

**INFORMAL RECYCLING AND RESOURCE RECOVERY
AT A MUNICIPAL OPEN DUMPSITE
– A CASE STUDY OF HULENE DUMPSITE**

LEONOR JOAQUIM DOMINGOS

Submitted as the dissertation component in partial fulfilment of the requirements
for the degree of Master in Environment and Development,
in the Centre for Environment and Development,
Faculty of Science and Agriculture,
University of Natal, Pietermaritzburg

Pietermaritzburg

2001

ABSTRACT

Poverty in its many guises - poor housing, no employment, indifferent health and hunger is a driving force for scavenging. In most developing countries, the informal recovery of material from waste is a common survival strategy for the poor. In fact, up to 2% of populations in developing countries depend on recovering, re-using and selling waste materials from streets, dumpsite or landfills for their livelihood.

The aim of this study was to develop an understanding of the socio-economic conditions affecting the scavengers and scavenging activities at the Hulene dumpsite in Maputo. This study set out to develop a conceptual framework depicting scavenging, its problems and opportunities. This was used to structure the research. The main issues addressed were:

- The driving forces of scavenging where poverty is the major factor.
- The organization of scavengers and scavenging activities showing that there is no formal organization of scavengers, which leads to exploitation of vulnerable groups.
- The reaction from the national and local authorities, with the prevalence of a repressive policy and absence of support.
- The gender dimension on scavenging activities; and
- The perception of health risks.

The findings are that scavenging constitutes a means of livelihood for poor people. These activities respond to the market demand and not to environmental considerations. However, in performing scavenging activities which results in informal recycling and resources recovery, people generate environmental benefits, economic benefits and social benefits.

Other findings are that the informal organization of scavengers increases the exploitation and the health risk of scavengers. Thus, organization is a key to the success of scavengers and indirectly to the municipal economy.

It is concluded that the framework set out in this thesis is useful in the sense that it illustrates the factors which influence scavenging activities. This framework can be used for further research in similar situations. It is also concluded that prohibition of scavenging activities would have undesirable consequences for the economy of Maputo in particular and of Mozambique in general. Thus, since this activity brings benefits to scavengers and to society, the government should support and stimulate this activity and not persecute those who provide this service. Consequently, as a recommendation, government, local communities and NGOs are called upon to support scavengers. The formation of scavenger co-operatives can promote sustainable grassroots development in this sector of the population.

TABLE OF CONTENTS

Abstract	i
Preface	iii
Table of contents	iv
List of figures	vi
List of tables	vi
List of plates	vi
Acknowledgements	vii
Dedication	viii
List of abbreviations and acronyms	ix
CHAPTER 1: INTRODUCTION	1
1.1. Background and rationale	1
1.2. Aims and objectives	3
1.3. Overview of thesis	4
CHAPTER 2: DIMENSIONS OF POVERTY IN MOZAMBIQUE AND THE STUDY AREA	6
2.1. Introduction	6
2.2. Background and information about Mozambique	6
2.3. Understanding poverty in Mozambique	7
2.4. Socio-economic conditions during the civil war	8
2.5. Socio-economic conditions after peace	10
2.6. Waste management system in Maputo	13
2.7. Hulene township and the study area	14
2.8. Conclusions	18
CHAPTER 3: LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK FOR INFORMAL RECYCLING AND RESOURCE RECOVERY AT A MUNICIPAL OPEN-DUMPSITE	19
3.1. introduction	19
3.2. Literature review	19
3.2.1. Definitions	19
3.3. Municipal solid waste management	26
3.3.1. Problems and constraints of waste management in developing countries	33
3.4. Framework for informal recycling and resource recovery at a Municipal dumpsite	35
3.4.1. Driving forces of scavenging	35
3.4.2. Organization of scavengers and scavenging activities	37
3.4.3. Reaction from the national and local authorities	39
3.4.4. Gender dimension on scavenging activity	43

3.4.5. Health risk perceptions	46
3.5. Application of the framework	48
3.6. Conclusions	51
CHAPTER 4: RESEARCH METHODOLOGY	52
4.1. introduction	52
4.2. Literature review	52
4.3. Conceptual framework	52
4.4. Data collection	53
4.4.1. The non-scheduled interview	53
4.4.2. The scheduled structured interview	53
4.4.3. The non-scheduled structured interview	54
4.4.4. The focus group interview	54
4.4.5. Observation	55
4.5. The survey process	55
4.6. Possible limitations to the study	57
4.7. Data analysis	58
4.8. Conclusions	60
CHAPTER 5: RESULTS PRESENTATION	61
5.1. Introduction	61
5.2. Driving forces of scavenging	61
5.3. Organization of scavengers and scavenging activities	67
5.4. Reaction from the national and local authorities	69
5.5. Gender dimensions	69
5.6. Perception of the health risk	71
5.7. Conclusions	74
CHAPTER 6: DISCUSSION	76
6.1. Introduction	76
6.2. Driving forces of scavenging	76
6.3. Organization of scavengers and scavenging activities	77
6.4. Reaction from national and local authorities	78
6.5. Health perceptions	79
6.6. An evaluation of the conceptual framework	80
CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS	82
REFERENCES	86
APPENDIX	92

LIST OF FIGURES

Figure 1. Map of Mozambique	5
Figure 2. Administrative division of Maputo city and the study area (Hulene dumpsite).....	15
Figure 3. Location of the study area	17
Figure 3.1. Illustration of a municipal solid waste management system	34
Figure 3.2. A conceptual framework depicting a hypothetical recycling system at a dumpsite in a poor community.....	50

LIST OF TABLES

Table 5.1. Years of scavenging activities by respondents	61
Table 5.2. Resources collected by scavengers	63
Table 5.3. Respondents' perceptions of demand for materials taken from the dumpsite	65
Table 5.4. Size of household	65
Table 5.5. Views of respondents on gender issues	70

LIST OF PLATES

Plate 1. Women, children and men scavengers picking resource materials from Hulene dumpsite	66
Plate 2. A moment after waste has been dumped. Shows women, men and children picking waste, and teenages boys on top of waste	66
Plate 3. Collected cans have been stored and packed, before being taken for recycling	67
Plate 4. Scavengers eating at the dumpsite	74

ACKNOWLEDGEMENTS

I owe a debt of gratitude to Professor C.M. Breen, my supervisor whose assistance, guidance, tolerance and patience throughout the project have been invaluable. His support, motivation, sacrifice and enthusiasm were a source of inspiration to me.

Many thanks to Professor R. Fincham for his support and guidance in the early stages of the design of the research proposal. This willingness to help saw him even travel to Maputo to meet me for pertinent discussion about the research.

The study would not have been possible without the financial support from the African American Institute. In particular to dr. Celia Dinis, the project Manager, my thanks for her support and motivation throughout the study period.

I wish also offer my deepest gratitude to Mrs Marion Jordaan and Kerry Roberts of CEAD/UNP for their invaluable assistance.

I am dept to my husband and our two sons Brian and Mike, for their understanding, moral and spiritual support which allowed me to study.

DEDICATION

This dissertation is dedicated to Brian and Mike and all of their age mates. The poverty level of Mozambique is of great concern to them. Further, the thesis is also dedicated to my parents who died very early wishing that I would get my Master's degree.

LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
CMM	Conselho Municipal de Maputo/ Municipal Council of Maputo
GNP	Gross National Product
GoM	Government of Mozambique
GAPVU	Gabinete de apoio aos grupos vulneráveis/ Office for Support of Vulnerable Population Groups.
IMC	Isolate, Manage and Control
MSW	Municipal Solid Waste
MSWM	Municipal Solid Waste Management
MEDIMOC	Medical Laboratory of Mozambique
NGO	Non-Governmental Organization
Nimby	'Not in my backyard'
OAU	Organization of African Unity
PRES	Programa de Reabilitação Económica e Social/ Economic and Social Rehabilitation Program
RENAMO	Movimento de Resistência Nacional/ Movement of National Resistance
UN	United Nations
UNDP	United Nations Department of Population
UNEP	United Nations Environment Programme

INTRODUCTION

This thesis is concerned with scavenging in cities. It uses the Hulene dumpsite in Maputo city, Mozambique as a case study. This chapter provides the background and rationale, aims and objectives and an overview of the structure of the thesis.

1.1. BACKGROUND AND RATIONALE

In most developing countries the informal recovery of material from waste is a common survival strategy for the poor (Medina, 1998). Up to 2% of the population in developing countries depend on recovering, re-using and selling waste materials from streets, dumpsites or landfills for their livelihood (Rapten, 1998).

Worldwide, cities are perceived as outstanding engines of economic and social progress. As such, they have been largely responsible for rural-urban migration (*Ibid.*). Rural-urban migration is increased by low productivity of family agriculture as well as an absence of employment opportunities in agriculture and others sectors, which leads to an increase of populations in urban centers in general, and in Maputo city in particular, as people search for employment. Rural-urban migration in Mozambique was also precipitated by the civil war which led to the rural people seeking a secure place in cities.

The astonishing growth in urban population has resulted in the government's inability to offer more employment and to cater for urban needs, especially of the poor and marginalized sections of society. Thus, the poor urban communities suffer poor sanitation, lack of clean water supply, lack of solid waste collection, high illiteracy rates, high infant and child mortality, have a high proportion of disadvantaged groups such women and children, and a low level of utilization of existing services (such as maternal and child health care). They also have a high initial enrollment in primary education, but a high drop-out rate, particularly among girls (*Ibid.*).

The lack of employment opportunities in the formal sectors has resulted in a growing informal sector in developing countries in general and in Maputo in particular (Peters, 1998). The informal sector has been defined by Furedy (1990, cited in Van de Klundert and Lardinois, 1995:8), as “unregistered, unregulated, or casual activities carried out by individuals and/or family or community enterprises, that engage in value-adding activities on a small-scale with minimal capital input, using local materials and labour-intensive techniques”. The informal sector is also classified as those people in the economy, who do manual work for low wages, in poor working conditions and without legal protection or job security.

