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HUMAN-INDUCED DISASTERS IN URBAN AREAS:
A VULNERABILITY ANALYSIS OF IBADAN METROPOLIS

JANUARY, 1998

CENTRE FOR URBAN AND REGIONAL PLANNING
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A DISSERTATION SUBMITTED IN
THE CENTRE FOR URBAN AND REGIONAL PLANNING
IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE
AWARD OF A MASTER OF URBAN AND REGIONAL PLANNING
(MURP) DEGREE.

JANUARY, 1998.

ABSTRACT

The study undertakes a vulnerability analysis of Ibadan metropolis to human-induced disasters. The term human-induced disaster is used as it is believed that disasters are not natural in the real sense of it. It is hazard that are natural. Some socio-economic and environmental factors such as income per annum, wall material, distance of water bodies, condition of drainage channel and so forth were identified and used as vulnerability variables. Eighteen of these variables were compressed into five dimensions using the method of multivariate technique of factor analysis.

The result show for instance that high density localities are more vulnerable to disease hazards under the first component which is the cleanliness dimension. Other components equally point to localities where some other types of vulnerability are highest. A further processing of the result of the factor analysis was done using the method of Analysis of Variance (ANOVA). This is to know whether factors of vulnerability differ significantly within and between localities under the five component loadings. The result also show that there are significant differences.

The study concluded by making some recommendations on how urban planners and policy makers alike can help to reduce the spate of disasters by reducing vulnerability. Some of these include the formulation of urban renewal programme such as redevelopment, conservation and rehabilitation programmes according to the performance of each localities under the five component leadings.

CERTIFICATION

I certify that this dissertation was carried out by **Babalola, S.O. (Mr.)** under my supervision, at the Centre for Urban and Regional Planning, Faculty of the Social Sciences, University of Ibadan.

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DEDICATION

To all those whose name have been written and would still be written in that place where disasters can never come.

ACKNOWLEDGEMENT

The author wishes to acknowledge with thanks the financial support of the **Council for the Development of Social Sciences Research in Africa** *(CODESRIA)* for this research work.

CREDIT

I humbly acknowledge the contributions of those who have in one way or the other contributed to the success of this work.

First and foremost, I thank the Lord Jesus Christ, the light of my life and perfecter of all that concern me.

I thank Dr. B.C. Arimah for starting this study with me and Dr. C.O. Olatubara for finishing it. His amiable nature, cool headedness and succinct suggestions on this work have proved most rewarding. Thank you, Sir.

The effort of my father, Mr. J. O. Babalola at making sure that I started and complete this course is also recognised. Mention must also be made of Mr. G.S. Ogunwole ('Uncle') for his unflinching interest in me and for his moral, financial and spiritual support throughout the course of my studies.

'Femi, my junior brother has been my constant companion in many ways and has contributed in no small measures to the success of this work.

I also appreciate the help of my field assistants: Kehinde Oloruntoyin, Funmi Anthony, Kike Odelana, Sister Taiwo and Folake Johnson. I thank you all.

Credit must also be given to Mr. Ayoola of the Oyo State Fire Service; Messers Ayomide and Adetunji of the Town Planning Department, Ministry of Land and Physical Development, Oyo State and Mr. Fawusi of FEPA. All for thier help in supplying vital secondary data.

Colleagues who have at one time or the other given constructive criticisms on this work include: Femi Okusipe, Kemi Obikoya, Paul Akporowho, Kayode Odedare, and Mr. Amos Adisa. I use this opportunity to recognise their contributions to the success of this work.

This task of giving honour to whom due would be incomplete without mentioning the names of Bros. Olaomi, Sanya Olubusoye and Tayo (Dr. Stone) who helped in the analysis of my research data.

I also wish to acknowledge the following individuals and families like Mr. 'Femi Adeyemo; Mr. & Mrs. M.O. Olowe: Elder & Mrs. Iwasokun , for their help at different stages of this studies.

And finally to 'Morenikemi' whom the Lord had graciously brought into my life. May God bless you.

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CHAPTER ONE

1.0 INTRODUCTION AND STATEMENT OF THE PROBLEM

1.1 INTRODUCTION

The last two decades have witnessed a tremendous increase in research devoted to disasters - its causes, preparedness and mitigation techniques. Furthermore, researchers have also sought to question the established ways of understanding natural disasters. Consequently, there has been a remarkable shift in the conceptualization and understanding of disasters. The human factor has now come too be incorporated as an important factor in disasters studies and management.

While it is believed that processes which lead to hazards such as flood, earthquakes, volcanic eruptions, hurricanes and so forth, may be natural, the disasters associated with them are not, as seen in both human and material losses arising from disasters. O'Keefe et all (1976) observed that there has been an increase in the global human and material losses from disasters during the 20th century, although there has been no major increase in the frequency of extreme geophysical events to account for this observation.

Table 1.1 gives the global frequency of hydrological and geological disasters and deaths and per event between 1947-81.

Table 1.1 **Global Frequency of Hydrological and Geological Disasters and Death Per Event Between 1947-81.**

Disaster	Types	Total No of Disasters	%	Death per Event
Hydrological	Flood Tropical	343	45.0	571
	Cyclone	211	27.7	2,373
Geological	Earthquake	161	21.1	2,652
	Landslide	29	3.8	190
	Volcanic	18	2.4	525
Total Average		762	100.0	1,262

Source Based on Table 2 in B long, 1992, pp. 210.

From the table, it can be seen that hydrological disaster has claimed more lives than those due to geological hazards during the same time span.

Not only has there been an increase both in human and material losses from disasters, Cunny (1983) has also observed that hazards of similar severity could produce dramatically different outcomes in social and economic contexts as different as California (a rich environment) and Nicaragua (a poor environment), suggesting that the degree of destruction was a function of the human context as much as the hazard itself.

Table 1.2 shows the incidence of disasters and loss of life by continental areas between the period 1947-81

Table 1.2: **Proportional Incidence of Disasters and Loss of Life by Continental Areas, 1947-81**

Continent	Disaster Incidence %	Lives Lost %
Asia	38	85.7
North America	33	1.0
Europe	11	2.2
Caribbean & Central America	7	4.5
South America	6	4.2
Africa	3	2.0
Australia	2	0.4
TOTAL	100	100.0

Source: Smith (1992), pp. 28

From the table, it can be seen that while both Europe and North America (rich environments) witnessed up to about 44% of the total disaster incidence, only 3.2% of the total lives lost occurred in these areas. On the other hand, Asia (a developing environment) with 38% of the total disaster incidence experienced a staggering 85.7% of the total lives lost. This is also the picture of the Caribbean, Central and South America; and Africa which all have a comparatively low disaster incidence but high death toll.

These important observation point to the fact that it was necessary to focus on the social process or the human vulnerability rather than on natural hazards so as to make disasters management more result-oriented. Hitherto, according to Cannon (1994, pp.21), most of the effort of those concerned with disasters (referring in part to the resolution that established the UN Decade for Natural Disaster Reduction, 1990 - 2000) are focused mainly on reducing the impact of the lazard itself and less on reducing vulnerability, i.e. efforts are hazard-centred rather than people-centred.

Table 1.3 gives the number of people affected by disaster, that is, those whose lifes are touched in one way or the other by a disaster and those who have been rendered homeless by different types of disasters between the period of 1900 and 1980 world-wide but excluding the United State of America.

The table gives credence to why disaster management should be more people-centred or reducing vulnerability and less on reducing natural hazards which human beings do not have much control over anyway.

Table 1.3 **Number of People Affected By Natural Disasters Between 1900 and 1980, World-Wide Excluding The United State of America**

Types of Disaster	No. of Affected people (million)	No. of Homeless (million)
Flood	339	36
Earthquake	26	
Typhoon & Cyclone	26	10
Hurricane	3.5	1.2

Source: Based on DHA, Jan/Feb. 1993, pp. 27

Disaster, according to (Velimirovic (1977) is a major emergency affecting a larger number of people, with the underlying concept of risk (of death and injuries) being the same in all disasters. Disasters can either be as a result of natural processes or human-induced. The former is believed to be the harmful effect of the larger environment beyond the control of humanity and only marginally controllable. The latter results from human activities. They are events consequent on decisions taken often by anonymous decision makers and should have been anticipated. They are thus preventable, should counter-measures and safety regulations be devised and complied with (Velimirovic, 1977).

A clear distinction is often difficult to make between what is termed natural and human-induced disasters. This is due to the fact that in natural disasters, many ill-effect might result from human actions such as poor construction of houses, over-crowding, infringement on river or stream banks and so forth.

This notwithstanding, Velimirovic (1977) stated that one clear fact is that non-natural (or human-induced) disasters always involve the human factor, some kind of human failure in the extended sense, but as in natural disaster involuntary risk plays a role.

1.2 STATEMENT OF THE PROBLEM

This study focused on human-induced disasters in the urban areas, in the sense of how human activities which include the location and type of dwelling units, nearness to hazardous site; number and age structure of inhabitant per dwelling unit; building materials and so forth have put people at risk of natural or environmental hazards. Thereby making them vulnerable to those disasters arising from erosion, floodings, fire-outbreaks, collapsed buildings and outbreak of diseases. The concept of vulnerability is thus central to this study. In order to stress the importance of the vulnerability concept in disasters studies, Cannon (1994) posited that disasters happen when a natural hazard strikes vulnerable people. This implies that when natural hazard strikes invulnerable people, the result is not likely to be a disaster, but a moderate interruption of people's daily activities, with minimum death and injuries.

Cannon (1994) goes on to define vulnerability as a characteristics of individuals and groups of people who inhabit a given natural, social and economic space within which they are differentiated according to their varying position in society into more or less vulnerable individuals and groups. He also regarded vulnerability as a complex characteristics produced by a combination of different factors derived primarily from class, gender, and enthnicity; and secondarily from such factors like age. For instance, elderly people and children are less able to escape from some hazards, while older people are also less able to recover from injuries or illness resulting from a hazard. It is therefore pertinent to stress at this juncture that different socio-economic factors produce different degree of impact in any hazard. Therefore, a hazard of similar magnitude might have different impact on one society compared with another depending on the degree of vulnerability as imposed by different socio-economic factors.

1.3 AIM AND OBJECTIVES

The study aims at examining the vulnerability of urban areas to human-induced disasters, using Ibadan metropolis as its focus. In order to achieve this aim, the following objectives would be pursued:

(i) To examine in a historical context incidence of various human-induced disasters.

(ii) To examine the losses both in monetary and human terms due to human-induced disasters in Ibadan metropolis.

(iii) To determine the vulnerability of the three density groups (high, medium and low density) to human-induced disasters.

(iv) To account for the observed pattern of vulnerability across the city.

(v) To examine the various mitigation techniques to human-induced disasters in Ibadan and recommend appropriate ones where non exists.

1.4 METHODOLOGY

Lewis (1979) has suggested a methodology for vulnerability analysis which centres around the collection of data on socio-economic and environmental variables. This study adopts Lewis' (1979) method i in the data collection. According to him, a vulnerability analysis using the socio-economic factor, focuses on land-use by people and the vulnerability of people not only the vulnerability of the land they occupy.

Therefore, with the recognition that socio-economic status is a factor of disaster, vulnerability researchers seek a method of identifying the key indicators of socio-economic status in the field and to sue them as a factor of vulnerability with environmental factors. Varley (1994, pp.6) in supporting this approach took the position that it is the need to look closely at the element of their everyday that is at the centre of vulnerability analysis. To her, researchers who adopt this approach do not beat around the bush. Also in agreement is Smith (1992) who posited that the vulnerability approach is one that is centrally concerned with the 'real world' in its attempt to tease out those element of reality that lead to disaster.

1.4.1 Sources of Information

Information for the study was collected from two major sources, the primary and secondary sources. Information on the former was collected through the administration of questionnaires to different households in different localities in Ibadan, across the three residential density areas. While information on the latter relating to the historical incidences of disaster, human and material losses due to disasters and mitigation techniques in place and so forth were sourced from relevant institution such as the Oyo State Fire Service; Oyo State National Emergency Relief Agency (NERA); Local Planning Authorities; National Population Commission; and the Federal Office of Statistics.

1.4.2. Method of Data Collection

The National Population Commission NPC) has delimited Ibadan Metropolis into one hundred (100) localities or neighbourhoods. The localities in each residential zone is as follows:

(i)	High Density Residential Areas	-	37 Localities
(ii)	Medium Density Residential Areas	-	46 "
(iii)	Low Density Residential Areas	-	17 "
	TOTAL	-	100 "

Thirty percent sampling frame was use as this was believed to be enough, given the time and resources available for generalization. This translates to thirty localities out of the hundred existing ones. Sample size of three hundred questionnaires were also administered under the same considerations.

