper, metals, plastic or glass, discarded clothing and furnishing, garden waste, construction waste, factory offcusts and process waste, pathological waste, hazardous and radioactive wastes. To some because of it menace, waste is more of a liability. However the best and the most rewarding attitude to waste is to see it as an asset, with this kind of attitude, waste can be better planned and managed as a valuable resource for man's benefits.

Scholars have written extensively on environmental pollution and waste disposition in Nigeria and the World at large. The environment as essential resource for human survival makes us to believe that for man to survive freely and comfortably more than a few generations, we must examine man environmental relationship (Adetoyi, 1998).

Waste according to Olawande (1991), could be defined as the "collective name for all component parts of solid waste which include domestic, industrial and agricultural operation which may be found in human environment".

Berry etal (1974), calls it any unwanted thing that are injurious to human health or undesirable materials that originate from industrial, mining project, agricultural as well as from residential, commercial and municipal uses of the urban areas.

W.H.O (1971) sees solid waste as "any unavoidable materials resulting from domestic activities or industrial operation for which there is no economic demand and which must be disposed off".

World book (2001), also defined solid waste as unwanted and undesirable product of life which range from leaves, animals faeces, to metallic plastic and chemical bye-product of manufacturing industries etc, which are free-flowing / or not free-flowing.

All waste end in one of the two ways. It may be put to some useful purpose or it may be dumped. Of all types of waste, solid waste is the most problematic as it can be found

in our cities and towns littering the streets, obstructing roads and drainage, polluting the environment and constituting a public health hazards (Tom, 1995).

Waste management involves the prevention of the production of waste products, eliminating without danger of a non-recoverable residue and recycling and new use of waste. The appropriated weight, which for example ought to be given to each of the three methods approaches as prevention, elimination, recycling, depends on a comprehensive view of technical and economic considerations.

2.2.0 SOLID WASTE MANAGEMENT IN DEVELOPED COUNTRIES:

The issue of unsanitary environment is as old as human existence. It can be traced back to ancient times when man first started to coverage or congregate into tribes, hamlet, villages and communities. Such waste emanated from the human consumption pattern (Olakesusi, 1994). The situation was terrible in the medieval town as the waste generated led to the breeding of rats and the eventual outbreak of epidemics, which killed many Europeans in the 14^{th} century.

According to Ahmed (2000), modern technology is extending stress on the environment, breaking some vital link in the web of physical and biotic potentials processes that maintain the ecological system in which man lives. This new technology that bring such high productivity and comfort also destroy man's biological capital such as air, water and other part of the ecosystem that must be support him and all future generation.

2.2.1 THE UNITED STATE OF AMERICA'S EXPERINECE:

In most part of the world today, these are various ways solid wastes are being generated, collected and disposed. A survey conducted in United state revealed that 94% of the land disposed sites were inadequate and many states and municipality have made major strides toward uses of sanitary landfill or other improved processing and disposed practices, Richard (1985).

About 80 % of all community waste in the U.S is disposed by sanitary landfill. About 10% is deposited in open dumps and about 10% is incinerated, Richard,

(1985). Others disposed methods such as composting, salvage and reclamation takes only small portion of the total.

Table: 1 Types of solid waste in U.S.A

S/NO	Components	Percentage
1	Papers	50.6
2	Food waste	19.6
3	Metal	9.9
4	Glass	10.1
5	Wood	3.5
6	Textiles	3.5
7	Leather and Rubber	1.7
8	Plastics	1.4
9	Miscellaneous	0.2
	Total	100.0%

Source: Encyclopedia Americana Vol. 28

There are also other types of waste that because of their large size or origin, are usually segregated for separation handling. These items include automobiles, household appliances, furniture industrial metal scrap, demolition waste, manure from cattle feed lots, radioactive materials and power plant fly ash.

In the United State, the percentage capital production of solid waste has increased steadily to daily rate of over 10 pounds (4.5kg) per person. Include both industrial and residential wastes. This is equivalent to national total of about 360 million tons per year. This total includes 55 billion cans, 26 billion glass bottles, 30 million tons of waste papers, 7 million automobile and 100 million fires. In addition, 2000 million tons of waste is produced by agricultural sector and over 1,100 million tons are mining and mineral waste, Richard, (1985).

2.2.2 THE CURTIBA BRAZIL EXPEERINCE:

Each inhabitant of curtiba produces an average of 0.85kg garbage per day. The composition of this garbage is shown in the table below:

Table: 2 Type of solid waste in Curtiba

S/NO	Composition	percentage
1	Recyclable (metal, plastic, glass, paper)	35
2	Organic (food, agricultural bye-products)	30
3	Vegetation/Yard chipping (Branches, leaves, grasses)	12
4	Inert materials (woods, cloth, rubber, leather)	21
5	Hospital waste	2
	Total	100.0%

Source: J. Rabinovitch and J. Leitmann (1993).

The curtiba metropolitan area produces around 1070 tons of municipal solid waste each day, of which three quarter are generated within the city with the reminder coming from the thirteen neighboring municipalities. The department of street cleaning operates within the curtiba environment department and coordinate public and municipal waste collection. The collection has been contracted since 1984 through a public competition to a private company, LIDATER.

The city is divided into 98 waste collection sectors that have three pick-ups every week performed by 45 compacting lorries. Two special lorries collected 12 tons of waste dailies from 180-hospital and health center. These lorries are staffed by specially protected teams and use tanks to collect contaminated liquids.

In the central city, 28kg are swept manually every day by 415 LIPATER employees.60km are swept at least once in a week by six mechanical vans working in two slight. Three lorries with water tanks clean curbsides, sidewalks, the municipal public market area, street market areas, bus stops and other locations.

Non-recyclable garbage is taken to the caximba landfill, a 46-hectare area that was inaugurated in 1989. It was originally predicted that this landfill would be used for 15 years but with the implementation will have a much longer life. Hospital waste in buried in controlled septic tanks located in high areas of the curtiba industrial city. Limestone powder and a one-meter clay layer in sites that are far from any ground or surface water cover the tanks.

However, two innovative approaches to waste management programmes in curtiba were integrated into their All-clean project. This include the city wide "Garbage that is not garbage" programme, which consist of curbside collection and disposal of recyclable garbage previously sorted by households. The "Garbage purchase" programme designed specially for low-income area normally located along riverine valleys. Seek to clean up areas that are difficult for the conventional waste management system. J. Rabinovitch and J. Leitmann (1993).

2.3.0 HISTORICAL DEVELOPMENT OF SOLID WASTE DISPOSAL IN NIGERIA:

The origin of environment planning in Nigeria can be traced by the enactment of the town improvement ordinance in 1863 by the colonial government in Lagos. It was to control development and urban sanitation in Lagos (Ola, 1984). However, the first systematic environmental planning in Nigeria was the township ordinance NO 29 of 1917.

Another attempt to control refuse with the establishment of the Lagos planning ordinance of 1928 following the "Bubonic Plague" which broke out in Lagos in 1928. This was as a result of the unsanitary environment.