The incomes derived in this sector normally are not counted in the national gross domestic product (GDP) (Rapten, 1998). Informal activities in Maputo include people who are: street vendors, kiosk or “*barraca*” owners, street barbers, shoe shiners, shoe repairers, maize roasters, cart pullers, auto-repairers, blacksmiths, building contractors, charcoal sellers, hairdressers, and furniture makers (Peters, 1998). Those who cannot cope with the deterioration of economic conditions end up picking waste from streets, households and dumpsites. Their extreme level of poverty, illiteracy and disorganization, makes the recovery of recyclables from street refuse or dumpsites their only means of livelihood (Rapten, 1998).

The health conditions of scavengers are particularly deplorable, as a result of living nearby or on dumpsites (Appleton and Ali, 2000). Worse still, they work long hours among vermin and diseases, without adequate drinking water and sanitation (*Ibid.*). In Maputo they are known as “*moluenes*”¹. They survive in a hostile physical and social environment. Due to their daily contact with waste and dirt, scavengers are often perceived by the public as disease carriers, a nuisance, a symbol of backwardness or even as criminals (Medina, 1997).

¹ Moluenes is a local name used to identify poor people in general and scavengers in particular.

Literature on Development has frequently described scavengers and middlemen² as symbols of urban environmental deterioration, human degradation and lost hopes (Digregorio, 1995). However, beyond these images lies a reality in which these denigrated occupations provide refuge for the unemployed, a secure economic niche for particular groups such as illiterate women, ethnic groups (for example the job of waste collector in Maputo city was linked to the Machopes³ ethnic group), caste, or territorial communities. Scavenging activities also provide material inputs for local informal or formal industries, commodities for export, and a means of diverting large amounts of recoverable materials from dumpsites, landfill sites and composting plants (*Ibid.*). In many cases, middlemen and government officials exert economic and political control over scavengers, making their livelihood more difficult (Medina, 1997).

It is in the light of the above discourse, the problem addressed in this study was how to develop a deeper appreciation of the socio-economic factors driving the activities of scavenging. This was premised on the understanding that the importance of taking a holistic view of scavenging necessitates objective analysis. It was thus envisaged that a conceptual framework based on a hypothetical recycling system would facilitate such an approach.

1.2. AIMS AND OBJECTIVES

The aim of this study was to develop an understanding of the socio-economic conditions of the scavengers and scavenging activities at the Hulene dumpsite, in Maputo (figure 1 page 4). This study sets out to develop and apply a conceptual framework, depicting the scavenging activity, its problems and opportunities. The objectives were to:

- a) Identify the driving forces of scavenging activities;
- b) Illustrate the organization of scavengers and scavenging activities;

² A middleman is an intermediary waste buyer.

³ Machopes, is an ethnic group localized in Gaza Province, in south part of Mozambique

-
- c) Recognize the reactions of the national and local authorities to scavenging activities;
 - d) Understand the gender dimensions of scavenging activity;
 - e) Identify the health risk perceptions of scavenging activity; and
 - f) Make recommendations to improve the conditions of scavengers.

1.3. OVERVIEW OF THESIS

The thesis comprises seven chapters. Chapter two describes the dimensions of poverty in Mozambique and the study area, the Hulene dumpsite. Chapter three presents the literature review and the conceptual framework for informal recycling and resource recovery through scavenging at a municipal dumpsite. Chapter four presents the research methodology, chapter five presents the results, chapter six presents the discussion and finally, chapter seven presents the conclusions and recommendations.



Figure 1. Map of Mozambique.

Source: http://www.sas.upenn.edu/African_Studies/CIA_Maps/Mozambique_19859.gif

DIMENSIONS OF POVERTY IN MOZAMBIQUE AND THE STUDY AREA

2.1. INTRODUCTION

The purpose of this chapter is to provide background information about the dimensions of poverty in Mozambique, and about waste management in Maputo and the study area. This is presented in the following order: background information on Mozambique; understanding poverty, particularly the socio-economic conditions during the civil war, where the economic crisis of the 1980s and 1990s is outlined; and the socio-economic conditions after the civil war, where other factors which lead to poverty are described as well as future development trends. The waste management system in Maputo is then described. Finally a description of the Hulene Township and Hulene dumpsite study area is given.

2.2. BACKGROUND INFORMATION ABOUT MOZAMBIQUE

Mozambique is situated on the east coast of southern Africa. Its position makes Mozambique one of the most strategically situated countries in southern Africa as a gateway to 6 hinterland countries. Mozambique has an area of 799,388Km² and 13,000Km² of inland water (figure 1) (Dejene and Olivares, 1991). It has a coastline of 2500 Km adjoining the Indian Ocean, which is one of the longest national coastal lines in east Africa (*Ibid.*).

Administratively Mozambique is divided into 10 Provinces, Niassa, Cabo Delgado, Nampula, Zambezia, Tete, Sofala, Manica, Inhambane, Gaza and Maputo. Bordering countries include Tanzania in the north, Malawi and Zambia in north west, Zimbabwe in the west and Swaziland and South Africa in the southwest and south respectively. In the east it is bordered by Indian Ocean (Morais, 1988).

2.3. UNDERSTANDING POVERTY - WHAT IS POVERTY?

Most people are capable of identifying poverty, but few are able to give a definition that will be generally accepted (De Beer, 2000). The World Bank Group (2001:1) gives the following definition of poverty:

"Poverty is hunger. Poverty is lack of shelter. Poverty is being sick and not being able to see a doctor. Poverty is not being able to go to school and not knowing how to read. Poverty is not having a job, is fear for future, living one day at a time. Poverty is losing a child to illness brought about by unclean water and finally, poverty is powerlessness, lack of representation and freedom".

Therefore, poverty refers to a situation where people are unable to meet the basic necessities of life such as food and shelter. People are also said to be poor when they have limited access to basic social services such as health, education, safe water and sanitation. The concept of poverty has been broadened to include powerlessness, vulnerability, deprivation, isolation, lack of decision-making power, lack of assets and general insecurity (Chambers, 1983). Measures of welfare including life expectancy and under-five mortality rates are used to gauge the poverty levels (ECA/SRDC-SA, 1998).

Poverty has many faces, changing from place to place and across time (World Bank Group, 2001). Thus, poverty is a dynamic condition among individuals, households and communities. It is recognized that while some individuals or households are permanently poor, others become impoverished as a result of general life-cycle changes, specific events such as illness or death of a main income earner, or when external economic conditions get worse due to factors such as a civil war (*Ibid.*) Poverty also refers to situations where people want to escape from oppressive regimes. Thus, poverty calls for action and for changing the world, so that as many people as possible may have enough to eat, adequate shelter, access to education and health, protection from violence, and a voice in what happens in their communities (*Ibid.*).

Poverty in Mozambique has been defined as “*the inability of individuals to ensure for themselves and for their dependents a set of minimum basic conditions for subsistence*” (Mozambican Authorities, 2000: 2). These basic conditions refer to shelter, food, health and education. They have been identified relative to an absolute poverty line. The absolute poverty line was constructed as the sum of a food poverty line using nutrition levels of approximately 2.150 Kilo-calories per person per day plus a modest amount for non-food expenditure, calculated on the basis of non-food consumption by food insecure households. In monetary terms, the national poverty line was set at 5.433.00Mt (less than 0.50 US cents) per person per day (*Ibid.*).

2.4. SOCIO-ECONOMIC CONDITIONS DURING THE CIVIL WAR

Mozambique became independent in 1975. Since that period the Mozambique government has been forced to concentrate its limited material and human resources on the defence and survival of its population. During the decade of civil war, waged against the FRELIMO government, the Mozambique National Resistance Movement (RENAMO) targeted the economic and social infrastructure of the country with a view to paralysing the productive capacity of the country and of the people (Government of Mozambique and United Nations, 1990). The infrastructure included hospitals, schools, roads, bridges, and in particular, houses. As a result of this war, Mozambique has become dependent on external aid. For example 90% of its market and relief cereal needs is derived from external aid (*Ibid.*).

By the end of 1986 the combined impact of war and natural disasters such, as prolonged drought, resulted in a situation where 3.2 million Mozambican peasants had been displaced or otherwise affected. This situation led to the convergence of people in Maputo City, augmenting pressure on limited infrastructure of Maputo and on the basic services such as waste disposal and management. As a result of the impact of prolonged drought and war, the government realized it no longer had sufficient resources to provide food and other basic commodities necessary to avert widespread starvation (*Ibid.*).

In 1987, Mozambique made the first appeal for emergency assistance. This was launched at Geneva. The Government adopted an ambitious structural adjustment program, known as the Economic Rehabilitation Program (Abrahamsson and Nilsson, 1998). This program addressed issues related to macro-economic policy reforms such as the exchange rate, trade policies, pricing policies, budget and credit. The country's earlier economic decline was reversed and a 4% growth in gross national product (GNP) was recorded in 1988 (*Ibid.*).

During the period 1988-1989, the second emergency appeal for assistance to Mozambique was made. In this appeal, a program that included essential rehabilitation as well as emerging requirements was adopted (*Ibid.*). This was because it had become evident that some rehabilitative support was required to provide minimum assistance to the displaced and severely affected populations (GoM and UN, 1990). It meant that the human aspect of rehabilitation was addressed. This component of the Economic Rehabilitation Program was known as the Economic and Social Rehabilitation Program (PRES) (Mozambican Authorities, 2000).

By 1990 the country's per capita annual income level was estimated to be around \$US150, which was the lowest in the world (GoM and UN, 1990). The annual infant mortality is the second highest in the world, with one out of every three children dying before reaching the age of five (Abrahamsson and Nilsson, 1998). In the same period the Office for Support to Vulnerable Population Groups (GAPVU) was established. This office was to supplement the earnings for the poorest section of the Mozambican population. Furthermore, in the same period, the first attempts at drawing up a Poverty Alleviation Strategy were made (Mozambican Authorities, 2000). These actions were undertaken in a climate of political instability since the civil war ended only in late 1992, when the General Peace Agreement was signed between the Mozambique President and the President of the RENAMO Party.

