Dissertation By

LASISI, Kamil Oluranti

UNIVERSITY OF IBADAN

LICATION AND ENVIRONMENTAL EFFECTS OF ABTATOIRS IN IBADAN

LOCATION AND ENVIRONMENTAL EFFECTS OF ABATTOIRS IN IBADAN

BY
LASISI, Kamil Oluranti
Matric. No. 58788
B.Sc. (Hons) Ibadan.

AN M.Sc. DESSERTATION IN THE
DEPARTMENT OF GEOGRAPHY
SUBMITTED TO THE FACULTY OF THE SOCIAL SCIENCES
IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE AWARD OF
A MASTER OF SCIENCE DEGREE
OF THE UNIVERSITY OF IBADAN.

ABSTRACT

Environmental issue is yet another dimension of the problems of development in Nigeria within the framework of comprehensive economic and social planning. If environmental constraints are violated, development will definitely lead to its own destruction. Development planners and policy makers must therefore be aware of the limit set by the environment.

In many large urban centres in the world, environmental issues have been topical for quite some time now. Ironically, development is a sinequanon to environmental deterioration in many of the centres. The major aspects of development that have occassioned environmental problems include urbanization and urban development, manufacturing, extractive industries and abattoir sites.

Ever since, one hears of oil spillage in Delta Area of Bendel State, the incessant pollution of Ewekoro area by the Cement Factory, the flaring of gas by oil companies in Warri, the Apapa Atmospheric Confussion and the Koko Toxic Waste. Next to nothing do we hear of environmental hazzards associated with refuse dumps and effluents/ pollutants from abattoir sites. This ofcourse occurs on Nigeria environment and the effects need to be assessed.

Location of abattoir and the nature of environmental effects posed are the topical issues focused on in this research. The rational behind the locational policy of government with respect to abattoir sites has shown unplanliness nature of our locational policy.

Questionnaires were administered on two different population sets (the butchers and the residents) on socio-economic indicators as portable water supply, drainage condition amongst other factors. In all about 500 pieces of questionnaires were used through the aid of systematic sampling procedure.

Secondary data were equally gathered mainly from published works, government data bank, statistical books and health survey records available in the study area. Other sources include the existing Ibadan Map information from journals, theses, dessertations, reports, seminar papers on abattoir sites and environmental matters.

Analysis of the abattoirs in the study area showed that there is a relationship between size of abattoir, average number of daily kill and the size of the available land. On the other hand it has been proved that location of market may not necessarily determine abattoir site. However, positive relationship exists between environmental effects and distance of residence from abattoir sites.

To further elucidate the relationship between the market size and the hierarchy of abattoirs in terms of services rendered and factors of location, a concept was applied from the central place theory.

Among the major environmental effects considered are noise, air pollution, water pollution and odour. Other data embedded in the study are income level of respondents, educational status, age, perception of the environmental effects and possible remedies. The results of the analysis were presented in percentages, graphs, charts, and histograms, on a wide range of social wellbeing indicators which include educational facilities, sanitation, water supply, drainage system, labour supply and market location.

Although difficulties were encountered in getting needed data and aggregating such to locational factors. However, analysis and result of the survey indicate a plausible model of effects of abattoirs in their respective locations.

To this effect, the finding showed that the low income class suffered the impact of the effluents generated by the abattoirs. In addition the abattoir sites are not in conformity with what Thornton (1968) felt should be the needed conditions for siting an ideal abattoir. To ensure a meaningful research, solutions were offered for the problems raised.

CERTIFICATION

I certify that this work was carried out by **LASISI, Kamil Oluranti** in the Department of Geography University of Ibadan.

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SUPERVISOR
PROF. BOLA AYENI

DEDICATION

This dessertation is dedicated to the Council for the Development of Social Science Researches in Africa (CODESRIA) for sponsoring my Master Degree Programme.

ACKNOWLEDGEMENT

Many individuals have contributed towards the successful completion of my Masters Degree Programme, to all, I say thanks.

I owe sincere gratitude to the Council for the Development of Social Science Research in Africa for sponsoring the theses writing.

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CHAPTER I

1.1 INTRODUCTION AND STATEMENT OF PROBLEM

The location of dangerous or obnoxious facilities is receiving increasing attention worldwide (FAO 1995). The beginning of the past decade witnessed some enlightment in the western world of environmental protection and control of obnoxious facilities which later became a global affair. The promulgation of the federal Protection Agency Decree 58 of 1988 in Nigeria aims at enforcing the operators of industries to incorporate Environmental Impact Assessment (EIA) into the plan of their project.

Abattoir which is a service factory where the cattle and other livestock are slaughtered for conversion into meat equally refers to an area where public health personnel conduct ante and post mothern examination on animals before slaughtering and distribution to the public as food. Just like any other human activities, abattoirs require the use of space and resources. In essence this human activities will have environmental effects if they are wrongly located. The environmental effects of abattoirs which is the focus of this study takes into consideration the huge amount of wastes the abattoirs generate and consequently how they affect the neighbourhood.

The fundamental purpose of this research is to examine the location and environmental effects of the choice of abattoir sites in different socio-economic contents of an urban setting such as Ibadan region. This is to help in conducting the activities of development in such a way as to account for proper efficiency of abattoirs and adequate conservation of the environment in which they operate.

1.2 THE RATIONAL OF THE STUDY

Generally speaking, several studies have been carried out on the abattoirs and meat hygiene alongside waste disposal management and they are all well documented (Herforeshire 1971). Specifically, some abattoirs which many of the past works considered were not discussed in the context of both distributional adequacies with environmental effects.

Approaches based on locational attributes of abattoirs centres have shown some promise, but the spatial manifestation of the environmental effects which they posed remain rather inadequately exlored. A more meaningful interpretation of abattoirs therefore requires an understanding of factors guiding the location together with the knowledge of nature of environmental consequencies

which follows.

This research has lead to a set of general questions common to developing societies.

1. To what extent have recent locational decision contributed to spatial accessibility of abattoirs.

2. Are specific groups significantly disadvantaged with respect to either access to abattoir or suffer the impact.

3. What alternatively ideal locational arrangement of the abattoirs could make them more accessible and effect-free than the existing patterns.

It is therefore my contention that researches of this nature could contribute immensely to :

1. Method of locational anaysis for measuring characteristics of spatial organisation of abattoirs as obnoxious activities.

2. Tangible knowledge, by providing basis for evaluating existing abattoir sites in terms of their relative spatial location and environmental effects.

1.3 RESEARCH AIM AND OBJECTIVES

The study aims at spatial analysis of the location and environmental effects of abattoirs in an urban centre, using Ibadan as a case study. The study focuses on what

makes abattoirs to be referred to as obnoxious activities, how the effects can be minimized and the way the present abattoir locations conform with the environmental standards and locational efficiency.

Some of the objectives of the study therefore include :

1. A general review of the existing abattoir standards in Nigeria and Ibadan region in particular.
2. An examination of the environmental and health effects of abattoirs on the populace.
3. An examination of the distributional adequacy of abattoirs in meeting demand for abattoirs by the residents of Ibadan.
4. Way of developing an alternative viewpoints and practical avenues of enquiry about location of abattoirs with particular reference to the significance of proper management and environmental education.

1.4 LITERATURE REVIEW

An abattoir is a service factory in which cattle and other livestock are slaughtered for conversion into meat. The abattoirs function is therefore the production of good quality meat free from infection at reasonable prices.

The siting of any proposed abattoir is of tremendous importance and to Thornton (1968), this should bear in mind the environmental pollution, preventive medicine and public health aspects.

According to Ogbona (1984), prior to 1964, Ibadan city council lacked any organised or centralized abattoir system. Instead slaughtering were done at the major markets. This offered the butchers maximum benefits being near their respective homes and market stalls but associated with poor sanitary conditions, inadequate supervision by public health and Veterinary Division.

Arthur (1964), recommended the establishment of centralized slaughtered system for Ibadan. This was to achieve an improvement in the overall meat quality and hygienic condition for slaughtering, marketing process, reduction of the risks associated with the meat of cattle on hoof within the city, provision of better slaughter and inspection facilities and generation of revenue for the local authority.

Anon (1989) stated that "the organisation and administration of a centralized meat inspection service have many advantages over the other systems and these

include improved veterinary control, independence of operations, better standardization, acceptability to visiting inspectors and improved intergration between the different branches of the veterinary service, good liason and communication with outside bodies".

Thornton (1968) opined that the following conditions are essential for efficient location of abattoir :

1. Area size to be determined by the size of the available land, the current and projected number of daily kill, adequate parking space and turning allowance for long transport vehicles, buildings, level of intended expenditure and extra land for future expansion.
2. Proximity to the cattle centres and meat market.
3. Freedom from human dwelling area such as school, market barns, stores, houses, public offices, hospitals and religious worshipping centres.
3. Freedom from laterine, open gutter system and public dumping ground.
5. The place should be screened from public glare by obstacles such as planted trees, fences e.t.c.

Adegboye (1990), observed that the location of abattoir should be freeway, major road netweork, railway line and seaport such that the abattoir benefits from efficient communication system these offer. In addition,

he noted that the wind direction should be taken into consideration so that contaminations are not blown into human settlements.

Thorn and Gracey (1981), confirmed that the soil type and ground should be suitable for good building foundations, heavy vehicular movement; free from flooding and sand drifting. Sloping site may be used if the gradient planning and construction of the abattoir should be carried out by expert and experienced consultant with the overall purpose to promote dynamic, hygenic and suitable condition for slaughtering of animal and meat inspection.

The decision to maintain an abattoir is undertaken mainly for the benefit of the public, hence, revenue generation should not be mistaken or wrongly assumed as the major reason behind its construction (Thornton, 1968).

Juddy (1980) confirmed that a major avenue for preventing contamination of meat and consumption of Tuberculosis organisms is the abattoir. Unfortunately, most abattoirs in this country are substandard ... Environmental hygiene in the abattoirs should be improved. Viz :

(a) Effluents from the abattoir should not be allowed to contaminate drinking water or stream.

(b) There is need for controlling flies and rodents in the abattoir.

In a survey carried out by Oyeyemi (1990) he observed that proximity of Sanngo abattoir to public toilet could be considered as a factor for contamination of meat. He further noted that developing countries generally lack proper slaughter facilities, inadequate water supplies and sewage disposal and low standard for butchers and meat handlers coupled with improper siting of the abattoirs.

Adegboye (1990), appraised meat inspection from butchers views, according to them, the facilities such as continous water supply, equipment, electricity, washrooms and toilets promised to them by government before centralizing the abattoir systems (as the basis for the centralisation of Bodija abattoir) have not been fulfilled almost 20 years after.

Mabogunje (1988) opined that the more serious risk from industrial production processes in Nigeria are mainly from water pollution. Almost all industries in Nigeria discharged their raw waste products (without treatment) into streams, rivers, estuaries, lagoons, bays or the sea and drainage channels in towns and cities. Many of these wastes contain toxic chemicals such as DDT, mercury, dye and

cadmium which pollute the water. He further identified the major wastes in urban centres as "

i. Liquid wastes originating from residential areas, savage and sullage, storm drains and industries.

ii. Solid wastes such as feaces and domestic refuse, livestock wastes, farm wastes and industrial wastes.

Liquid Wastes

Human excreta is disposed off mostly in the drainage channel around the town and cities. The sullage however, is disposed indiscriminately into open drainage which ultimately find their way into streams and rivers.

Solid Wastes

Faniran (1982) noted that solid wastes are posing an ever increasing problem mainly because of quantity involved.

M.K.C. Sridhar, S.A. Sulu and G.O. Fasina (1991) calculated the projected solid wastes generated in Ibadan cith by 2000 A.D at 559,882 tonnes/year.

Ikporukpo (1978) carried out locational analysis on a broad national basis on the location of gasoline depots in Nigeria. The essence was to examined the extent to which their location conforms with the optimum. He opined that depots may constitute a physical distribution problem

not only where they are numerically insufficient but more fundamentally because they are not located with due regards to the spatial demand structure of the area. He therefore recommended that properly programmed locations were necessary in addition to the existing depots from time to time.

In 1983, Ikporukpo observed whether formal models are in all given situations superior to human judgement in the determination of an optimal location for a facility as indicated by Neyman-Pearson school. He submitted that given many unrealistic assumptions of location models and the fact that decision makers in many cases have their own tangible idea about what locations are optimal. It becomes difficult to ascertain whether optimal location can be viewed basically from perspective of the decision maker or from that of the analysts.

Ikporukpo therefore recommended that in location decision process, care must be taken of the restriction by both parties and the final location must be determined by some bargaining between the decision maker and the location analysts rather than a prerogative of any of them. It is therefore cumbersome to get a clear cut difference between location analysis and human judgement as both depend on human judgement based on individual life experience. This

is equal the notion of Bayesian school as postulated in 18th century.

Experience has shown that often times, public decision makers aim at increasing or maximizing social utilities while minimizing social costs for those facilities provided. Non profit criteria or suboptimality are particularly important in the location of public facilities. In most cases, (Abler, Adams and Gould 1972) the relevant variables can not be assigned monetary values.

Some perculiar problems of waste management in Nigeria include poor technological knowledge, shortage of personnel, inefficient institutional arrangement and poor financing. As a result, most of the disposal sites have become eye sores to the communities living nearby. They are known to emit smoke, breed flies, mosquitoes and rodents which constitute source of health hazards, (Omishaking and Sridhar, 1986).

What is clear from all this is that our cities are the places where environmental stress particularly of the industrial and chemical nature have achieved the greatest salience in recent times" (Mabogunje 1988).

1.5 CONCEPTUAL FRAMEWORK

Considering the fact that environemtnal safety has been a great problem to which much global attention is being devoted. However location of abattoirs for efficiency and environmental protection has not been given serious consideration by government and planners in Nigeria.

As geographers only recently emerged from the morass of descriptive realm of new discoveries and consequently, the discipline is undertaking serious broad studies which depend upon the quantitative assessment of geographical factors and their impacts upon human population groups and their spatial distribution (Knox, 1974). Environmental hazzards posed by abattoirs remain largely uncontrolled, unmonitored and unmapped which of course is, seemingly, not in tune with the needs of current and future generations on the one hand, while the haphazard developments, have posed intracable problems for planning on the other hand. In this research, a practical avenue about enquiry into proper siting of abattoirs is to be considered. Hence the study is directed at issues of location and environmental effects of an obnoxious industry in an urban centre using measure based on Environmental Impact Evaluation (EIE) techniques and by theoretical concepts drawn from central place theory as well

methods gathered from the literature of location-allocation models and regional development planning.

1.6 HYPOTHESES

The hypotheses to be tested include that

1. Environmental effects of abattoir on the residents decreases with increasing distance from the abattoir sites.

2. Area size of an abattoir is determined by the size of the available land and average number of current density kill.

3. Market site determines the choice of abattoir location.

CHAPTER II

2.1 METHODOLOGY

The data needed for the study were collected from two sources namely : Primary and Secondary Sources.

2.1.1 PRIMARY SOURCES

Two sets of questionnaires were used. The first set was administered on the users of abattoirs in all the eleven local governments under consideration and the second set was directed to household heads of the residents around abattoir sites where questions on socio-economic data, portable water supply, drainage condition and some aspects of the nature of environmental nuisance prevailing in the area were obtained. The total number of two hundred and fifty pieces of questionnaire were produced for each set making five hundred in all. The number of questionnaire administered in each district was based on the population size. The systematic sampling procedure where every tenth house is surveyed was applied in determinng the housing unit for interview.

2.1.2 SECONDARY SOURCES

This was gathered mainly from published work, government data bank, statistical books, and health survey

records available in the study area.

Other sources of secondary information used include the existing Ibadan Map showing the spatial location of some of the abattoirs. Relevant data were also collected from theses, books, dissertations, journals, reports, seminar papers as well as other published materials on abattoir sites and environmental matters.

2.2 LIMITATIONS

The major problems encountered during the field work could be attributed to low level of awareness of the butchers. The larger proportion of the butchers were illiterate and they reacted negatively when our crew wanted to take photograph of the abattoirs because they thought we were going to use such for something else. Infact, it was very difficult to convince the butchers that the result of the research is not going to lead to their removal from their present site to another location.

Those who compromised among them even did so with the believe that it will enable government to listen to their clarion call for pipeborne water, coldrooms and other important amenities needed in the abattoirs.

In order to solve those problems, I made myself familiar with most of their leaders especially those residing close to Basorun. They then introduced me to all other units leaders who assisted greatly in getting things right.

The most recent map available in the ministry is the 1979 (1,500,000) edition apart from the recent 36 states Map which I got from the department. Most of the' maps do not contain abattoir sites and settlement. This problem was solved by updating the maps personally.

High transportation fees for covering all the eleven local government areas where eleven abattoir sites are located posed a serious problem as well. This is because the fieldwork was carried out during the period of fuel scarcity January 4 to April 5, 1997).

PROCEDURES OF DATA ANALYSIS

The data collected from the two sets of questionnaires were analysed statistically with the aid of computer. The data were subjected to series of descriptive statistical analysis - such parametric statistics as chi-square, simple frequency, mulptiple regression and cross tabulation were used. All these are to enhance a proper description of the data set.