The Lagos executive development board (LEDB) was also established for the same effect, clearing refuses to restore sanity in Lagos. This was later transformed into the Lagos state development and property corporation (LSDPC), (Ola, 1984).

History also traced out that, traditionally in the early 1900's, solid waste disposal used to be sprayed over farmlands and after decayed used as manure on farmlands. It was later when population was increasing with more influx of people and more economic output, there come a system where by people were disposing refuse including industrial waste to the rivers and streams. They thought by then, water was the only reasonable way of transport both solid and liquid waste without having an effect on human health.

At the age of petroleum which us generally called age of petrochemical, water become more contaminated by industrial disposed like alkalis, chemical and organic acid etc that is not easy to purify by water. The volume arose to the extent that it became hazardous to the public and water produced was collusive and affect by many kinds of

disease. Despite this water pollution, primitive means solid waste disposals were and still being used in some sparsely populated areas.

To be candid, proper refuse collection and disposal has for long been an illusion in this country until in 1975 when act tagged "solid waste act 1975 " was passed by the federal government for which it assumed the role of solid waste collection, disposal and management. The act clearly stated the responsibilities of each tiers of government (Federal, state and L.G).

The prevailing situation of refuses collection and disposal in most Nigeria town and cities is still quite unsatisfactory. In many urban areas out dated methods are still being employed in disposing of human wastes, street are frequently littered with domestic garbage because inability of township authority to organized regular collection, disposal and extensive flooding is often experienced especially after heavy rains of the inadequately of existing storm water drainage systems.

A typical example is that of the "ogunpa" disaster that happen in Ibadan and 19th June 1980, which claimed many lives and properties. Other cases include that of Minna in September 1986 and the recent Lagos (victorial Island) episode of June 2004.

Household refuse collection is inefficiently organized at present in most Nigeria town and cities. A large number of house have no refuse bins and because of irregular collection by the township or health authorities who normally provide these services of refuse bins frequently become overall thereby contributing a nuisance and health hazard. Public refuse bins are uncommon and where they are provided, they are often on a state of neglect. The existing system consists mainly of open earth; as a result most solid wastes generated are seen littering the neighboring hood.

The main problem with refuse collection and disposal in this country is that the service is being left in the hand of local authorities who are lacking funds and qualified personnel for efficient operation and this result to the negligence of the service and concentrating more on other national programmes.

Lacks of road into many of the most densely populated section of urban area don't allow garbage collection vans access to the area. There is also generally failure of people to acquire the right attitude toward garbage disposal and thus join the system of having their

garbage regularly being collected by the authority instead of throwing then around their residential houses.

In 1975, a solid waste disposal Act established and federal government assumed a major role in solid waste disposal management. Under the act, the federal government became responsible for research, training, demonstration of new technology, technical assistance and grants for state, and their inter-state solid waste programmes. More so, the establishment of ministry for environment and FEPA in both federal and state. These agencies are to assume a greater role in finding ways in solving our diverse environmental problems.

Furthermore, Irabo (1991), said that there were other subsequent acts, programmes and policies on how sanitary could be attained in Nigeria. For example, in 1984, the environmental sanitation edict was enacted. The aim was to boost the moral of and citizens in the "war against filth and dirt's. In 1985, a sum of one million naira was earmarked as a price for the cleanest state, in demonstration government seriousness to salvage the deplorable condition of Nigeria environment.

The promulgation of National Policy on environment in 1988, again demonstration the conviction of government that the environmental problem of the country were serious enough to deserve a well focus national policies.

According to J.M Baba (2004), one of the goal of the environment policy is the enhancement of the human environment, which was to make human living environment conducive e.g. through proper garbage disposal, good sanitation at home and in public through provision of basic social services such as good drinking water, public toilet, good shelter.

2.4.0 NIGER STATE EXPERINCE:

Effort were made by past administrators in the state, in launching war against indiscipline and giving priority to solid waste management. Adequate funds and logistics were made available. However problem of waste began when the regime elapsed, which result to non-funding of the appropriate organization. Also leading drastically cut down, they're monthly subvention for this purpose there to indiscriminate dumping of solid waste in every nook and crannies of the state.

According to Francis falola (The Punch, Oct. 12 2004), that beside the serenity and quietness of Minna, the state capital. One of the major attractions especially to first caller to the city used to be its neatness. The city had on several occasions been adjudged one of the neatest in the country.

The state had in its fleet many refuse disposal vans managed by local government area with assistance from state government to embark on constant evacuation of the refuse to a dumpsite on the outskirts of the city. But today, the city is fast losing its past glory as gradually, this culture of cleanliness and good management of waste is being cast aside.

The state capital, has experienced continues increase in volume of solid, waste accumulation due to increase in population and coupled with uncontrolled and unplanned urbanization which has brought with it environmental degradation.

2.4.1 COMPOSITION AND SOURCE OF WASTE GENERATION:

Habitat (1986), observed that refuse from affluent communities contains large proportion of papers, polythene, plastic, metals and glasses, while the waste in low income communities are predominantly organic in nature.

Solid waste are generated from many different sources, they are naturally comprises an almost infinite variety of material, ranging in sizes from a speck of dust to a discarded automobile. The proportion of the constitute of solid waste collected at the disposal sites are virtually constant for a particular town and subject only to seasonal and long term changes although this could be upset by industrial deliveries.

Adedibu (1982), confirm that the phenomenon of waste generation is common to all communities and often leads to urbanization process, especially when both the natural and the migratory net gains are relatively large. Thus, man's activities on domestic, commercial and industrial processes produce some undesirable effects, which are pollutant of all categories.

According to Adedibu and Okekunle (1989), certain factors determined the rate and characteristic of waste generated. These include the level of economic activities, the pattern of consumption and the income level. To some extent culture, populations' size and the level of economic development.

However, personal income has been found to have the most significant effect on waste generation, this is due to its impact on individual consumption pattern. Also the rate of solid waste generation per capital increase as the standard of living improves (UNCHS Habitat, 1984).

Lester (1987),in his report says, "without population there would be no pollution and that pollution is the price of progress". Also that the spatial variation of socio-economic and demographic characteristics as well as the level of technological development of our environment has influenced waste generation effort.

Adedibu (1985),noted that the economic activity of any community will determine to a great extent the quality and type of waste generated by the people. In an agrarian economy for instant, the common type of waste are usually in the form of leaves, food remnants, harvest wastes among others. But in industrial economy, tin cans, plastic packages among others are common.

In as much as the generation of waste is inevitable, therefore the need to protect our environment becomes paramount.

Table: 3 Sources of waste generation:

Type of waste	General composition	General sources
Garbage	Waste from preparation of cooking, left over market waste from storage and sales of wares.	Household (kitchen), Restaurants, stores and markets.
Rubbish	Combustible paper, carbon unused paper, wood, rags.	Office, household, market
Ashes	Residues from fire used in cooking.	Kitchen, market.
Street trash	Leaf litters, corncobs, fruit peel etc.	Restaurants, stores, passer-by, food vendors.
Abandon vehicles	Unwanted cars, motor-cycle, and bicycle parts, wood logs	Roadside mechanics, lumbering activities.