The assessment made by the United Nations cited by Brown (1998), is that one million people were killed because of civil war, hunger and disease. *“Two million refugees fled to neighbouring countries and almost four million people were internally displaced (from a total of 17 million). The Mozambique Finance Ministry has estimated the cost of the ‘damage and lost development’ to be 15 billion US Dollars”* (Brown, 1998:29). Schools, hospitals, transport and communication infrastructures and industries have been destroyed. According to Waterhouse (1996, cited in Brown, 1998:29), *“war time sabotage and neglect put some 70% of the national road network out of use. At the end of the war there were only 12 secondary schools left standing in the country”*.

2.5. SOCIO-ECONOMIC CONDITIONS AFTER PEACE

FRELIMO retained power in 1994, after the first democratic elections. But it was power over a country which was classified as one of the poorest in the world (Brown, 1998). According to UNDP (1993, cited in Elliot, 1999), in the 1990s the Mozambique debt burden outweighed the Gross National Product several times over, and Mozambique was leading the list of the top ten most debt burdened countries.

Economic development in Mozambique was marked by following the instructions of the Bretton Woods Institutions “to reduce the role of the state and to increase the role of the market in resource allocation” (Cornwell, 2000: 249). In doing so, a massive program of privatisation was undertaken in order to improve economic conditions (Mozambique 2, undated).

The floods which affected the country in February and March 2000, and the spread of AIDS, also affected the economic growth of Mozambique which showed a marked slowdown, a rekindling of inflation, and a weakening of the external current account. However, production at the recently opened Mozal aluminium smelter has helped contain the economic slowdown, and increased real GDP growth to 3.8% in 2000 (International Monetary Fund, 2000).

A household survey of living conditions for 1996/1997 illustrated that in spite of all attempts at development, the poverty level in Mozambique is still extremely high (Mozambican Authorities, 2000). The incidence of absolute poverty is 69%, indicating that more than two-thirds of the Mozambican population is living below the poverty line. Poverty is higher in rural areas (71%) where 80% of the population live, than in urban areas (62%) (Mozambican Authorities, 2000). In summary, the household survey of 1996/1997 (Mozambican Authorities, 2000) has identified the following determinants of poverty in Mozambique:

- slow economic growth until the early nineties;
- poor education of economically active household members, especially women;
- high dependency rates in households;
- low productivity of family agriculture;
- absence of employment opportunities in agriculture and elsewhere;
- weak development of infrastructure in rural areas;
- poor health care service delivered to the poor people.

Given this scenario the Mozambican Government has targeted poverty reduction, as its priority.

The first attempt to define specific and explicit poverty reduction policies was the 1995 Poverty Reduction Strategy for Mozambique, which comprises five specific objectives; (a) to improve living conditions in rural areas, (b) to invest in human capital, (c) to improve social protection networks, (d) to formulate a population policy and (e) to improve national capacity for analysing and monitoring poverty.

The poverty reduction strategy was based on the recommendations of the First World Summit on Social Development held in Copenhagen in March 1995, where a commitment to work for social development throughout the world was made. The recommendations stated that "*men, women and children in poverty will be able to exercise their rights, utilise resources and share responsibilities through an integral global approach and*

reconstructing social links with disadvantaged populations to build confidence and take to combat misery" (ECA/SRDC-SA, 1998:12).

Schubert (1995, cited in Aina *et al.*, 2000) indicated that by the year 1995, 70% of the population of greater Maputo (then estimated at 1.3 million) was assessed as being generally poor. This means that some 85,000 households or 650,000 people were absolutely poor and therefore unable to save or invest, nor to satisfy their immediate needs such as food, housing, health and education (Aina *et al.*, 2000).

The quantitative impact of poverty is easier to illustrate than the qualitative impact of poverty. Women and children were the first sector of the population to be seen working as informal vendors (*Ibid.*). Schubert (1995, cited in Aina *et al.*, 2000) observed a high proportion of female street traders. Recent studies indicate that the number of males joining informal vending is increasing. This situation is caused by the massive restructuring of the employment sector in Mozambique caused by structural adjustment (Aina *et al.*, 2000). This has aggravated widespread losses in the formal sector of employment (*Ibid.*). Studies indicate that losses in recent years total up to 20,000 jobs (in a formal sector workplace of some 160,000) including some 5,000 in the largest employer at CFM (Port and Rail Authority) and another 5,000 in the cashew nut industry (*Ibid.*).

In general it is estimated that 60% of the greater Maputo workforce is engaged in the informal sector. This is the group of poor who can cope with the weakening conditions of the economy; those who cannot cope end up picking waste from streets, households and dumpsites. Nowadays, scavenging is one of the survival options among the poorest urban section of Mozambican population. This study attempts to understand the social and economic conditions of scavengers in order to support policies to alleviate their poverty.

2.5.1. Future development trends

A future trend in Mozambique is environmental management in order to attain sustainable development. Sustainable development tries to reconcile development and maintenance

of environmental resources on which society depends (Elliot, 1999). This means that economic development and social development are strongly linked to environmental development. All forms of economic and social activities make demands on the resources base (*Ibid*). Moreover, all production and consumption activities produce the liquid, solid or gaseous wastes. However, the rate of waste generation may exceed the natural capacity of the environment to absorb these. Consequently, detrimental effects can occur for human health and in the environment in general. Re-use/recycling offers an opportunity for reducing waste generation.

2.6. WASTE MANAGEMENT SYSTEM IN MAPUTO

Maputo city comprises 5 types of urban districts. Urban district number 1 represents concrete city or urban area. Urban districts numbers 2 and 3 represent townships, and urban districts numbers 4 and 5 represent the peri-urban area. The Hulene dumpsite is located in urban district number 4, (figure 2) one of the most populated peri-urban areas.

The growth of the population in Maputo city has increased the pressure on the weak urban services in general, and on the waste management system in particular. The number of inhabitants in the concrete city is 154,284, in the township 373,301 and in the peri-urban area 439,252 giving a total of 966,837 inhabitants (Conselho Municipal de Maputo, 2000). More than 80% of the population of Maputo live under circumstances where municipal services are poor to non-existent.

90 Ninety percent of the waste produced in Maputo city is solid waste, comprising of household waste, industrial waste, commercial waste and hospital waste (Conselho Municipal de Maputo, 2000). Solid waste includes: sand, cardboard, metallic residues, food scraps, night soil (human faeces), plastics, dead animals, construction debris, wood, chemical residues, broken household appliances, bottles, broken glass, ash, vegetables and sharp materials like needles and scalpels from medical waste (*Ibid*).

754 Waste management in Maputo city is a joint responsibility of the Municipal Council of Maputo, the private sector and local communities. Waste management involves collection, transport, disposal and treatment. The effectiveness of these waste management activities is, however, very low. Financially and physically the city is unable to collect waste, especially to the urban poor occupying the township and peri-urban areas (Conselho Municipal de Maputo, 2000). Scavengers who pick recyclable resources before they get to the disposal site also collect waste in the 'concrete city'. For instance, women scavengers are commonly observed asking for and sometimes buying bottles and containers from rich households.

The urban poor are left to contend with waste disposal on their own. Local communities either bury waste in their backyard, or they burn it. Where there is no space to bury the waste they dispose of the waste in streets near to their houses. The lack of support given to the urban poor in this area has serious consequences for their health and for the urban environment.

All waste collected by the authorities is transported to the open dumpsite in Hulene. In general, wastes are not subjected to any formal treatment apart from compaction at the dumpsite. Two enterprises are involved in waste recycling in Maputo city: Vidreira (a glass factory) and Fapacar (a paper factor). In 1998 the Vidreira factory was operating with 20% of recyclable glass and 80% of virgin raw materials (Moçambique, 1998). Fapacar was involved in recycling of paper on an experimental basis. Scavengers make a great contribution to the recycling of materials for formal and informal enterprises. The director of Fapacar factory, Nharnbire, (cited by Moçambique, 1998) stated that scavengers are their biggest supplier of raw materials. In 1998, for instance, scavengers provided 239,541Kg of paper to Fapacar during the period of March to October, making them the principal suppliers.

2.7. HULENE TOWNSHIP AND THE STUDY AREA

Most people in Maputo do not live in the “concrete city” but in the “cane city”, the archipelago of shantytowns that surrounds the capital. Hulene Township is one of these shantytowns. The population of the Hulene peri-urban area increased during the war. Displaced people were informally allocated space in shantytowns and in marginal areas. Thus, part of Hulene dumpsite was illegally occupied during the period of the war. Nowadays this situation persists and is aggravated by the construction of durable houses.