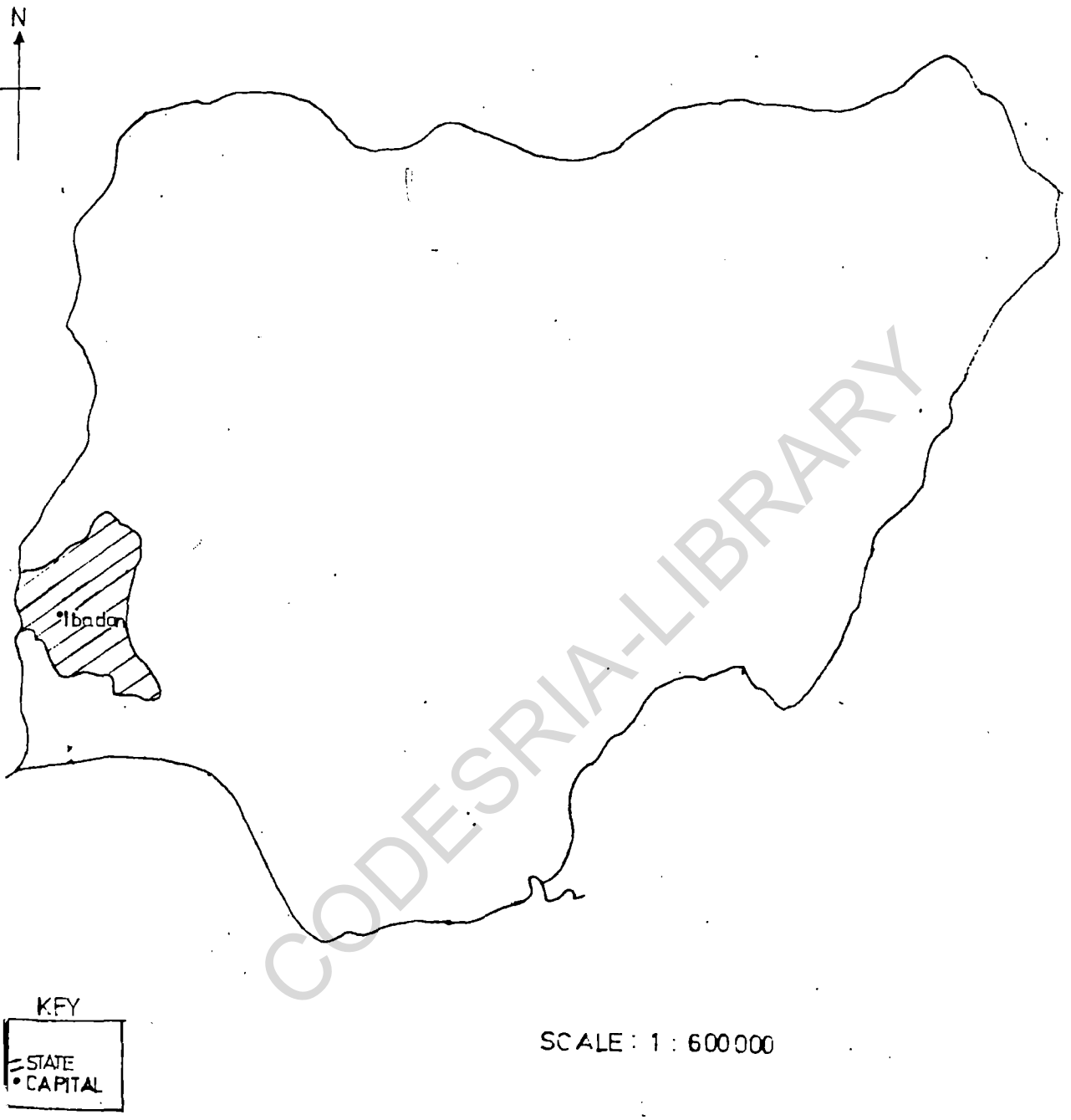

FIG 21: MAP OF NIGERIA SHOWING IBADAN THE CAPITAL CITY OF OYO STATE

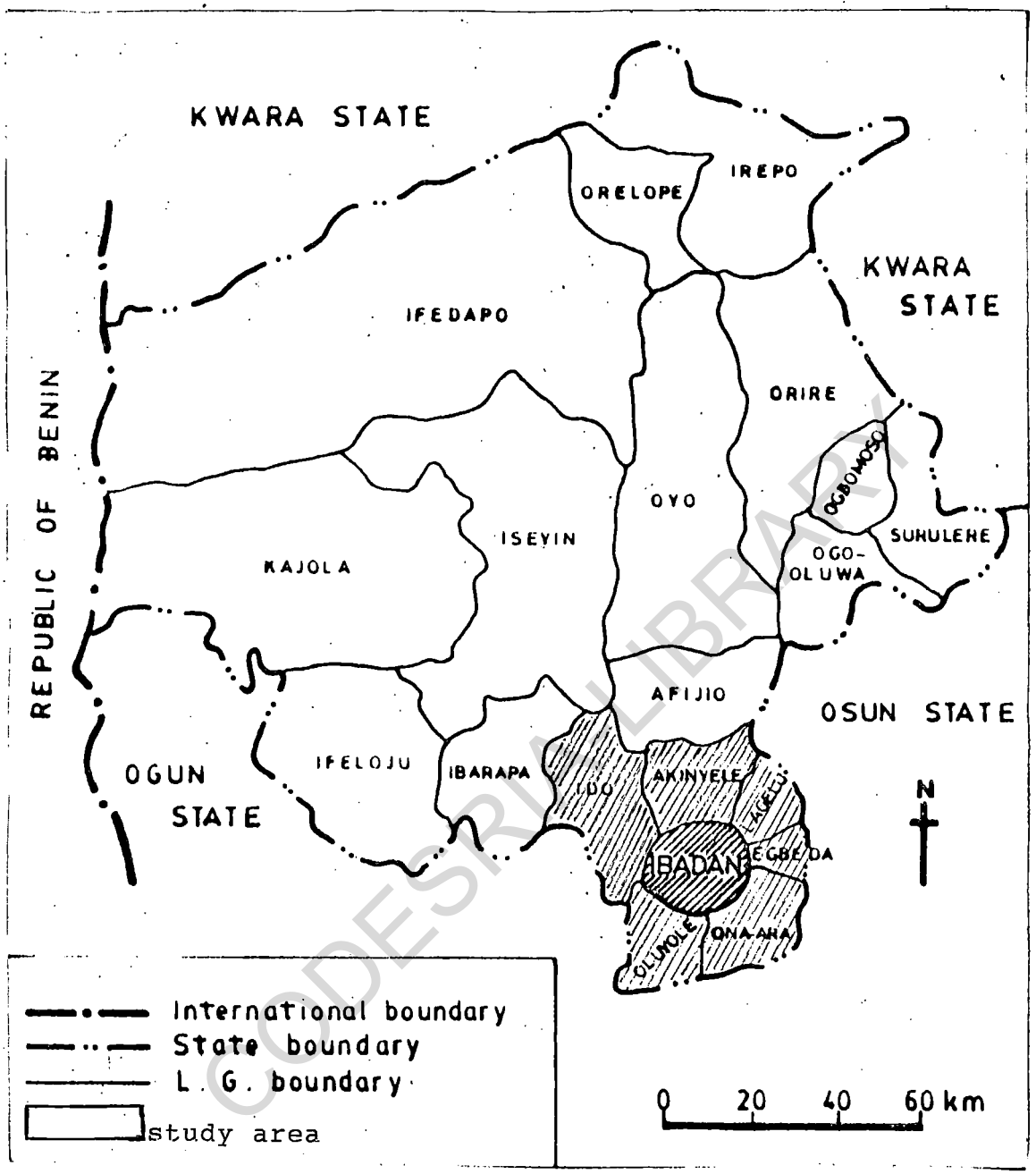

FIG.2.2: MAP OF OYO STATE SHOWING IBADAN REGION

Simple chi-square was applied to test the first hypothesis while multiple regression analysis was used for the second hypothesis. The last hypothesis was tested by simple linear regression. The results were presented in form of tables, graph, charts and maps.

2.4 STUDY AREA

2.4.1 LOCATION, SITE AND PHYSICAL SETTING

This study used Ibadan region as the study area because of the city's unplanned rapid growth and increasing environmental problems. Ibadan the Capital of Oyo State remains the largest indegenous African city (Mabogunje, 1968). It was established in 1829 by Lagelu, a legendary Yoruba warrior as a war camp in frontier region between the forest and savanna belts in the South-Western part of Nigeria. It is located approximately on Longitude $3^{o}54^{1}$ East of greenwich meridian and Latitude 7^{o} 23^{1} North of the Equator. It extends for about 55Km from Asejire in the East to Agemo in the West and for about 70Km from Iroko in the North to Mamu in the South. The study therefore considered all the eleven local govenment areas that form Ibadan region. These are Ido, Akinyele, Lagelu,

Egbeda, Ona Ara, Oluyole, Ibadan North, Ibadan North East, Ibadan South West, Ibadan South East and Ibadan North West.

2.4.2 CLIMATE AND WATER RESOURCES

Man, to a considerable extent has been influencing the climate through modification of the local climate by various means such as concretization of natural surface and transformation of such into open space, pools, bare surfaces and others. These activities in conjunction with industrial processes, urban waste disposal and transportation control the climate of man's immediate environment to give what is known as urban climate (F.J. Monkhouse, 1975).

Ibadan region has a mean January and April temperature of 25^{o}C and 22.5^{o}C respectively. It enjoys the dust laiden winds called Hamattan which blows from Sahara Desert toward the Atlantic Ocean between November and February. This marks the dry season. The West African monsoonal climate characterize shift in wind pattern between March and October. This is often followed by the raining season of March $\pm$ 15 days to October $\pm$15 days for the beginning and end of raining season respectively.

2.4.3 GEOLOGY, RELIEF AND DRAINAGE

Rocks found in Ibadan comprise of sedimentary rocks of cretaceous age as obtained in the South-Western part of the country. Even though most of the rocks have been metamorphosed, there is still an ample instrusions of granites and Porphyrites of Jurasic age.

There are basically major rocks and minor rocks. The major rocks comprise of quantities of metasedimentary series and the magmitite complex made up of banded gneiss and migmatites. The minor rocks include pegmatites, amphibolites, doletites, zenolith, quartz veins and aplite dykes.

Both the major and the minor rock types are covered in some places by regoliths and only outcrop in a few places. The thickness of the regoliths, the density and size of the rock fractures, fissures, and other cracks determine the presence of acquiver over basement complex rock in particular locations. This therefore explains why there are more rivers and streams draining Ibadan South than the North. Such rivers and streams include Ona river, Ogunpa, river, Ogbere, Kudeti river, Agbowo and Yemetu stream.

2.4.4 TRANSPORTATION

"All cities depend on transportation in order to utilize the surplus of the land for their support (Ullman 1962). Transportation as one of the major prerequisites to efficient functioning of a city or region has great effects on a city's interaction with its hinterland and neighbouring regions.

Ibadan city serves as "emporium of trade" and a commercial centre with highly distributive trade where break of bulk for both the imported and exported goods are handled. The railway line from Lagos reached Ibadan in 1901. The major products transported through this medium include livestock, beans and guinea corn while such products as cocoa and kolanut are sent from the Southern to Northern Nigeria.

Two basic types of transport network observable in Ibadan are intracity and intercity linkages. Among the areas that generate substantial traffic in Ibadan are the state secretariat, the local government secretariats, the abattoir sites, Apata Industrial Area, Educational Institutions, University College Hospital (U.C.H.), residential areas, various daily and periodic markets in Ibadan notably Bodija, Oje, Oja'ba, Gbagi, Dugbe, Agbeni, Moniya, Oremeji and so on.

2.4.5 POPULATION

The total population of Ibadan region according to 1991 census was 1,829,187 with the total landmass of 130.55sqKm.

TABLE 2.1

S/No.	L.G.A Name	Population	Percentage
1.	Akinyele	139,587	7.63%
2.	Egbeda	128,998	7.05%
3.	Ibadan North West	146,759	8.02%
4.	Ido	55,893	3.06%
5.	Lagelu	68,732	3.76%
6.	Oluyole	91,020	4.98%
7.	Ona-Ara	122,387	6.7%
8.	Ibadan North East	272,979	14.92%
9.	Ibadan South East	227,865	12.46%
10.	Ibadan South West	274,028	14.98%
11.	Ibadan North	300,939	16.45%
		1,829.187	100%

The age pyramid of Ibadan region is an indication of a young population with 42.17% and 36.8% for total population aged 0-19, 54% and 61.1% respectively for those aged 20-59, and 3.9% and 2.1% respectively for those aged 60 and above for both male and female simultaneously.

TABLE 2.2

AGE RANGE

Sex	0-19yrs	20-59yrs	60-above
Male	42-1%	54%	3.9%
Female	36.8%	61.1%	2.1%

Source : Ibadan Region 1990.

There is an indication of high fertility level because those in child bearing age are higher in number than proportionate to others. However, the narrowing down of the age pyramids at higher age level is a strong indivation of low expectancy rate.

As regards the labour force composition, almost 80% of the population aged 15 years and above form the working class. Male however, form the higher sex of 61.5% of the aggregate in relation to 38.5% for female.

The major ethnic group in Ibadan is Yoruba constituting about 95%. Among different Yoruba groups present in Ibadan are Ibadans, the Ijeshas, the Ondos amongst others. Considering the metropolistic nature of the city there is presence of other ethnic groups which constitutes the remaining 5%. These are the Ibos

(2.1%), the Hausas (1.7%), the Edos (0.8), the Igbiras (0.2) and the Urhobus (0.2%). this indicates how indigenous the city is, based on its historical background as the domain of the Yorubas.

Religious composition of Ibadan in 1963 census figures indicates the highest of 61.5% for Muslims, followed by Christians with 37.7% and the least been other religions with only o.8%.

2.4.6 RESIDENTIAL PATTERNS IN IBADAN

Five major residential zones are identifiable in Ibadan region. These are the core, the old suburb, the newer suburb, post 1952 suburbs and Government Reservation areas.

The core is the oldest part of the city which is occupied mainly by the indigens, This area is found around Mapo Hills. Houses here are built without proper planning for ventilation, refuse disposal, garrage and drainage system, Houses here are built hapharzadly.

The older suburb has virtually the same residential characteristics as the core area. The only exception is that the zone is occupied mainly by Yoruba immigrants.

The newer suburbs can be classified into two. The Eastern Suburb and Western Suburb which are creation of waves of twenty century immigrants into the city who could afford to buy parcel(s) of land for residential use. These areas demonstrate a high degree of internal heterogeneity because different residential structure can be identified with the zone ranging from sophisticated mansions, castle to mud houses. Most of the abattoirs under study are found in this zone.

The Reservations are low density residential areas. This could be regarded as high cost and quality residential zones because of the calibre of people found therein. These are mainly professionals, engineers, lawyers, contractors, administrators, lecturers, top executives, doctors, civil servants, business tycoons and top civil servants.

2.5 GOVERNMENT LOCTIONAL POLICY

"It has long been the practice of cities to dump unwanted industries into rural areas by ordinance

excluding them from the cities. Such industries include slaughter houses, wholesales, oil storage, noxious industries and some public utilities such as cementaries, sewage disposal plant, radio tower and airport" (Ayeni, 1990).

The siting of most of the abattoirs under consideration in their present sites conform with Ayeni's description in his rural-urban fringe analysis.

According to both the Chief Environmental Health Officer of Ibadan North Local Government and the Veterinary Officer in charge of Bodija abattoir, the bodija abattoir was only given to the state architect to design by the defunct Ibadan Municipal government but there was no written document to support such government locational decision of Bodija abattoir due to the local government reforms which splitted the then Ibadan Municipal Government into five different local government areas namely Ibadan North, Ibadan North East, Ibadan South West, Ibadan South East and Ibadan North West with the newly created Ibadan North Local Government in control of Bodija abattoir.

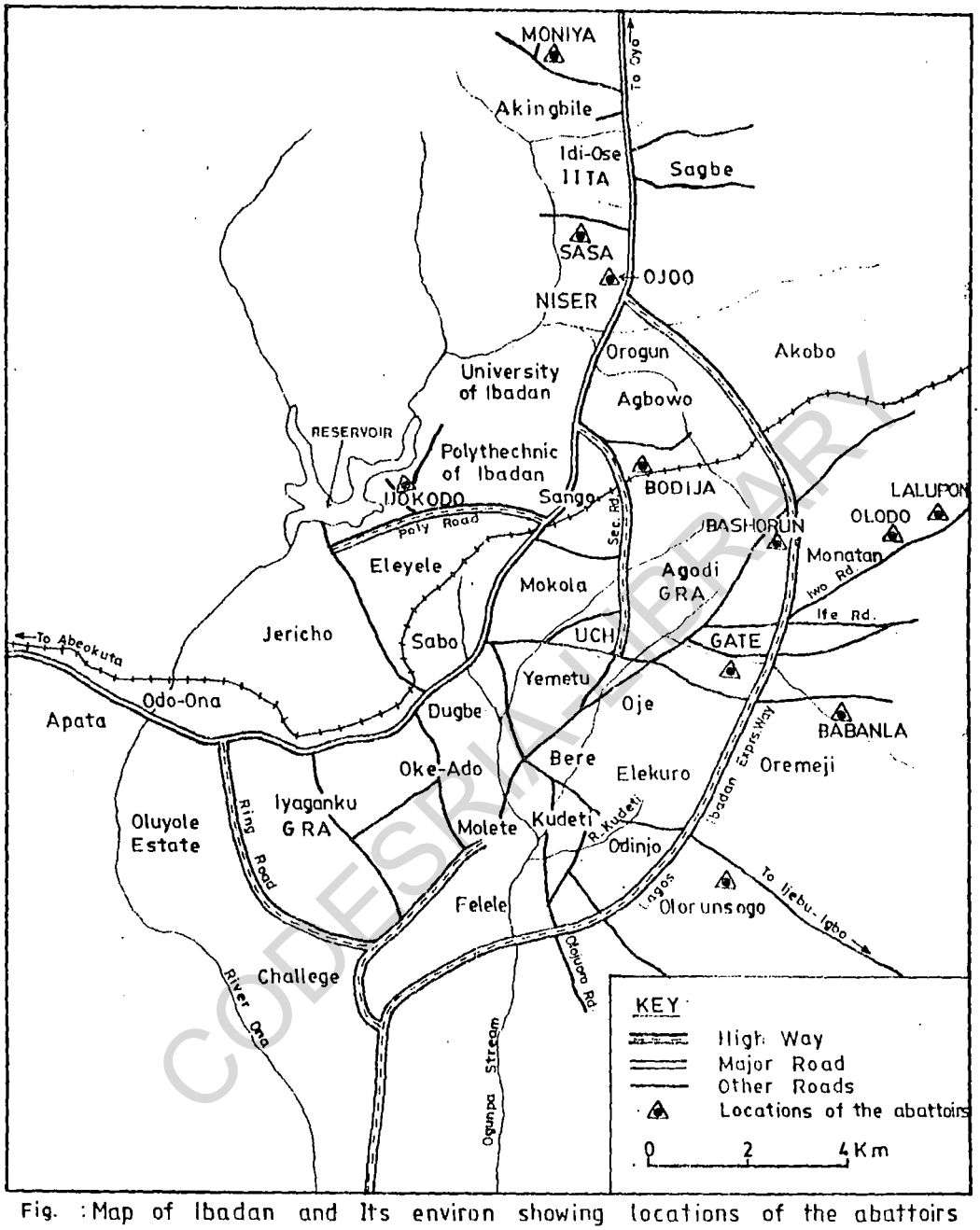

Fig. : Map of Ibadan and Its environ showing locations of the abattoirs

In reality, the location of all abattoirs in the eleven local government constituting Ibadan region conform largely with the earlier postulate by Ayeni. Such abattoirs that are found in the rural-urban fringe include those of Moniya, Sasa, Ojoo, Olodo, Olorunsogo, Babanla-Ogbere and Ijokodo. Of allthe nine abattoirs considered, only those of Bodija, Gate and Basorun are located in urban centres.