Source: America public works Department (1968), Adopted from Akinjide

.Mabogunje (1974), further argued that the incidence of a population explosion in an area enlarges the sizes of households, and thus translating into heavy waste generations. Generally the source of waste generation is a function of many interacting variables.

2.4.2 COLLECTION AND DISPOSAL OF WASTE:

Economists see waste as that which is cheaper to throw away than to make further use of. This does not mean that waste is valueless; some of it certainly is not (Henstock et al, 1975). Unless recycline is possible, disposal is merely a question of relocation. Disposal level mean total disappointment but only transfer, from an inconvenient to a convenient site.

Leorenzen et al (1986) reported that the most important factor in determining the proper handling methods for a solid waste is the actual character of the waste and method that define the chemical and physical composition of the waste. All these are essential in ensuring that such material are treated, collected and disposed off in a manner that is protective to human health and the environment.

Traditionally, hand picking has long been relied upon as a collection technique to extract from the flow of refuse certain classes of large saleable items. As household waste disposal is by feeding animal with waste, where they are composed of food items and after separately from those that can not be consumed.

Today much interest has been shown in attempt to automate this process because of its health implications.

Two (2) important collection methods are now been employed in most Nigeria towns and L.G.A`s. They are the houses to house and the communal depot method.

The formal is been practiced in residential layouts and other well planned areas of the towns. Here, the collection crew enters each premises, take out the trash containers and bags and emptying them into the collection vehicles. The efficiently of this method, however is a function of the price to be paid by the residents of these areas.

Communal depots is more convenient and better affordable by vast majority of people under this arrangement, household discharged their waste as designated location

where there are storage facilities. Collection vehicles visit these sites at frequent intervals to remove the accumulated wastes.

A safe disposal of solid waste is a prequisite for sound waste for sound waste management practice. However, the existing disposal practice in Niger State and Nigeria in general leaves more to be desired. To this end different method of disposal is being employed.

Burning of waste is one method of solid waste disposal in most urban cities center, it is said that burning reduces the amount of waste to between 10-15%. Other sanitary method of waste disposal includes: sanitary landfill, incineration, composting, reclamation and recycling methods are not been practiced by many states in Nigeria due to lack of financial, technical and institutional capacities to manage and operate them effectively.

2.4.3: **PROBLEM ASSOCIATE WITH WASTE GENERATION**:

According to Ahmed (2000), man generates waste as a result of his daily activities in a bid to maintain his means of livelihood to enhance and makes his life comfortable. Waste generated by man, however has an adverse effect on the environment and subsequently on man himself.

Uncollected waste encourages the breaking of flies' cockroaches, rats, mosquito etc. These categories of pest easily transmit diseases that can greatly affect human health. Other pathogenic and epidemiological disease such as cholera, typhoid fever, river blindness, dysentery and diarrhea etc, can result from improper disposal and management of solid wastes.

Solid waste dumpsites are ugly; they produce in most cases bad, uncomfortable odour. Which leads to a discomfort and psychological imbalance to the people residing nearby or to the people passing through the area where the wastes have been dumped.

In most cases, many people dispose their waste in cities gutters, drains, streams and rivers. The waste material so deposited becomes clogged up and flooding result at the on set of a rainy season as the available waterways have been blocked due to the deposits.

Smog and /or air pollution results in places where wastes are being openly burns indiscriminately. The resulting carbon dioxide is usually destructive to both the human health and stratospheric ozone layer.

Waste deposits may constitute as an obstacle to free traffic flow in urban area. This type of situation easily results when wastes are deposited close to high ways. The waste grows in size and eventually takes up the roads.

Other negative environmental effects of solid waste are in the area of social economic aspect of a nation as it affects its tourism potentials and its aesthetic standard.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

This study was carried out to identify the various problem associates dumping of refuse, waste disposal and management, using Tunga area of Minna as a case study.

A reconnaissance survey (visual survey) of the study area was carried out in other to observe and study the physical characteristics element concerning dumping of refuse and waste disposal.

This also gives the researchers of the dumping sites, the mobility of the people and their activities around the sites.

In the course of this study, two (2) procedures were employed for systematic collection and analysis of necessary data. These procedures are Data collection and technique, and Data analysis.

3.1 DATA COLLECTION AND TECHNIQUES:

The vital aspect in any research work is data collection, and the method used in the gathering of this research materials gives credence to the success of the research. Data collection is a tedious process that consumes a lot of time and money. The process of data collection is even more difficult where no prior data exist or no research has been carried out before on the research topic.

Various approaches were used to collect data in this work. The researcher used both primary and secondary data in addition to other research instruments used in descriptive survey studies.

3.1.1 SOURCES OF DATA:

(i) PRIMARY DATA:

The primary data were based on the use of carefully formed questionnaires and personal interviews. This questionnaire was structured in such a way that respondents can easily respond by ticking from the alternatives given to each question items.

Two types of questionnaire were developed and administered to residents of the study area and the officials of the body responsible for collection and disposal of solid waste in Minna.

The secondary data were gathered from the brochure, FEPA's operational manuals, and guidelines and lectures notes, symposia, textbooks, journals, unpublished materials, Newspapers etc. Other appropriate literature on solid waste management were also sources and reviewed in chapter three (3) of this report.

It is however, envisage that in future more response will be gotten from the public in form of public awareness campaigns, write up, workshop etc, to afford future researchers with adequate secondary data for use.

3.2: SAMPLE SELECTION:

It is impractical if not possible, within the limit of time and finance to take on research work of this magnitude covering the whole Tunga area of Minna. A deliberate selection of representative areas for the purpose of this research was done with respect to peculiar antecedent of waste generation in such areas.

Based on this premise Tudun Wada, Anguwar-Kutare, Anguwar-Maje, Aero- Park, Kolawale, Top-Medical and N.S.T.A. garage area where chosen as settlement that compose of the affluent and provirised member of the society. Their waste generation, collection and management system seem to be take the same pattern with other settlement in and around the study area, that have similar economic prospect and living standards. Were chosen as one of the sample representative areas. The data obtained adequately represent what exist in different settlement of the study area.

3.3 INSTRUMENT OF DATA GATHERING:

For this research work to be carried out successfully, apart from using questionnaire the researcher had to conduct comprehensive personal oral interview with the staff of the responsible for waste disposal in the area. Owing to the nature of the study, it necessitated the researcher to visit the various dumpsites within the area of study.

The interviews were designed to successfully come up with solution to the following investigation.

To find out the method of disposing solid waste.

To identify problems associated with waste collection and management.

- The experience of local government council and NUDB in solid waste collection and management.

3.4: RELIABILITY AND VALIDITY OF THE INSTRUMENTS:

The reconnaissance survey result obtained prior to the administration of questionnaire to the respondent, was used to ascertain the strength of reliability of the instrument. While the validation of the questionnaire was consciously ensure by taking expert views from the department of Geography F.U.T Minna.

3.5: LOCATION OF MAIN DUMPSITES:

The study sought to identify the location of main or official dumpsites. These dump sites are collection center for refuse from households, stores and other establishment such as restaurants, bars etc. The sites are usually open and easily accessible.