The thirty localities where questionnaires were administered were chosen randomly. While the number of sample localities and the number of questionnaires in each zone were done in proportion to the total number of sample localities (30) and the total number of questionnaires (300) respectively, thus:

TABLE 1.4 **PROPORTIONAL DISTRIBUTION OF QUESTIONNAIRES BY RESIDENTIAL AREAS**

RESIDENTIAL ZONES		NO OF LOCALITIES SAMPLED IN PROPORTION TO SAMPLING FRAME	NO OF QUESTIONNAIRE ADMINISTERED IN PROPORTION TO SAMPLE
High Density			
Residential Area	(37)	37/100 x 30 = 11	37/100 x 300 = 111
Medium Density			
Residential Areas	(46)	46/100 x 30 = 14	46/100 x 300 = 138
Low Density			
Residential Areas	(17)	17/100 x 30 = 5	17/100 x 300 = 51
TOTAL:	(100)	30	300

Source: Field Survey (1997)

Out of the three hundred questionnaire distributed systematically to every fourth buildings, nineteen of them were either not returned or are not suitable for furthers processing. The summary of the return in each residential zone is as follows:

Table 1.5: **SUMMARY OF QUESTIONNAIRE RETURNS**

RESIDENTIAL AREAS	NO. OF QUESTIONNAIRE ADMINISTERED	NO. RETURNED	DEFICIT
High density	111	104	7
Medium density	138	134	4
Low density	51	43	8
TOTAL	**300**	**281**	**19**

1.4.3 Analysis And Presentation of Data.

The data collected wee analyzed using the multi-variate technique of factor analysis and simple frequencies. This provided dimension on the vulnerability of different density areas across the localities.

Table of frequencies and percentages were also derived from the analysis. For graphic representation and enhancement of visual impression, bar and percentage graphs; and pictures and maps were also used.

1.5 CONTRIBUTION TO PLANNING KNOWLEDGE

The study postulates that disasters is the outcome of hazards on vulnerable people. This is in terms of how the day-to-day activities of people, the working of the social system and the configuration of the environment have created conducive atmosphere for disaster events. With just a year to the end of the United Nations International Decade for Natural Disaster Reduction (IDNDR), a trouble-shooting profession like Urban and Regional Planning should therefore seek ways of minimizing disaster by reducing vulnerability. Cury (1983) opined that "reducing vulnerability ... is a development question ... that must be answered politically". Government and policy makers alike are thus more likely to succeed in this task if they are properly informed on the socio-economic factors that have bred these vulnerable condition so that they can be reversed. This study is set to do just that.

Furthermore, this study advises policy makers according to Susman et al (1983) "that the only way to reduce vulnerability was to locate disaster planning within development planning...". The benefit of adopting this preventive approach will on the long run outweigh the huge cost involved in mitigating disaster events.

CHAPTER TWO

2.0 CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

2.1 CONCEPTUAL FRAMEWORK URBANIZATION PROCESS AND POVERTY

The study is hinged on the concept that the processes of urbanization and poverty are at the root of vulnerable conditions. This view is shared by writers like Burton et al (1987); Davis (1987); Krimgold (1974); and Quarantelli (1978). Although writing at different times, they agreed that urbanization and poverty together give rise to vulnerability. The former which results from both natural population growth and rural-urban migration characterizing most developing countries and associated with changes in the ways of life, traditional cultural values, economic system and consequently replacing the natural environment with man-made ones.

Operating over the already stressed environmental condition (as a result of population growth and rapid, uncontrolled urbanization) is the poverty factor which is also a common feature of developing countries. This factor is characterised by high rate of unemployment, few material possession, poor income, under-nourishment, limited education, health problems, difficult access to land, and poor access to social and health services among many others.

These twin factors of urbanisation and poverty combined, produce vulnerable condition such as high population growth rates, environmental degradation, inadequate housing conditions as a result of poor construction, poor building materials, inappropriate design, inadequate amenities and maintenance; substandard and overcrowded housing, poor and unsafe settlement condition, high density and compact settlement, lack of infrastructures such as sewage system, water supply, garbage collection, drainage system, electricity and road network.

When people are vulnerable as above and a natural hazard strikes, it is then that disasters happen (Cannon, 1994).

The effect of such disaster are seen both on the environment and on human beings. On the environment, damages to building and infrastructure, and natural resources. While injuries, disablement, death, traumatic stresses and diverse social problems such as the realities orphans and widows are some of the effects of disasters on human beings.

The outcome of disasters is seen in the distruption of the socio-economic, cultural and political ways of life. In the face of a disaster, various attempts are made at different spatial levels to respond by way of mitigating the effect of such disasters. Therefore, mitigation can be at international, national, state, community, or individual level.

Mitigation or relief efforts can be on an international non-governmental organisations (NGOs), such as the Red Cross Society; United Nations Organistions, such as the United Nations Disaster Reduction Organisation (UNDRO) and so forth help in organizing for relief operations. Mitigation can also involve the national regional, state and community level of governance. Tucker (1998) shed some light on the mitigation agencies across North America. In Mexico in the event of a big disaster, the Military and Red Cross Society respond first. In Canada the initial help lies with the individual municipalities then with the provinces. While in the United States the largest disasters are handled by the Federal Emergency Management Agency (FEMA). The Agency was established in 1979 and it responds when the President of the U.S declares a region a federal disaster area. FEMA has a full-time staff of about 2600, but still maintain some 4500 trained standby workers ready to drop everything to help when a disaster is declared. The last level of mitigation efforts is on the individual. The resources and savings of an individual, family, friends and previous experience of a disaster can also help victims of disaster back to the pre-disaster way of life. (See Figure 1).

2.2 LITERATURE REVIEW

Contemporary view about disaster-preparedness, vulnerability and mitigation strategies have changed from what it used to be at the initial stage of disasters studies. Basically, this change in focus is related to the 'naturalness' or human-induced nature of disasters.

Disaster are two-edged. On one side is the natural hazards or the trigger mechanism which could be flooding erosion, fire-outbreaks, earthquakes and so forth; while on the other side which is at the receiving end are the damages done to the built environment, the injuries and losses of human life.

Natural hazard according to Velimirovic (1977) are beyond man's control, unpredictable or so far only marginally controllable. Whereas the havoc these hazards cause on the environment and human beings can be minimised by making people invulnerable. For instance, when the minimum setback to a river is observed, no matter the intensity of a rainstorm, lifes would not be lost and properties would not be damaged.

Therefore, scholars have reasoned that instead of just being at the receiving end of natural hazards which humans do not yet have control over, focus should be shifted to the human side. It is better to prepare and equip target groups technologically, socially, and economically to withstand these 'natural' threats. It is such thinking which had led to the changes in views on disasters that abound in the literature in contemporary time.

Prior to the 1970s, Varley (1994) has noted that disasters were viewed purely as natural phenomenon. A departure from this view came to see the light of days in O'Keefe et al (1976). The focus of these writers was their spirited attempt to 'take the naturalness out of natural disasters'. That is, disaster cannot be explained only in terms of its naturalness, some other factors (human) are also important. This view was also shared by Hewitt(1983). On his part, he tried to offer an alternative vision to the dominant view on disaster characterised by a straight forward acceptance of natural disaster as a result of 'extremes' in geophysical processes and a 'technocratic' belief that the only way to deal with disasters was by public policy application of geophysical and engineering knowledge (Hewitt, 1983b, pp. 5-7).

Furthermore, in agreement with Hewitt (1983), the authors of 'Interpretations of calamity from the viewpoint of Human Ecology', edited also by Hewitt took the position that:

CONCEPTUAL FRAMEWORK

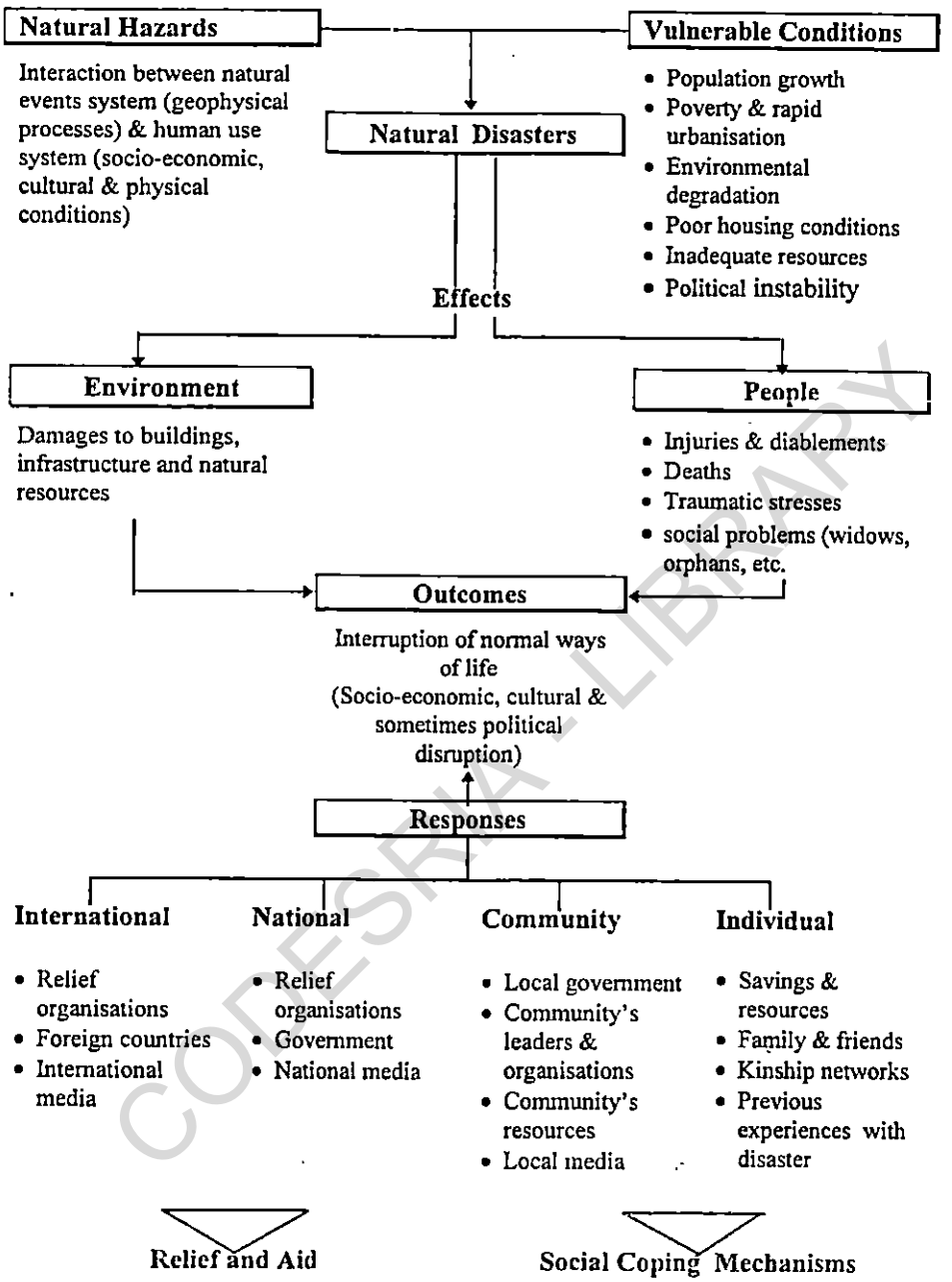

Figure 1.1 **Natural disaster: creation, effects, outcomes and responses**
Source: Based on definitions in Burton et al. (1987); Davis (1987); Krimgold (1974) & Quarantelli (1978).

the important extent to which natural disaster, its causes, internal features and consequences are not explained by conditions or behaviour peculiar to calamitous events. Rather, they are seen to depend upon the ongoing social order, its everyday relations to the habitat and the larger historical circumstances that shape or frustrate these matters (Hewitt, 1983b, pp.25).

To these group of writers, the social order plays an important role in disaster event Using this approach to explain disasters has since been reiterated by different researchers and practitioners (Cunny, 1983; Wijkman and Timberlake, 1984; Oliver-Smith, 1986; Maskrey, 1989, 1993; and Blaikie et al, 1994).