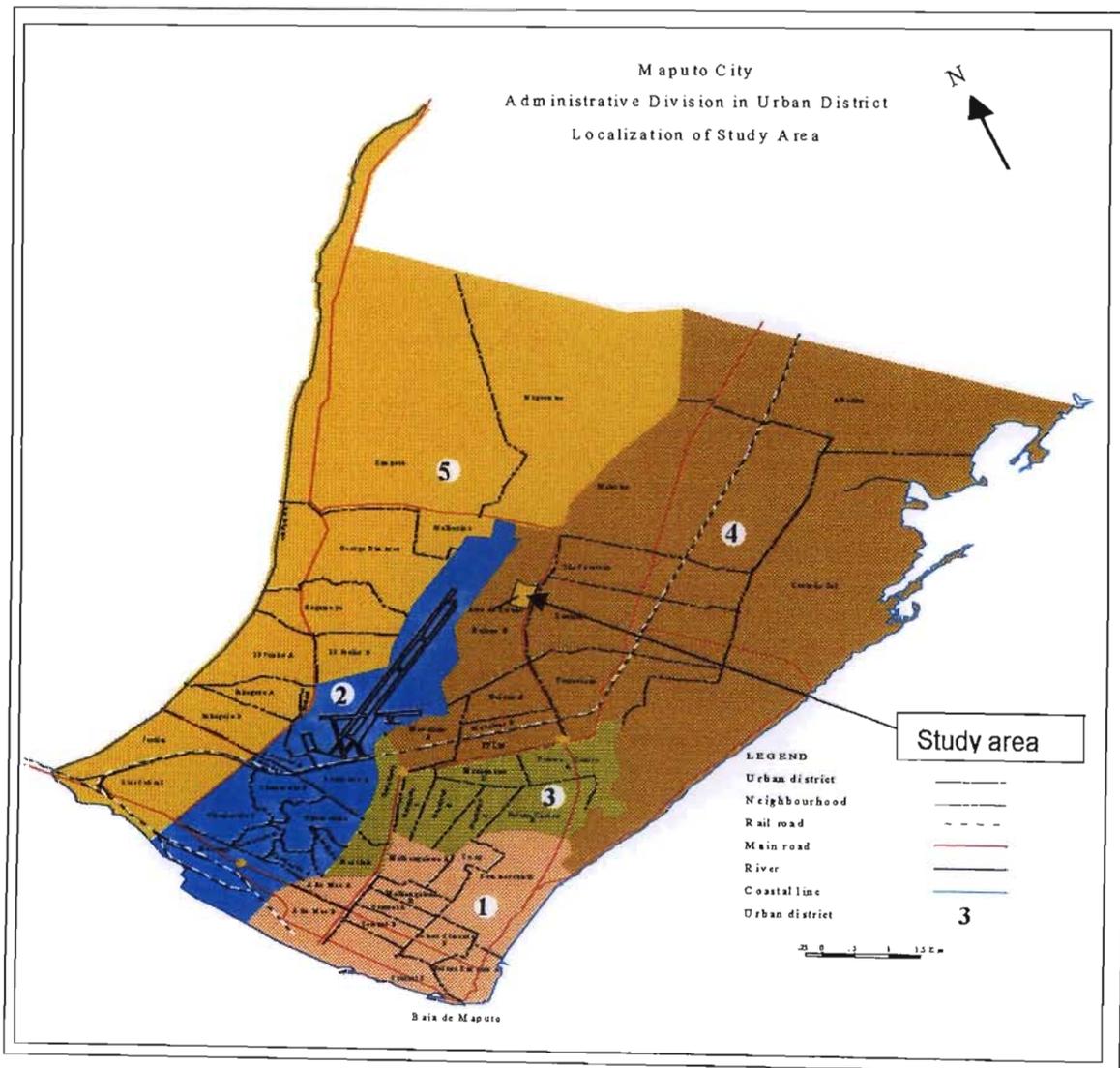


Figure 2. Administrative division of Maputo city and the study area (Hulene dumpsite).

Displaced people moved to Maputo seeking security in the first instance, but also employment. However, since jobs were and are seldom available in the formal sector, these people created many informal activities for survival. Some of these people ended up as beggars on streets or scavengers at the dumpsite. Thus, the majority of scavengers at Hulene dumpsite are likely from Hulene Township.

Hulene is one peri-urban area where most of municipal services such as water delivery and waste collection are not available. The population of Hulene peri-urban area use open wells for drinking water. Recently studies showed the water from a well in Hulene peri-urban area was contaminated. According to the National Directorate of Geology toxic metals and faecal materials from the dumpsite contaminated this water. To mitigate this situation, the National Directorate of Geology, offered to provide a borehole to the Hulene Township local community to provide clean, potable water.

The Hulene dumpsite was initially developed over 50 years ago. At the time of its establishment, and even now, no environmental controls have been realized. According to Matos (1998, cited by CMM 1999) the Hulene dumpsite was developed, like the other dumpsites around the world, where the nature of the landscape is such that it is not suitable for housing development for example, in locations such as ravines and wetlands.

The fact that adequate measures to control pollution of groundwater were not instituted during the establishment of the original site is cause for environmental concern nowadays. The dumpsite has been operating without any formal development plan. It was established to receive only general waste from the municipality. However, in practice all kinds of waste are being disposed of at the Hulene site (Austral, 1998).

The Hulene dumpsite (figure 3) occupies an area of 17 ha of which 45% is already utilized. 25% has been occupied by the local population and 30% is still available (*Ibid.*). The Hulene dumpsite is located in the middle of the township adjacent to the most prestigious

avenue, Julius Nyerere. It is bordered by Julius Nyerere avenue in the east, and Hulene B⁴ in the north, west and south as indicated in the study area figure 2. With the urban growth the dumpsite now finds itself located in a sensitive area.

Currently, 600 tonnes of waste is collected daily and dumped at Hulene dumpsite (*Ibid.*). Conselho Municipal de Maputo (CMM) (2000) estimates that 0.75kg of waste per person per day is produced in the “concrete city”, and only 0.28kg of waste per day per person is produced in townships and 1.15kg/per person in the peri-urban areas.

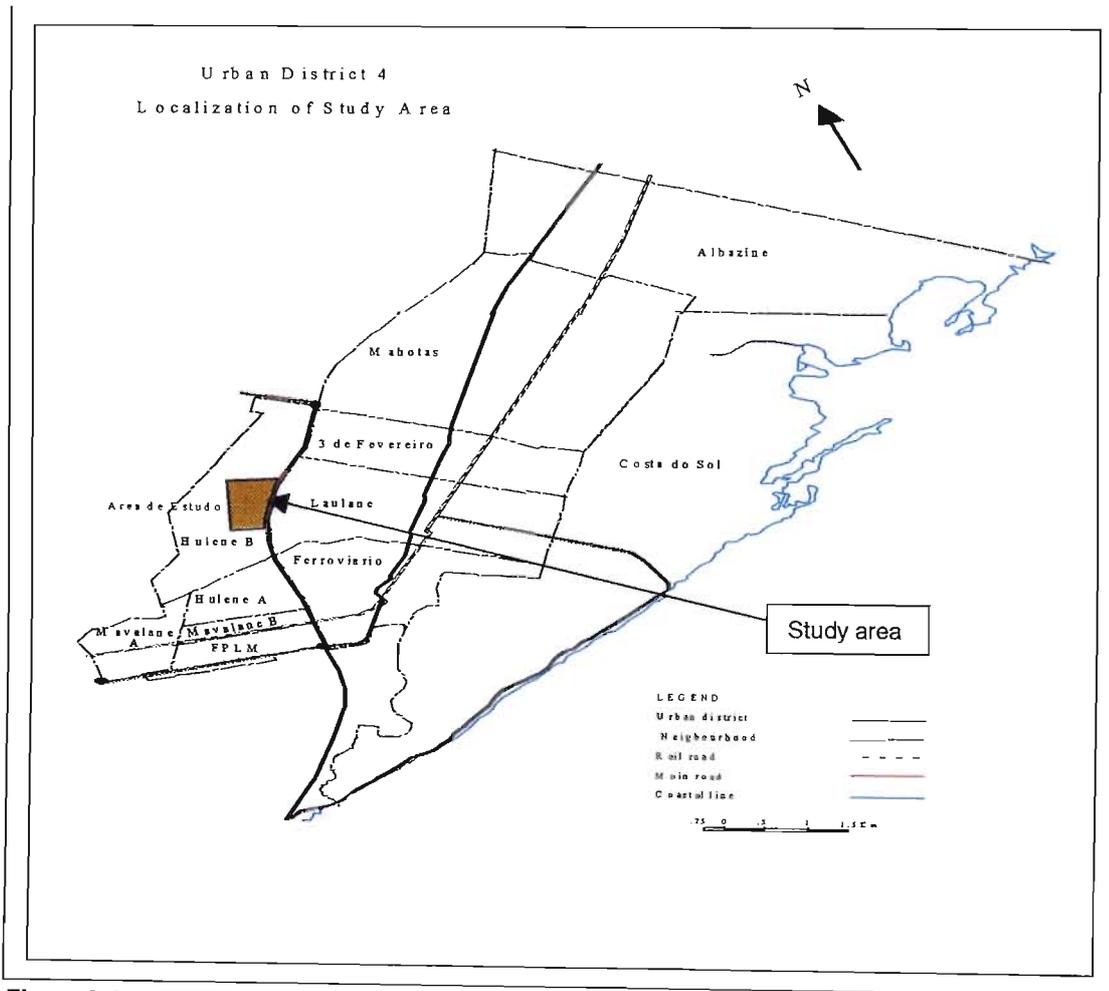


Figure 3. Location of the study area: Source CMM (1999)

⁴Hulene peri-urban area is divided in two areas Hulene A and Hulene B. Hulene B is the one which make border with the dumpsite.

2.8. CONCLUSIONS

This chapter has provided background information about the dimensions of poverty in Mozambique. It has also offered some insights into waste management issues and concerns in Maputo, and particularly in the study area. Clearly, Maputo has a developing economy and is recovering from years of civil war. It is characterised by a large population of displaced people with little or no employment opportunities. This chapter has illustrated that this situation has increased the numbers of people who rely on the informal sector in general, and in particular, on waste recovery, re-use and recycling for their survival.

Based on this background information, it is clear that to understand poverty, particularly the socio-economic conditions during and after the civil war, necessitates developing an effective conceptual framework. Accordingly, the following chapter presents a review of literature and constructs a conceptual framework, premised on poverty, that drives the field work.

**LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK
FOR INFORMAL RECYCLING AND RESOURCE
RECOVERY AT A MUNICIPAL OPEN-DUMPSITE****3.1. INTRODUCTION**

The aim of this chapter is to construct a conceptual framework for informal recycling and waste reclamation/re-use. However, before discussing the conceptual framework, the chapter will present concepts and definitions of the key terms. In addition, a general framework for a municipal solid waste management system will be presented in order to visualize the flow of waste and its management. Finally a specific conceptual framework for informal recycling and resource recovery at a municipal open dumpsite will be described. In this framework, poverty is considered as a driving force for scavenging.