The researcher also identified some other large heaps of refuse sites not designated as official dumpsites along Kolawole road, School of midwives junction road, Tunga market area etc. All within the study area.

CHAPTER FOUR

4.0: DATA ANALYSIS:

This segment entails the result analysis and discussion of all the findings.

However due to the nature of the research work, data available to the researcher are both narrative / descriptive and statistical forms.

Both were used in the analysis of data since they complement each other.

4.1: METHOD OF DATA PRESENTATION:

As earlier stated in the write-up, a total of one hundred and ten (110) questionnaire forms for both the people living in the study area and the body responsible for waste management in the town (Sanitation unit, Health Department and NUDB) were sent out for administering. Only seventy eight (78) forms were successfully attempted and returned.

In the analysis of data, a simple frequency and percentage were used in the presentation of the results.

4.2: SOURCES OF SOLID WASATE IN THE AREA:

Table 4.1 Source of Solid Waste.

	Tudun Wada	A	Tundun Wada	B
Source of waste	Frequency Distribution	Percentage (%)	Frequency Distribution	Percentage (%)
Domestic	18	60	18	52.94
Commercial	9	30	14	41.18
Institutional	3	10	2	5.88
TOTAL	30	100	34	100

Source: Field survey 2004.

On the waste composition in the area of study, the finding from the field survey on the table above reveals that 27.5% of the refuse generated are made up of leaves and food reminants, papers and polythene recorded 53.6% of waste generated, plastic recorded 14.5%, while ceramics and metals scraps represent the remaining 4.4%.

Kaduna metropolis

The level of income of the residents usually affects composition of the waste. Though Tunga area residents can be termed as low and middle-income earners. The use of polythene and papers in both domestic and commercial activities is high. The table above reveals that.

4.3: METHOD OF WASTE STORAGE

Table 4.2 Table of Storage of Facilities.

Type	Frequency Distribution	Percentage (%)
Bucket/Baskets	21	29.17
Sacks	15	20.83
Drums	8	11.11
Pile on floor	28	38.89
TOTAL	72	100

Source: Field Survey 2004

The method of storage of waste in different household from the table above shows that respondents use sacks, drums or Bucket/Baskets to store their waste.

Contrary to expectation, about 40% of the total respondents dump their refuse on the floor, especially people living in and around ~~Anguwar Kutare and Maje area.~~ Chikun, IGabi and Kaduna North

On the hygienic nature of the storage facilities, survey reveals that the residents leave their refuse bins exposed (not covered) to the environment. The storage facilities are also inadequately in the commercial area of the study area, where it was believed that lots of waste materials are been generated.

4.4: WASTE COLLECTION:

Generally speaking, the responsibility of waste collection lies with the communities, Local government Authority and State government etc.

From the survey findings however, of all the ~~seventy-eight~~ Three hundred & ninety nine 399 (78) respondents, 60% indicate that once the refuse is taken out of the household to a dumping sites it becomes the responsibility of the government (i.e. sanitation unit, Health Department) to collect the waste. From their responses they further affirmed that it was a social service expected to be provided by the government in any community.

The survey also reveals that there is no order waste collection in the town. Many official-dumping sites allocated by the local authority have been ignored. Any available open space or plot of land owned by individual for future residential development purpose is now been used as refuse dump. This is however causing a lot of untidy nature of these dumps and the public health danger associated with them.

The study also reveals that most of the respondents ~~on Low-cost and other part of the Tudun-Wada A,~~ Kaduna South and other parts of Chikun, have either household members collecting their refuse for them or employs the service of private waste collecting firms.

Most of the respondents in the mention area are either paying or are willing to pay between #200 and #500 monthly for their wastes.

The finding is not surprising, as these areas are inhabited by the affluent and educated people who appreciates the ideals of sanitation and can afford to pay the price correspondingly.

From the data gathered in the course of this study, it is obvious that the dumping sited are not many and those provided are sited very close to the residential area. It was also observed that the management programme does not include recycling, land filling sites due to cost and also no incinerators. The structure used for the collection of these refuse are no longer in place. Some of these structures have been destroyed due to lack of proper attention.

4.5: DISPOSAL OF SOLID WASTE:

Survey reveals that the equipment and personnel being used at present to collect refuse from all dump in the area of study are not adequate and the existing are not of services to achieve the high frequency of refuse disposal.

The method adopted by the people in disposing includes burning and dumping in the drainage. The refuse and gathered around the dumping site and burnt.

During the application of this method, pollution of the air around the town is usually observed.

Table 4.3 Method of refuses Disposal by household:

Method	Frequency Distribution	Percentage (%)
Packing and Burning	20	31.25
Open dumping	32	50.00
Dumping in Drainage	9	14.06
Others	3	4.69
TOTAL	64	100

Source: Field survey 2004

The above table shows various methods employed by household in disposing their refuse.

From the table 31.25% of the respondents' dispose their refuse by packing and burning, 50% of the respondents disposed their waste by open dumping, 14.06% dump their waste in drainages. While some other 4.69% uses other means of disposal.

None of the method above is free from associated health hazard. Burning causes pollution and can also pollute the atmosphere with odours emitting from the decaying organic component of the waste, which also attract disease causative agents like rodents and flies. Open dumps as well as polluting the underground water.

4.6 PROBLEM ASSOCIATED WITH SOLID WASTE MANAGEMENT IN MINNA:

There are several problems militating against effective solid waste in Minna. These problems are multidimensional ranging from administration, political, technical and financial problems.

LAW:

There are weaknesses in the Niger State public health law (Amendment) Edict No2 of 1984 that backed up the bodies responsible for solid waste management in Minna. Investigation reveals that there are lapses in the implementation of the provision of this law. Economics reason has weakened the implementation of the provision of section 1 of this law; as many households cannot afford to buy refuse bins for the collection of waste. Also in Section II, III and IV, the fees or fine contained there in are too meager to make any impact on the offenders.

AGENCY:

The rapid rate of urban and rural development has placed a greater burden on environmental sanitation management. The small size of the task force has been stretched to limits in its effort to maintain a clean environment. Despite the efficient and effective functions of the sanitation unit of the municipal council, there are still inadequacies in the execution of their functions. Some of these lapses includes, lack of proper routine inspection by the officers to identify nuisance that are injurious to health.

Lack of proper inspection of household in relation to refuse storage and disposal in the town. There are also laxity as a result of administration bureaucracy and political reasons where officers find it difficult to challenge or report other officers' weakness in the performance of their duties.

FINANCE:

The role of a sound financial base is a pre-requisite for any organization to survive and carryout its functions in order to realize its set objectives. Money is needed to pay and maintain workers, purchase of specialized equipment in sufficient number needed for effective waste management agencies annually has been drastically cut down over the years.

MANPOWER:

The number of trained environmental officers whose responsibility is to ensure effective coordination of the management system and general inspection of the town is also grossly inadequately (see table 4.5).

Table 4.4 Staff strength of the sanitation Unit:

S/NO	Capacity	Total Number
1	Chief Environmental Officer	3
2	Principal Environment Officers	15
3	Health Attendants/Read Cleaners	130
4	Drivers	6
	Total	154

Source: Field Survey 2004.