In contemporary times, the emphasis have not completely shifted from that of viewing disasters as purely natural occurrences. Pockets of evidence still about to show that the belief on the naturalness of disasters remain largely unchanged. For instance, January 1990 witnessed the launching of the United Nations International Decade for Natural Disaster Reduction (IDNDR). The proclamation of the decade reflects to main developments, namely:

the increasing impact of natural disasters in terms of loss of life, physical damage and effect on the economic development of vulnerable countries; and the progress achieved in scientific and technological knowledge which has such as to allow its application to disaster mitigation through transfer of technology (UNDRO, 1990)

Therefore, over the next ten years, nations throughout the world were asked to give special attention to programmes and projects designed to reduce loss of life, property damage and economic and social distruption due to natural disaster (Whittow, 1979).

This line of action of the UN, according to Mitchel (1990) involves:

a narrow view of hazard and hazard reduction .... the concept of ..... interaction among physical risk and human responses is largely by-passed in favour of a

focus, solely on physical risk .... (with) expansive and optimistic assumption about the role of natural science and engineering knowledge in the hazard policy arena (Mitchel, 1990, p. 147).

To him therefore, the UN still views disasters as natural event which can only be tackled using scientific and engineering knowledge.

Further evidence on the unchanged dominant paradigm as above can also be found in a recent publication from the World Bank's Environment Department titled: "Environmental Management and Urban Vulnerability" (Kreimer and Munasinghe, 1992). While contributing to this volume, Jones et al (1992) acknowledged that vulnerability is more than an index of geophysical hazard, but other elements involved are defined in technical rather than a social measure.

Many people now accept that human activities itself has created the conditions for disaster event (Cannon, 1994). One reason among many others adduced for this is that through negligence or inappropriate response, the working of social system have made a disaster of a situation which otherwise might not have been so serious. Also, understanding have increased that it is hazards that are natural and for it to become a disaster, it has to affect vulnerable people.

The vulnerability concept is thus a means of translating known everyday processes of the economic and political separation of people into a more specific identification of those who may be at risk in hazardous environment (Cannon, 1994). The implication of this statement is that some social groups are more vulnerable than others. One reason given for this is that certain lifestyle of urban population leave them especially vulnerable to disasters (Quarantelli, 1992)

Increased awareness on the role of human beings in vulnerability and disasters event have shaped the research methodology employed in the study of disaster. Since disasters are the outcome of natural hazards on vulnerable people, vulnerability analysis is done, and this centres around the collection of data on socio-economic variables principally. This study used this approach as well.

CHAPTER THREE

3.0 THE STUDY AREA

3.1 IBADAN IN ITS PHYSICAL SETTING

This study is restricted to Ibadan City, located approximately on Longitude $3^0 54'$ East of the Greenwich Meridian and Latitude $7^0 23'$ North of the Equator at a distance of about 145km. North-East of Lagos. It is directly connected to many towns in Nigeria by a system of roads, railway and air route. The physical setting of the city consists of ridges of lateritized quartzitic hills that run approximately in a north-west-south-east direction. The largest of these ridges lies in the Central part of the city and contains such peaks as Mapo, Mokola, Aare and Aremo hills. These hills range in elevation form 160 metres to 275 metres above-sea level.

The area occupied by the metropolitan area of Ibadan is drained by two important rivers - the Ona and Ogunpa rivers. The former drains the western parts while the latter drains the eastern part.

Because of its latitudinal location, Ibadan enjoys the characteristics West African Monsoon Climate, marked by distinct seasonal shift in the wind pattern. Between March and October, the city is under the influence of the Moist Maritime South-West Monsoon wind which blows inland from the Atlantic Ocean and bring rain. While the dry season occurs from November to February when the dry dust-laden harmattan winds blow from the Sahara desert. (See Figure2)

3.2 CHARACTERISTICS OF RESPONDENTS IN THE STUDY AREA

3.2.1 Gender Characteristics

Disasters are not gender-specific, both male and female alike can be affected by disaster if they are vulnerable. With this in mind, the questionnaire survey was not targeted at a particular sex in the surveyed area. Out of the 281 respondents surveyed, 191 of the respondents (68%) were males while the remaining 32% were females.

3.2.2 Age Characteristics

Age is one of the secondary factors to be considered as to why hazards have different degrees of impact on a society. Older people and children constitute the vulnerable groups in this regard. This is because they may be less able to escape in the event of a natural hazards. In addition to this, older people may find it difficult to recover from injury or illness inflicted in emergency situations. In the survey, 38% of respondents in the high density areas were found to constitute this vulnerable group; in the medium density area, an almost equal figure of 37% were at risk. While in the low density areas as high as 47% of the respondents may be at risk.

TABLE 3.1: **AGE DISTRIBUTION IN THE DENSITY AREA OF IBADAN**

	AGE BRACKETS (in Yrs.)			%	
DENSITY AREAS	**0 - 9***	**10 - 59**	***60+**	**Vulnerable**	**TOTAL**
High	406	882	135	38	1,423
Medium	412	994	186	37	1,595
Low	67	219	36	47	322

Source: Field Survey, 1997.

***Vulnerable Groups.**

3.2.3 Educational Qualification

This was necessary to show the calibre of respondent and also the intergrity and quality of information elicited from them. From the survey, about 90% of respondent have one form of education or the other. Ranging from primary/adult education to post secondary education, while the remaining 10% have no form of education. The response of such people were given verbally in vernacular to field assistant who enter them in the appropriate column. However, about 19 questionnaire were discarded for inconsistency.

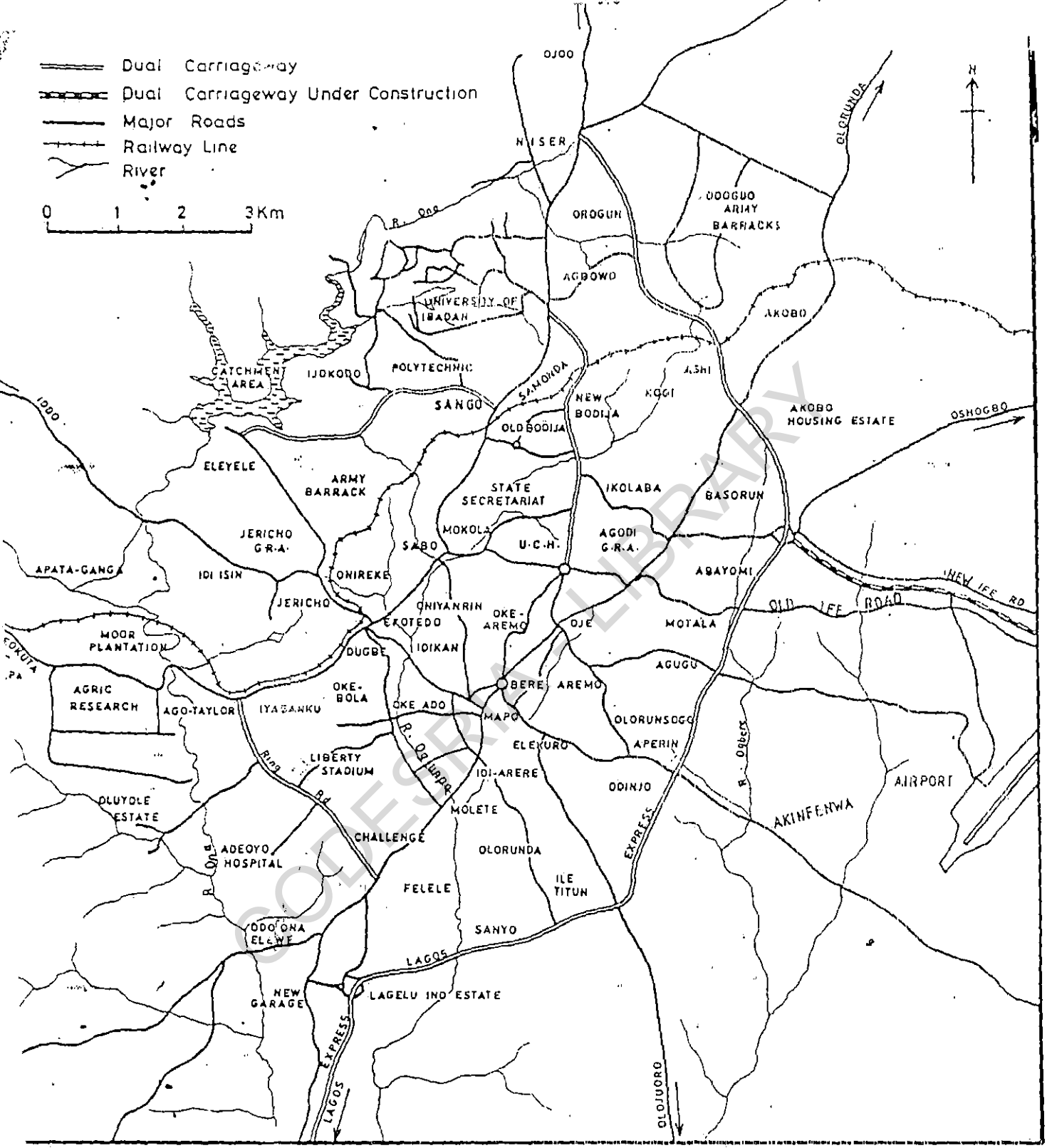

Fig. 2: *Map of Ibadan Metropolis*

Source: RECTAS [Ile-Ife] S.I.P. (Ibadan) 1996

TABLE 3.2 THE EDUCATIONAL CHARACTERISTICS OF RESPONDENTS

EDUCATIONAL QUALIFICATION	NO OF RESPONDENTS	%
None	28	10
Primary/Adult Education	71	25.3
Secondary	62	22.1
Post Secondary	120	42.7
TOTAL	281	100%

Source: Field Survey, 1997

3.2.4 Income of Respondents

Vulnerability includes an economic element depending on people's access to resources and income opportunities. This implies that the income of people can make them vulnerable or invulnerable to specific hazards. All other things being equal, high income people would be expected to be invulnerable or less vulnerable when compared with low income people. In the quest to ascertain this claim, information was collected on this important variables. The result shows that 52% of the respondent earned about N12,000 and less per annum. While 48% earned above N12,001 per annum. Income variable also featured in the factor analysis used in subsequent chapter of this study.

TABLE 3.3 INCOME OF RESPONDENTS

INCOME LEVEL (per Annum)	NO. OF RESPONDENTS	%
Less than N3,000	38	13.5
N3,001-N6,000	42	14.9
N6,001 - N9,000	38	13.5
N9,001 - N12,000	28	10.0
N12,001 - N15,000	35	12.5
Above N15,000	100	35.6
TOTAL	281	100%

Source: Field Survey, 1997.