However, Bodija abattoir assumes the position of rural-urban fringe when it was first established in 1971 and now been encroached by the city. Other factors involved in the location of Bodija abattoir include the presence of cattle market near the abattoir, to serve as the central abattoir to the city, the need to slaughter animal under hygienic condition and to prevent hawking of meat. Due to the centralization of Bodija abattoir, this has lead to amalgamation of other mini abattoirs at Gbagi, Aliwo, Ojurin-Akobo, Gege, Apata, New Garage and Bode to Bodija where they slaughter their animals for onward transfer to their various meat market at those earlier stated locations.

Abattoir at Sasa-Odona was established in 1978 by the butchers association after been driven away from their former location that was said to be too close to Ibadan - Oyo express way. Ojoo abattoir was established by only two butchers in 1910. Then their slaughtering was been carried out on bare-rock surface before the slaughters slab was introduced. In the words of Alhaji Abanikanda Yekini, the Chairman of Butchers Association, Olodo, he said that Olodo abattoir was formerly moved from its former location at Alaropo area prior to independence, to its present site due mainly to its proximity to Iwo Road expressway. Okoki-Ade Babanla slaughter slab at Ogbere was established in 21st February, 1982 by butchers Association lead by Alhaji Hassan Adedokun, the Chairman. All these are basically in conformity with what Ayeni propounded.

2.6 A REVIEW OF THE EXISTING ABATTOIR SITES IN IBADAN

2.6.1 BODIJA ABATTOIR

Bodija abattoir is located in Bodija area to the North of Ibadan metropolis within Ibadan North Local Government by the then Ibadan Municipal Government in 1971.

The abattoir is bounded to the north by the Bodija Foodstuff market, to the west by the Trans-Amusement Park, to the east by the Bodija Plank market and to the south by residential areas along Kongi Layout of new Bodija Estate.(see Fig.2.5).

The abattoir started operation in 1972 with the following different sections:-

(a) Administrative section: Two major officials were involved in the management of the abattoir and they are:

1]. The Local Government Health Officials who are to see to maintenance of the abattoir's environment.

2]. The veterinary officers, are to inspect the animals before slaughtered.

(b) The Lairage : This is where animals are inspected before slaughter.

(c) The slaughter Slabs : There are various slaughter slabs in the abattoir. These include:

1. Cattle slaughter slab
2. Goat and sheep slaughter slab
3. Pig slaughter slab
4. Private slaughter slab

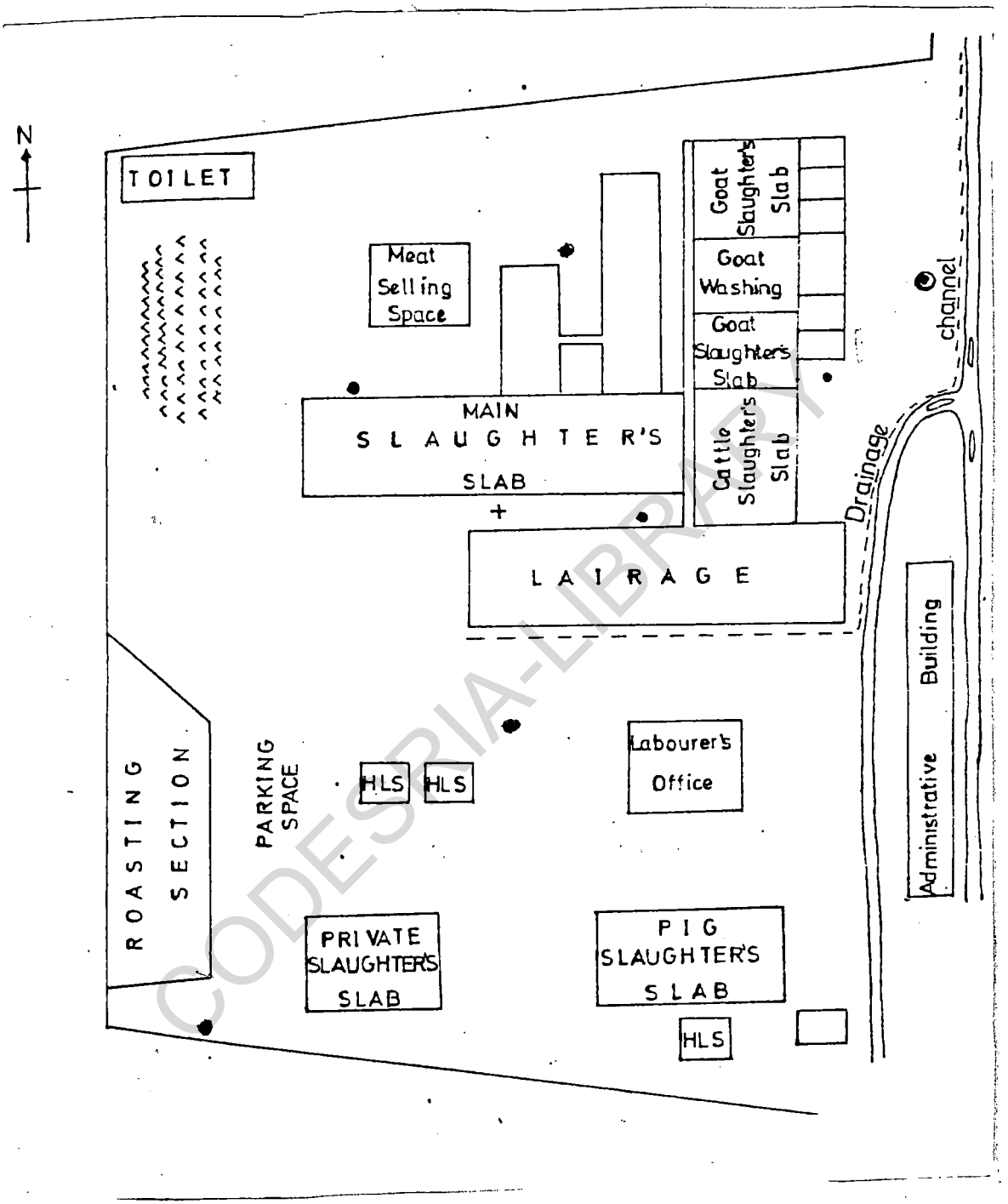

FIG. 2.4: SHOWING BODIJA ABATTOIR AND ITS DIFFERENT SECTIONS

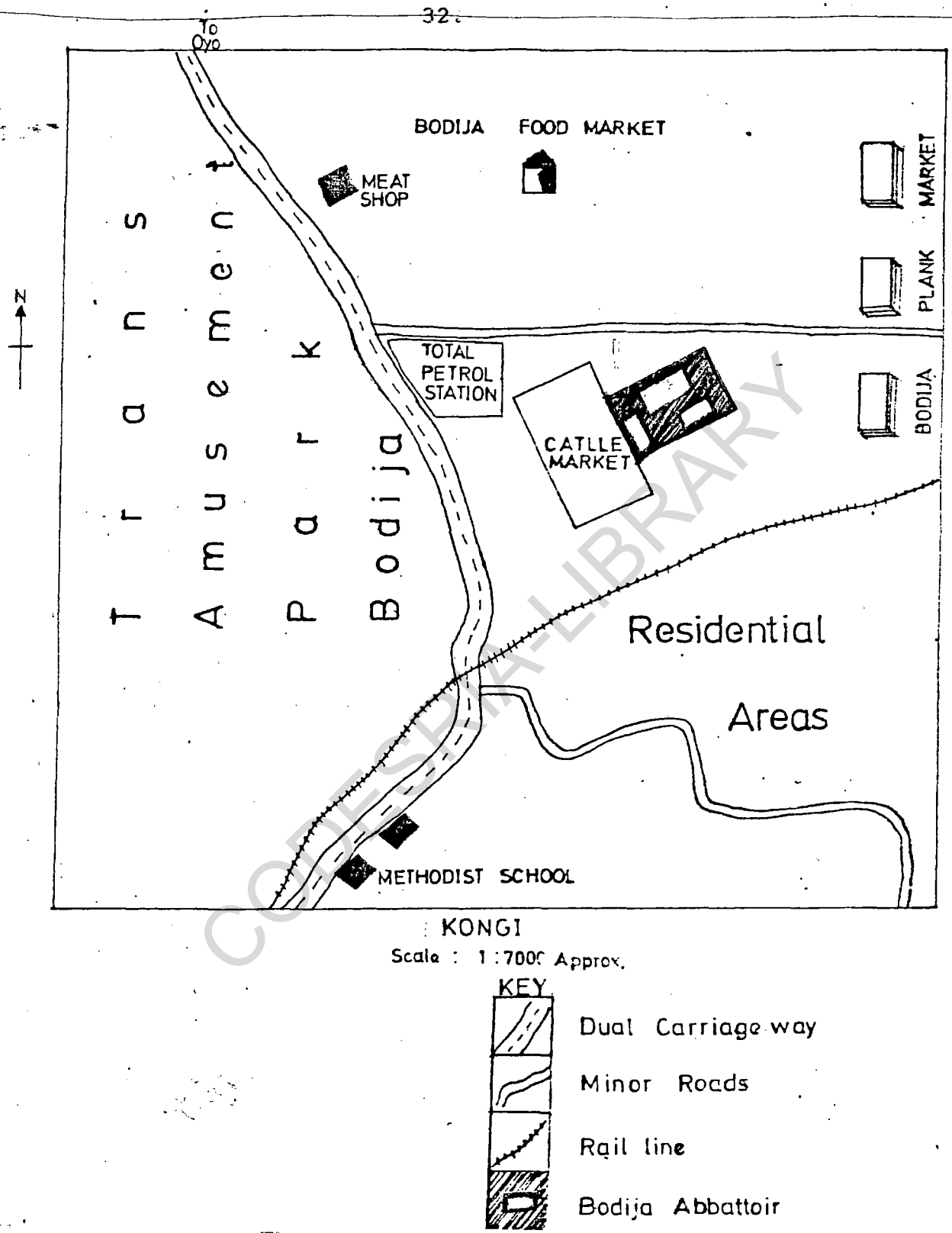

FIG.2.5: SHOWING BODIJA ABATTOIR AND ITS NEIGHBOURHOOD

(d) Head, leg and skin dressing section

(e) Section for roasting of sheep and goats

Presently there is only one borehole and eight functioning deep wells. There also exists a control post beside the abattoir. See Fig.2.4.

2.6.2 MONIYA ABATTOIR

Moniya abattoir is located in Moniya area to the Northern part of Ibadan rural fringe under Akinyele Local Government Area. The abattoir was established in 1980 by the Local Government after shifted the butchers from their initial slaughter slab at Aponmode Area very close to the main road.

The abattoir is bounded to the North by vacant plots tending towards Ijaye, to the West by Moniya residential district, to the East by Oyo-Ibadan Expressway and to the South by Moniya garrage and foodstuff market.

The following sections are identificable in the abattoir.

1. The Lairage : This consists of the cattle resting and the location set aside for inspecting animal before slaughtering.
2. The slaughter slab
3. Head, leg and skin dressing section
4. Section for roasting.

At present, the abattoir has a single veterinary officer, one well and a toilet.

2.6.3 BASORUN ABATTOIR

This abattoir is located in Basorun area of Ibadan North Local Government. It is an abattoir that has witnessed urban encroachment. Initially its location complied with rural-urban fringe but now it is fully within urban centre. it is bounded to the North by the newly constructed modern shops, to the south by Basorun commercial centre, to the East by residential area and to the West by a trunk A road separating it from residences.(See Fig.2.6).

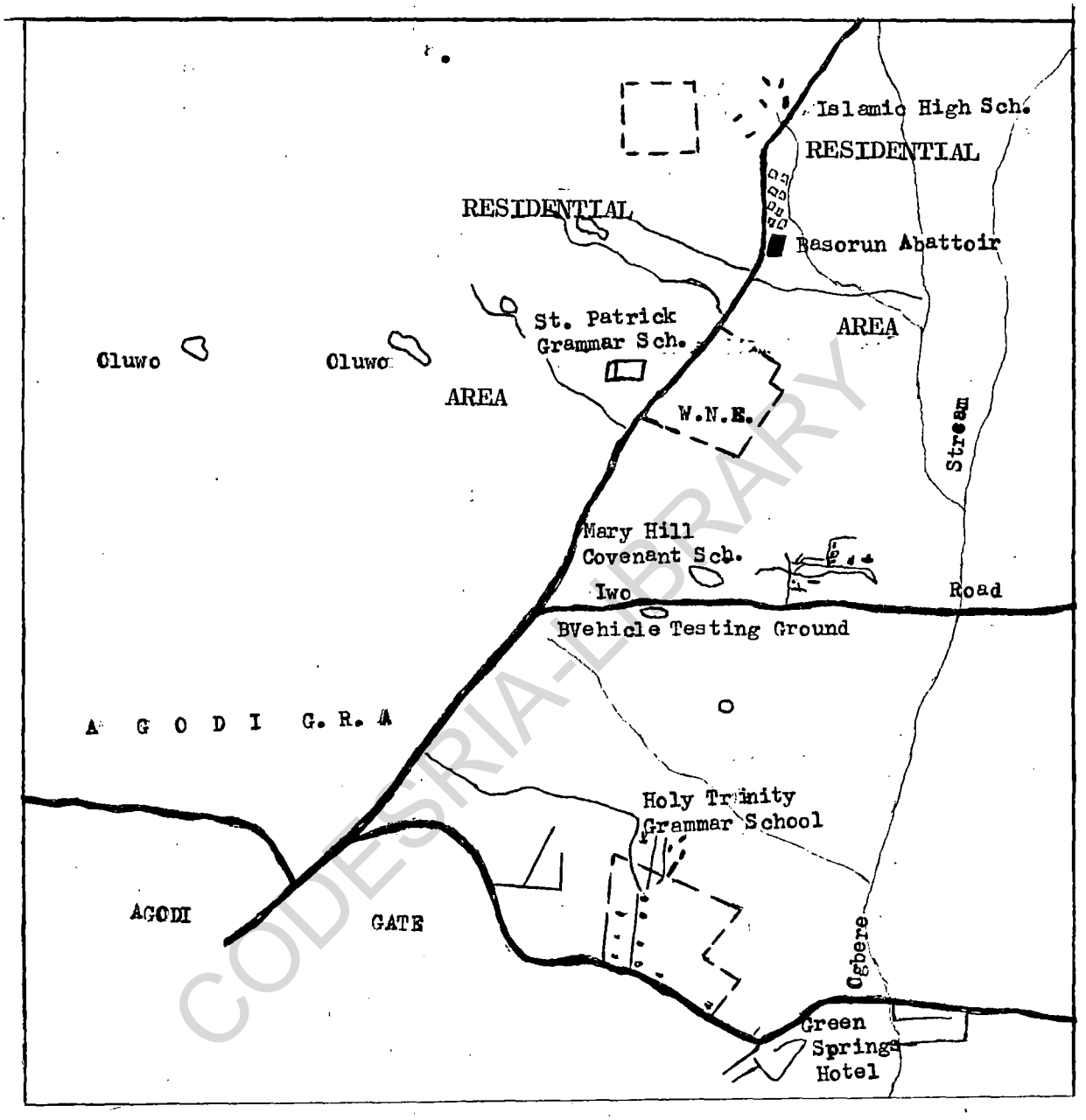

FIG. 2.6: MAP SHOWING LOCATION OF BASORUN ABATTOIR 1:20,000

The abattoir started operation in 1973. Facilities contained include:

1. The slaughter slab and
2. Head, leg and skin dressing section

Presently, the abattoir has no lairage but a functioning well. The veterinary officer in charge of the abattoir do come daily from Bodija. see Plate).

2.6.4 OTHER ABATTOIRS

The description of other abattoirs sites are as tabulated below:

S/NO	N A M E	DATE OF ESTABLI-SHMENT	NAME OF NEAREST MARKET	ABATTOIR SITE	FACILITY
1.	OKIKI-ADE BABA NLA	21st Feb. 1982	Baba Nla Foodst-uff Market	1250m^2	Two wells, a slaughter slab section for roasting head, leg and skin dressing section.
2.	OLODO	1991	Olodo Market	1460m^2	A well, a slaughter slab, sections for roasting and dressing.

3.	LALUPON	1924	Lalupon Market	$1090m^2$	Two deep wells, modern market, a big slaughter slab, an administrative block sections for roasting and dressing.
4.	OJOO	1910	Ojoo food stuff Market	$540m^2$	A slaughter slab, head, leg and skin dressing section.
5.	SASA-ODOONA	1978	Sasa Market	$1250m^2$	A slaughter slab, sections for roasing and dressing and a functioning well.
6.	BALE-LAYO	1967	Olorun-sogo food-stuff Market	$1200m^2$	A slaughter slab, a deep well and undefined section for roasting and dressing.

CHAPTER III

3.1 ENVIRONMENTAL EFFECTS OF ABATTOIRS IN IBADAN REGION

This is the most important aspect of the study and that is what effects the abattoirs have on the surrounding residences. The environmental effects identified include noise, air-pollution and odour. Other factors considered are age structure of the respondents, educational status, drainage system, assessment of the performance of those responsible for maintenance of abattoirs and the various suggestions put forward as ways of improving the environment in which abattoirs operate.

All eleven local Government that constitute Ibadan region were visited between 1st of March through 5th of April, 1997. Among the abattoirs visited are Bodija, Basorun, Ojoo, Sasa, Moniya, Oremeji, Olorunsogo, Ijokodo, Agodi, Olodo and Lalupon. All the abattoirs visited lacked fence except Bodija abattoir. The fence ought to serve as obstacle to prevent public glare. See Plate 1.

Plate 3.1: SHOWING BASORUN ABATTOIR WITHOUT FENCE

The age structure of the butchers interviewed ranged between 24 and 68 years. Conserning the educationa1 status of the butchers 66% received no forma1 education, 20% passed through primary schoo1 while only 14% had secondary schoo1 education. None of the respondents has post secondary schoo1 education. Se tab1e 3.1.