As at the time of this survey, the unit had a total number of 154 staff out of which about 35 were posted to the sanitation department of the unit (i.e. Duba-Gari). Based on the analysis carried out on volume of waste generated couple with the increased population of people living within the area of study, more lands are needed to carry out the demanding exercise effectively.

ROAD, EQUIPMENT AND OTHER INFRASTRUCTURES:

In order to facilitate refuse collection, good access road to premises is an asset. This will enable bins or bags to be directly emptied into collection trucks. However many areas of the municipality still suffer this inaccessibility. Few collection points available in the areas are not logically and strategically located. The distance of the collection point to the point of refuse generation is very far, this has led to open dumping of waste on any nearby available open space.

Lack of collection vehicles for effective collection and disposal of refuse has also been identified as one of the major constraints toward effective management of solid waste.

CHAPTER FIVE

5.0 SUMMARY, RECOMMENDATIONS AND CONCLUSION:

5.1 SUMMARY AND FINDINGS:

Refuse/waste generation, disposal and public health has being tropical environmental issues that has generated a lot of interest among environment experts in developing countries of the world.

The eight (8) weeks long surveys, observations, interviewing and administration of questionnaire on the topic **REFUSE DUMP AND WASTE DISPOSAL** as an environmental problem, has broading and further enlighten the researcher on the various ways in which refuse/waste are being generated, collected and disposed in Tunga area of Minna.

The following therefore forms the summary of research findings based on a thorough understanding of the problems and prospects in the area: -

1. The study examined the existing solid waste management practiced and associated problems, land use and the population of the study area and its environs. The study reveals that the area is made up of residential, commercial, public and semi-public, recreational and educational land uses. Agricultural land is not classified among urban land in Tunga area of Minna. Presently, there is tremendous reduction of agricultural land while commercial land is rapidly developing due to population upsurge and educational activities within the area.

   This is seen to have put undue pressure on the existing sanitary condition of the area, thereby contributing to the present deplorable condition of the environment.

2. Several factors determine the extent and the type of waste generate. These factors includes population size and density, cultural habits of the people, there level of affluence and land use characteristics. The amount of domestic waste keeps increasing in relation to the rapid growth of urbanization and the population in the area. The increasing income of the people also cause an unprecedented rise in their in their purchasing power. The survey shows that about 60% of the wastes so generated in the area are from domestic source, while papers and polythene account for over 53% of waste constituents in the areas (see table 4.1 and 4.2).

3. Method of pile ling on the floor is widely used to stored refuse especially in high density and low-income areas. About 40% of the respondents fall into this category. Other forms of household storage containers used in the area include Basket, sacks and drums. Given the relatively high cost of some of these storage containers (e.g. Drums). It is not surprising that their users were mainly resident of high-income area of the study area.

Research also revealed that few respondents are willing to pay up to #500 per Month for collection of their refuse.

4. The disposal strategies are the most sensitive aspect of this research studies. It really involves the collection of waste from refuse depots and containers, transportation of waste to their final disposal point. The research revealed that open dumping is the most common method of final disposal in Minna and that most of the collection points in the study area are illegal. Also in term of location, they are not readily accessible to collection vehicles.

5. Study also reveals storage and inadequately of facilities used in management of solid wastes. Only two (2) refuse Van is functioning out of four (4) available. This problem couple with other handicapped such as lack of trained manpower and finance has limits the number of time and frequency of evacuating refuse from the depot to one or twice in every two to three months in the study area.

6. The survey has found out that many people especially those within the core area are ignorant of the effect indiscrimate refuse disposal has on their health. Most roads, street and drainage are littered with waste thereby making the environment unsightly. Some drains even get blocked as a result of dumping of the wastes. It was also observed that uncollected waste encourage the breeding of flies, cockroaches, rats etc. these categories of pests easily transmits disease that can greatly affect human health and pollute the source of water supply to humans.

Most of the unofficial dumping sites constitute eyesores and produce bad odours. There is also no incinerators, no treatment of waste before final disposal except medical waste, which are burnt or buried in the ground. The management programme does not include recycling, and land-filling sites due to cost and that not all waste management practical before there can be efficient waste management.

5.2 RECOMMENDATIONS:

Having had an in-depth study of the problem of solid waste management within Tunga area of Minna, ranging from its generation, collection and subsequent disposal and after a careful consideration of the options available to individual and government.

Thus the following measures have been suggested as a panacea to the problem of waste menaces that parade most Nigeria cities.

1. Waste collection and management authority in the state should be properly reorganized. Part of their responsibilities should include the creation of dumping sites for different categories of waste such as biodegradable and non-biodegradable. This typed of development will allow waste that can be recycled, observed, monitored, saved and used for new sets of raw materials. This will also go a long way in encouraging companies that depends on the recycled materials.
2. Agencies involved in the management of solid waste should be effectively be equipped with tools and there should be involvement of private organization participation. Enough funds should be made available for these agencies to effectively carry out there function adequately. In addition there should be enough manpower both technical and otherwise. Staff welfare should be given priority by the government because this is a job most Nigerians would not do to earn a living especially the labour aspect. Improved welfare scheme would attract people to the job.
3. There must be renewed and conducive working relationship between the local/community arm and the state arm of agencies responsible for solid waste management as well as other related organization (e.g. NGO's). Further more, Geographers, planners, Engineers and others workers in the area of health should be encouraged so as to provide workable methods, for effective and efficient waste management and formulation of environmental laws.
4. Government should buy refuse bins and sell at subsidized rate to the residents of the town, for onward storage and collection of their waste. House to house collection of refuse should be intensified to avoid or reduce indiscriminate dumpsite and uncleared heap of wastes.

5. Massive enlightenment campaign to re-awake the sanitation consciousness of the people is to be embarked upon jointly by all the relevant agencies that are involved in waste management. This can assume the form of mass media such as radio, television, Newspapers, magazines, workshop and seminars etc. A dimension to this is to float on environmental educational programme with a focus on waste management.

6. There is also the need for environment control standards as an abating measure. Such standard imply that the community is willing to bear certain costs or to enforce those costs on others to maintain its surrounding at a given level of quality. Alternatively, a committee should be put in place and changed with the responsibility of collecting sanitation fees, create refuse dump sites, monitor the behaviours of refuse disposal and impose sanction on defaulters of these regulations. This type of development is capable of sustaining an environment standard.

Generally, these measures are bound to succeed if the entire citizens comply with the suggestion religiously. Also if there populace equally make themselves amenable to future changes on environment laws and regulations.

5.3 **CONCLUSION**:

The problems of waste generation, collection, disposal and management have underscored the need for re-evaluating the basis for delivering modern service efficiently in urban center. It is the believe of all that everybody has an important part to undertake in this re-evaluation. To avert disaster is to avoid disaster, therefore careful planning and management of the expanding life support system I most of the urban center are very crucial if the environmental crisis is to be ameliorated.

The most important factors in determining the proper handling methods for a solid waste is the actual characteristics of the waste.