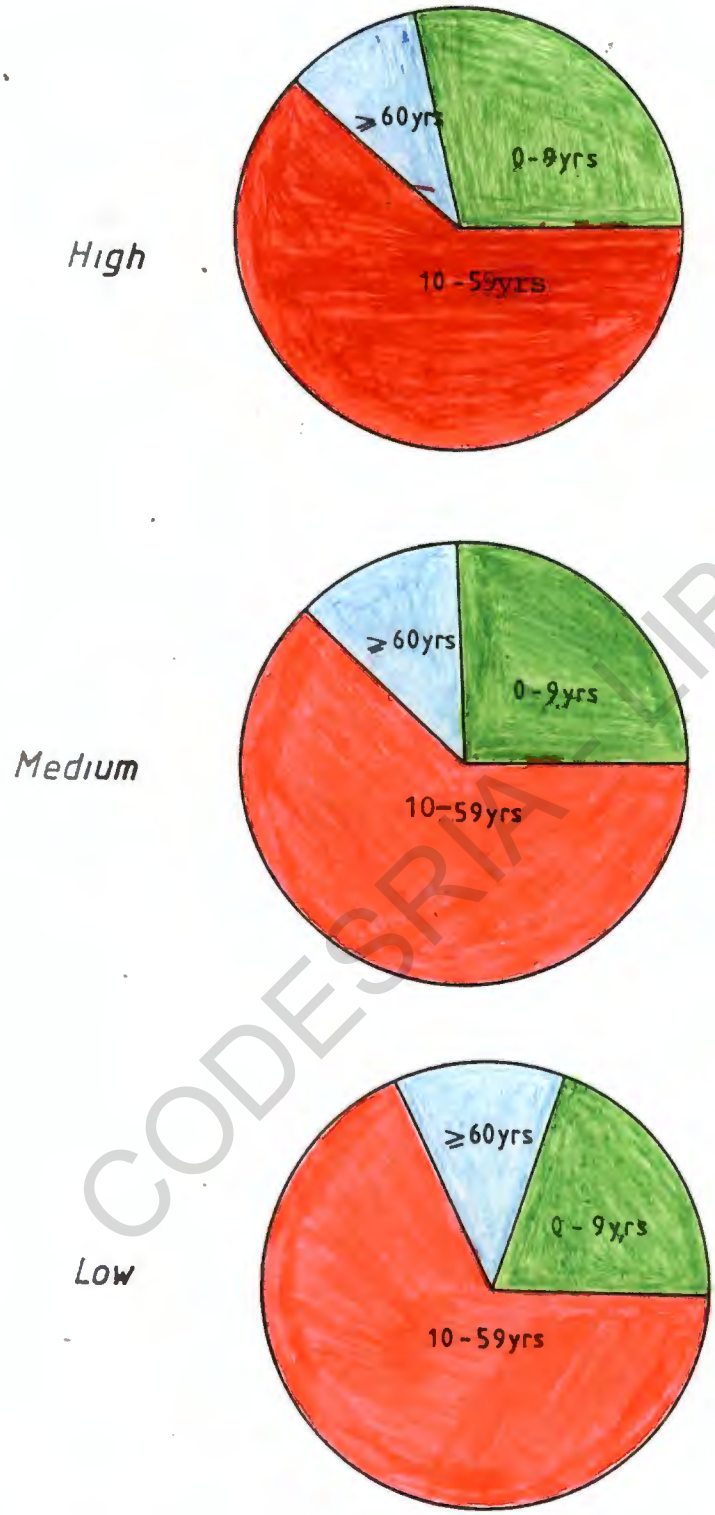

Fig.3 : Pie Chart Representation of Age Distribution in Each Density Areas.

3.2.5 Occupation of Respondents

Different occupational groups abound in Ibadan which are represented in the survey. Of all these groups, respondents who are either traders or civil servant are the most represented accounting for about 63% of the total.

TABLE 3.4 **THE OCCUPATION OF RESPONDENTS**

OCCUPATION TYPE	NO OF RESPONDENTS	%
Trading/Business	83	29.5
Civil Servant	93	33.1
Farming	11	3.9
Artisans	33	11.7
Professionals	37	13.2
Unemployed	13	4.6
Retired	11	3.9
TOTAL	**281**	**100%**

Source: Field Survey, 1997.

Farmers represents about 4%; artisans 12%; professionals 13%; unemployed 5%, while retired respondent account for 4% of the total.

3.2.6: Types of House Occupancy

This is one of the pertinent variables with regards to vulnerability of dwelling units, in terms of density. In the survey, 161 respondents representing 57.3% of the total live in rented apartment. Forty-six respondents or 16.4% as owner-occupiers; twenty respondents on 7.1% occupy institutional property; fifty-two (18.5%) in family houses, while two respondents (0.7%) dwell as squatters.

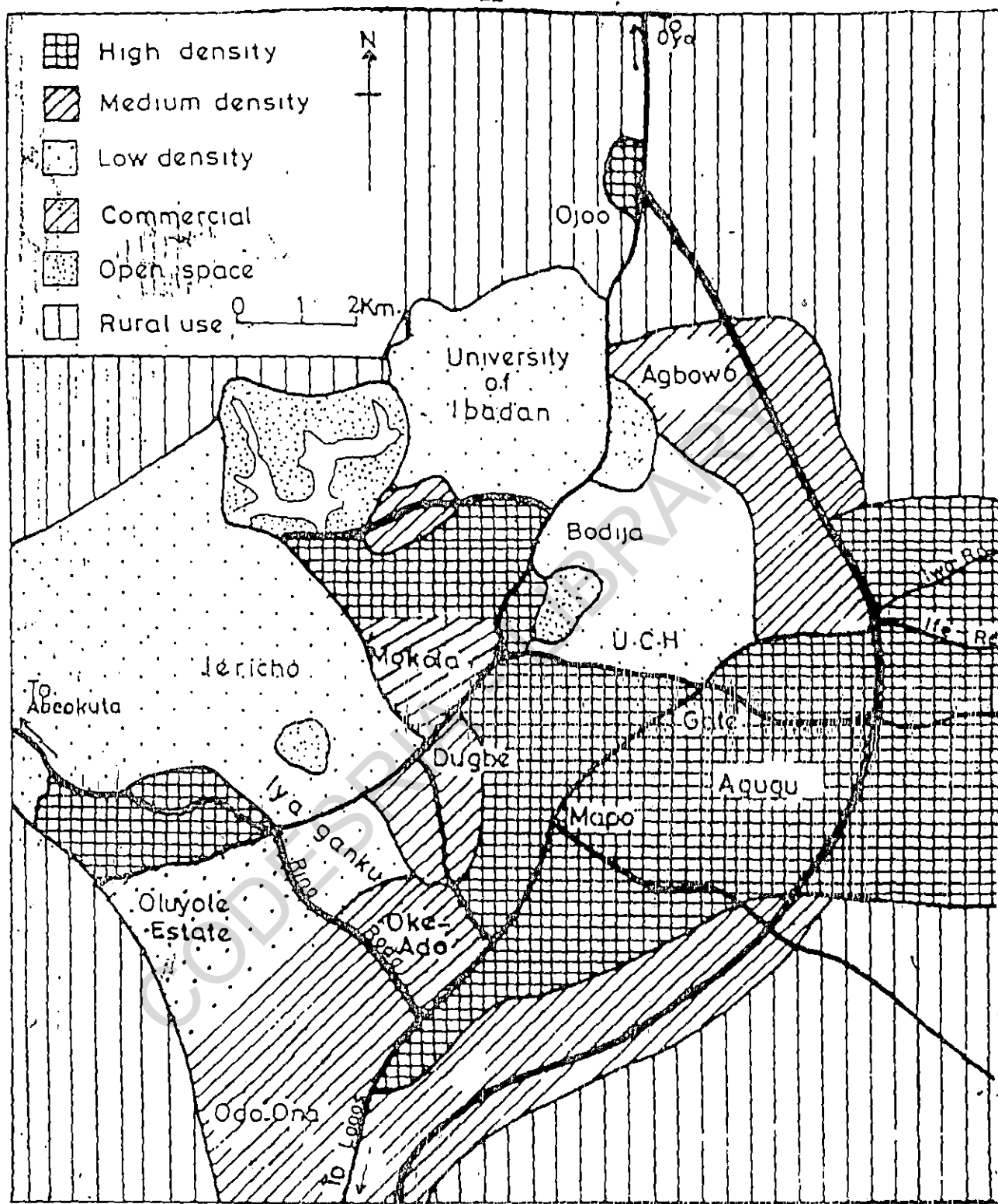

FIG 4: Textured Map of Ibadan showing the Three Residential Districts and other Landuses.

Source: Bureau of Lands, Housing and physical planning, Ibadan.

TABLE 3.5 **NUMBER OF RESPONDENTS IN DIFFERENT HOUSING CONDITIONS**

HOUSING CONDITION	NO. OF RESPONDENTS	%
Owner-Occupier	46	16.4
Rented	161	57.3
Institutional Property	20	7.1
Family House	52	18.5
Squatter	2	0.7
TOTAL	**281**	**100%**

Source: Field Survey, 1997.

CHAPTER FOUR

4.0 HISTORY AND INCIDENCE OF DISASTERS IN IBADAN

4.1 HISTORY OF DISASTERS IN IBADAN

Ibadan has witnessed the occurrence of many devastating disasters with a lot of property and human lifes lost. These disasters range from erosion and flooding, fire outbreaks to collapsed buildings and the outbreak of diseases. From these disasters, flooding and fire outbreaks are common ones.

In the history of flooding in Ibadan which are many and vary in the degree of causalities recorded, the one of August 30, 1980 stands out. Vulnerable conditions which existed before the flood include the clogging of river channels with solid wastes; the Ogunpa channel was flattened with sediments, thereby making passages beneath the bridges to be partially blocked. According to Akintola (1987), this set the stage for a disaster.

The August 30 flood occurred as a result of heavy downpour (the natural hazard) which started around mid-day that Sunday. By 1300 hours, flood waters had reached the knee level in buildings adjacent to the Ogunpa stream between Mokola and Gbagi. The rains continued heavily and by 1600 hours that day, the Ogunpa channel between Elizabeth road and Molete had become a massive water body, extending 150metres on both banks.

The flood came with such massive force that it swept away buildings, stationary vehicles and buses full of passengers. Indeed, the disaster was so great that Ibadan was declared a national disaster zone.

In terms of monetary costs, official record gave an estimate of N300,000,000 (Three hundred million naira) while the number of lives lost was put at 500 people.

Fire-outbreaks and collapsed building are disasters worthy of mentioning, given the number of lives lost and also in terms of property damaged. Table 4.1 gives a summary of the incidence of both fire-outbreaks and collapsed buildings from the year 1984 to 1996.

TABLE 4.1 **INCIDENCE OF FIRE OUTBREAK AND COLLAPSED BUILDING IN OYO STATE (1984-1996)**

(N)

S/N	YEAR	FIRE CALLS*	ESTIMATED COST	LOSS OF LIVES
1	1984	1,175	3,722,420	122
2.	1985	1,019	3,506,100	161
3.	1986	739	3,366,401.25	203
4.	1987	864	3,434,993	155
5.	1988	872	21,114,104	141
6.	1989	1,314	14,019,572	92
7.	1990	1,210	26,323,373.38	126
8.	1991	779	11,190,215	113
9.	1992	666	134,430,446	48
10	1993	779	60,200,102.50	78
11.	1994	534	25,364,280.66	29
12.	1995	444	23,279,650	63
13.	1996	426	32,173,030	72

Source: Oyo State Fire Service, 1997

***Fire calls include fire outbreaks and collapsed building.**

4.2 INCIDENCE OF DISASTERS IN IBADAN

This section gives information on the occurrence of each type of disaster in the study area. Since the study took the position that disasters can not be explained away just as "natural" phenomenon. Information was also collected on the perception of respondents as to their view on the cause of the disaster that has be fallen them. After a disaster event, it is expected that people would want to leave

a vulnerable locality or accommodation but some still continue to live there. Reason for this type of unexpected behaviour was also sought for in each of the disaster types. Lastly, respondents suggested ways by which future disasters can be prevented from reoccurring.

4.2.1 **Erosion And Flood Disasters**

Out of the 281 respondents interviewed, 66 or 23.5% answered affirmatively to have suffered at least once form erosion or flood disasters. 27 of these 66 respondents believed that the disaster that has befallen them was of a natural cause or the "will" of God. The remaining 39 respondents were of the opinion that their calamity was due to human failure or because they were vulnerable. Vulnerability factors in this regards ranges from location of their property in hazard area (river bank with no sufficient setbacks) to improper planning or design to lack of flood warning system.

TABLE 4.2 **HUMAN-INDUCED FACTORS OF VULNERABILITY THAT LED TO FLOOD DISASTERS**

VULNERABILITY FACTOR	NO. OF RESPONSE	%
Location in hazards areas	20	51
Improper planning or design	18	46
Lack of flood warning system	1	3
TOTAL	**39**	**100%**

Source: Field Survey, 1997.

After a flooding disaster, 20 respondents gave nearness to place of work as reason for continuing to stay in their present dwelling; 13 because they were occupying family house; 9 because they were in their personal house; 13 because of cheaper rents; compared to other dwelling units and 10 for some other reasons.

TABLE 4..3: **REASONS FOR CONTINUING TO STAY IN FLOOD-PRONE AREA AFTER FLOODING**

REASONS	NO. OF RESPONDENTS	%
1. Nearness to place of work	20	30.8
2. Family House	13	20.8
3. Personal House	9	13.8
4. Cheapter Rents	13	20.0
5. Others	11	15.4
TOTAL	**66**	**100%**

Source: Field Survey, 1997.

**Note the balance of 215 are those who have never experience a flood disaster.*

When asked how they think that future flood disasters could be prevented, 13 respondents believed that flood disasters cannot be prevented; 22 believed that only relocation to an invulnerable area is the solution; 14 of the respondents took the problem that there must be an enhanced flood warning for flood to be prevented; 13 respondents were in favour of better planning and management of flood plains; while 4 gave some other reasons. (See Tale 4.4)

TABLE 4.4 **PREVENTION OF FUTURE FLOODING**

PREVENTION TYPES	NO OF RESPONDENTS	%
1. Cannot be prevented	13	19.7
2. Property relocation	22	33.3
3. Enhanced flood warning	14	21.2
4. Better Planning & Management	13	19.7
5. Others	4	6. 1
TOTAL	**66**	**100%**

Source: Field Survey, 1997.