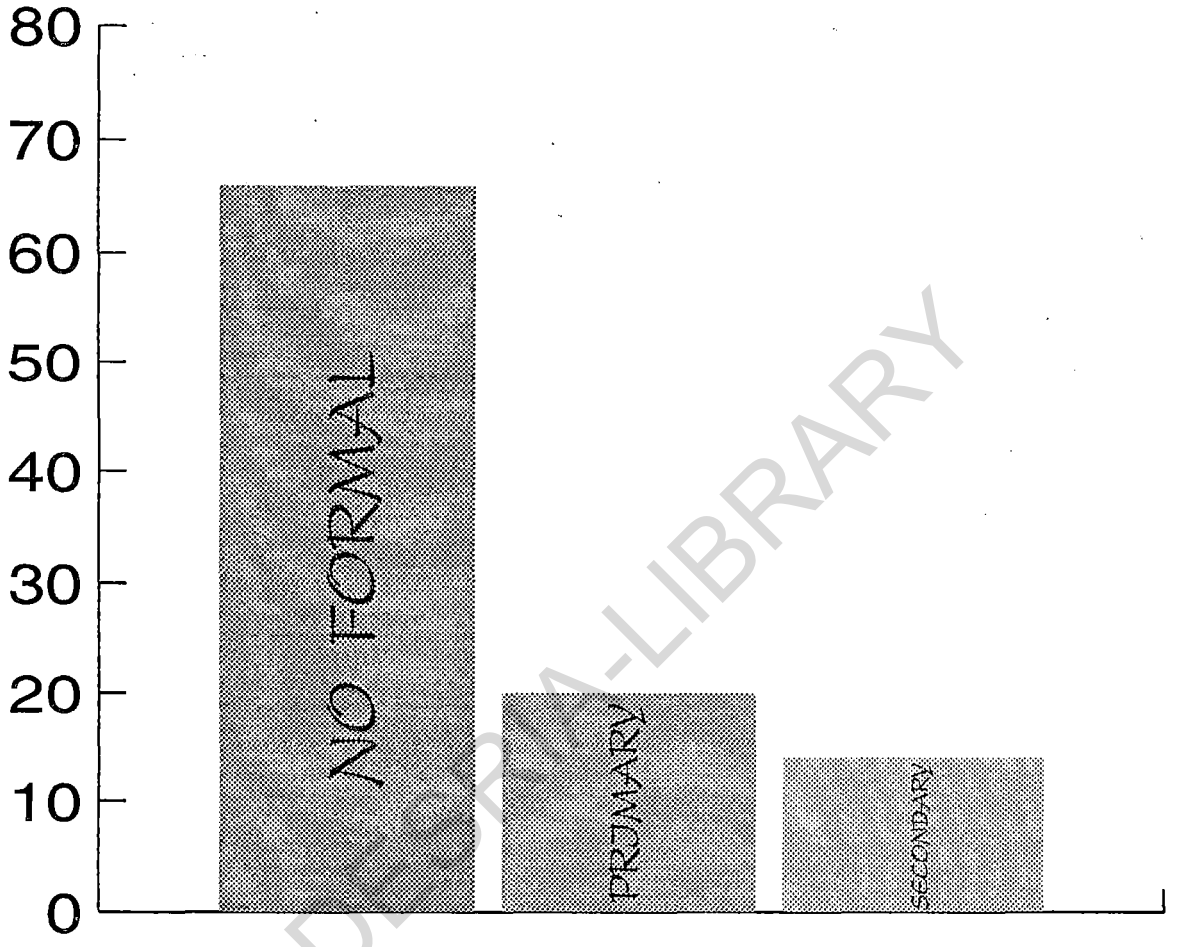

FIGURE 3.1

BAR GRAPH SHOWING EDUCATIONAL STATUS OF BUTCHERS IN THE STUDY AREA

Source: Field Work, 1997

TABLE 3.1

EDUCATIONAL STATUS	FREQUENCY	PERCENTAGE
No formal	163	66%
Primary	50	20%
Secondary	37	14%
Post Secondary	-	0%
Total	250	100%

Source: Fieldwork, 1997.

3.2 SOURCE OF ODOUR

Virtually all the abattoirs in the study area present the greatest problem due to the uncontrolled way in which abattoir wastes are dumped openly. The locations which present terrible odour and breeding places for mosquitoes, rodents and maggots. Heaps of intestinal wastes serve as the major source of abattoirs bad odour (69.2%). This is closely followed by indiscriminate refuse dumps which constitute 20.4% (see Fig. 3.1) while bad drainage system constitutes only 10.4% of the reasons abrogated for unpleasant odours in the abattoir sites.

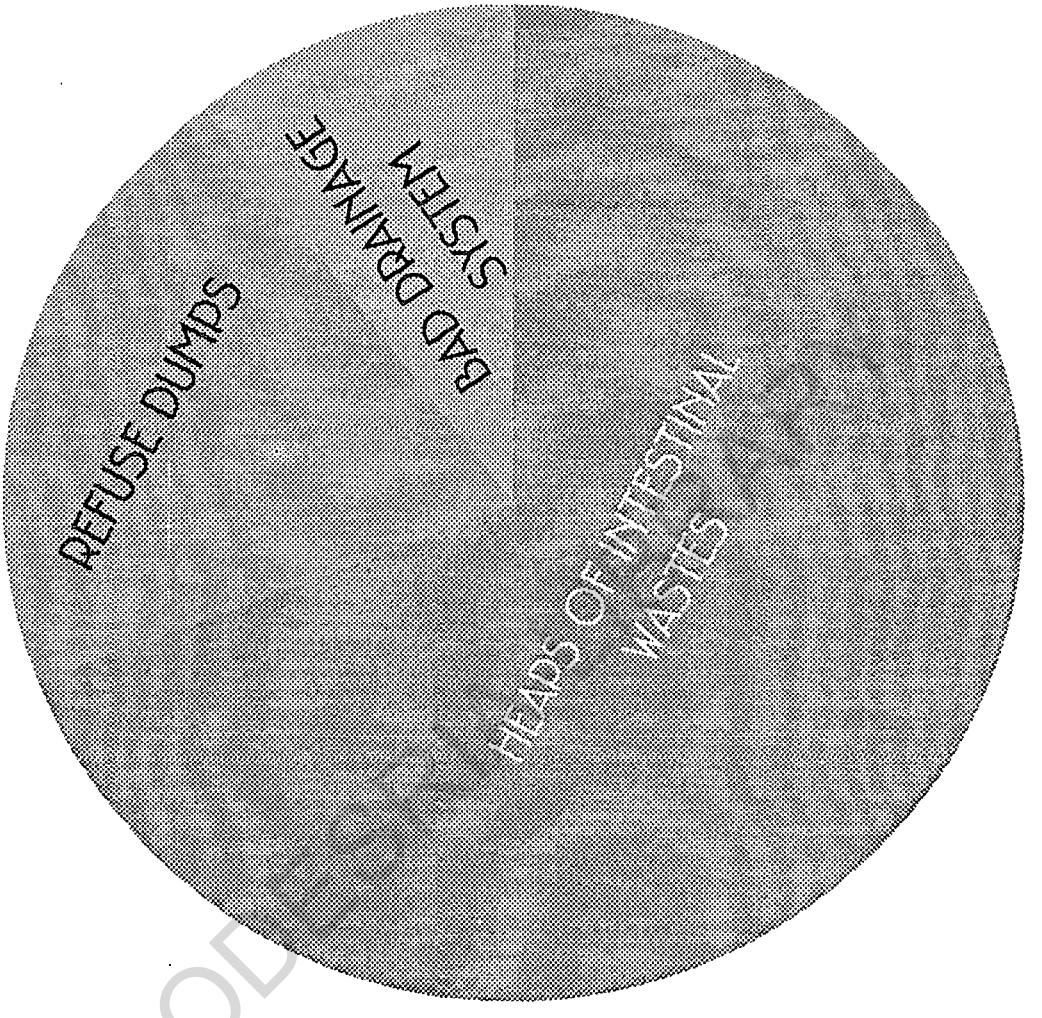

FIGURE 3.2

PIE CHART SHOWING SOURCE SOURCE OF ODOURIN THE STUDY AREA

TABLE 3.2

SOURCE OF ODOUR	FREQUENCY	PERCENTAGE
Heaps of intestinal wastes	173	69.2%
Refuse dumps	51	20.4%
Bad drainage system	26	10.4%
Total	250	100%

Source: Fieldwork, 1997.

However, all the butchers interviewed held a common view that there can not an abattoir without odour, no matter how minute. Although there is provision of open air dumps for unneeded materials in all the abattoirs visited. 83.1% of the butchers held the notion that the sites of the provision is unsatisfactory while only 16.9% are comtempted with the situation.

see plate 3.2:

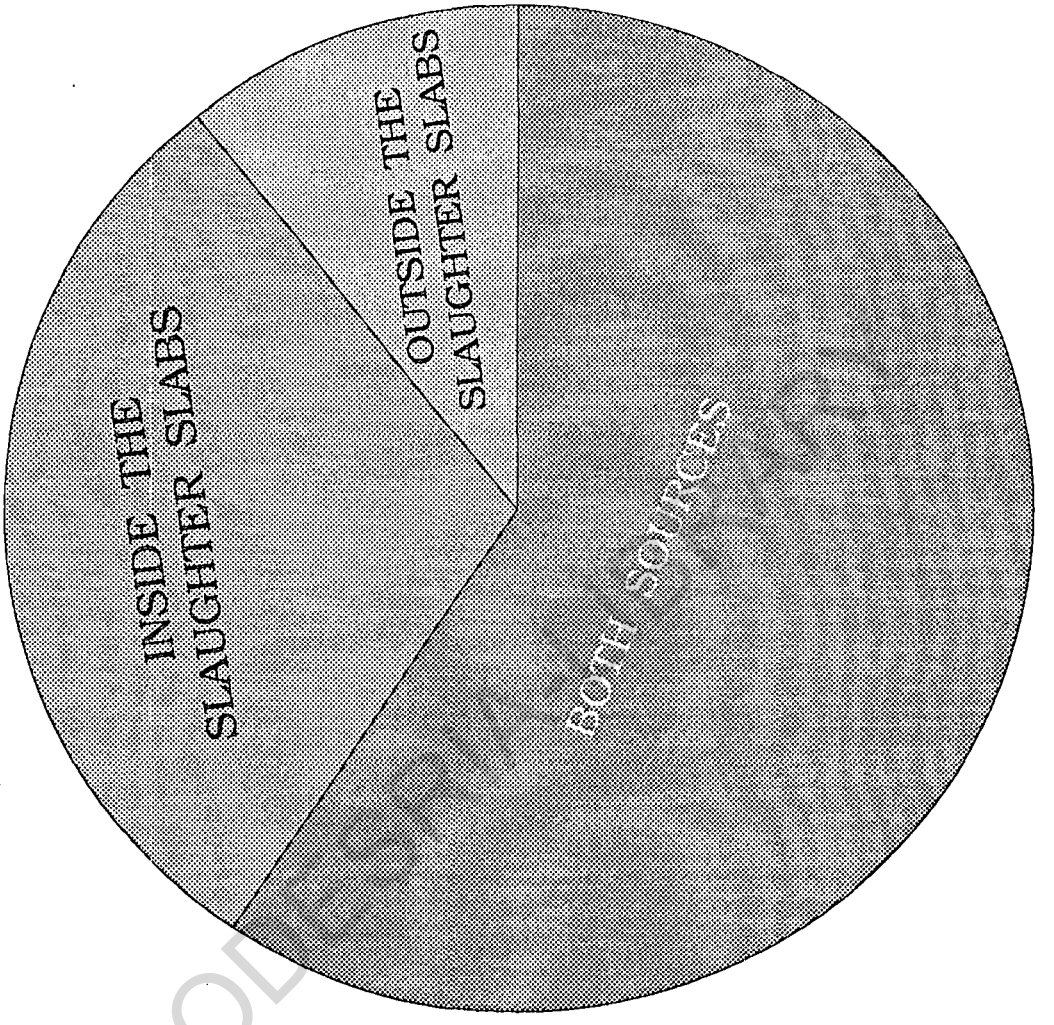

FIGURE 3.3

PIE CHART SHOWING SOURCE OF NOISE POLLUTION — BUTCHERS' VIEW

Plate 3.2: SHOWING THE SITE OF OPEN DUMP FOR ANIMAL DUNGS AND REFUSE.

3.3 NOISE POLLUTION

'Noise pollution has deteriorating effects on human life ranging from interference with communication and speech to psycho-social stress and loss of hearing'. (Egunjobi, 1988). Different activities such as meat and food selling within and outside abattoir sites generate noise pollution. 59.6% of the butchers agreed that the sources of noise are both inside and outside the slaughter slab. 29.6% of them believed that the main source of noise pollution is inside the abattoir especially in the morning when slaughtering is carried out.

Whereas, only 10.8% which form 27 out of 250 persons interviewed agreed that the source of noise pollution is outside the abattoirs especially from the market women. See table 3.3.

TABLE 3.3

SOURCE OF NOISE	FREQUENCY	PERCENTAGE
Inside the slaughter slab	74	29.6%
Outside the slaughter slab	27	10.8%
Both Sources	149	59.6%
Total	250	100%

3.4 AIR POLLUTION

United Nation Research Council ascertained that pollution is an undesirable change in the physical, chemical and biological characteristics of our air ..... that may or will harmfully affect human life or that of other desirable species, our industrial process, living conditions, cultural assets or will deteriorate our raw materials.

Some animals are roasted daily alongside wastes in the abattoir producing smoke which later pollute the environment, leaving behind some amount of ashes in certain

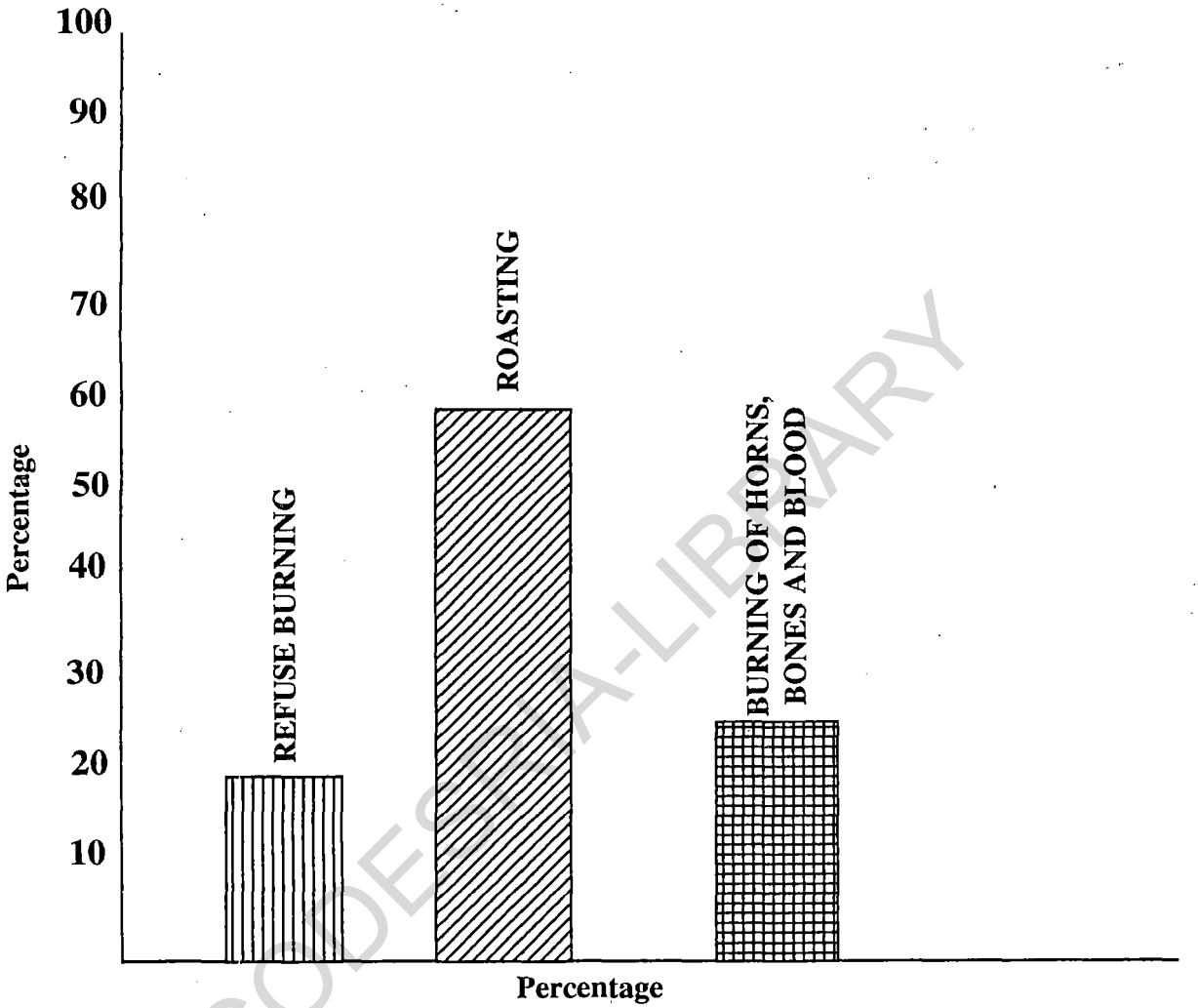

FIGURE 3.4

SOURCE OF AIR POLLUTION AS OBSERVED BY BUTCHERS

parts of the abattoir premises. See plate 3.3a:

Plate 3.3a: SHOWING ANIMAL ROASTING WITH KEROSENE AS A SOURCE OF AIR POLLUTION

Refuse burning constitute the least factor responsible for air pollution with only 18.8%. The greatest source of air pollution remains roasting. Fuel and condemned tyres are used in roasting animals including the legs, heads and horns to hasten the rate of burning which consequently increases the rate of air pollution. Roasting therefore takes 56% while burning of unneeded parts such as blood (which many women in the abattoirs later sell to unpreviledged ones as "Sikin" i.e. artificial liver), bones, hooves and horns take 25% of the sources

Plate 3.3b: SHOWING REFUSE BURNING IN AN ABATTOIR

Plate 3.3c: SHOWING BURNING OF CONDEMNED ANIMAL

of air pollution in the abattoirs. See table 3.4.