Method that define the chemical composition and physical characteristics of a waste is also essential in ensuring that such materials are treated or disposal of in a manner that is protect of human health and the environment.

The findings of this research work also agreed with Egunjobi's (1985), observation, that we must not underestimate the role of habits, and altitude of the people, hence the need for awareness. To this end, the researcher is of the view that ignorance, habit and

altitude of the people account for the food materials, cans, polythene, plastics and papers that litters the environment. Other factors include social-cultural and educational background of the inhabitants

It is therefore the submission of this study that the information gotten from this work will in no small way help in solid waste generation, evacuation and disposal. The citizens must be educated and enlightened on the need to keep our environment clean at all times. Appropriate recommendation have been made which if implemented will solve the problems of solid waste in the long run. Seeing solid waste management as a high priority sector will alleviate the financial and other administration inadequacies in the management of solid waste.

Lastly, living in a healthier and cleaner environment would bring about sustainability of life and the environment in general.

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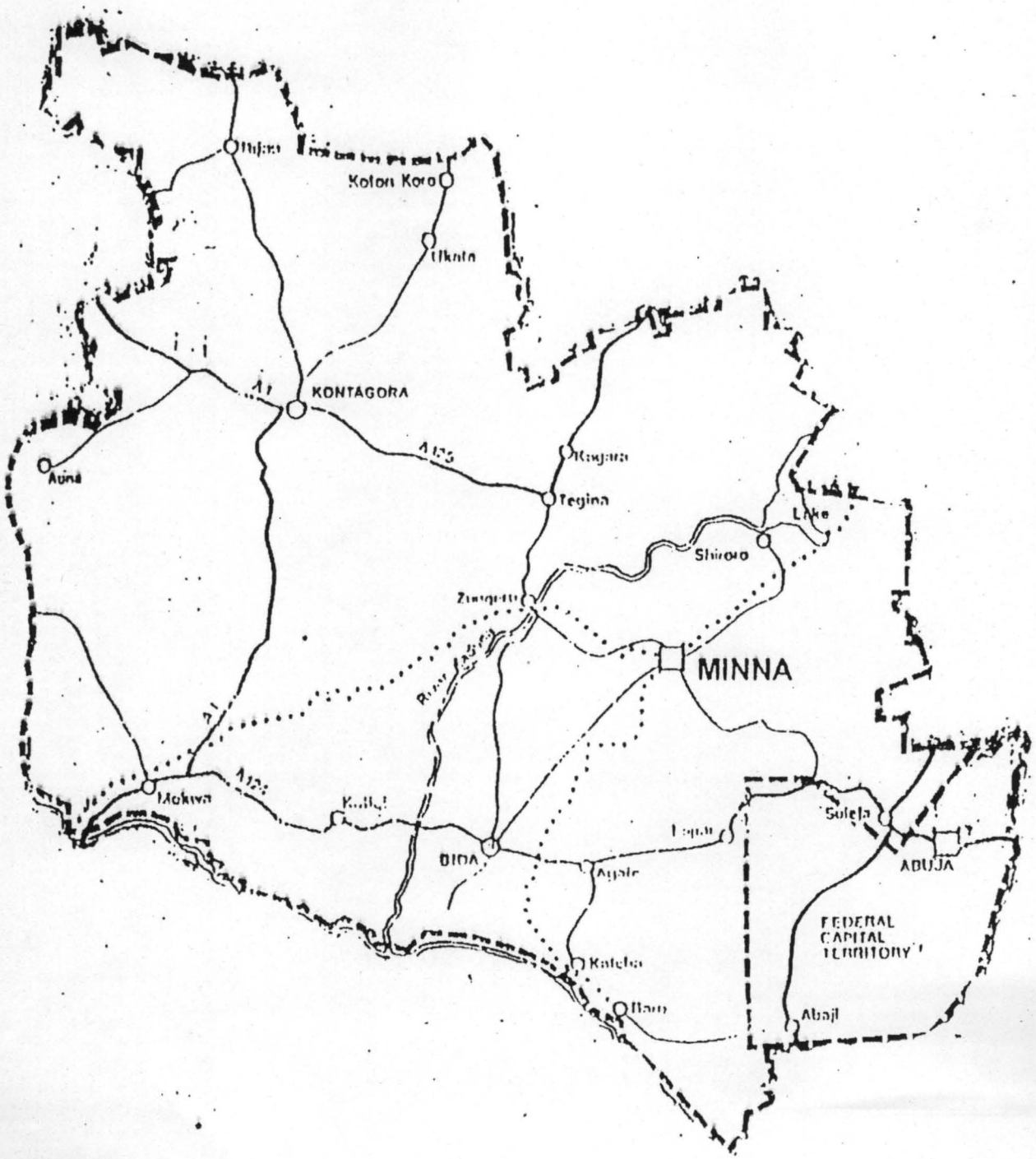
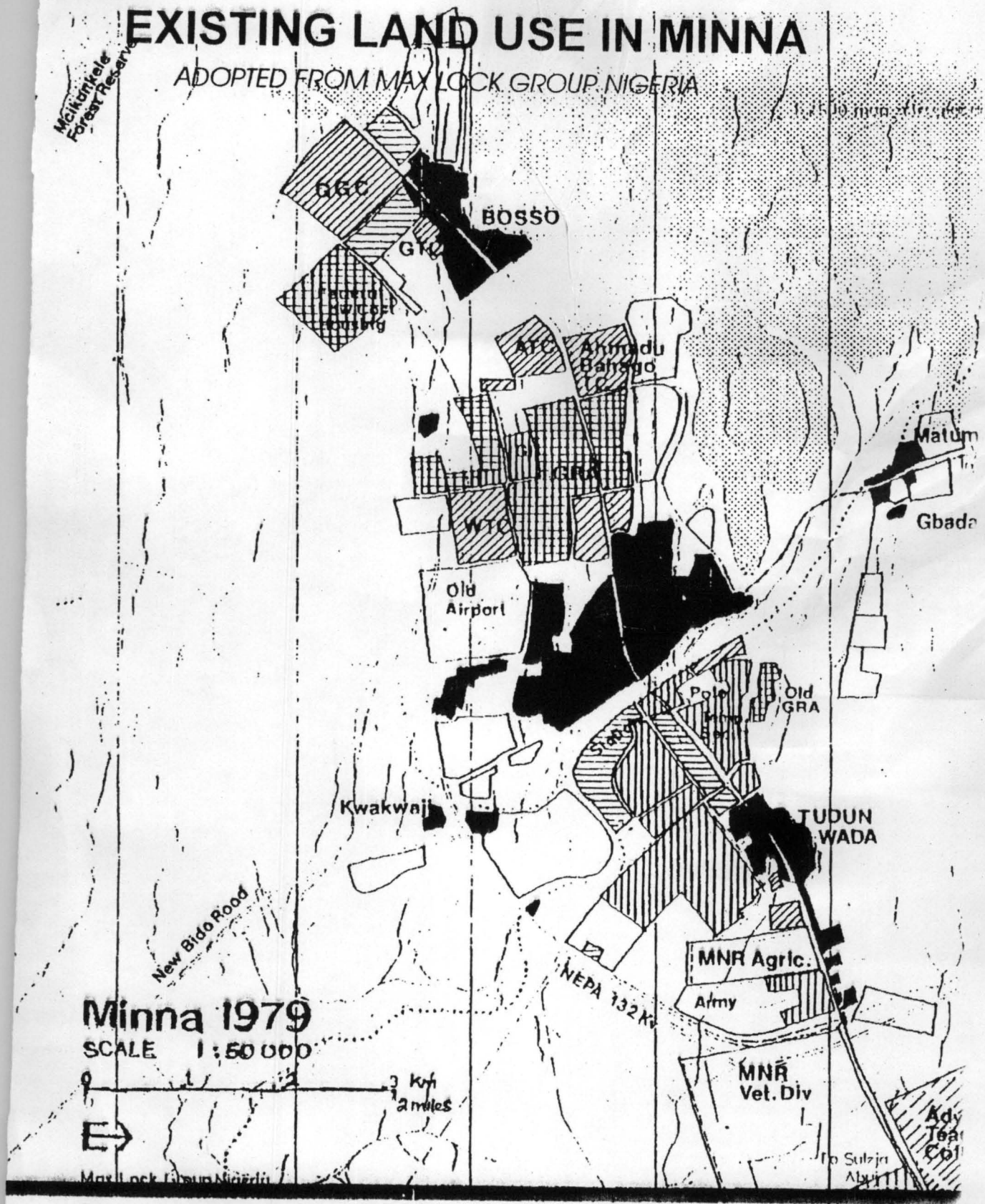
MAP OF NIGER STATE