4.2.2 Fire - Outbreak

Forty-one (41) respondents or 14.6% of the total (281) have suffered once or more from fire-outbreaks. Two or 4.9% of these respondents believed that their calamity was the will or punishment of God. This view is the same with the 'natural' school of thought. 39 or 95.1% believed that the fire incidents they suffered was human-induced. Pertinent factors in this regards include careless handling of fire, improper planning or design, and the use of improper building materials among others. Responses in each of these factors are given in Table 4.5.

TABLE 4.5: **HUMAN-INDUCED FACTORS OF FIRE-OUTBREAKS**

HUMAN-INDUCED FACTORS	NO OF RESPONSES	%
1. Careless handling of fire &Electrical	35	90
2. Improper planning or design	2	5
3. Improper building materials	2	5
TOTAL	39	100%

Source: Field Survey, 1997, p.20.

When asked how future fire-outbreaks could be prevented, 35 responses which is about 81.4% were in favour of the fact that careful handling of fire and electrical appliances is the solution, 4 responses were in favour of using fire resistant materials in building; while 2 respondents felt that better design of structure would check future fire-outbreaks.

4.2.3 Collapsed Building

Twenty-five (or about 9% of the respondents have suffered from one or more cases of collapsed buildings. Out of these 7 respondents (about 28%) blamed their calamity on the will or punishment of God, while 18 respondents (72%) agreed that the responsibility for the blame is humans. Two main vulnerability conditions are important here. These regards faulty design of building and use of improper building materials. Responses of those who believed that their calamity was human induced is contained in Table 4.6.

TABLE 4.6: **HUMAN-INDUCED FACTORS OF COLLAPSED BUILDINGS**

HUMAN-INDUCED FACTORS	NO OF RESPONSES	%
1. Faulty design of building	3	17
2. Use improper building materials	13	72
3. Others	2	11
TOTAL	**18**	**100%**

Source: Field Survey, 1997.

On how future cases of collapsed buildings could be averted, most response was in favour of using appropriate building materials as 20 respondents (76.9%), 3 respondents believed that proper design of building is the best thing to do to prevent future cases of collapsed buildings. Two respondents also believed that other actions apart from these two should be taken to reduce the incidence of collapsed buildings.

4.2.4 **Outbreak of Diseases**

Respondents who have suffered from the outbreak of disease one or more times in the survey are 44 or about 15.9% of the total. Out of this figure, 10 respondents (22%) blamed their misfortune on the will or punishment of God, while 34 respondents (78%) agreed that it was a result of human failure. Vulnerable conditions that aided disease outbreak included inadequate hygiene condition both at home and the locality. When those who believed that their calamity was human-induced were asked on the perceived cause of disease outbreaks, the following responses in Table 4.7 were made.

TABLE 4.7 **HUMAN-INDUCED FACTORS OF DISEASE OUTBREAK**

HUMAN-INDUCED FACTORS	NO. OF RESPONSE	%
1. Inadequate hygiene condition	25	74
2. Over-crowding of inhabitants	8	24
3. Others	1	2
TOTAL	**34**	**100%**

Source: Field Survey, 1997

From the table, it can be seen that 25 respondents adduced their vulnerable condition to inadequate hygiene condition of their dwellings. While 8 respondents gave overcrowding as being at the root of their vulnerable conditions.

When asked why despite the outbreak of disease, they did not change their present dwelling 8 respondents gave reasons of nearness to family house; 2 because of personal houses; 12 because of cheaper rents and 1 for some other reasons.

When asked what they thought was the best solution to preventing future outbreak of diseases, 4 respondents suggested the decongestion of buildings as way out; 37 thought that improving hygienic condition would be the best, while 3 respondents suggested some other reasons.

4.3 DISASTERS MITIGATION IN IBADAN

In the event of a disaster, emergency relief efforts at mitigating the effect of disasters are multi-dimensional. Emergency Aids can come from foreign governments, NGOs. Federal, State, or Local governments, or residents association or individuals themselves.

Information on this was elicited in the questionnaire survey. Out of all those who have a fallen victim of one disaster or the other, 65 (53.3%) actually received help while the remaining 57 (46.7%) did not receive any help in terms of relief. Out of these 65 respondents whose disasters were mitigated, 28 were either by individuals or resident associations, 2 by NGOs or philanthropist organisations; 35 by Community or State government and 1 by international organisation.

There exists in Ibadan, a government agency charged with the responsibility of catering for and providing relief materials and fund for victims of natural disasters, like flood, tornadoes, rainstorm, fire and earthquakes.

The National Emergency Relief Agency (NERA) with States branches of which Oyo State is one was established by the Federal government by the enactment of Decree 48 of 1976. Each time there is a disaster, relief materials such as corrugated iron sheets, foam and mattresses, blankets, nylon, mats, towels, plastic kegs, clothing materials and so forth are usually given to victims.

CHAPTER FIVE

5.0 INTERPRETATION OF RESULTS OF THE ANALYSIS

Using vulnerability analysis in the study of disasters is based on the explicit recognition of the fact that disasters happen to only vulnerable people. Vulnerability studies entails the collection of data on socio-economic variables. Similar approaches have been adopted by Lewis (1979) and Lavell (1994).

Eighteen variables as presented in Table 5.1 were used as indicators of vulnerability. To examine this meaningfully, the eighteen variables must be collapsed into fewer composite dimensions. This was achieved using the method of factor analysis. The results are summarized in Tables 5.1 and 5.2.

Table 5.1 reveals that all the variables can be collapsed into five main dimensions which account for about 57 per cent of the variation in the original data set. An examination of the first component which alone account for 26 per cent reveals that condition of drainage channel, physical condition of building and the presence of toilet facilities have high positive loadings. Consequently, these variables gave a dimension of cleanliness and physical vulnerability. On the former, Iyun (1987) has observed that poor environmental condition and filthy housing conditions are responsible for disease hazards in the region.

TABLE 5.1 : **LOADING OF THE ORIGINAL VULNERABILITY VARIABLES ON FIVE COMPONENTS**

S/N	VARIABLES	1 Factor	2 Factor	3 Factor	4 Factor	5 Factor
1.	Income Per Annum	-0.63991	-0.08181	-0.02099	0.13288	0.23010
2.	Type of Building	0.61860	-0.06156	-0.3444	0.13368	0.48829
3.	No. of Household Per Building	0.5153	-0.29097	0.20217	0.36153	0.10494
4.	Wall Materials	0.48919	0.14943	-0.53151	0.15028	-0.21660
5.	Wall Plastering	0.18224	0.59039	0.34182	-0.20854	0.08598
6.	Roof Materials	0.52467	-0.09192	0.02848	0.13380	0.00846
7.	Building Foundation	0.35142	0.33367	-0.21953	0.52012	-0.3372
8.	Door and Window Material	0.69720	-0.07621	0.24136	-0.04070	0.16269
9.	Height of Building	0.19242	0.36639	-0.61170	-0.37153	0.07433
10.	Physical Condition of Building	0.62508	-0.05410	-0.01158	-0.15956	-0.22126
11.	Elevation of Building	-0.37520	0.10385	0.25762	0.51053	0.02520
12.	Distance to Water Bodies	-0.37908	0.43833	-0.32670	0.21738	0.46088
13.	Distance to Soakaway /Refuse Dumps	-0.55134	0.31057	-0.27096	0.14619	-0.10883
14.	Access to Health Facilities	0.31918	0.56125	0.37682	0.14619	-0.1221
15.	Toilet Facilities	0.72337	0.13714	-0.02217	0.13262	-0.10883
16.	Waste Disposal Facility-0.61530	0.29217	0.06008	0.10392	-0.43183	
17.	Presence of Drainage Channel	0.19146	0.67118	0.36346	-0.24921	-0.3034
18.	Condition of Drainage Channel	0.63738	-0.08463	0.22426	0.09930	0.15232
	Eigen Values	4.68021	1.90500	1.49842	1.19019	1.06260
	Percent Variance of Each Factor	26.0	10.6	8.3	6.6	5.9
	Cumulative Variance Extracted	26.0	36.6	44.9	51.5	57.4

TABLE 5.2: **SCORES FOR INDIVIDUAL LOCALITIES**

S/N	LOCALITIES	Factor1	Factor 2	Factor 3	Factor 4	Factor5
1.	Abebi	0.26288	1.25151	0.68679	-0.31673	2.0406
2.	Oje	0.51023	0.09531	-0.19253	-0.43779	-0.7659
3.	Oniyanrin	0.59984	0.63400	0.32479	0.07251	-1.04167
4.	Yemetu	0.64486	-0.31621	0.78686	-0.31478	0.19748
5.	Ode-Aje	1.00762	0.61018	0.88607	-0.21086	0.92567
6.	Mapo	1.07835	0.6984	0.10169	-0.20346	0.44764
7.	Bode	0.22485	2.11388	-0.04928	-0.40556	0.22661
8.	Itamaya	1.21340	-0.29712	-1.51695	-0.04362	-0.48355
9.	Opoyeosa	0.91855	2.1815	-0.53937	0.44092	-1.07451
10.	Beere	1.05642	0.9118	0.17843	0.39796	0.68318
11.	Aliwo	0.27871	0.73674	-0.84847	3.77074	-0.62115
12.	Coca-Cola	-0.30707	0.14512	0.4966	0.19892	-0.46616
13.	Odo-Ona	0.74765	-0.30787	-0.44491	-0.09196	0.22355
14.	Oke-Bola	-0.00059	-0.14237	-0.35221	0.07937	-0.27794
15	Molete	0.39583	-0.52338	0.046162	0.08621	0.37233
16.	Liberty Stadium	1.04175	-0.52699	-0.23756	-0.08760	-0.08760
17.	Orogun	0.10356	-0.58658	-1.12664	-0.21361	0.02458
18	Iwo Road	0.09836	-0.31553	-0.34278	0.14868	-0.37978
19.	Apata	0.459956	-0.3399	-1.312898	-0.10435	0.13044
20.	Eleyele Market	1.06590	-0.70427	-0.75249	-0.19009	0.01898
21	Ashi	-0.10964	-0.19862	0.09735	-0.23148	-0.17208
22.	Orita-Bashorun	-0.37636	-0.30576	0.68645	0.18492	-0.55502
23.	Orita-Mefa	-0.36165	-0.30576	0.68645	0.18492	0.55502
24.	Agbowo	0.63997	0.20709	-0.05247	0.83821	1.02882
25.	Oke-Itunu	-1.26774	0.4412	0.08803	-0.7912	1.31016
26.	Secretariat	-0.99541	-0.43312	0.64363	-0.07028	0.17843
27.	Old Bodija	-0.21256	-046581	0.22013	-0.6568	0.08199
28.	Iyaganku	-0.77223	-0.5806	0.22013	-0.16011	0.08199
29.	Kongi	-0.70027	0.0015	0.3153	-0.1125	0.4042
30.	Idi-Ishin	-0.9731	0.7419	0.4528	-0.1092	0.4897

The component scores presented in Table 5.2 show the performance of the localities with respect to each dimension. Under this factor of uncleanliness localities such as Ode-Aje, Mapo, Itamaya and Beere, all in the high density areas have high positive loadings, suggesting that these areas are highly unclean. During the field trip, these areas were observed to be very indiscriminate in the dumping of refuse and other wastes in its environment, coupled with high per capital solid waste generations. Localities in low density areas and in some medium density area have negative and low loadings. This suggest that these areas are generally clean, thereby making them invulnerable to hazards of disease outbreak. (See figure 4).

Under the second dimension, presence or otherwise of drainage channels have high positive scores. This gives the infrastructure dimension. Localities with high positive scores suggesting high level of vulnerability include Abebi, Bode, Opoyeosa and so forth. While some of the localities that have low and even negative scores include Iyaganku, Liberty Stadium Road, Orita-Bashorun, Kongi and so forth. These localities are mostly in the medium and low density areas. (See Figure 5).