TABLE 3.4

SOURCE OF AIR POLLUTION	FREQUENCY	PERCENTAGE
Refuse burning	47	18.8%
Roasting	140	56%
Burning of horns, bones and blood	63	25.2%
Total	250	100%

Source: Fieldwork, 1997.

3.5 FINDINGS ON THE ASSESSMENT OF BOTH THE BUTCHERS ASSOCIATION AND LOCAL GOVERNMENT AUTHORITIES

The performance of the local government authorities concerning the environmental situation of the abattoirs is viewed unsatisfactory by 86% respondents while the remaining 14% said it is satisfactory. However it was collectively agreed by all butchers in the study area that the butchers association peforms satisfactorily at 100% level. See table 3.3.

TABLE 3.5

ASSESSMENT BY BUTCHERS	FREQUENCY	PERCENTAGE
Butchers' association	250	100%
Local government	35	14%

3.6 PERCEPTION OF BUTCHERS ON WAYS TO IMPROVE THE ENIRONMENTAL SITUATION OF THE ABATTOIRS

Among the ways recommended are water supply, labour provision, provision of health personnel, improved drainage system, increased butchers' participation and provision of light in the abattoirs.

Provision of water (36.2%) stems from the fact that all effluents from the abattoirs need to be washed away by water. Not only that, it is essential to rinse the roasted animals with water after been washed with soap. Labour provision (18.4%), Health personnel (13.2%) and Drainage system (12.8%). Improved drainage system is necessary because there is need for the slaughter slabs to properly linked with the major stream to prevent odours that normally emanate from improperly drained off water. The need to enlighten the butchers on environmental hygiene (10%) while prevention of insessant power failure constitute 6%. See table 3.6.

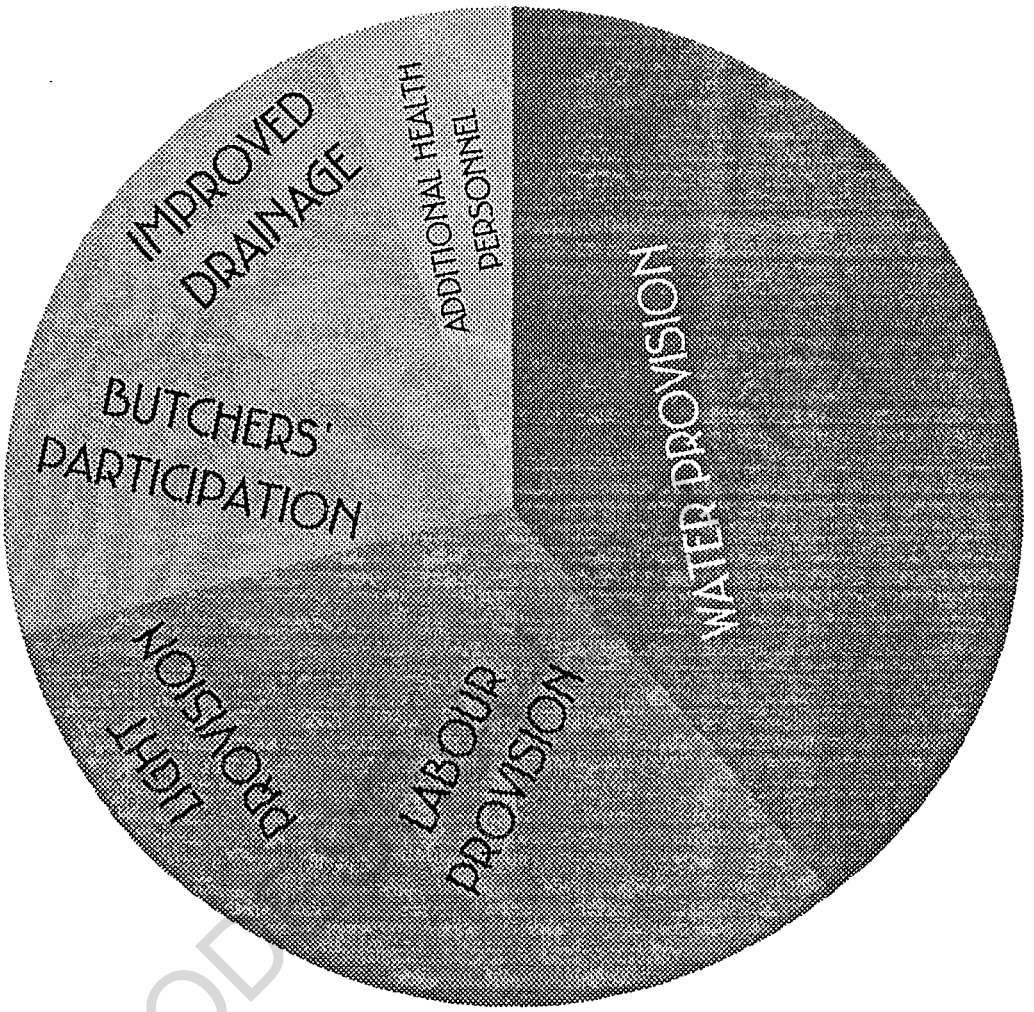

FIGURE 3.5

PIE CHART SHOWING WAYS OF IMPROVING THE ABATTOIR SITES — BUTCHERS' VIEW

Table 3.6

WAYS	FREQUENCY	PERCENTAGE
Water Provision	98	39.2%
Labour Provision	46	18.4%
More Health Personnel	33	13.2%
Improved Drainage System	32	12.8%
Butcher's participation	25	10 %
light	16	6 %
Total	250	100%

WAYS	FUNCTIONS
Water Provision	1. For flushing slaughter slab
	2. Enhances proper functioning of the abattoirs.
Labour Provision	Responsible for the cleaning up of refuse and scattered wastes in the abattoir premises.
Health Personnel	1. Inspection of animals before slaughtering.
	2. Treatment of butchers for minor injuries.
Butchers' participation	1. To participate in environmental cleanliness and sanitation exercise.
	2. To enable them desist from

unscrupulous acts such as defeacating in the drainage system and the abattoir sites.

Light

1. Prevention of power failure leads to frequent flow of boreholes, this in turn saves butchers from buying water.

2. Enhances storage of unsold meat in coldroom.

3.7 ANALYSIS OF FIELD OBSERVATION ON THE SECOND QUESTIONNAIRE

The fieldwork was carried out alongside that of butchers. Questionnaire was administered within the areas with radius of not less than 650 metres. A total number of 250 heads of households were taken as sample size. The age structure of the respondents ranges between 31-65 years. 46% of the respondents received no formal education, 45.2% have primary school education while only 12.4% received post secondary education. See table 3.7.

Table 3.7

EDUCATIONAL STATUS	FREQUENCY	PERCENTAGE
No formal	115	46%
Primary	53	21.2%
Secondary	51	20.4%
Post secondary	31	12.4%
Total	250	100%

Source: Fieldwork, 1997.

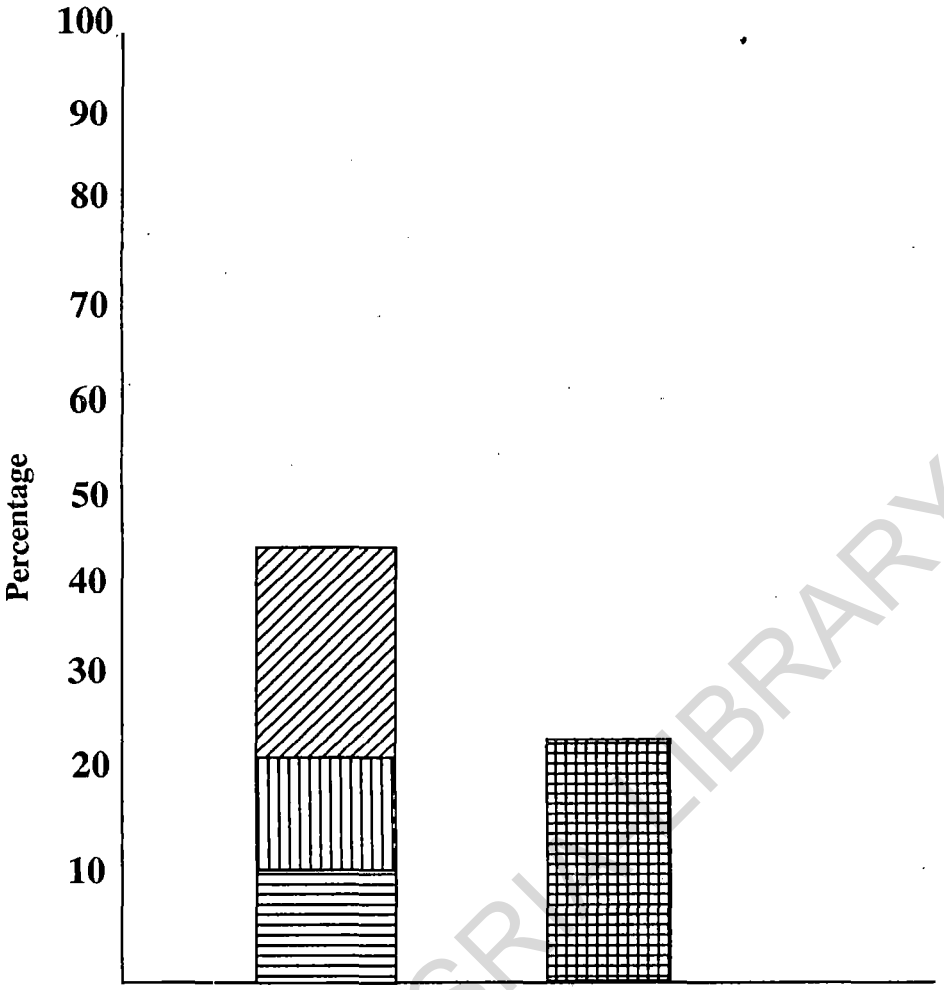

FIGURE 3.6

COMPOSITE BAR CHART SHOWING EDUCATIONAL STATUS OF RESIDENTS AROUND ABATTOIR SITES

3.8

NOISE POLLUTION

The intensity of noise decreases with increasing distance from the abattoir sites. Residents within the radius of 10-250m to the abattoir sites observed high intensity noise pollution. Those within the range of 250-450m are disturbed by medium noise while those residents between 450 - 650m considered noise from abattoir sites as low. However, out of the total number of 250 respondents only 36% are affected by noise while the larger proportion of 64% are not affected by noise generated by abattoirs. See table 3.8.

Table 3.8

INTENSITY OF NOISE	DISTANCE OF RESIDENCE FROM ABATTOIRS
High	10 - 250m
Medium	250 - 450m
Low	450 - 650m

Source; Fieldwork, 1997.

3.9

ODOUR

Residents along the main drainage channel of the abattoirs up to about 500 metres smell some form of terrible odour. The odour stems from accummulation of blood and intestinal contents of slaughtered animal.

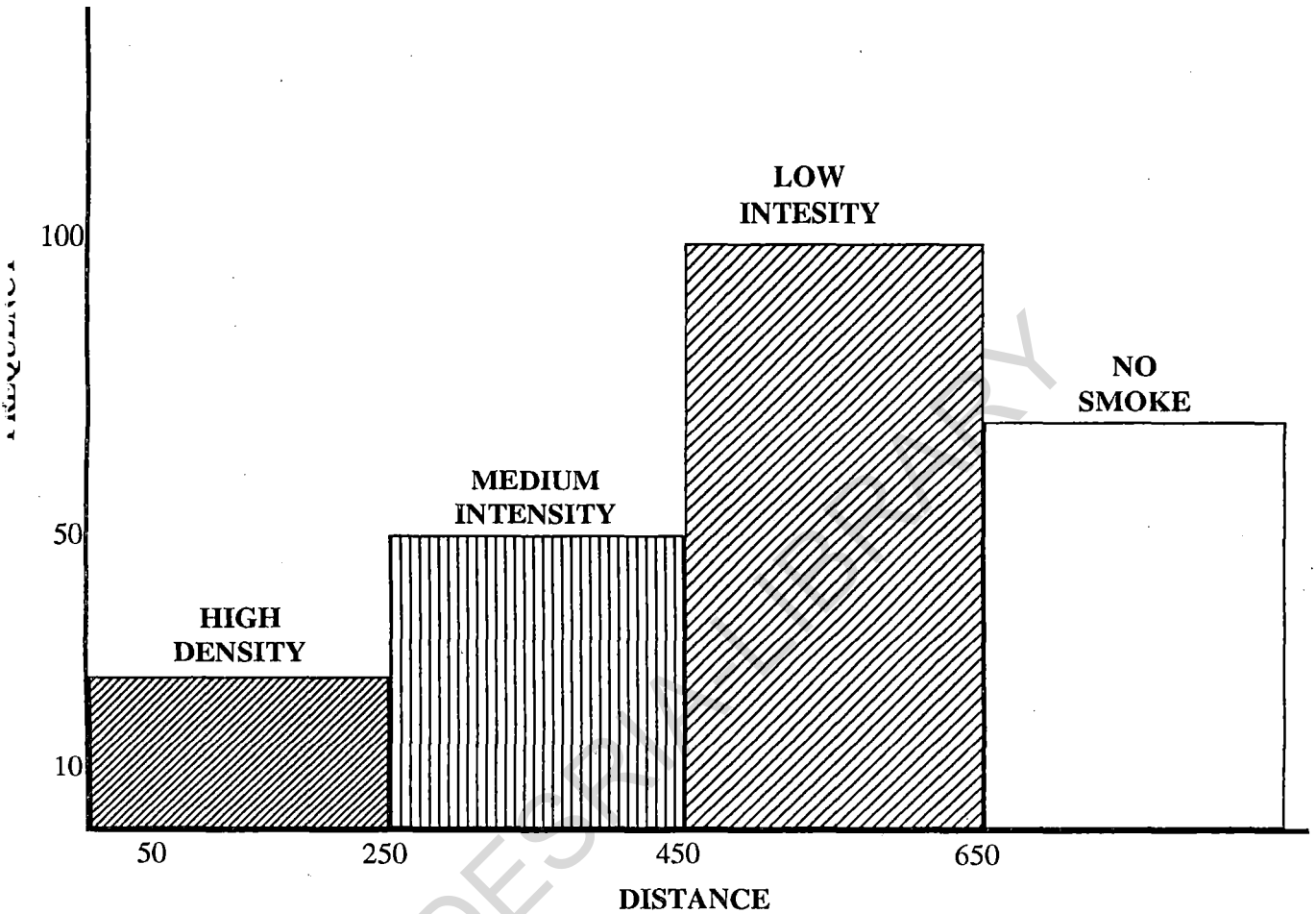

FIGURE 3.7

HISTOGRAM SHOWING RELATIONSHIP BETWEEN INTENSITY OF NOISE AND DISTANCE

Source: Field Word, 1997

These materials blocked the drainage system and consequently serve as breeding place for mosquitoes and other infectious insects. This therefore could be attributed to higher frequency of malaria attacks on the residents. 73.4% of the residents confirmed that they have malaria infection at least once in every two month on average. Majority of them even lamented that oftentimes they are not allowed by mosquitoes to enjoy their night sleep.

3.10 AIR POLLUTION

Observation of air pollution by residents.

Table 3.9

SMOKE OBSERVATION	FREQUENCY	PERCENTAGE
High intensity	24	9.6%
Medium intensity	49	19.6%
Low intensity	107	42.8%
No smoke	70	28%
Total	250	100%

Source: Fieldwork, 1997.

The table above indicates that there is an inverse relationship between air pollution (smoke) and distance from abattoirs. Largest proportion (42.8%) observe low

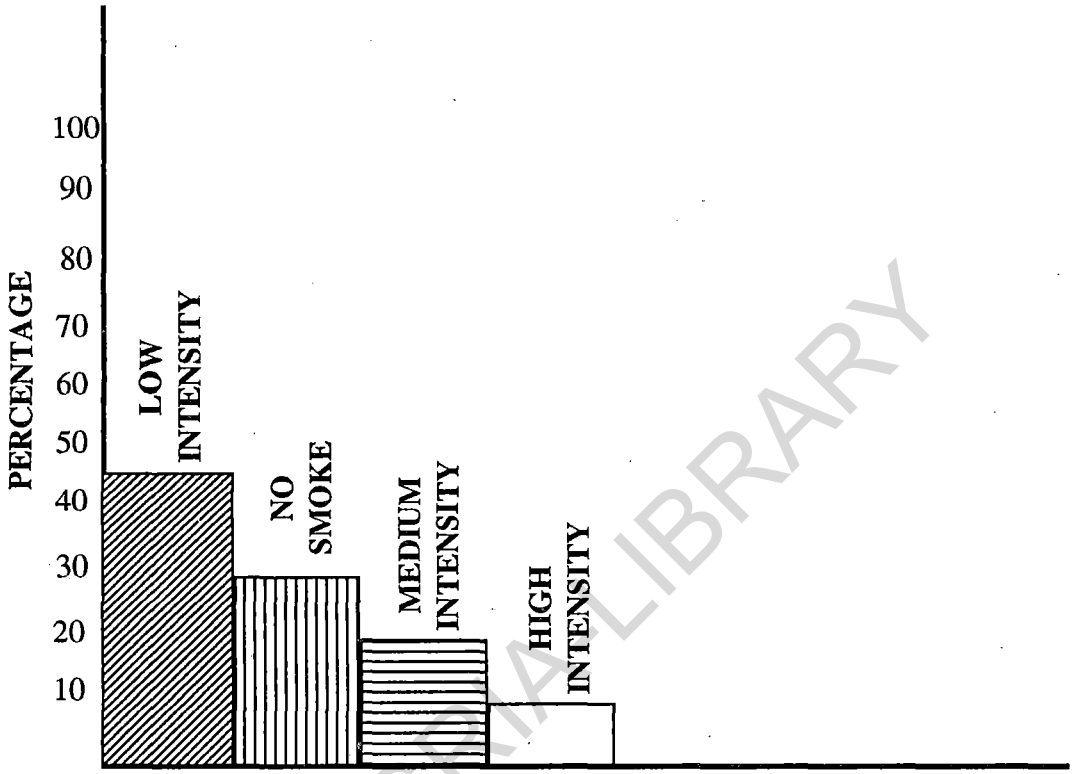

FIGURE 3.8

HISTOGRAM SHOWING THE OBSERVATION OF SMOKE BY RESIDENTS

Source: Field World, 1997

smoke from the abattoirs. 9.6% considered pollution as high intensity while only 19.6% perceived it as medium or moderate. Whereas 28% did not even observe any smoke perhaps due to their distance from abattoir.