3.2. LITERATURE REVIEW**3.2.1. Definitions****Basel Convention**

The Basel Convention was established in response to the growing awareness of the problem of international traffic in hazardous waste and other wastes. It obligates parties to ensure environmentally sound management of wastes, especially during the disposal process. The Basel convention was developed under the auspices of the United Nations Environment Programme (UNEP) and was adopted in 1989. Thus, according to UNEP/IETC (1996:421), the Basel Convention is defined as "*an international agreement on control of transboundary movements of hazardous wastes and their disposal, drawn up in March 1989 in Basel, Switzerland, with over 100 countries as signatories*"

Collection

Collection of waste is an activity which takes place in the so called waste stream. Collection and street sweeping is the only part of waste management that virtually everyone sees and is involved with. Collection is defined by (UNEP/IETC (1996:421) as

a *"process of picking up wastes from residences, businesses, or a collection point, loading them into a vehicle, and transporting them to a processing, transfer, or disposal site"*.

Two kinds of waste collection were identified in developing countries, collection where motorized vehicles are involved and the non-motorized collection (small-scale muscle-powered vehicles), where muscle-powered carts or wagon and relatively small rickshaws are pulled or pushed by people or animals (UNEP/IETC 1996).

Waste collector

This is defined as a *"person employed by local authority or private firm to collect waste from residences, business and community bins"* (UNEP/IETC, 1996:426).

Disposal

Disposal is the final handling of the solid waste stream. The UNEP/IETC (1996:422) has defined disposal as *"the final handling of solid waste, following collection, processing, or incineration. Disposal most often means placement of waste in a dumpsite or a landfill site"*. Disposal sites can be of the following kind: controlled dumps, open dumps and sanitary landfills.

a) Controlled dump: is defined as a planned "landfill" that incorporates to some extent features of a sanitary landfill: siting with respect to hydrogeological suitability, grading, compacting in some cases, no cell planning, partial leachate management, partial or no gas management, regular (not usually daily) cover, access control, fence, basic record-keeping and controlled waste picking and trading (UNEP/IETC, 1996).

b) Open dump: is defined as an unplanned "landfill" that incorporates few if any of the characteristics of a controlled dump. There is typically no leachate control or management, no gas management, no cell planning, little or no site preparation, it is

poorly sited, has unknown capacity, no cover, no compaction of waste, no fence, no record keeping, and has many waste pickers and trading (UNEP/IETC, 1996).

c) Sanitary landfill: is defined as having an engineered method of disposing of solid waste on land, in a manner that meets most of the standard specifications, including sound siting, extensive site preparation, proper leachate and gas management and monitoring, compaction, daily and final cover, complete access control, and record-keeping of volume, and no waste picking or if waste picking is accepted it is controlled (UNEP/IETC, 1996).

Hazardous waste

Hazardous waste is defined as *“waste that is reactive, toxic, corrosive, or otherwise dangerous to living things and/or the environment. Many industrial by-products are hazardous”* (UNEP/IETC, 1996:423).

This definition was adopted by United Nations because it is narrow, and specific and makes data collection unambiguous. This definition is found in Article I of the Basel Convention, which names 45 waste streams, or waste constituents that demonstrate one or more of 13 hazardous characteristics. The Basel Convention has divided waste into 3 groups that appear in Annex one, two and three (United Nations, 1994). Hazardous characteristics of waste are listed in annex three, which include explosives, flammable liquids or solids, organic peroxides, poisonous or infectious substances and corrosives (UNEP, 1997).

Annex one lists categories of waste to be controlled. In this category waste is divided into two groups. The first group comprises 18 types of wastes from by-products of a particular process. These include waste from medical care in hospitals, pharmaceutical products, the production of paints, or from the production of photographic chemicals. The second group identifies another 27 categories of waste because they contain constituents such copper, or zinc compounds, arsenic, lead or mercury (UNEP, 1997).

Annex two identifies the categories of wastes requiring special consideration. Those are wastes collected from the households (municipal waste) and residues arising from the incineration of household wastes.

Some countries such as Japan and the United Kingdom, use a broad definition that is non-specific for hazardous waste. For instance, in Japan, the term "hazardous" is used for those "specially controlled wastes" that require special handling; for example, placement in a secure fill that completely isolates the waste from its surroundings. From the amendment realized in 1992, hazardous wastes have now been defined as those special wastes that are toxic, explosive, infectious, or that may cause damage to human health and the environment (United Nations, 1994).

Another type of definition is characterized by the approaches used in the Netherlands, which do not differ much from those used in Japan. They have types of waste called "non-processible" that are managed and stored under special criteria (IMC criteria: *Isolate, Manage and Control*) (United Nations, 1994).

As noted, the definitions of hazardous waste differ from country to country. Some countries use "toxic", "dangerous chemicals" "dangerous wastes", "hazardous wastes", "special wastes", "scheduled wastes" and "listed wastes" to describe similar things. Countries adopted these definitions because they were considered appropriate for their needs and fitted their legal and regulatory framework. A result is that a "hazardous" waste in one country may not be a hazardous waste in a neighboring country. There is no clear distinction between substances that are wastes and those that are products. Many products contain hazardous substances but this does not automatically make them toxic or dangerous chemicals. The confusion on definitions has resulted in the failure of some countries to adopt and implement rules on the international movement of chemical products and hazardous wastes (United Nations, 1994).

The problem of the definition of hazardous waste and the failure to incorporate a ban (of all transboundary movements of hazardous wastes worldwide) into the final text of the Basel Convention, as demanded by members states of OAU, has led to the creation of

a separate regional African Agreement, the Bamako Convention in 1991. The Bamako Convention bans the import into Africa, and controls transboundary movement of hazardous wastes within Africa. The Convention categorizes hazardous wastes in two ways: waste generated in Africa and waste generated outside of Africa. For the waste generated outside of Africa, the Convention prohibits and criminalizes importation into Africa (Art 3); for the waste generated in Africa the provisions are generally similar to the Basel Convention (United Nations, 1994).

For the purpose of this study hazardous waste is defined as *“any used and discarded substance that no longer has any feasible, near-term use and that may impair human, plant, or animal health or may adversely affect the safety of any person or the environment, or may demonstrate any of the characteristics listed in Annex III, and be from any of the waste categories in Annex I of the Basel Convention”* (United Nations, 1994:71).

Leachate

Leachate is a *“liquid (which may be partly produced by decomposition of organic matter) that has seeped through a landfill or a compost pile and has accumulated bacteria and possibly harmful dissolved or suspended materials.”* (UNEP/IETC, 1996:423). If leachate is not controlled, as in case of open dumps, or in some controlled dumpsites, it can contaminate both groundwater and surface water.

Nimby

“Not in my back yard” refers to the community opposition to siting and operation of municipal solid waste (MSW) facilities close to their neighborhood. The UNEP/IETC (1996:424) defined NIMBY as *“an expression of resident opposition to the siting of a solid waste facility based on the particular location proposed”*.

Residents express a variety of concerns about the presence of such facilities in their midst. These concerns include: the health and environment risks posed by the facility, its negative impact on aesthetics in the area, particularly obnoxious odours, its lowering

of property values, the increase of traffic, noise, flies, and dust associated with the facility and the inequity of dumping everyone else's waste in their backyard (UNEP/IETC, 1996).

✓ **Recycling**

Recycling occurs when materials from the waste stream are recovered and used as a raw materials "input" for the new product (Palmer Development Group, 1996). UNEP/IETC (1996:425) has defined recycling "*as the process of transforming materials into raw materials for manufacturing new products, which may or may not be similar to the original product*".

✓ In developing countries recycling is commonly realized through informal sector activities and scavengers are the key people. This is because scavengers search for recyclable products in the waste stream and then sell the products to the middlemen or directly to the small-scale informal recycling enterprises.

Resource recovery

Resource recovery "*is the direct reuse of the discarded product in its original form, for the same or a new purpose. In this way, maximum reuse is achieved of the energy and materials used in the original production process*". The terms recovery and reclamation will be used interchangeably in this dissertation (Haan *et al*, 1998:109)

✓ **Scavenger or waste picker**

Scavengers have been defined by Medina (1997:1) as "*people who recover materials from the waste stream for re-use, selling, recycling as well as own consumption*". These people also have different names, depending on the local language, on the place where they work, and on the material(s) they collect. "For example, Colombians use the generic term 'basuriegos', but depending on the material they collect, scavengers are known as 'cartoneros' (cardboard collectors), 'chatarreros' (ferrous and metal

collectors), 'traperos' (rag collectors), 'frasqueros' (glass bottle collectors) and so on" (Medina, 1997). In Maputo for example, scavengers are called 'moluenes'⁵.

Waste

The Basel Convention defines "*wastes as being substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provision of national law*".

A gendered definition of waste

It is widely known that women and men commonly play different roles in society and each has a gender-specific combination of roles, shaped by a host of determinants (cultural, economic, political etc). Since women and men play different roles in society they will also have different needs and expectations. Thus, decisions taken by an individual are the result of balancing the combination of roles and expectations (Muller and Schienberg, 1997).

The Concise Oxford Dictionary defines waste as "something that is no longer serving a purpose", something "without value". Obviously, certain people in certain circumstances consider waste or waste material as a resource for their family, livelihood or their enterprise. For example, milk packages may be used as fuel; leftover food may be fed to pigs and goats; discarded cardboard may serve as walls and roofs of houses; plastic bottles may be used by small scale sellers of petroleum or cooking oil. In such cases, one can expect that men and women re-value waste material differently and see their usefulness for different purposes. For instance, women might regard scrap metal as waste, whilst for men scrap metal is a significant resource (Muller and Schienberg, 1997). This means that the definition of waste could vary according to gender. What is considered waste for one group can be considered **as a** resource for another group (*ibid.*). This assumption is also observed on the **younger** girls and boys. Normally younger girls work with their mothers and they get same resources as their mothers.