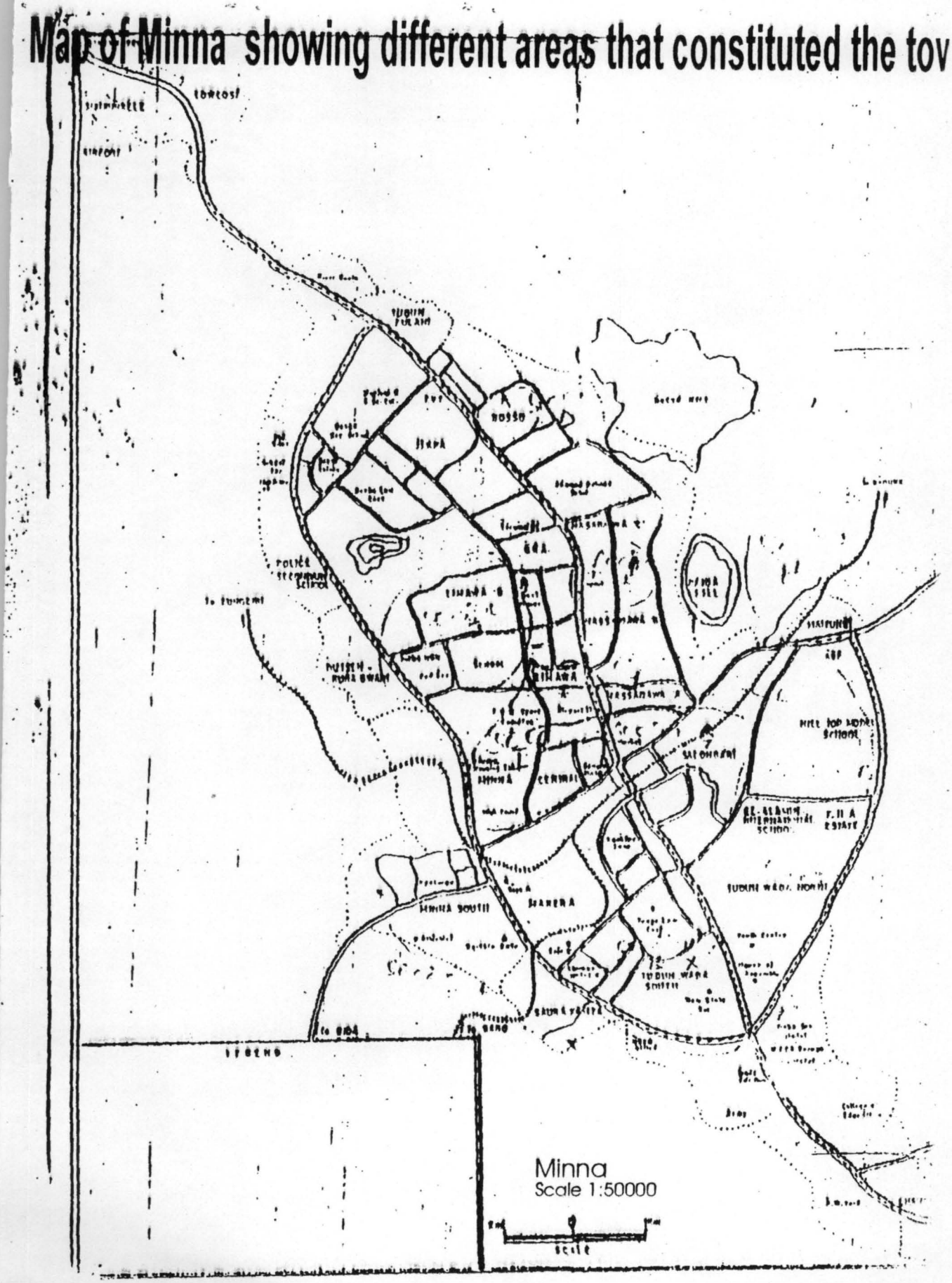


MINNA IN THE CONTEXT OF NIGER STATE

Topic: Refuse dumping and waste Disposal as an environmental problem


EXISTING LAND USE IN MINNA
ADOPTED FROM MAX LOCK GROUP NIGERIA
Minna 1979
SCALE 1:50 000
3 Km
2 miles
Max Lock Group Nigeria
Existing Land Use
Mainly Residential: High Density
Low Density & Existing Layouts
Future Layouts & Allocated Land
Institutions: Education
Government
Utilities & Commerce
M Market
Land Over 1,000 feet
Minna L.U.S.
GGC
BOSSO
GTC
ATC
Ahmadu Bahago
GRA
WTC
Old Airport
Old GRA
Kwakwaji
TUDUN WADA
New Bido Road
NEPA 132 Kv
MNR Agric.
Army
MNR Vet. Div
Gbada

Map of Minna showing different areas that constituted the tov



Appendix I

SCHOOL OF POST GRADUATE

DEPARTMENT OF GEOGRAPHY

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA.

Questionnaire: For the body responsible for collection and disposal of refuse in Minna.

Organization: _____ **Date**: _____

Research Topic: REFUSE DUMP AND WASTE DISPOSAL As an environmental problems.
Case Study: TUNGA AREA, MINNA.

A research work is proposed to be done on the above topic in pursuit of postgraduate Diploma. The aim of this preliminary survey is to obtain useful information needed for the success of the research.
Therefore, your candid response to the inquiries is highly solicited for, as well as your co-operation for the next stage of the study. All information obtained would be treated with strict confidence and only for the purpose of the research.