3.11 ANIMAL DUNGS AND GRAZING

Animal dungs and grazing are peculiar phenomenon in some parts of Bodija abattoir only. No other abattoir exhibits those similar environmental effects. This may not be unconnected with its major position as the only cattle and goat market within the study area.

Animals from the North are off-loaded here. It is from Bodija market that all other abattoirs including Bodija buy their live cattle. Therefore questions on grazing and animal dungs were answered only by residents around Bodija abattoir. Out of 25 copies of the questionnaire administered at Bodija immediate surrounding residences, 72% respondents noticed animal dung. This is attributable to free ranging (28%), grazing (64%) and the remaining 8% gave no response.

Grazing becomes necessary especially for animals that await slaughtering or to be sold to butchers in other abattoirs or those who might need them for ceremonial purposes.

These animal dungs can of course habour some dangerous and infectious insects which can contaminate our food especially in residences without mosquitoe nets or where food canteens are sited. See Place 3.2

3.12 DRAINAGE

The drainage system from the abattoirs affect mainly those residents along the channel. The proportion of the residents affected is only 28%. Among the items found inside the channel are intestinal contents, blood of slaughtered animal, minutes bones and pieces of meat ('Ijanja'). Most of the drainage systems serve as breeding points for mosquitoes from where malaria, sleeping sickness, river blindness and other related diseases. 10 out of 11 abattoir sites visited have there slaughter slabs channelled toward existing streams. Infact, one of the butchers interviewed opined that it is a necessary condition for siting abattoir that it has to be located close to stream. The only abattoir in the study area that does not conform with this is Ojoo abattoir. See Place 3.4 & 3.5.

Plate 3.4: SHOWING DRAINAGE SYSTEM AROUND ABATTOIR SITE.

Plate 3.5: SHOWING OJOO ABATTOIR

Table 3.10: INCOME DISTRIBUTION OF RESIDENTS

Names	Low Income	Medium Income	High Income
	0 - N18,000	N18,000-36,000	N36,000-above
Basorun	29.2%	30.5%	40.3%
Balelayo	62.1%	29.7%	8.2%
Sasa	53.6%	27.2%	19.2%
Olodo	67.3%	10.4%	22.3%
Oremeji	71.2%	23.5%	5.3%
Ojoo	68.7%	13.2%	18.1%
Moniya	51.3%	23.3%	25.4%
Bodija	16.1%	48.8%	35.1%
Ijokodo	29.5%	40.2%	30.3%
alupon	58.4%	24.3%	17.3%
Gate	25.5%	32.1%	42.4%
	532.9%	303.2%	263.9%
	X % = 48.4%	27.56%	23.9%

Source : Field work, 1997.

The amount an individual receives per annum tends to reflect the category such a person is likely to belong on poverty line. The rational behind this is to show the relationship between location of abattoirs and the calibre of people that suffer the impact.

To determine whether specific group significnatly disadvantaged with respect to the impact they suffer from the abattoir sites, the above table is a guide. Three income groups are identificable viz: low income (0 - N18,000 p.a.), Medium income (N18,000 - N36,000 p.a.) and high income (36,000 - above p.a.). 48.4% of the total number of residents around the radium of 650M to abattoir sites are low income earners. 27.56% of them are medium income earners while only 23.99% of the respondents are high income group.

The generalization that can be made from this is that about half of the residents around the abattoir sites are low income people, hence they are the ones that suffer the impact most.

The abattoir site with the highest number of low income residents is Oremeji (71.2%). Bodija abattoir has the highest number of medium income earners suffering the impact of abattoir (48.8) while Gate abattoir is the only abattoir with the highest percentage of high income group suffering the environmental effects of abattoir (42.4%).

3.13 ASSESSMENT OF BOTH THE BUTCHERS ASSOCIATION AND THE LOCAL GOVERNMENT AUTHORITIES

This is with respect to environmental situation of abattoirs in the study area. 69.2% assessed their contribution as unsatisfactory while only 30.8% gave them pass mark.

3.14 WAYS OF IMPROVING THE PRESENT ENVIRONMENTAL SITUATION OF THE ABATTOIR - RESIDENTS PERSPECTIVE

Among the factors considered as solution to environmental deterioration resulting from location of abattoirs are: relocation, total renovation, labour provision, removal of burning sites, local government intervention and improved drainage system, 38.4% of the residents interviewed believed that if abattoir sites can be renovated completely, environmental nuisance will greatly be reduced. 18.4% opted for relocation. They want the abattoir to be shifted away from their residences. They know that this is the global solution. Labour provision (10.8%). Removal of burning site is advocated for by the residents very close to abattoir sites, while local government intervention (10.%) is the solution proposed by residents whom their compound is been used as grazing field. Improved drainage system(10.8%) was suggested as way out by residents along streams attached to the abattoir

sites. See table 3.10:

Ways of improving the present Environmental situation .

Table 3.11

WAY	FREQUENCY	PERCENTAGE
Relocation	46	18.4%
Total Renovation	96	38.4%
Labour Provision	27	10.8%
Removal of burning site	29	11.6%
Local Government Intenvention	25	10%
Improved Drainage system	27	10.8%
	250	100%

source: Fieldwork, 1997.

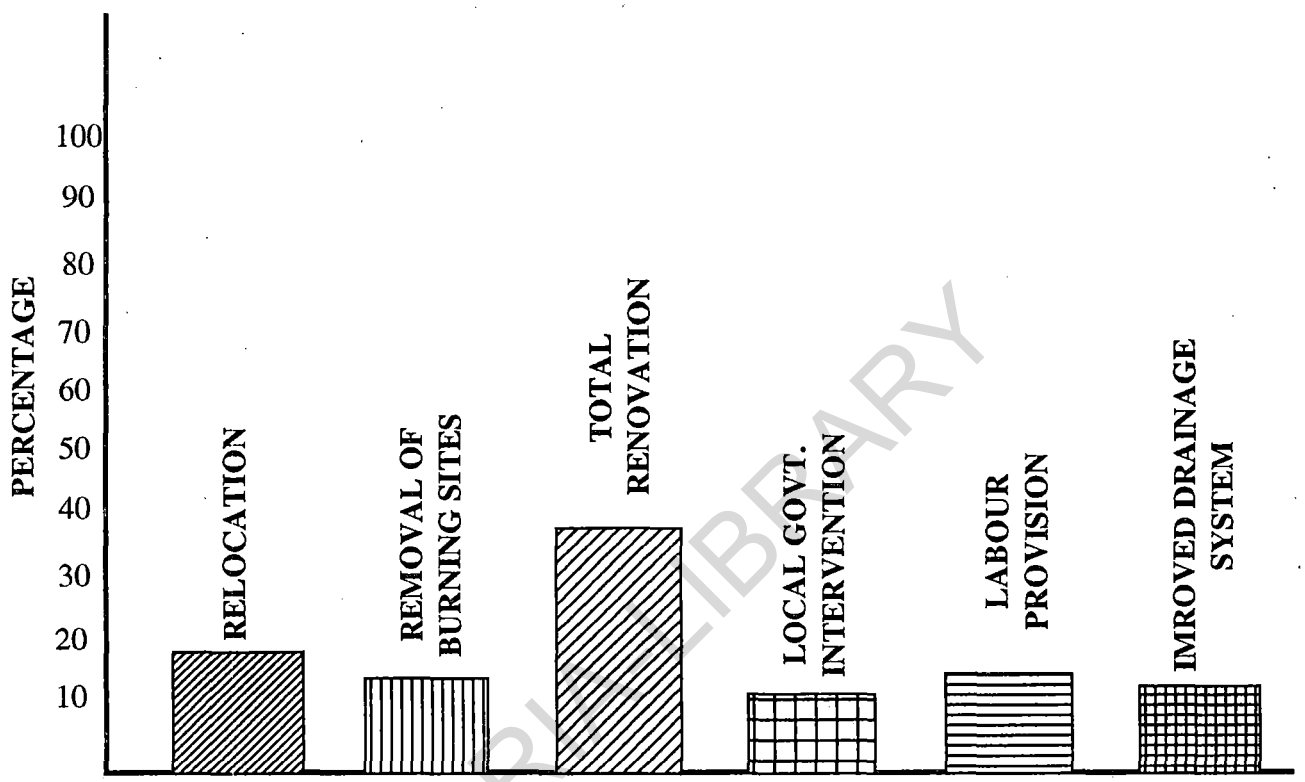

FIGURE 3.9

BAR GRAPH SHOWING WAYS OF IMPROVING THE PRESENT ENVIRONMENTAL SITUATION — RESIDENTS' PERSPECTIVE

CHAPTER IV

4.1 INTRODUCTION

As geography, it is known that location is very central to the descipline. This is true both in the past and now. At anytime, the emphasis in geography is on location of regions/empire, determination of boundaries and region especially in the past. Given the fact that location is very central to geography, there is need to define location in a clear and precise way. One important aspect of location is the idea of distance. It is ofcourse, possible to measure distance using different methods indentifiable with different location such as physical distance, time distance, economic distance, psychological distance and perceptual distance. All these are important when talking about location.

4.2 AN IDEAL ABATTOIR - LOCATIONAL ANALYSIS

The location of most of the abattoirs in their present sites conforms with Ayeni description of industrial development and other institutional factors in his rural - urban fringe analysis. Other factors capable of affecting the location of abattoir sites are the need for

proximity to access road, availability of portable water, the need to slaughter under hygienic condition, proximity to cattle centre, freedom from human dwelling, public offices, hospitals, religion worshipping centres, market barns, stores e.t.c. The location must be free from laterine, open gutter system and public sewage dumping ground. It has to be free from industries releasing toxic by-products, smoke, dust, radiation of offensive odour. The site must be screened from public glare by obstacles such as planted trees, fence e.t.c. The size of the abattoir site should be the function of number of expected daily kill and the size of the available land.

Applying Matrices, Assuming.

A = Availability of land

B = Adequate parking space

C = Proximity to cattle market

D = Freedom from human dwelling

E = Freedom from public offices

F = Freedom from laterine, open gutter of public sewage system.

G = Freedom from industries releasing toxic by-product.

H = Screened from public glare.

Table 4.1

	Attributes								
Names	A	B	C	D	E	F	G	H	
Basorun	1	0	0	0	0	0	1	0	2
Balelayo	1	1	0	1	1	0	1	0	5
Sasa	1	1	0	0	1	0	1	0	4
Olodo	1	1	0	0	0	0	1	0	3
Oremeji	1	1	0	0	0	0	1	0	3
Ojoo	1	0	0	0	0	0	0	0	1
Moniya	1	1	1	1	0	0	1	0	5
Bodija	1	1	1	1	1	0	0	1	6
Ijokodo	1	1	0	0	1	0	1	0	4
Lalupon	1	1	0	0	1	0	1	0	4
Gate	1	0	0	0	0	0	1	0	2
Total	11	8	2	3	5	0	9	1	39

Considering all these eight conditions stated by Thorton (1968) as major pre-requisites for efficient location of abattoir, all the eleven abattoir sites visited have available land. Nine are free from industries releasing toxic by-product, eight of them have adequate parking space. Five are free from public offices. Three are free from human dwelling. Two are very close to cattle market.

Only Bodija abattoir site is screened from public glare. However, none of the eleven abattoirs is free from latering, open gutter and public sewage system.

In terms of how each of the abattoirs meet the above stated requirement, Bodija abattoir ranked highest with 75%, followed by Balelayo (Olorunsogo) and Moniya with 62.5% each. Sasa, Ijokodo and Lalupon scored 50% in the locational requirement. Olodo and Oremeji both scored 37.5% each while Gate and Basorun abattoirs sites got 25%. The least scored abattoir on the hierarchy is Ojoo with only 12.5%.

The interpretation or implication of this is an hierarchical order of the abattoir sites. The hierarchy is as follows:

1st Order - Bodija

2nd Order - Moniya, Balelayo, Ijokodo and Lalupon.

3rd Order - Olodo, Oremeji, Gate, Basorun and Ojoo.

See table 4.1:

4.3 GENERAL LAYOUT OF A STANDARD ABATTOIR

The first step in planning an abattoir site is to ascertain the maximum daily kill of each class of animals and the proposed disposal and treatment of the edible and inedible by-products. The actual system of operation must also be determined.

4.3.1 SITE

The abattoir site must have availability of ample supply of water, adequate facilities for sewage disposal, an electricity supply and good road facilities. Grazing land must also be provided for cattle and sheep. The provision must be that animals are not allowed to suffer unnecessarily awaiting slaughter.

4.4 BUILDING

The following are the major buildings which must be provided in a modern abattoir.

1. Lairage
2. Isolation Block
3. Slaugher Hall
4. Cold Room
5. Hide and skin store
6. Guttery and Tripery
7. Sanitary Inspectors/Veterinarian offices
8. Laboratory

4.4.1 **LAIRAGE**

Lairage is the place where animals are accomodated awaiting slaughter. It is adviceable that animals are put in lairage for about an hour before slaughter. This reduces the incidence of 'black beef'. The house must not be too cold or hot and the animals accommodated must be provided with adequate food and water from leaving the farm until the time of slaughter. Lairage space sufficient for 3 days' supply of cattle and two days supply of sheep and pigs is regarded sufficient.

Under slaughter animals (Prevention of Cruelty) Regulations,horned stock as well as those capable of injuring other animals must be separated from other stock and if two such animals are kept together, they must be prevented from injuring each other. Under this regulations, animals must be fed twice daily except on the afternoon preceeding the morning of the intended slaughter. An important factor which facilitates cleaning is that the lairage has to be served with passage wide enough to admit entry of a vehicle suitable for the removal of manure. This equally helps in the quick removal of dead animals.

Of more importance is the fact that emphasis need be placed on ease of cleaning, comfort for the animals and ease of handling animals. Veterinarians and lairage staff have to be provided with wash-- hand facilities.

The design of sheep, calf, goats and pigs' lairage is however different from the above. The only similarity is in the area of provision of food and water.

4.4.2 **SLAUGHTER HALL**

The movement of animals from lairage to slaughter hall is a simple issue if killing floor is used. The animals can possibly be walked directly on the level floor on to the slaughter slab.

The slaughter hall must be an open hall which is well ventilated and lighted. The slaughter houses (Hygiene) Regulation prescribed that efficient natural and artificial light of an intensity of 200 foot candle power be provided, except where inspection is conducted when it shall be not less than 50 foot candle. All floors in slaughter halls, lairage, workrooms and rooms for condemned meat must be of non-slip material. The slaughter hall and workroom floor must be laid so as to have a gradient of not less than two inches in every ten feet.

Under the above Regulations, blood of slaughtered animal must not be allowed to gain access to gullies as it congeals and quickly blocks the drains. It must be collected by a sizeable shallow tray of 50cm diameter and 10cm deep, especially when the blood is required for manufacture into black puddings. The blood intended for human food must be properly stored and indentifiable with the carcass.

Other methods of slaughtering, such as Gravity Rail system, intermittent powered system, continous powered system and 'Canpak' system are available but the study limits itself to the type practiceable in our society as permitted by the economic consideration. However, no animal must be slaughtered in the sight of another animal.

A combination of several machines, tools and correlated items of equipment such as brisket, saw, horn cutters, hide puller, bone cutter, cutlass, knife e.t.c. enables the complete dressing of cattle, sheep and pigs.

4.4.3 **COLD ROOMS**

It is essential to treat the carcass after dressing. In large slaughtering centres a space is necessary for pre-cooling with good ventilation. The space should be large enough to accommodate at least two days' kill. The

problem is to hold the meat in good condition without destroying taste and appearance, hence temperature between 1.5°C and 4.5°C have proved most satisfactory.

4.4.4 HIDE AND SKIN ROOM

A provision must be made for an apartment where hide and skin can be kept before selling out to those who need them. The room must be clean and slipless.

GUTTERY AND TRIPERY

Gut scraping rooms, a boiler house, tripe room and by product plant should form a separate unit from the main building but should be placed at convenient site for handling the materials dealth with. Among the items dealth with here include slaughtered animals intestine, stomachs, legs, heads and hoofs.

4.4.5 OFFICES AND WELFARE FACILITIES

Office accomodation must be provided in the meat market. It must occupy a central position. It must house abattoir personnel such as veterinary doctors, sanitary inspectors and local government tax collectors. Other

welfare facilities to be installed in the abattoir include:

(a) Up-to-date toilet

(b) A fully trained industrial nurse

(c) A fully equiped First Aid Room

(d) A food canteen

(e) A car park

(f) A comprehensive communication system.

4.5 DISPOSAL OF ABATTOIR EFFLUENTS

Efficient disposal of abattoir effluents is important because of its tendency to pollute water courses. The problem of abattoir effluent treatment start from the slaughter slab where every effort must be made to adopt an efficient by-product recovery and dry clean up as it reduces the actual volume of water required for cleaning up, thus cutting costs. The abattoirs use large quantities of water which is a significant processing cost factor.

Many systems exist for the treatment of effluents generated by abattoirs. On - site treatment is always necessary to avoid water pollution. The system adoptable in our society entails screening out solids and removing fats by hands. This must be followed immediately by

washing away the residual by enough water which leads into an enclosed pit.

However, Thorton sums up that before any proposal to treat effluent is undertaken data on flow rate. BoD levels, fat and suspended solids level must be determined over a period of time during which the minimum use of water is made and as few solid as possible allowed in the effluent.

DATA ANALYSIS

4.6 HYPOTHESIS TESTING

To test the hypothesis that area size of an abattoir is determined by the size of the available land and average number of daily kill.

H_o: Area size of an abattoir is determined by the size of the available land and average number of daily kill.

To test this aforementioned hypothesis, a total number of 250 pieces of questionnaire were administered to butchers. The result of which was subjected to computer analysis. The factors considered were size of the available land for abattoir (X_1), Average number of daily kill (X2) and Areas size of slaugher slab (Y).