⁵ Moluenes is a local name used to identify poor people in general and scavengers in particular

Boys and teenagers tend to work alone and they gather scrap materials for selling. Due to differences in resources gathered by different genders and the lesser strength of women, the problems faced in these groups are different.

Refuse

Refuse, "rubbish and garbage are terms often used interchangeably with solid waste" (UNEP/IETC, 1996:425). The term rubbish is sometimes used to exclude food wastes and ashes. Solid waste in a majority of developing countries is characterized by high concentration of moisture and low energy content (UNEP/IETC, 1996). This makes solid waste in developing countries good for certain purposes, such as composting and not good for other such as incineration.

Solid waste

Solid waste, as defined in chapter 21 of Earth Summit (UNCED, 1992:184), "includes all domestic refuse and non-hazardous wastes such as commercial and institutional waste, street sweepings and construction debris. In some countries, the solid wastes also include night soil, ashes from incinerators and septic tank sludge from sewage treatment plants. If these wastes manifest hazardous characteristics they should be treated as hazardous wastes".

✓ For the purpose of this study solid waste will be defined as "waste which includes all refuse and non-hazardous waste such as commercial and institutional waste, street sweepings and constructions debris".

Municipal solid waste (MSW)

This comprises all solid waste generated in an area except industrial and agricultural wastes. Sometimes it includes construction and demolition debris and other special wastes that may enter the municipal waste stream. Generally it excludes hazardous wastes, except to the extent that they enter the municipal waste stream. It is sometimes

defined so as to mean all solid wastes that a city authority accepts responsibility for managing in some way (UNEP/IETC, 1996).

Annex II of the Basel Convention covers the waste collected from households and the residue from incinerated household wastes. This kind of waste is also called municipal waste (MSW) or domestic waste. For the purpose of the Convention this kind of waste is called "other wastes" (UNEP, 1997). From the public health point of view MSW can be placed into three categories based on their sources and/or process of generation:

- a) domestic waste:** comprises all general household wastes with used batteries, drug containers and street sweepings with small quantities of excreta;
- b) special and hazardous wastes:** comprises the health care waste (sharp and infectious components), toxic chemicals, pharmaceutical and other industrial wastes, as well as radioactive waste; and
- c) bulky waste:** untreated abattoir waste, construction waste with asbestos components, and sludges from treatment plants.

Most of these wastes could be isolated at the source of generation and managed in a rational way. However, in practice, the municipal waste stream is usually a mixture of two or more of the above categories. "This is the reality of most developing countries and some of the emerging or transition economies of Central Asia and Eastern Europe, where waste management systems have generally broken down" (UNEP/IETC, 1996:396).

3.3. MUNICIPAL SOLID WASTE MANAGEMENT

Municipal solid waste management (MSWM) is a planning and implementation system for handling municipal solid waste. The Palmer Development Group (1996) has labelled the MSWM as a process of waste collection through to disposal. However, this process must go beyond the mere collection and disposal of waste. It should also seek to address the root cause of the problem by attempting to change unsustainable patterns

of production and consumption (UNCED, 1992). This implies the application of the integrated waste management concept, which presents a unique opportunity to reconcile development with environmental protection.

✓ Integrated waste management is based on the idea that all aspects of a waste management system should be analysed together. This is because the aspects of waste management are interrelated. Aspects of waste management in one sector frequently affect other aspects in another. To tackle one single aspect may sometimes do more harm than good. All parties concerned must be assisted to learn and understand that a waste management system is a multi-dimensional system that concerns many aspects and issues, which are closely interrelated (Mongkolnchaiarunya, 1999). A holistic understanding is essential for efficient waste management. It is the acknowledgement of the importance of a holistic view that provides a motivation for this study.

✓ The planning process of MSWM must involve all stakeholders. According to Mongkolnchaiarunya (1999: 9), "the planning and implementing stages should allow more of different stakeholders (especially women, NGOs, local community and informal sector) and other fields of expertise to join and organize supplementary activities as a package (such as source separation, reuse, recycling, educational campaigns, community composting, etc)". The informal sector **and** community-based organizations have a direct interest in waste management. This is because, as residents of peripheral areas, they receive marginal or no service in terms of waste collection, sanitation or drainage. Peters (1998) also recognizes the need for involving the informal and community sectors in waste management systems as both private and public sector actors are unable to provide waste services to low-income areas of the city.

✓ According to the Agenda 21 (1992), the framework of municipal solid waste management should be founded on a hierarchy of objectives and focused on the four major waste-related program areas, namely: minimizing wastes; maximizing environmentally sound waste re-use and recycling; promoting environmentally sound

waste disposal and treatment; and extending waste service coverage. In order to achieve these four objectives of MSWM an integrated management plan is needed.

The waste management process involves a range of activities that encompasses the generation, reduction or minimization, storage, collection, transport, recycling, reuse or reclamation, disposal, and sale of recovered resources. All these activities deal with the flow of waste and can take place at different stages of the waste management process. For example, waste reduction or minimisation should start at the source or generation of waste. If waste is not created in the first place, the waste control problem is not created either. According to SWEAP (1989a, cited by Brown 1993), examples of waste reduction include reducing household hazardous waste generation, reducing production rejects in manufacturing processes, reducing packaging, substituting re-usable for disposable items, and developing more durable and repairable items. On the other hand, waste can be recycled at source and sold from that point with the remaining waste being collected and transported directly to disposal sites. Alternatively, waste could be stored, collected, transported to a disposal site at which point reclamation/re-use through scavengers could take place (Palmer Development Group, 1996).

✓ Product recovery or re-use means using objects or materials again. After source reduction, reusing material resources is the next best way to control waste production. Reuse or reclamation can take place at the source or by scavengers during storage or at the dumpsite. Scavengers at the dumpsite or landfill are traditional examples of agents who reclaim waste. A good example of product recovery is the re-use of bottles, which make several trips from the drinks factory to the consumer and back again, where they are cleaned and refilled (Haan *et al*, 1998).

✓ Recycling means using "waste" material in place of virgin material in the manufacture new products. According to Brown (1993), the best recyclable materials can theoretically be used over and over again without any significant loss in quality or quantity. An example would be aluminium after initial smelting; metallic aluminium may be used in one product, remelted, and remanufactured into a new product, a limitless

number of times, and with an energy savings of some 90 per cent over the initial smelting and refining process. Other substances are limited in their recyclability due to degradation in quality or physical characteristics. This is referred to as the cascade effect (*Ibid.*). For example, paper can only be recycled a limited number of times due to the eventual weakening and breakage of the cellulose fibres, which gives the paper its strength and durability.

Recyclable materials can be separated at the point of generation by the waste generator. If the materials are collected and transported together, but placed in different positions in the vehicle, the recyclable materials and non-recyclable materials may be placed in different places at the dumpsite.

✓ Recycling is a way of life for the poor in developing countries. In most developing countries today, the recovery of materials for recycling relies on the activities of human scavengers (Medina, 1998). Scavenging takes place at all stages along the waste management system. The term "scavengers" is used here to describe people who collect recyclables from the disposal sites.

Scavenging has the potential to be more than a refuge for the poor people. It can be viewed as an informal solid waste management system based on recovery and recycling, of waste materials (Rapten, 1998). Benefits of waste recovery and recycling can be divided into three categories: benefits to the waste management system, benefits to the economy and benefits to the environment.

Benefits to the waste management system

According to Haan *et al* (1998:110) benefits to the waste management systems can be outlined as the follows:

- Reduction of the amount of waste materials requiring collection and disposal. "*This is a result of recovery and return to productive use of materials that would otherwise end up in the waste stream. Since the municipal authorities have less waste to manage, there are savings in both operating and capital expenditures*";

- *"In some cases there may also be benefits resulting from the removal of a large proportion of certain materials from the waste, if the municipality would need to remove these materials itself before processing the waste";*
- *"Expenses of street cleaning may be reduced if paper and plastic is collected by recycling workers".*

Benefits to the economy

- Reduction of the public burden to pick up, transfer, haul and dispose of waste through the recovery of materials from waste stream (Rapten, 1998);
- The scavenging system is able to provide industries with raw materials at a lower cost than virgin materials thus avoiding using foreign exchange and import procedures;
- Recovery of materials decreases the need for the extraction of raw materials, sometimes non-renewable materials (*ibid*);
- Stimulation of industrial production through the maintenance of a large and available stock of secondary resources (Haan *et al*, 1998);
- Recycling materials may constitute import substitution if virgin materials are not produced domestically (Rapten, 1998);
- Availability of products that can be afforded by poor people, such as containers, harnesses, and wheels, made from recycled materials (Haan *et al*, 1998);
- Provision of income and generation of activities for large numbers of people, many of whom might otherwise not be able to survive. *"It is not unusual in the large cities in Asia and Latin America for around 50,000 persons to be involved in recovery activities in each city"* (Hann *et al*, 1998:111)

Environmental benefits: ✓

Haan *et al*, (1998:111 and 112) have identified the following environmental benefits:

- Conservation of resources when materials are recovered. It means that processing recovered materials requires considerably less energy than processing virgin raw materials. *"For example, the recycling of aluminium scrap results in energy savings*

of up to 96% when compared to the production of aluminium from bauxite. The production of paper pulp from waste paper demands 60% less energy than paper production that uses wood as the raw material;

- Reduction in environmental damage from exploiting primary resources; that is, less mining and deforestation;
- Reduction in the use of water in primary production;
- ✓ • Reduction of litter and illegally dumped materials (paper, plastic, bulky items and others wastes) because these materials are picked up for recycling purposes.

All the above benefits contribute to effective waste management. As such, it is contended that scavenging based on waste recovery and recycling should be construed as the most important activity performed by the informal sector towards effective waste management in urban areas in developing countries. It is therefore an important component of a waste management system.

A model of a waste management system is depicted in figure 3.1. The model illustrates the different sources of waste, such as household, business and medical waste. Actors operating at these sources store the waste, which is subsequently collected and transported by the municipality. The transportation of waste can be categorised into either motorised or non-motorised. However, both categories ultimately lead to the waste being taken to the disposal site. It is at the disposal site that scavengers sort the waste for recovery and recycling. However, it is important to note that recycling can also start at the stages of waste storage and collection (Figure 3.1).