INSTRUCTION:

(A) COLLECTION POINTS

1. How many collection point do you have in Tunga Area of Minna? _____

2. What is the nature of the collection point?
   (a) Enclose ( ) (b) Open ( ) (c) Walled ( )
   (d) Others (specify) _____

3. Where are the collection points located?
   (a) Along the streets/road ( ) (b) Within planned space ( )
   (c) Within accidental open space ( ) (d) other (specify) _____

(B) VEHICLES

1. How many vehicles do you have for refuse collection? _____

2. What type of van or refuse do you have? _____
   (a) Trucks ( ) (b) Tipper ( )
   (c) Tractors ( ) (d) others (specify) _____

3. What is the carrying capacity of each van? _____

4. How often do you go out for refuse collection?
   (a) Daily ( ) (b) Weekly ( ) (c) Monthly ( ) (d) Other _____

5. What are the problems encountered during collection?

_____.

(C) DISPOSAL SITE

1. How do you finally dispose refuse after collection?
   (a) Landfill ( ) (b) Ordinary Dumping ( )
   (c) Composting ( ) (d) others (specify) _____

2. How many disposal sites do you have in Minna? _____

3. What are the criteria for choosing these sites? _____

4. What are the problems you encounter during disposal? _____

(D) OTHER MATTERS

1. What major problems is the body facing in collection, transportation and disposal of refuse?
(a) Level of finance strength ( ).
(b) Low level of staff strength ( )
(c) Inadequate equipment ( )
(d) Lack of access to collection point ( )
(e) Other (specify)

2. What step are being taken to solve these problem? _____

3. What is the source of finance to the body? _____

2 **QUESTIONNAIRE**: For people living in the area of study.

The questions below are in respect to the topic above. Please thick/fill in appropriate answers your will be treated with confidence and secrecy.

Date: _____ House No: _____ Street: _____

INSTRUCTION:

PERSONAL INFORMATION: (Section A)

1. Sex _____
2. Occupation _____
3. Size of the household
   (a) 1-5 ( ) (b) 6-10 ( ) (c) 11 and above ( )
4. Income per month:
   (a) Less than #5,000 ( ) (b) Between #5,000-10,000 ( )
   (c) Above #10,000 ( )

Section B:

1. What are the sources of your refuse?
   (a) Household activities ( ) (b) Commercial activities ( )
   (c) Industrial activities ( ) (d) other (specify) _____
2. Type of refuse (waste) generated?
   (a) Food materials ( ) (b) Polythene and paper ( )
   (c) Ashes and dust ( ) (d) Plastics and ceramics ( )
   (e) Other (specify) _____
3. Type of collection point in your house/Area?

(a) Refuse container ( ) (b) Commercial depot ( )
(c) Illegal dump/site ( ) (d) other (specify) _____

4. Do you dispose your waste immediately?
Yes ( ) / No ( )
5. If No, where do you store your waste before disposal?
(a) Sacks ( ) Drum ( ) Bucket / Basket ( )
(d) other (specify) _____ (e) pile on floor.
6. How do you dispose your waste?
(a) Through burning ( ) (b) Drainage ( )
(c) Rain- wash ( ) (d) other (specify) _____
7. How frequently do you empty your Dustbin?
(a) Daily ( ) (b) Weekly ( )
(c) Monthly ( ) (d) other (specify) _____
8. What establishment or agency is responsible for the collection of refuse in your Area?
(a) Local Gov't Authority ( ) (b) State Gov't ( )
(c) Private firm ( ) (d) Community ( )
(e) Other (specify) _____
9. If method of disposal is open dumping, are you satisfied with the location?
Yes ( ) / No ( ).
10. If no, what do you feel should be the best alternative?
(a) Provide incinerator ( ) (b) provide more lids containers ( )
(c) Other (specify) _____
11. Do you pay fee in respect to the collection of your waste?
Yes ( ) / No ( ).
12. If yes, how much? _____
13. If no, are you willing to pay? Yes ( ) / No ( ).
14. How could payment be made? If yes to question 13.
(a) Pay to L.G.A secretariat ( )
(b) L.G officials visit homes for the payment ( )
(c) Pay at zonal offices ( )
(d) Others (specify) _____
15. What major problems do you encounter with the body responsible for waste/refuse disposal in your area?

_____

_____

16. What possible suggestion do you have to improve on the collection and disposal of waste in your area?

_____

_____

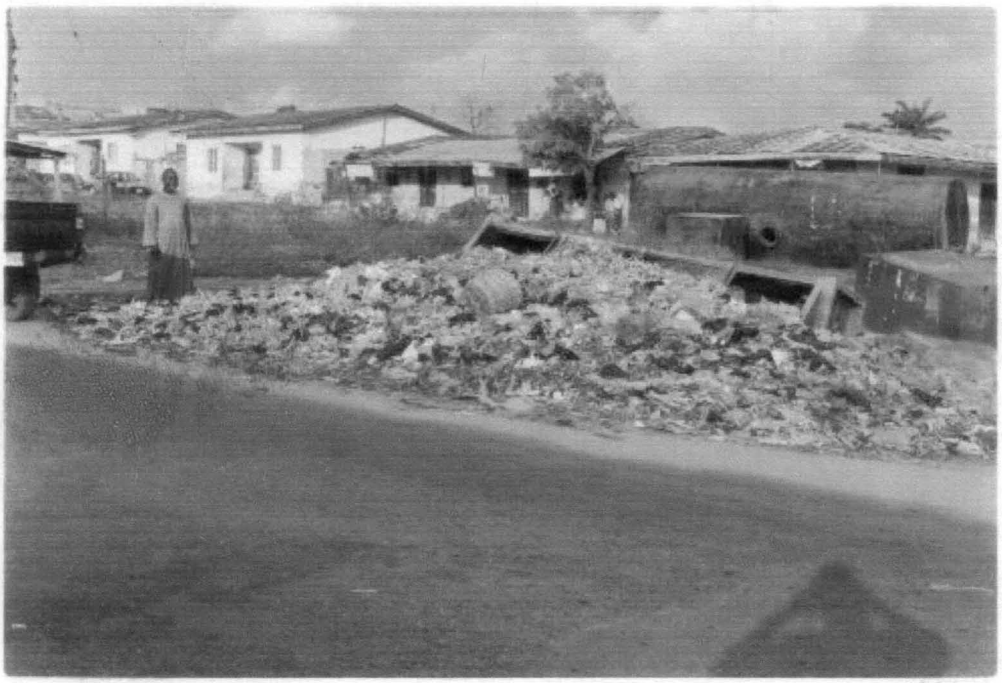
17. Does this refuse dump affect you in any way? Yes ( ) / No ( )
18. If yes, how does it affect you?

_____

_____

Eletu M.T 12/04
(PGD/GEO/03/04/297)

Indiscriminate Dumping of waste along Kolawale road, Tunga low-cost Minna



Unofficial Dumping site along Shiroro road

Illegal dumping site behind school of Midwifery.

One of the designated dumping site along Bay clinic road.