The third dimension is the health component also an infrastructural facility. Those localities that have high positive scores are those with increased access to health facilities. Localities with low scores have less accessibility to health facilities and they are mostly in the high density areas, with notable exceptions like Yemetu, probably because of the location of the Oyo State General Hospital in nearby Adeoyo. Localities in medium and low density areas generally perform better on this component. Exceptions include localities such as Agbowo, Odo-Ona and Eleyele, to mention a few (See Figure 6).

The fourth dimension relates to the physical vulnerability. Pertinent variables here include the building foundation types (from responses of respondents) and the elevation of property from the ground surface. Laying proper foundation for buildings go a long way to determine the structural stability of such in case of any disturbance in the lithosphere. Although Ibadan is not in the seismic danger zone, an earth tremor that occurred not long ago is a pointer to the fact that the unexpected do happen atimes. Elevation

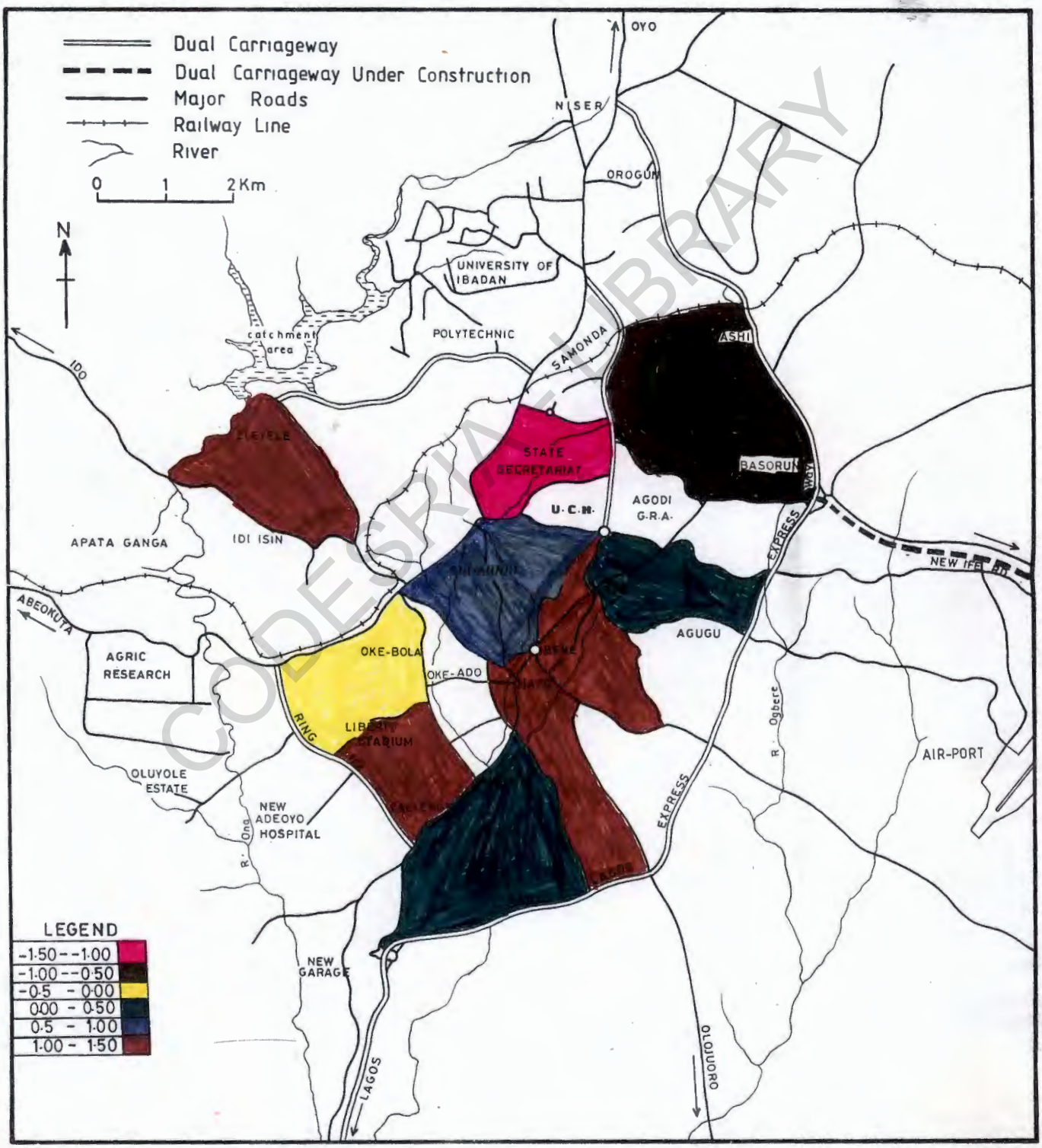

FIG. 5: COMPONENT 1 -- CLEANLINESS DIMENSION

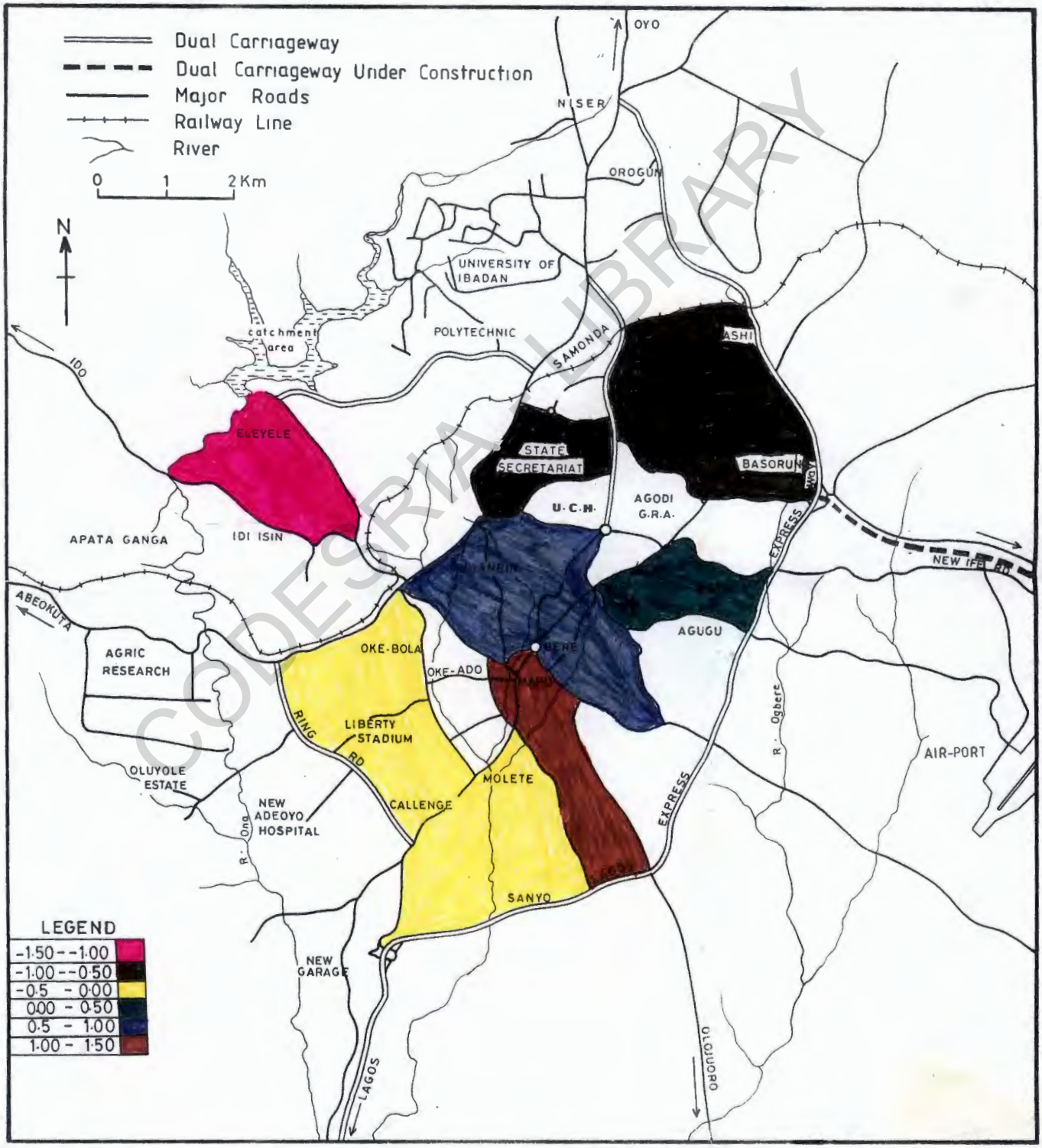

FIG 6: Component 2 - Infrastructure Dimension

of property from the ground level to an extent will make buildings to be invulnerable to inundation in case of erosion or flood.

Most localities in Ibadan exhibited a low negative scores for this component suggesting that only few localities like Aliwo and Opoyeosa are vulnerable under this consideration. (See Figure 7).

The last dimension identifies the type of occupancy and nearness to water bodies as the dominant vulnerability indices in the fifth dimension. Overcrowded dwelling units are more vulnerable to the spread of diseases. Not only this in the case of other disasters, a greater percentage of lives are liable to being lost since many people are at risk than areas with less occupancy ratio. Under the consideration of distance to water bodies which also have a similarly high positive loading, localities which have sizeable per cent of their inhabitants occupying river or streams bank are suceptible to flooding are not observed. Table 5.3 gives the minimum set-back to some notable streams in Ibadan (See Figure 8).

Localities that have high loadings signifying high vulnerability include Abebi, Ode-Aje, Agbowo and the rest. While some localities that are less vulnerable include Oniyanrin, Oke-Bola, Ashi, Orita-Mefa and so forth.

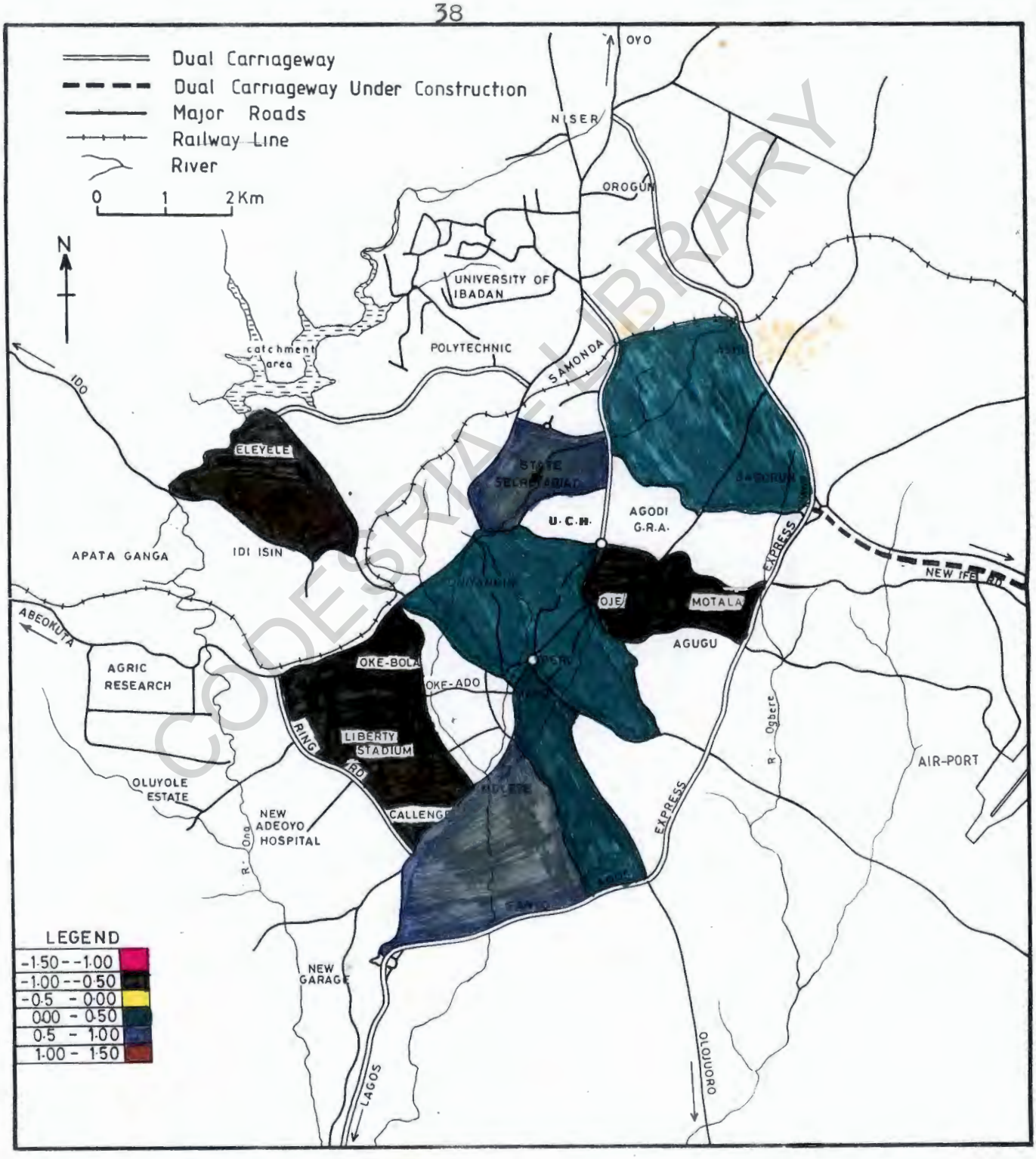

Fig.7: Component 3 - Health Dimension.