18 { This study focuses on informal recycling activities by scavengers at a dumpsite in Maputo. Recycling, as well as re-use, falls under the second objective of the framework for municipal solid waste management proposed by chapter 21 of Earth Summit (UNCED, 1992), i.e. "maximising environmentally sound waste reuse and recycling".

3.3.1. PROBLEMS AND CONSTRAINTS OF WASTE MANAGEMENT IN DEVELOPING COUNTRIES.

A typical municipal solid waste management system (MSWMS) in a developing country faces a number of problems which include:

- low collection coverage;
- irregular collection service;
- crude open dumping and burning without air and water pollution control;
- breeding of flies, vermin and rats;
- ✓• poor handling and control of informal waste picking or scavenging activities which are prevalent in the collection, separation, and recycling of waste;
- low labor costs and extreme shortages of capital, which together call for low technical solutions to MSWM problems;
- wastes streams dominated by organic waste, which means that incineration is difficult unless undertaken in conjunction with a program that achieves separation of organics at source. Composting may be especially important if large amounts of waste are to be diverted from landfills;
- significant quantities of mixing of industrial hazardous wastes with MSW;
- few people who are adequately trained in solid waste management activities, and a high proportion of the urban population with low levels of education;
- inadequate physical infrastructure in urban areas, which makes collection of waste particularly difficult.

These environmental, public health and management problems are caused by various factors, which complicate the development of effective solid waste management systems. They can be categorized and grouped into technical, financial, institutional, economic and social constraints (Ogawa, undated).

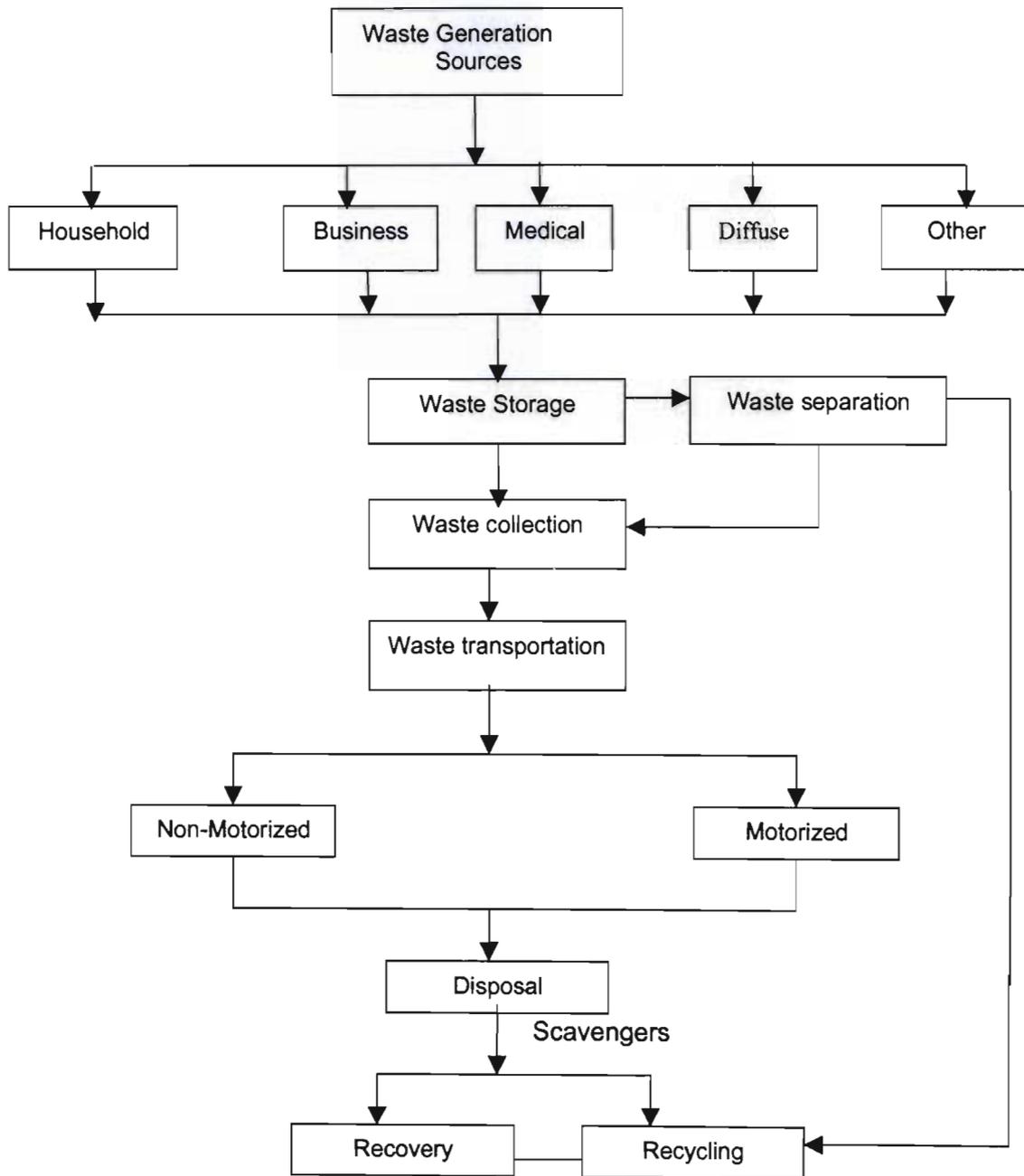


Figure 3.1. Illustration of a municipal solid waste management system
(source: Adapted from UNEP/IETC)

3.4. FRAMEWORK FOR INFORMAL RECYCLING AND RESOURCE RECOVERY AT A MUNICIPAL OPEN DUMPSITE

The importance of taking holistic views of informal recycling necessitates objective analysis. This is facilitated by construction of frameworks.

The framework developed for use in this study (figure 3.2) is a representation of an hypothetical relationship between the following:

- the driving forces of scavenging
- organization of scavengers and scavenging activities;
- the reaction from the national and local authorities;
- the gender dimension of scavenging activity; and
- the health risks perceptions

These issues are reviewed in order to uniform the construction of the hypothetical framework.

3.4.1. Driving forces of scavenging

The poverty prevalent in most developing countries forces the poor to make the most of resources available to them (figure 3.2). Given their very low incomes, scavenging provides them with re-useable and saleable materials. In doing so, the poor have developed and created ways to satisfy their immediate needs (Medina, 1997). In general, scavenging is done by religious or ethnic minorities, low castes or rural immigrants or displaced people who are looking for a way to generate subsistence income in an urban context (Van de Klundert and Lardinois, 1995). The informal recovery of materials from waste is a common survival strategy for the poor. The World Bank (cited in Medina, 1998), estimates that up to 2% of the population in developing countries survive by scavenging. These individuals recover various types of materials for re-use or recycling, including organic waste.

Scavengers recover materials from the dumpsite for two purposes: consumption and use by themselves and for sale. Each individual scavenger can engage in either or both types of activities (Medina, 1998). Among the materials that scavengers salvage for consumption by themselves and use are: food, firewood, charcoal, discarded clothes, appliances, and any others items they can use to satisfy their needs. The items recovered for sale, on the other hand, are determined by demand for particular materials and their value. For instance scrap metal, cans, plastic and papers tend to attract more attention (Van de Klundert and Lardinois, 1995). Thus, scavenging activities, are determined to a large extent by economic factors and not environmental considerations (Medina, 1998).

The environmental benefits, which these activities provide, are positive externalities generated by scavenging. For instance scavengers shoulder part of the ecological costs of development through collecting and processing waste, which the state would otherwise have to pay for in terms of waste transport, depositing and regulating. Scavengers contribute much to the efficiency of the formal sector economy because they provide raw material from recycled waste at a comparatively low price (Oepen, 1992).

On the economic side, scavenging activities absorb part of the otherwise state-covered social cost of modernisation through self-employment in the urban informal sector. The high rates of unemployment and poverty in developing countries means that scavenging has to be seen as a real option for promoting recycling and creating employment (Palmer Development Group, 1996). "At the moment there appear to be no guidelines for local authorities on how to deal with what is perceived by many as a problem. It seems sensible to recognise the advantages of scavenging and to deal with the problems such as safety and health risks in an innovative way" (Palmer Development Group, 1996:97).

3.4.2. Organization of scavengers and scavenging activities

Scavenging activity is driven by the poverty situation. Scavenging starts spontaneously (and sometimes haphazardly) by a few poor people and slowly the number of people involved in this activity increases. As the concentration of people increases at the dumpsite, the competition for materials increases and this leads to conflicts and the informal control or organization of activities. In informal control the philosophy of the strong versus the weak prevails and weak people, mainly women and children are exploited and robbed by the strong people (figure 3.2,).

Exploitation of scavengers may also occur by the middlemen who buy the recyclable materials from the dumpsite. "For example, scavengers in Indian, Colombian and Mexican cities may receive as low as 5.5% of the price industry pays for recyclables. On the other hand, scavengers on the U.S.–Mexico border are paid 50% of what industry pays for materials" (Medina, 1997:10).

Medina, (1997) argues that it is possible for scavengers to organize themselves in co-operatives in order to circumvent the middlemen and break down the 'vicious cycle of poverty' in which many scavengers find themselves (figure 3.2,). The result can be dramatic. For example, Castillo (1984c) cited by Medina (1997:18) stated that the members of the "Sociedad Cooperativa de Seleccionadores de Materiales (Socosema), created in 1975 in Ciudad Juárez, on the Mexico-Texas border, saw their incomes increase ten-fold after replacing the 'concesionario' (middleman). The members of the co-operative now enjoy better living conditions, medical care, legal protection, and schooling for their children. They are self-reliant, are recognized by the authorities, and have developed stable business relationships with industries".