Table 4.2

MULTIPLE REGRESSION ANALYSIS

	Name	Y	X1	X2	X_1^2	X_2^2	YX1	YX2	X1 X2
1.	Basorun	250	1340	6	1795600	36	335000	1500	8040
2.	Balelayo	250	3480	15	12110400	225	870000	3750	52200
3.	Sasa	540	3450	25	11902500	625	1863000	13500	86250
4.	Olodo	540	3560	20	12673600	400	1922400	10800	71200
5.	Oki	280	2340	9	5475600	81	655200	2520	21060
6.	Ojoo	540	1560	15	2433600	225	842400	8100	23400
7.	Moniya	580	3080	70	9486400	4900	1786400	40600	215600
8.	Bodija	4045	12135	250	147258225	625000	49086075	1011250	3033750
9.	Ijokodo	540	3270	8	10692900	64	1765800	4320	26160
10	Lalupon	540	3560	22	12673600	484	1922400	11880	78320
11	Gate	180	250	4	62500	16	45000	720	1000
		8285	37.775	444	226564925	69556	61093675	110	3616980

$Y = a + b1\ x1 + b2\ x2$

$$Y = na + b1\ x\ 1 + b2\ x2 \text{ ----------(1)}$$
$$YX1 = a\ x1 + b1\ x1^2 + b2\ x1\ x2 \text{ ----------(2)}$$
$$YX2 = a\ x2 + b\ x1\ x2 + b2\ x2^2 \text{ ----------(3)}$$

11	37775	444	444	a
37,775	226564925	363616980	61093675 =	b1
444	3616980	69556	1108940 =	b2

Standardize B1 = 0.306249

B2 - 0.690050

To carry out inferential test

Y = Y = a + bx1 +bx2

Where SSY = SSR + SSE

Multiple R = 0.98339

R square = 0.96705

Adjusted R square = 0.95882

Standard Error = 223.71398

Apply ANOVA

Source of Variation	Sum of sq.	DF	Mean of sq	F
Regression	11737730.07	2	5875865.07	117.4
Residual	400383.56	8	50047.95	

F = 117.4

At 95% confidence level, the hypothesis is significant, hence we accept the H_o.

There is a very high correlations of 0.98 between size of slaughter slab and the average daily kill with size of the available land. The percentage explanation given by the two independent variables is 96.8%.

4.7 HYPOTHESIS II

To test the hypothesis that location of markets determines the choice of abattoir sites.

Ho : Location of markets determines the choice of abattoir sites.

Where X1 = Year of establishment of market

Y - year of establishment of abattoir

Table 4.3

NAME OF ABATTOIR	Y	X1
Basorun	24	13
Balelayo	30	23
Sasa	19	27
Olodo	12	4
Oremeji	15	14
Ojoo	87	27
Moniya	17	9
Bodija	26	12

Table 4.4. (CONTD.)

Ijokodo	15	18
Lalupon	12	24
Gate	14	12

Table 4.4

Y	X1	X_1^2	YX1
24	13	169	2197
30	23	529	12167
19	27	729	19683
12	4	16	64
15	14	196	2744
87	27	729	19683
17	9	81	729
26	12	144	1728
15	18	324	5832
12	24	576	13824
14	12	144	1728

Normalized B1 = 0.485811

To carry out inferential test

$$Y = a + bx1 + bx2$$

Where SSY = SSR + SSE

Multiple R = 0.48581

R Square = 0.23601

Adjusted R Square = 0.15112

Standard Error = 19.82185

APPLY ANOVA

Source of Variation	DF	Sum of Sq.	Mean of Sq.	F
Regression	1	1092.39449	1092.39449	2.7803
Residual	9	3536.15097	392.90566	

F = 2.7803

Significant F = 0.1298

At 95% confidence level, the hypothesis is not significant.

The implication of this is that most of the abattoirs under consideration were established before the advent of the nearest market. Infact one can readily say that the abattoirs attract those markets to their present location being very close to abattoir sites.

However, the percentage explanation given by market as a factor for locating an abattoir site is only 23.6%. This is below average.

The inference from this is that location of market is not sufficient enough to explain the reason for siting an abattoir.

4.8 CENTRAL PLACE THEORY _ An Application to Abattoir Location

Walter Christallor (1933) in his central place theory demonstrated how hierarchical distribution of settlements can evolve. To construct his theory, he made certain assumptions among which are:-

1. An isotropic surface with homogenous distribution of purchasing power.
2. That central goods are purchased from the nearest central place.
3. All trade areas must be served by a central place.
4. That no excess profit may be made by any central place.

He further defined some elements to explain his theory. These are:

(a) **COMPLEMENTARY REGIONS:-** These are the regions served by a central place. Those central places serving large areas are called High Order Centres and those serving small areas are known as Low Order Centres. The service limit of each centre was described by

the outer limit of the range of the commodity in which it dealt.

(b) **THRESHOLD POPULATION:-** This is the minimum effective population that is needed to sustain a business or keep an enterpreneur in operation.

(c) **RANGE:-** Range of goods or services is the maximum distance over which people would be willing to travel in order to purchase a good or derive a service offered at a central place.

Applying these principles to the assumptions, he came up with a model of town distribution. The system of central places and complimentary regions implies that central places are Towns that serve as central for regional communities by providing them with central goods and services. High order centres stock a wide variety of goods and services as well as serve large areas. Lower order centres stock smaller range of goods and services with lower coverage area. The order of centres are defined by their centrality

Taking all these into consideration it is possible for one to develop another chrisalarian model for abattoir organisation and spatial distribution in the study area.

The hierarchy of abattoirs in the study area are as follows:-

Table 4.2

NAME	HIERARCHY
Bodija	1st Order
Moniya	
Balelayo	
Ijokodo	2nd Order
Sasa	
Lalupon	
Olodo	
Oremeji	
Gate	3rd Order
Basorun	
Ojoo	

Using the three vital elements involved in christaller's model, the abattoir sites in the study area closely fulfil the conditions.

The threshold population of all the abattoir's are in accordance with their ranks. Bodija abattoir has the largest threshold population while Ojoo has the least threshold population.

In terms of range of goods and services, the 1st order abattoir (Bodija) attracts people from far and wide. The maximum distance people are willing to cover to obtain goods from Bodija is larger than those of all other abattoirs.

The order of good/services provided by the abattoirs depends on their order. For instance Bodija abattoir provides higher order goods/services. Among the services and goods provided by Bodija are sale of life cattle, presence of lairage, availability of different salughter slabs for varying types of animals (Cattle, sheep, ram, goat and pigs) which are not found in other abattoirs. Other facilities available in Bodija abattoir include offices for veterinary officers and sanitary inspectors and the availability of borehole as compared with the 6th Order abattoir (Ojoo) which has only a small slaughter slab without rendering any of those aforementioned services or having any of the facilities mentioned earlier.

The complimentary regions for Bodija abattoir are the settlements within Ibadan and its environs as well as those ten other abattoirs. Bodija abattoir as a 1st order centre with high centrality supplied many services per residents while lower order centres like Ojoo and Gate supply lower services. In addition to the range of

goods and services provided by Bodija abattoir, it equally provides low order services and goods.

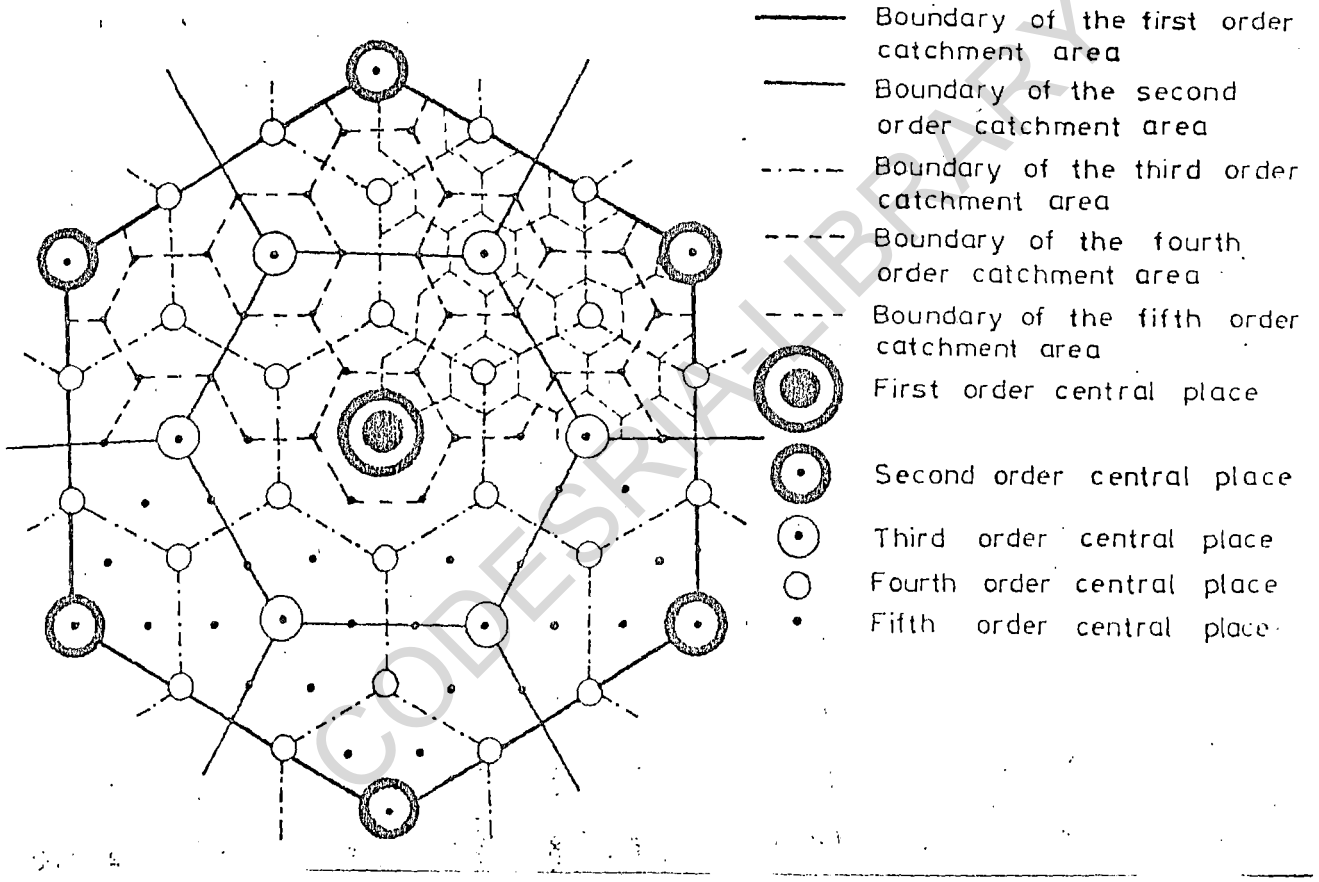

FIG. 4.1: Christaller's Central Place System

CHAPTER V

5.1 ASSESSMENT OF ENVIRONMENTAL POLICIES

The federal military government recognises the inter relationship between pollution, environment and development. The government has therefore taken some bold decision to solve these above problems. Some of the actions taken include the launching of various policies on population, health, agriculture, science and technology. Among the measures taken in the pursuance of the policy of proper management of the environment, the Federal Environmental Protection Agency (FEPA) was created in the wake of Koko Toxic waste by Decree No 58 of December 30, 1987 as an autonomous organization charged with the full responsibility to oversee and control the state of Nigerian environment. Another step was the lunching of the National Policy on the environment on 27th November, 1989. The policy was developed as a strategy for achieving environmentally sound management of our nations resources with special consideration for social, demographic and health issues. The policy also aims at encouraging and intensifying the integration of population and environmental factors in the National development. Also to secure for all Nigerians a quality of environment adequate for health and well being and to encourage individual/public awareness and

promote understanding of essential linkages between environment and development and to encourage individual and community participation in environmental improvement efforts amongst other goals.

President Babangida in 1989 at the launching of the National Policy on Environment identified industrial pollution and waste disposal as a priority environmental problem. He then charged FEPA to evolve practical programmes, national strategies and guidelines to solve the problem.

Most of Nigeria major urban industrial centres show clear evidence of the effects of industrial pollution. This is caused by the setting of industries in populated areas and by discharge of domestic waste and noxious emissions as those generated from abattoirs into the air, streams and lagoons. These problems are, however, receiving some attention. In other to safeguard our communities from being a dustbin for industrial wastes, the harzardous and toxic waste Decree No 42 of 1988 was promulgated in 1988.

Lastly, thelast Saturday of every month has been set aside by Nigerians to spend the hours between 7.00a.m. and 10.00a.m. cleaning their suroundings. The environmental issue is gradually occupying a more central position in the

national consciousness and people are becoming more aware of the implication of ignoring danger signs. Industrial pollution has been identified as one of the greatest environmental problem which has the potential of adversely affecting the quality of present and future generation and doing damage to health and survival of Nigerians.

5.2 THE CONCEPT OF ENVIRONMENTAL POLLUTION

The encyclopedia Americana defines environmental pollution as "the contamination of air, land and water by industrial, agricultural and human wastes". Environmental problems especially air and water pollution, majorly from industrial effluents are resultant effects of unintended consequences of production activities of industries. As noted by Akinkoutu (1984), environmental pollution in Nigeria seems to be limited to many slums and disrept quarters spread all over country, the gabbage heaps, the rotting carcass, the over flowing gutters, lawn and bushes that have become public lavatories. Not many people even see noise as a form of environmental pollution. Industrial sources generate a range of pollutants specific to the process involved. Almost all industries dispose off

pollutants and are therefore, all guilty of environmental pollution.

Pollution sources include battery manufacturing, steel,paints, plastic, chemical, breweries, fertilizer, textile industries as well as abattoir sites. Their pollutants however include highly poisonous wastes like amonia salt, chromium, copper, acids,hydrogen sulphide and carbon monoxide. Many towns and villages in Nigeria have suffered greatly from all forms of pollution resulting from toxic waste dumps. The effects which range from direct contamination resulting in disease. For instance water pollution can result in a variety of water borne diseases such as typhoid, diarrhoea and cholera. The inhalation of carbon monoxide from refuse burning causes cancer and asthma.

5.2.1 AIR POLLUTION

"Air pollution" the contamination of the air with unwanted gases, smoke particules and other subtances is generally considered as recently discovered phenomenon. However, pollution of air, particularly with some has plagued many countries since the dawn of industrial revolution (A.S.Asaju, 1992).

There are five basic classes of air pollutants. These are cabonmonoxide, particulate matters, sulfur oxides, gaseous hydrocarbons and nitrogen oxides. The distribution of pollution of concentration varies from area to area and in accordance with the direction of the wind and the strength of the wind. The greater the wind force, the greater the air mixing and therefore, the less the concentration of pollutants, It is equally difficult to assess the cost of damage and boiling of homes especially those resulting form inhalation of bad odour from abattoirs. The most difficult effects of air pollution to assess are those on human health. In reality, the value of medical costs and time lost from work by those whose health is affected by air pollution is impossible to determine.

A.S. Asaju observed that air pollution are damaging to variety of materials, steel corrodes two or four times faster in urban and industrial areas than it does in rural area where much less sulfur bearing coal and oil are burned. In some cities work of art made of stone bronze or steel need be moved indoor to prevent them from deterioration causes by air pollution.

Water may be considered polluted because of an excess burden of any gaseous, liquid or solid constituents. The main pollutants include organic wastes such as abattoir effluents from both rural and urban areas and by industrial

wastes of animals and plants origin, living agent such as bacteria, virus and other micro organisms that can cause disease.

Water pollution is produced mainly by the activities of man, specifically in his management of water resources. The pollutants are any kind of physical, biological, and chemical substances that affect the natural condition of water or its intended use. Water pollution threatens the availability quality and usefulness of water.

5.2.2 NOISE POLLUTION

Noise pollution is a form of environmental nuisance that is just recently been recognised. This characterise our towns and cities. Environmental noise is a kind of noise pollution that emanates from sources uncontrollable by those affected. Environmental noise include outdoor noise and country noise as the case of abattoir sites. This noise constitutes external diseconomy. Those who are subjected to such environmental noise, whether they are inside or outside a building must endure the noise and the resulting damage and annoyance. Otherwide incure a

cost of protecting themselves from all or a portion of it. Some of the effects of the environmental noise associated with abattoirs include interference with the activities of those in the room. If they happen to close the window, circulation of air may be impeded especially on hot day. The need to decrease the noise damage is an example of an external cost. An economic cost will be incured if such resident needs to install an air conditioner solely because of the closed window. It is generally accepted that the major contribution of noise in most urban environment are transport, certain commercial and industrial activities as well as contruction. A typical man has little or no control over such noise generated activities. The effects of each of these types of noise sources may be psychological, sociological, physiological and economical. The effect so caused will depend on the characteristics of the aggregate noise passed on various locations as well as on the personal characteristics and the activities of the individuals hearing them at those locations.

Finally, overcrowding on the slaughter slabs and impatient attitudes of some abattoir users make many abattoirs in the study area a noisy place. Many a time,

butchers do enjoy shouting unnecessarily just to create unneeded awareness about the type and size of the animals to be slaughtered.

5.3 THE NEED FOR POLLUTION CONTROL

Policy makers, ministries, parastatals, town planners, corporate bodies, NGOs and private individuals are hereby implored to consider the fact that improper management of environmental pollution involving air, land, water shall definitely have negative and deleterious influences on human life, health and material welfare. Air pollution seems to correlate with respiratory diseases. Water pollution poses health hazards and constitutes obstacle to recreation as well as a threat to acquatic life.

Barbout, 1980 believes that whatever harms human life support system also harms humanity. Lave and Seskin opined that toxic wastes are capable of producing cancer and injure the human nervous system.

Pollution control involves legal, institutional, scientific and technological arrangements established to minimize the concentration of pollutants in the environment (Mbaokwe, 1989). If the urban wastes produced by abattoirs

contain toxic substances, the pollution can be controlled by setting standard limiting the maximum effluents that can leave such abattoir daily. To comply with such standard, butchers, should either clean the effluent water before discharge or redesign the abattoir process such that effluents are not discharged directly, into town's water supply system.

Noise pollution can be controlled by enacting an appropriate policy limiting the noise level in abattoir sites. The devastating effects of noise from abattoir on human health will be minimized if sanitary inspectors are stationed at all abattoirs to control noise making by all and soundry within and outside slaughter slab. A fine could be introduced to penalize noise makers.

FEPA should quickly as a matter ofnecessity provide guidelines and standards for waste disposal and effluent management in abattoir sites.