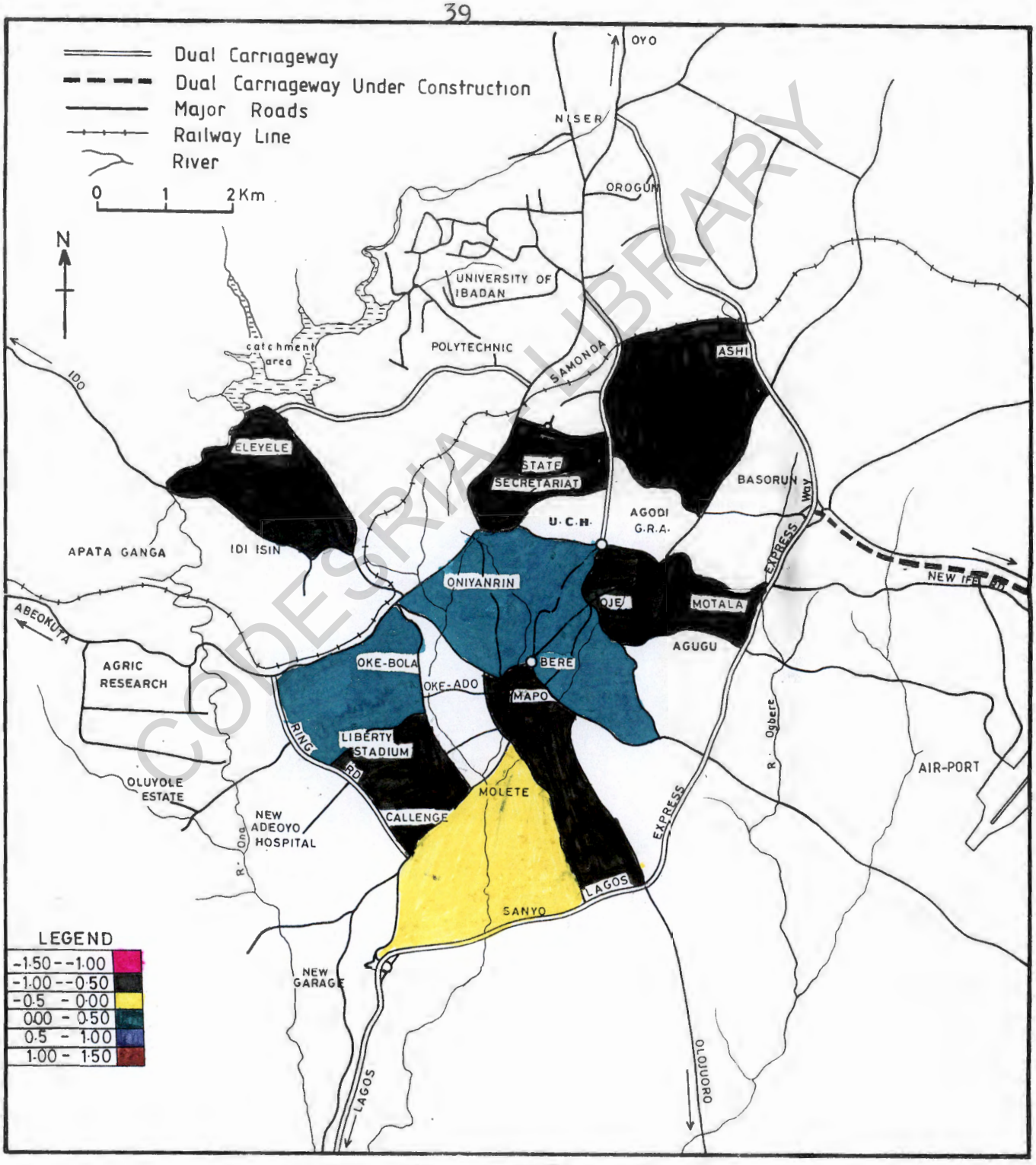

Fig. 8: Component 4 - Physical Dimension.

TABLE 5.3: **MINIMUM SETBACK TO SOME MAJOR STREAMS IN IBADAN**

S/N	STREAMS	SETBACKS
1.	Ogunpa	45m (150')
2.	Kudeti	30.5m (100')
3.	Odo-Ona	45m (150')
4.	Orogun	30.5m (100')
5.	Onireke	30.5m (100')
6.	Gbanamu	30.5m (100')
7.	Odo-Oba	15m (50')
8.	Adamo	15m (50')
9.	Alaro	30.5m (100')
10.	Ogbere	30.5m (100')
11.	Oluyoro	15m (50')
12.	Gege	30.5m (100')
13.	Alalubosa	15m (50')

Source: Town Planning Division, Ministry of Land an Physical Development, Ibadan.

5.1.1 ANALYSIS OF VARIANCE (ANOVA)

The result of the factor analysis was further processed using ANOVA. This is to know whether there are significant differences between and within groups under each localities under the five factor scores.

TABLE 5.4 **ANOVA FOR FACTOR SCORE 1**

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	'F' RATIO
Between groups	29	71.2	2.5	
Within groups	128	85.8	0.67	3.6620
TOTAL	**157**	**157.0**		

Source: Field Survey, 1997.

TABLE 5.5 **ANOVA FOR FACTOR SCORE 2**

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	'F' RATIO
Between groups	29	70.4	2.4	
Within groups	128	86.6	0.6	3.5840
TOTAL	**157**	**157.0**		

Source: Field Survey, 1997.

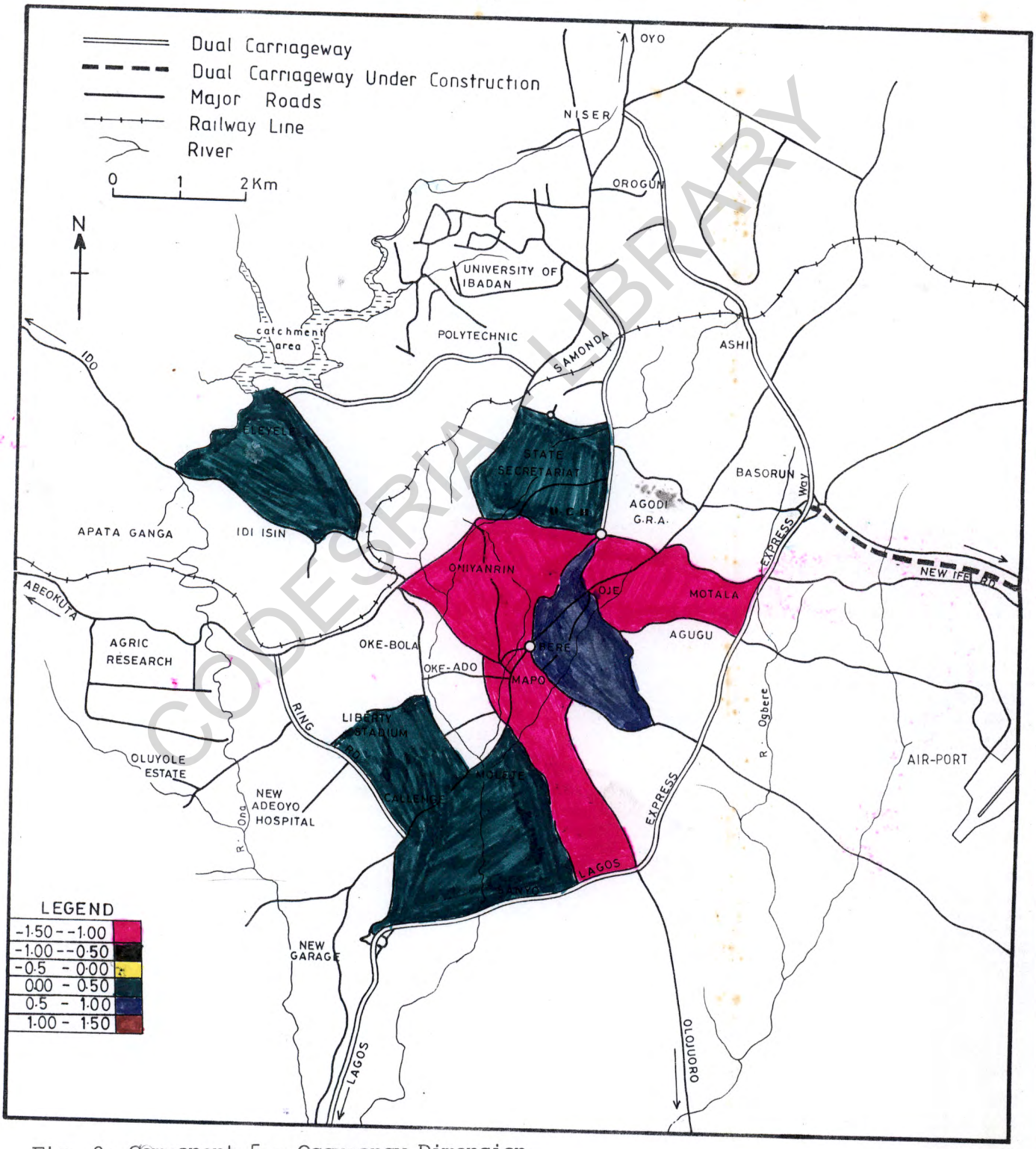

Fig. 9: Component 5 - Occupancy Dimension

TABLE 5.6: **ANOVA FOR FACTOR SCORE 3**

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	'F' RATIO
Between groups	29	47.48	1.64	
Within groups	128	109.5	0.86	1.9135
TOTAL	**157**	**157.0**		

Source: Field Survey, 1997.

TABLE 5.7: **ANNOVA FOR FACTOR SCORE 4**

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	'F' RATIO
Between groups	29	50.89	1.75	
Within groups	128	106.11	0.83	2.1167
TOTAL	**157**	**157.0**		

Source: Field Survey, 1997.

TABLE 5.8: **ANNOVA FOR FACTOR SCORE 5**

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	'F' RATIO
Between groups	29	40.77	1.41	
Within groups	128	116.23	0.99	1.5480
TOTAL	**157**	**157.0**		

Source: Field Survey, 1997.

From Table 5.4 to 5.8, the 'F' calculated of factors scores 1 to 5 are all greater than the 'F' tabulated. This means that there are significant differences between factors of vulnerability operating in the various localities.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

The main focus of this study has been to stress the importance of vulnerability in disaster events. This is in terms of how the socio-economic and environmental conditions operating in a place have set the stage for disasters. Vulnerability is not disaster per se as an area can remain vulnerable as long as possible without any disaster unless there is a trigger mechanism. Using socio-economic conditions such as wall materials, access to health facilities, presence and condition of drainage channel, etc. as vulnerability indicators, it was found that these indicators (eighteen of them) can be collapsed into fewer components to explain what areas are vulnerable in what sense: to certain human-induced disasters. For instance, it was observed that high density areas are very vulnerable to human-induced disasters that are triggered by poor individual and environmental health conditions. This is due to the fact that in low density areas, the income is such that they have the wherewithals to improve their living standards in terms of living condition and accessibility to health facilities.

It was also observed that some vulnerable conditions are not density-specific as above, rather, they occur across the three density areas. Such conditions relate, for instance, to distance of dwelling units to water bodies.

6.2 RECOMMENDATIONS

The question that agitates the mind at this juncture is: how can the results of this study inform urban planning practice within the city?

First and foremost, urban planners and practitioner alike should avail themselves with the socio-economic factors operating in a place to help in the formulation of result oriented urban policies to be effected in an area. Moreso, when this socio-economic factors varies spatially and temporally. They should also update their information from time to time to keep abreast of happenings to avoid making

outdated policies.