An autonomous Federal Ministry of the Environment needs to be created. The idea of subsetting environmental issues under the current Ministry of Works, Housing and Survey is not ideal. The present situation where no separate ministry exists to cater for the environment is not commensurate with the notion of environmental consciousness as key to success.

Research into quality of the abattoir environment with a view to laying down a sound policy of environmental control should be executed. The present situation of most of our slaughter slabs is nothing to write home about. There is the need to introduce our abattoirs to the path of environmental sanity if we are to live in a clean and safe environment.

The abattoir users who pour into the stream effluents would be charged with the responsibility of cleaning up the water.

5.4 SUGGESTED POLICY MEASURES

Urban centres in Nigeria are significant of ever increasing pollution of air, land and water. (Inyang 1981). This has lead to environmental degradation. United Nation, (1971) postulated that a degraded environment is one in which air and water are polluted as well as degradation of inhabitants because it deprieves them the opportunity for the development and utilization of their full potential and subject them to an unadjustable stress.

Environment which can be defined as the total condition surrounding man at any particular point in time;

oftentimes becomes harmful and unhabitable if not properly maintained. Situation in many of the abattoirs visited indicates minimal environmental effects. The following policy recommendation are hereby suggested as means of checking environmental effects associated with abattoirs. This is expected to lead to improvement in the environmental condition of our abattoirs.

1. Total Renovation of the abattoirs
2. Water Provision
3. Labour Provision
4. Provision of Light
5. Environmental Education
6. Removal of burning sites
7. Butchers participation
8. Preservation of meat
9. Treatment and Disposal of by-product
10. Provision of Toilet
11. Financial Prudence
12. Government Intervention

RENOVATION

Most of the abattoirs visited are in a state of dilapidation. The slaughter slabs are in a terrible condition. Lots of them have pot holes. The slabs therefore should be patched properly to prevent accummulation of dirty water and blood of slaughtered animal.

WATER

Water is the basis of life and measure of sustaining human existence. Oyo State Water Corporation, Ministry of Agriculture and Water Resources and the Environmental Health Departments of all the local governments within the study area should cooperate and strive towards the provision of portable water for the use of their abattoirs. There is currently problem of inadequate water supply in most of the abattoirs visited. Butchers in the study area therefore, oftentimes result into buying water. This ofcourse can not go anyway in cleaning the abattoir to any satisfactory level. The advice then is that all local government must ensure that all the abattoirs have sufficient deep wells and functioning boreholes.

LABOUR

There is great shortage of labour in all the abattoirs in Ibadan region. This could be attributed to current economic crisis. In order to maintain an acceptable environmental sanitation condition, an adequate labour must be provided/supplied to all the abattoirs to assist butchers in some activities such as cleaning of slaughter slabs,fetching water, clearing of refuse dumps and sweeping of abattoir surrounding.

LIGHT

Provision of light in abattoir sites is essential in order to ensure free flow of water from the borehole. Without light coldroom system can not be operated just like proper illumination can not be maintained. Effort should therefore be made to prevent the abattoirs from incessant power failure. This can be achieved through installation of stand-by generating set.

ENVIRONMENTAL EDUCATION/MANAGEMENT

Environmental education programmes should be organised to educate people on various aspects of health as this would help limit the rate of diseases among people thus reducing death rates and promoting healthy living.

Health inspectors must inspect not only the cows but also the abattoirs and the food sellers. Effort should be made to ensure that people are aware of the consequeces of bad environmental situation. The enlightenment could be done through Mass Media and Open Campaign with the assistance of Federal Environmental Protection Agency (FEPA). This ofcourse will improve the environmental condition of all abattoirs in the study area.

Masses, government, policy makers and butchers need to be educated on the environmental problems which readily come through the pollution of our surface and ground water system through indiscriminate disposal of solid and liquid wastes. It is essential to raise public awareness and promote understanding of essential linkages between environment and development and to motivate community and private individual to participate in environmental improvement efforts.

However, federal government is already taking measures along this time. Such measures include:-

a). Its recognition of the interrelationship between pollution, environment and development. This it does with the formation of FEPA whose goal on the National Policy on the environment is to achieve sustainable development for Nigeria.

b). Promulgation of Hazardous and Toxic Waste Decree No.42 of 1988

c). Monthly environmental sanitation excercise.

There is need for intensification of efforts on the part of the media both print and electronic concerning the enlightening of the public on the environmental issue. The same should apply to all non-governmental organisations (NGOs) on environment such as the Nigerian Environmental Study Team (NEST), the Nigerian Conservation Foundation (NCF), the Nigerian Environmental Society (NES), and various other NGOs and professional association who have been addressing key issues of the environment through lectures, conferences, symposia and researches.

Our butchers and other abattoir users must develop an environmental conscience and be ready to pay the full cost of natural resources they deplete and the environment they degrade in the course of their actions. To those who collect fresh slaughtered animal blood for cooking and later sell such cooked blood to the masses as artificial liver 'Sikin', they should realise and take congisance of the fact that a relationship exists between poverty and its dehumanising consequences and the Nigerian environmental problem. As one Professor Omuta rightly said

"Poverty and attempts to get out of poverty generates environmental problems". Therefore the crucial issue of mitigating poverty in all its ramifications, needs to be quickly and comprehensively addressed as factor responsible for the success of various efforts being made to solve the Nigerian environmental question.

REMOVAL OF BURNING SITES

Permanent dumping site for refuse should be provided for all the abattoirs to avoid indiscriminate dumping of refuse. This can also be done by providing some incenerators for abattoir users. Two separate dumping sites should be provided far away from the abattoir sites for each abattoir. One of the incenerators for refuse, the other for intestinal wastes and other unneeded parts. The site must be cleared off regularly. The refuse dumps and the intestinal contents of the slaughtered animals should neatly be collected and disposed off by the local government environmental health officials instead of burning the refuse within the abattoir premises. Condemned animals should be buried instead of burning. The use of condemned tyres, tubes and kerosine for roasting and burning of animals should be discouraged.

BUTCHERS PARTICIPATION

Butchers should be encouraged to participate fully in environmental sanitation excercise. This should be done alongside personal hygiene as follows:

1. Butchers should wash their hands and arms throughly and frequently.
2. Hands should be washed immediately after using a sanitary convenience.
3. Butchers should not cut up meats with infected cut on hand or arm whether bandaged or not.
4. Coughing or sneezing near market should be discouraged instead clean handkerchief should be used.
5. Cuts and abrassion should be covered with water proof dressing.
6. Butchers should not spit near the slaughter slab or meat market.
6. Butchers must report any case of typhoid, dysentry, diarrhoea and paratyphoid infection to the nearby health personnel.

Furthermore, the butchers should participate more in the bi-monthly environmental sanitation exercise. They should be given identity cards also as to enable them move

to the abattoirs on the environmental day.

Lastly, "Wash your hand thoroughly and often- "You' know where they have been. Be clean in clothing, person and habit. It is important for the meat you handle, your own health and everyone else" J.F. Gracey, 1974.

PROVISION OF TOILET

More toilets should be built for the abattor users at a distance place to the slaughter slab. Guards should be placed at those ventilated improved pit toilet so as to make sure that the place is kept clean by the users. The need for v.I.P toilets in abattoirs stems from the significance of solving the problem of excreting all over the places. If this is done, certain diseases which are as a result of excreting in all abattoirs would be curbed.

The open slaughter slabs should be fenced to prevent insect transmitting various diseases. The number of people on the slaughter should be controlled. This is to prevent overcrowding. Abattoirs should be located a bit far from the main road to disallow animals from ocassional accidents with man.

TREATMENT AND DISPOSAL OF BY-PRODUCTS

Blood - slaughtered animal blood should be preserved by given it treatment in a drier. The product could be suitable for animal feeding.

Bones - Fat and gelatine can be extracted from the fresh bones of slaughtered animal, the remaining of the bone can also be ground into bone meal which is the main constituent of calcium phosphate. The bone if grinded in large quantity can also be exported to countries like China where it is used for manufacturing high class pottery, refining of silver and in copper smelting. Bone charcoal is equally useful in bleaching and sugar refining as well as for removal of flouring from drinking water.

Hair and Bristle - Cattle hair if properly dried be used as insulator for placing beneath carpets. Also the long bristles of the back and tail of pigs are used for brushing making.

Hoofs and Horns - If black hoofs are dried and ground, it can be made into hoof meal. This is a nice property for making fertilizer for grape vines, White hoofs are particularly useful for the manufacturing of horn articles such as combs and bottons. Horns can be sawn from the skull, graded and used for manufacturing of hairpins, knife handles and other hair arnaments.

Combination of hoof, horn and pig hair are good material for making foaming fire extinguisher.

Hides and Skins obtained from sheep, pigs and cattle are useful for making an excellent leather particularly suitable for saddles, handbags, gloves and bookbinding.

The primary purpose of food preservation is to prevent food spoilage. This spoilage may be slight with but minor changes in odour, flavour and texture or it may be manifested by extreme changes, as in the decompoaition of goods of animals origin. (Harace Thornton, 1974).

FINANCIAL SUPPORT

In order to obtain the needed fund for the maintenance of abattoirs in Ibadan and its environs, various local gover government authorities should ensure adequate monitoring of the ₦50 and ₦30 per cattle to the slaughtered by Ibadan North Local Government and other local governments respectively. The fund generated should be used directly for the maintenance of the abattoir from where it was collected.

GOVERNMENT INTERVENTION

Considering the high cost of maintaining an abattoir which may be beyond the capacity of the local government authority, there is need for the state government to

assist in area of funding. Thee government should provide people with pipeborne water to eliminate the problem of bad water. Government should also provide refuse vehicle to help carrying away their refuse to the dumping. The Ministry of health should try and device a successful means by which the illiterate people could be educated towards the necessity of living in a clean environment.

5.5 SUMMARY AND CONCLUSION

The study has so far looked into the location and environmental effects of abattoirs in eleven local govern governments that constitute Ibadan region. IIt has considered the rational behind the locational policiess of both the government and the policy makers. What makes abattoir to be regarded as obnoxious industry has been exposed. Dirrerent environmental effects of abattoir sites on human health have been overviewed. The study has equally observed the issues of pollution and pollutants. Many policy recommendations have been made with the hope that such would be considered by policy makers.

"It is the quality of living that is expressed in the clean home, the clean farm, the clean business and

industry, the clean neighbourhood, the clean community. Being a way of life, it must come from within the people. It is nourished by knowledge and grows as an obligation and ideal in human relations" National Sanitation Foundation (NSF) of the United State of America.

Conclusively, our own policy of self reliance and hygienic location for slaughtering should be carefully studied, analysed and cautiously adopted with a view to developing humanized as against dehumanizing pattern of development in Nigeria. Government and environmental policy makers should use a much broad range and mixture of regulatory measures and economic incentives to ensure that our national development is both ecologically and economically sustainable. We should be aware that the costs to government, industry and society are far greater if environmental protection and locational analysis measures are postponed or ignored. If all these are considered and implemented, the resultant effects are:

1. Improved product quality
2. Increased efficiency
3. Improved safety conditions
4. Improved health standard and
5. Cleaner working condition which makes job more pleasant.

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APPENDIX II

DEPARTMENT OF GEOGRAPHY
UNIVERSITY OF IBADAN

QUESTIONNAIRE ON THE PROJECT TITLED:
LOCATION AND ENVIRONMENTAL
EFFECTS OF ABATTOIRS IN IBADAN

This questionnaire is mainly for academic purpose.

Please tick (✓) the appropriate box or write as need be.

To be answered by the occupant of the abattoirs immediate sorrounding residences.

1. Age of Respondent in years

2. Sex of Respondent (a) Male .....(b) Female .....

3. Educational Status (a) Informal .....(b) Primary.....
(c) Secondary.....(d)Post Secondary.....

4. Annual Income of Respondent.....

5. Name of the nearest abattoir.....

6. Distance of nearest abattoir from your residence.....

7. Do you smell any form of offensive odour (a)Yes....
(b) No....

8. If yes, what factor do you think is responsible for this: (i).....
(ii).....
(iii).....
(iv).....

9. Does the drainage system of the abattoir have any effect on your own drainage system (a)Yes.....(b)No.....

10. If yes, what type of materials are found in your drainage channel.....

11. Do you observe any smoke/dust from the abattoir
(a)Yes.....(b)No.....

12. If yes, state the intensity of the smoke (a)High intensity.....(b)Medium intensity.....
(c) Low intensity.....

13. Do you notice too much noise from the abattoir(a)Yes...
(b)No.....

14. Are you affected by the noise(a)Yes.....(b)No.....

15. If yes, in what ways:
(i).....(ii).....
(iii).....

16. Do you notice animal dung/feaces in your area
(a)Yes.....(b)No.....

17. If yes, how come this feaces/dungs(i).....
(ii).....(iii).....

18. Do you suffer any ailment as a result of the abattoir location (1)Yes (2)No

19. If yes, please stay type and frequency
(a)..... (b).....

20. Would you prefer a new location for this abattoir?

21. Why?.....

22. Where in the City?.....

23. How will you assess the performance of both the butcher's association and the local government authority with respect to the environmental situation of the abattoir
(a)Satisfactory.....(b)Unsatisfactory.....

24. What are your suggestions for the improvement of the environmental situation(i).....
(ii).....(iii).....

APPENDIX III

DEPARTMENT OF GEOGRAPHY
UNIVERSITY OF IBADAN

QUESTIONNAIRE ON THE PROJECT TITLED:
LOCATION AND ENVIRONMENTAL
EFFECTS OF ABATTOIRS IN IBADAN

This questionnaire is mainly for academic purpose.

Please tick ( ) the appropriate box or write as need be.

TO BE ANSWERED BY THE BUTCHER

1. Age of respondent in years.....

2. Sex (a) Male.....(b)Female.....

3. Educational Status (a)Informal education.....
   (b)Primary sch.....
   (c)Seconday sch.....
   (d)Post Secondary.....

4. Name of the abattoir .....

5. Date/Year of establishment.....

6. Name of the nearest Market.....

7. Would you say that the location of the market determines the choice of this abattoir?.....

8. What is the size of the slaughter slab.....M^2

9. What is average daily kill?.....

10. What is the size of the parking space?.....M^2

11. Any land for future expansion?.....

12. What is the distance of the abattoir from:

    (a). Nearest sch.....Metres
    (b). Nearest Hospital.....Metres

(c). Nearest residential area.....Metres
(d). Nearest major road.....Metres
(e). Cattle market.....Metres
(f). Religious worship centre.....Metres
(g). Nearest public Toilet.....Metres
(h). Nearest Public sewage system...Metres
(i). Industries releasing toxic bye-product.....Metres

13. Would you prefer a new location for this abattoir?
.....

14. If yes, where in the city and why?.....
.....

15. How do you dispose the blood of the slaughtered animals.....

16. How do dispose the intestinal contents and other wastes?.....

17. Is there any provision for the dumping of unneeded materials (a)Yes..... (b)No.....

18. If yes, how satisfactoyr(a)Satisfactory.....
(b) Unsatisfactory.....

19. Is there any provision for drainage system (a)Yes.....
(b)No.....

20. If yes, how efficient is it (a) Very efficient.....
(b) Not very efficient.....

21. Do you smell any form of offensive odour
(a)Yes.....(b)No.....

22. If yes, what do you think is responsible for this?.....
.....

23. Do you hear too much noise (a)Yest.....(b)No.....

24. If yes, where is the noise too much?.....
(a) Inside the slaughter slab.....
(b) Outside the slaughter slab.....
(c) both (a) and (b).....

25. Any form of obstacle that screen the abattoir from public glare (a)Yes.....(b)No.....

26. If yes, state type.....

27. Is there any association which caters for your interest and the environmental situation?.....
(a)Yes.....(b)No.....

28. If yes, how would you assess the performance of the association? (a) Satisfactory
(b) Unsatisfactory

29. How would you assess the performance of the local government authority in the cleaning of the abattoir?
(a) Satisfactory
(b) Unsatisfactory

30. What are your suggestions for the improvement of the environmental effects of the abattoir?(i).....
(ii) .....
(iii).....
(iv) .....

31. What are your other suggestions unspecified above.

* * * * M U L T I P L E R E G R E S S I O N * * * *

Listwise Deletion of Missing Data

	Mean	Std Dev	Label
VAR00004	24.636	21.514	Year of establishment
VAR00005	16.636	7.698	Year of establishment of the nearest mar

N of Cases = 11

Correlation, 1-tailed Sig:

	VAR00004	VAR00005
VAR00004	1.000	.486
	.	.065
VAR00005	.486	1.000
	.065	.

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. VAR00004 Year of establishment

Descriptive Statistics are printed on Page 3

Block Number 1. Method: Enter VAR00005

Variable(s) Entered on Step Number
1.. VAR00005 Year of establishment of the nearest mar

Multiple R	.48581
R Square	.23601
Adjusted R Square	.15112
Standard Error	19.82185

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	1092.39449	1092.39449
Residual	9	3536.15097	392.90566

F = 2.78030 Signif F = .1298

---------- Variables in the Equation ----------

Variable	B	SE B	95% Confdnce Intrvl B		Beta
VAR00005	1.357778	.814298	-.484290	3.199847	.485811
(Constant)	2.047867	14.806712	-31.447224	35.542959	

---------- in ----------

Variable	T	Sig T
VAR00005	1.667	.1298
(Constant)	.138	.8930

End Block Number 1 All requested variables entered.

* * * * M U L T I P L E R E G R E S S I O N * * * *

Listwise Deletion of Missing Data

Equation Number 1 Dependent Variable.. VAR00001 y

Block Number 1. Method: Enter VAR00002 VAR00003

Variable(s) Entered on Step Number
1.. VAR00003 x2
2.. VAR00002 x1

Multiple R	.98339
R Square	.96705
Adjusted R Square	.95882
Standard Error	223.71398

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	2	11751730.07221	5875865.03611
Residual	8	400383.56415	50047.94552

F = 117.40472 Signif F = .0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. VAR00001 y

---------- Variables in the Equation ----------

Variable	B	SE B	95% Confdnce Intrvl B		Beta
VAR00002	.109463	.066976	-.044984	.263910	.306249
VAR00003	10.586110	2.874640	3.957186	17.215034	.690050
(Constant)	-52.505113	145.387961	-387.770008	282.759783	

---------- in ----------

Variable	T	Sig T
VAR00002	1.634	.1408
VAR00003	3.683	.0062
(Constant)	-.361	.7273

End Block Number 1 All requested variables entered.