Also, knowing these information for the sake of it is not enough but enforcing them where necessary. For instance, knowing that locating structures within minimum set back limit of a stream only make the inhabitant vulnerable, and prone to flooding disasters, urban planners should be able to stand their ground by not granting approval for such structures even in the face of pressures from land owners or developers.

The finding of this study also can be used as a basis for formulating urban renewal programmes for the city of Ibadan. The type of renewal programme to be implemented can then be determined by the extent of the poor performance of these localities. A redevelopment programme could be put in place for localities which perform poorly under specific vulnerability; while conservation and rehabilitation programmes can be applied in area which perform fairly.

Furthermore, programmes to enhance neighbourhood cleanliness can be put in place based on the scores obtained for the cleanliness dimension.

Also of importance is the fact that it is necessary to put in place a programme on environmental awareness so that the population would be informed on the negative impact of their day-to-day activities. This is a sort of preventive disaster mitigation and may help to forestall the occurrences of some disasters.

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APPENDIX I

CENTRE FOR URBAN AND REGIONAL PLANNING
FACULTY OF THE SOCIAL SCIENCES
UNIVERSITY OF IBADAN, IBADAN

NUMBER OF SURVEYED LOCALITIES

High Density

1. Abebi
2. Oje
3. Oniyanrin
4. Yemetu
5. Ode-Aje
6. Mapo
7. Bode
8. Itamaya
9. Opoyeosa
10. Beere
11. Aliwo

Medium Density

12. Coca- Cola
13. Odo-Ona
14. Oke-Bola
15. Molete
16. Liberty Stadium Road
17. Orogun
18. Iwo Road
19. Apata
20. Eleyele Market
21. Ashi
22. Orita-Bashorun
23. Orita-Mefa
24. Agbowo
25. Oke-Itunu

Low Density

26. Secretariat
27. Old Bodija
28. Iyaganku
29. Kongi
30. Idi-Ishin

APPENDIX II

CENTRE FOR URBAN AND REGIONAL PLANNING

FACULTY OF THE SOCIAL SCIENCES

UNIVERSITY OF IBADAN, IBADAN.

QUESTIONNAIRE ON THE VULNERABILITY OF IBADAN METROPOLIS TO HUMAN-INDUCED DISASTERS

Dear Respondents,

Answers to the following questions are intended purely for research purposes. You are therefore enjoined to answer truthfully as responses would be treated with utmost confidence.

Thank you

Instructions: Please mark 'X' in the column that suits your condition.

PERSONAL DATA:

1. Geographical Location

(i) Name of Locality .....

(ii) High density ( )

Medium density ( )

Low density ( )

2. Sex: (i) Male ( ) (ii) Female ( )

3. Marital Status: (i) Single ( ) (ii) Married ( )

(iii) Widowed ( ) (iv) Divorced ( ) (v) Separated ( )

4. Educational Qualification: (i) None ( ) (ii) Primary/Adult Education ( )

(iii) Secondary ( ) (iv) Post Secondary ( )

5. (i) For how long have you been living in the locality? .....

(ii) What is the length of your stay in the present dwelling? .....

SOCIO-ECONOMIC AND ENVIRONMENTAL INFORMATION:

6. Income per annum: (i) Less than 3,000 ( ) (ii) N3,001 - N6,000( )
(iii) N6,001 - N9,000 ( ) (iv) N9,001 - N12,000 ( )
(v) N12,001- N15,000( ) (vi) Above N15,000 ( )

7. Occupation: (i) Trading/Business ( ) (ii) Civil Servant ( )
(iii) Farming ( ) (iv) Artisans (v) Professionals ( )
(vi) Unemployed ( ) (vii) Retired ( )

8. Type of house occupancy: (i) Owner-occupier ( ) (ii) Rented ( )
(iii) Institutional Property ( ) (iv) Family house ( )
(v) Squatter ( ) (vi) Others (Specify) .....

9. If owner, method of financing the construction of building: (i) Bank Loan ( )
(ii) Building Society/Cooperative ( ) (iii) Self financed ( )
(iv) Others (Specify): .....

10. Type of building: (i) Apartment ( ) (ii) Flat ( )
(iii) Rooming ( ) (iv) Others (Specify).....

11. Total number of rooms in the building .....

12. Total number of households in the building:.....

13. Age and number of occupants in household

Age Bracket	Number
0-9 years	
10-59 years	
60 years and above	
TOTAL	

14. Accessibility to telephone: (i) Yes ( ) (ii) No ( )

15. Material for well: (i) Block ( ) (ii) Mud ( )

(iii) Plank and iron sheets ( ) (iv) Others (Specify):.....

16. Is the well plastered? (i) Yes ( ) (ii) No ( )

17. Roof material: (i) Abestos ( ) (ii) Corrugated iron sheets ( )

(iii) Thatched roof ( ) (iv) Other (Specify): .....

18. Building foundation: (i) Sandcrete( ) (ii) Reinforced Concrete ( )

(iii) Mud ( ) (iv) Bricks ( ) (v) Others (Specify) .....

19. Door and window material:

(i) Modern frame and wooden panel ( )

(ii) Wooden frame and glass/louvres ( )

(iii) Metal frame and glass panel/louvres ( )

(vi) Aluminum doors and window ( )

(v) Metal sheet ( )

(vi) Others (Specify) .....

20. Height of building: (i) High-rise building ( )

No. of floors: .....

(ii) Storey ( ) (iii) Bungalow ( )

(iv) Others (Specify): .....

21. Physical condition of building (i) Good ( )

(ii) Needs minor repair ( )

(iii) Needs major repair ( )

(iv) Others (Specify): .....

22. Elevation of building above floor level: (i) 1-2 ft. ( )

(ii) 3-4ft. ( ) (iii) 5-6 ft. ( ) (iv) Above 6 ft.

23. Setback of property from water bodies (stream, rivers, ponds, etc.): (i) 0-10m ( )
(ii) 11-20m ( ) (iii) 21-30m ( ) (iv) 31-40 ( )
(v) 41-50m ( ) (vi) Above 50m ( )

24. Setback of well or source of water to soakaway or refuse dump, etc.: (i) 0-10m ( )
(ii) 11-20m ( ) (iii) 21-30m ( ) (iv) 31-40m ( )
(v) 41-50m ( ) (vi) Above 50m ( )

25. Source of water for domestic use: (i) Tap water ( ) (ii) Well/Borehole ( )
(iii) Stream Pond ( ) (iv) Others (Specify) .....

26. Distance to source of water: (i) Within the compound ( )
(ii) Within neighbourhood ( ) (iii) Outside Neighbourhood ( )
(iv) Others (Specify) .....

27. Do you have access to health facilities?
(i) Yes ( ) (ii) No ( )

28. If 'Yes', which type? (i) Public health facilities ( ) (ii) Private Physicians ( )
(iii) Bucket/Pail system ( ) (iv) Bush/Water bodies ( )

29. Type of toilet facility: (i) Water closet ( ) (ii) Pit latrine ( )
(iii) Bucket/Pail system ( ) (iv) Bush/Water bodies ( )

30. Method of waste disposal (i) Communal dumps ( )
(ii) Council collection points ( )
(iii) In the bush/drain ( ) (iv) Privately paid agents ( )
(v) Others (Specify) .....

31. If Council, how often? (i) Daily ( ) (ii) Weekly ( )
(iii) Forthnightly ( ) (iv) Monthly ( ) (v) Others (Specify) .....

32. Drainage channel for water flow around building: (i) Available ( )
(ii) None ( )

33. If available, comment on the condition: (i) Free ( ) (ii) Blocked ( )
(iii) Others (Specify).....

34. Do you have information prohibiting living or building in certain part of your locality for safety
reasons?
(i) Yes ( ) (ii) No ( )

35. Do you have an association of residents in your locality?
(i) Yes ( ) (ii) No ( )

36. If 'Yes', do they help to comfort common disaster event?
(i) Yes ( ) (ii) No ( )

37. If 'Yes', which of the following: (i) Advisory help ( ) (ii) Financial help ( )
(iii) Resettlement( ) (iv) Others (Specify).....

DISASTER INFORMATION

38. Do you suffer from Erosion or Flooding?
Yes ( ) No ( )

39. If 'Yes', how often?
(i) Everytime it rains heavily ( )
(ii) Occasionally when it rains heavily ( )
(iii) Anytime it rains ( )
(iv) Other (Specify).....

40. What do you think was the cause of erosion or flooding?
(i) Natural Cause ( )
(ii) The will or punishment of God ( )

(iii) Human failure/mistake ( )

41. If human failure or mistake, which of the following?

(i) Location of property in hazard area, e.g. river bank ( )

(ii) Improper planning or design ( )

(iii) Lack of flood warning system ( )

(iv) Others (Specify) .....

42. Reason for continuing to stay in present dwelling despite the erosion or flooding:

(i) Nearness to place of work ( )

(ii) Family house ( ) (iii) Personal house ( )

(iv) Cheaper rent ( ) (v) Others (specify) .....

43. How do you think that erosion or flooding can be prevented from reoccurring?

(i) Cannot be prevented ( )

(ii) Properly relocation ( )

(iii) Enhanced flood warning system ( )

(iv) Better planning and management ( )

(v) Better design and structure ( )

(vi) Others (Specify) .....

44. Have you been affected by fire-outbreaks?

Yes ( ) No ( )

45. If 'Yes', comment on the frequency: (i) Once ( ) (ii) Twice ( )

(iii) More than twice ( )

46. What do you think was the cause of the fire-outbreaks

(i) The will or punishment of God ( )

(ii) Human failure or mistake ( )

47. If human failure or mistake, which of the following?

(i) Careless handling of fire or electrical appliances ( )

(ii) Improper planning or design ( )

(iii) Improper building materials ( )

(iv) Others (Specify) .....

48. Reason for continuing to stay in present dwelling despite fire-outbreak:

(i) Nearness to place of work ( )

(ii) Family house ( ) (iii) Personal house ( )

(iv) Cheaper rent ( ) (v) Other (Specify) .....

49. How do you think that fire-outbreaks can be prevented from reoccurring?

(i) Careful handling of fire/electrical appliances ( )

(ii) Using fire-resistant materials in building ( )

(iii) Better design of structure ( )

(iv) Others (Specify).....

50. Have you suffered from a case of collapsed building?

Yes ( ) No ( )

51. If yes, how many times? (i) Once ( ) (ii) Twice( )

(ii) More than twice ( )

52. What did you think was the cause of the collapse(s)?

(i) The will or punishment of God ( )

(ii) Human failure or mistake ( )

(iii) Other (Specify) .....

53. If human failure or mistake, which the following?

(i) Faulty design of building ( )

(ii) Use of improper building materials ( )

(iii) Others (Specify) .....

54. How do you think that future case of collapsed building can be prevented?

(i) Use of appropriate building materials ( )

(ii) Proper design of building ( )

(iii) Others (Specify) .....

55. Have you suffered an outbreak of disease?

Yes ( ) No ( )

56. If 'Yes', which of the following? (i) Cholera ( )

(ii) Typhoid fever ( ) (iii) Measles ( )

(iv) Others (Specify) .....

57. How often? (i) Frequently ( ) (ii) Occasionally ( )

58. What do you think was the cause of the outbreak

(i) The will or punishment of God ( )

(ii) Human failure ( )

59. If cause by human failure, which of the following:

(i) Inadequate hygiene conditions ( )

(ii) Overcrowding of occupants ( )

(iii) Others (Specify) .....

60. Reason for continuing to stay in present dwelling despite the disease outbreak?

(i) Nearness to place of work ( )

(ii) Family house ( ) (iii) Personal house ( )

(iv) Cheaper rent ( ) (v) Others (Specify) .....

61. How do you think that future outbreak can be prevented ?

(i) Decongestion of dwelling ( )

(ii) Improved hygienic condition ( )

(iii) Others (Specify) .....

62. After a disaster event, did you receive help from anywhere?

Yes ( ) No ( )

63. If Yes, from what categories of the following?

(i) Individual/residents association ( )

(ii) NGO/Philanthropist organisation ( )

(iii) Community/LGA ( )

(iv) State government ( )

(v) Federal government ( )

(vi) International Organisation/Foreign Government ( )

(vii) Others (Specify).....

64. Who do you believe can help to reduce the danger/hazard faced? (i) Government ( )

(ii) Community ( ) (iii) Family ( )

(iv) Others (Specify):.....