However, even if scavengers are highly motivated, several obstacles stand in the way of the formation of a co-operative (Medina, 1997). The following factors can hinder the formation and profitable operation of scavengers' co-ops: Due to their daily contact with waste, scavengers are normally associated with dirt, disease, squalor and are perceived as a nuisance, a symbol of backwardness or even as criminals (Medina, 1998). Due to

this general view which society has of scavengers, they face a lack of support from the authorities, lack of financial support through credit and reluctance of industries to deal direct with scavengers. These problems are aggravated by the low educational level and lack of business experience of scavengers (Medina, 1997). These attitudes and conditions make the working conditions of scavengers very difficult and hazardous.

Organized and supported scavenging can bring benefits to society and to the environment and can increase benefits for scavengers through their direct incorporation into the market system. Thus, the role of the middleman could be reduced. The co-operative is viewed as one means of strengthening the individual scavenger's bargaining position in obtaining a fair market price for recovered materials, easing access to credit, and providing education on basic rights and resources available for greater self-reliance (untitled and undated document).

Given the positive role which scavenging plays in society, government, civil society and NGOs and industries showed support for the activities of scavengers. For instance, when citizens perceive waste as recyclable materials, attitudes toward scavengers could change. In Manila, Philippines, a pilot-recycling programme was established and supported by a widespread public information campaign. The programme trained workers (called ECO_AIDES) and provided them with clean, attractive uniforms emblazoned with the message; "pera sa basura" (money from refuse). To some extent, the social stigma toward house-to house scavengers appears to have lessened (untitled and undated document).

In some countries, governments have been reported to be supportive of scavengers. For instance the Philippine and Indonesian governments have tried to support scavenging activities and small businesses that use recyclable materials (Medina, 1997). The Indonesian government provided credits to scavengers and enacted laws to restrict importation of waste materials in order to raise the prices of recyclables.

More successful so far have been the efforts of NGOs in supporting scavengers' co-operatives in Mexico, the Philippines, India and Colombia (Medina, 1997). "According to Medina (1997:19), "the 'Fundación Social', a Colombian NGO represents a unique case in the world. Since 1986 they have supported the formation of scavengers' co-ops throughout Colombia, and provided the co-ops with loans, grants, and assistance on legal, technical and business matters. Interestingly, NGOs with a strong presence of Catholic priests have played an important role in the formation of scavengers' co-ops in Mexico and Colombia".

3.4.3. Reaction from the national and local authorities

The economies and organizational capacity of developing countries make it almost impossible to effectively prohibit scavenging. Its presence needs to be acknowledged. Since scavenging brings benefits to the society in general, and to the scavengers in particular, support of this group is needed from the national and local authorities. Four kinds of policies⁶ towards scavenging have been identified by Medina (1997). These policies can be classified as: repression, neglect, collusion, and stimulation.

a) Repression

Repression is the dominant reaction to scavenging in many developing countries (Medina, 1997). Repression occurs because scavenging is perceived, among other things, as being inhuman, a symbol of backwardness, and a source of embarrassment and shame for the city or country. In many countries, repressive attitudes against scavengers have also been exhibited in terms of policy decisions. For example, González and Suremain, (1991); Furedy, (1984); Keyes, (1974) cited by Medina (1997) have reported that scavenging has been declared illegal and punished in many Third World cities, such as in Colombia, India, and Philippines. Sometimes scavengers face extreme animosity and violence⁷.

⁶ Policy is the term used in this section to describe the reaction of authorities towards scavengers in the absence of enforced policy.

⁷ In 1992, forty scavengers were killed, their organs recovered and sold for transplants. The rest of their bodies' were sold to the University to be dissected by medical students (Medina, 1997).

Repressive policies and negative public attitudes increase the isolation of scavengers. This condition increases the stigma attached to scavengers and aggravates the vicious cycle of poverty. Where scavenging is not authorized, associated labor procedures and market activities are also not authorized (Rapten, 1998). On the other hand, the isolation and repression increases the aggressive attitude among the scavengers. In short, policy restrictions and hostile public attitudes towards scavengers typify repression.

b) Neglect

Neglect occurs when authorities ignore scavengers and their operations, leaving them alone, neither persecuting nor helping them. According to Waas and Diop (1990); Diallo and Coulibaly (1990); Tonon (1990) cited by Medina (1997), a policy of neglect is characterized by indifference towards scavengers, and their activities. This has been illustrated in many African cities and countries such as Dakar, Senegal, Bamako, Mali, and Cotonou, Benin. Scavenging activity is a "profession" considered by many governments as illegal and therefore it is unprotected by laws and regulations and most of the times it is neglected.

Neglect aggravates the exploitation of scavengers through the middlemen who fill the essential role of a leader, protector, or a patron (Rapten, 1998). Ignorance, illiteracy, inability to collaborate among themselves, confined situation on the dumpsite or landfill as well as heavy indebtedness to the buyers, all contribute to create a weak bargaining situation in which the scavengers are sole losers. This situation ends up allowing the middlemen to make profit from recyclable products four to five times higher more than the scavengers' (*Ibid.*).

In order to increase their profit and to respond to the demands of the middlemen, scavengers work long hours, some up to 12 hours a day. The long hours of work under the unsanitary conditions of the dumpsite shortens their life span while also increases

their susceptibility to diseases. Coughing, eye irritation, diarrhoea are common among scavengers. Women and children are the most vulnerable of the scavengers (*Ibid.*).

c) Collusion

Collusion is defined by the Oxford Students Dictionary (1991) as a secret agreement or understanding for a deceitful or fraudulent purpose. Medina (1997) stated that, government officials sometimes develop with scavengers relationships of exploitation, mutual profit and mutual assistance; that is, a relationship of political clientelism. The exploitation arises when government officials force the scavengers to pay some amount in order that the scavengers may perform their activity. This situation is worsened with the perception of scavenging as an illegal activity. As the exploitation of scavengers increases, the poverty level among this group will be aggravated and the vicious cycle of poverty activated, leaving them even more vulnerable (figure 3.2). On the other hand collusion can enhance the livelihood of small groups among the scavengers. The leaders benefit since they can gain support from government members and can undermine the majority of scavengers, namely those who are not leaders such as women and children.

Collusion associated with scavengers is well described by Medina (1997:15) giving the example of collusion between authorities and scavengers' leaders in Mexico City. "Over the last five decades, a complex structure developed, involving legal and illegal relationship between dump scavengers, the local bosses known as "caciques", street sweepers, refuse collectors, middlemen, industry, and local authorities. Some of the illegal relationships include the payment of bribes to government officials by the "caciques" for ignoring the "caciques" abuses of power; the tips that refuse collectors demand from small industries and some households pick up their waste, and "sale" of refuse collection routes in wealthy neighborhoods". The demand for waste picking in wealthy neighborhoods arises because the upper-income individuals tend to consume more industrialized products, and their garbage contains more recyclable materials than

that of low-income communities. Thus, serving wealthy areas produces a higher income to the collectors working on these routes.

The local bosses or “caciques” have close ties with government officials and the PRI (Mexico’s Ruling Party). For example, in the mid-1980s the most powerful scavenger boss became a deputy representative in the Mexican Congress (Medina, 1997). “Scavengers have disguised themselves as peasants and workers in official’s parades and during PRI and government rallies. Thus, the Mexican government receives bribes and political support from scavengers, and scavengers obtain legitimacy and stability in their operations” (Medina, 1997:15).

d) Stimulation

It is argued that scavenging activity provides benefits to society. Thus, this activity should be supported and stimulated not persecuted (Medina 1997). For instance, Medina (1997) argued that recycling of solid waste can lead to:

- Reduction of air and water pollution, saves energy and reduces waste from industrial processes compared with the use of virgin materials;
- Provides both income and reusable products for the poor, and in many cases reduces imports of raw materials.
- Scavenging also reduce the amount of wastes that need to be collected, transported and disposed of, which translates into savings to the local governments and extends the life of dump/landfills.

Thus, scavenging provides social, economic and environmental benefits.

In developing countries supportive policies towards scavengers have resulted after environmental awareness among authorities had been cultivated, and following multiple and repeated failure of American and European waste management technology (Medina, 1997). Recognizing the economic, social, and environmental benefits of scavenging and recycling, governments have started to change their attitudes of opposition, indifference or tolerance, to one of active support (Medina, 1997).

Examples of stimulation or a policy of support in different third world countries are described by Medina (1997:16,17):

- “In Indonesia, President Suharto declared scavengers beneficial to the country’s economy and environment. Now the government supports the formation of co-operatives of dumpsite and street scavengers. Private banks have granted loans to scavengers’ co-ops. And the government established a duty on imported waste materials in an effort to increase scavengers’ income” (Salim, 1992 cited by Medina 1997).
- In Egypt, with the financing of the World Bank, the “Zabballen community (informal waste collectors and recyclers), was provided with water, sewers, and roadways, and was supplied with improved collection and waste processing equipment (Cointreau and Kadf, 1991 cited by Medina 1997).
- In Korea, scavengers at open dumps have been provided with new housing, clean water and bathing facilities (*Ibid.*).

3.4.4. Gender dimension on scavenging activity

Gender is the relationship between women and men in a given society. This relationship is socially constructed. This means that the society imposes certain attitudes, behavior and roles on women and men. As a result gender relations might change from society to society, in different cultures, within religions, within social groups, during economical crises or social crises such a war. According to Moser (1993 cited by Muller and Schienberg 1997) women and men play different roles in society and their gender differences are shaped by ideological, historical, religious, ethic, cultural and economic determinants.

Since women and men play different roles in society they may be expected to play different roles in waste management in general, and waste picking in particular. Their difference would start in the definition of the word “waste”. The definition of waste may be influenced by the gender of the person making the judgement. What looks like “junk”

to women may be useful motorcycle parts to men; what looks like "dirty" material to men may be useful fuel, compost or fertilizer to women (Muller and Schienberg, 1997).

Amongst the urban poor, women (with the help of children) are usually the main providers or organizers of daily household needs; they collect fuel as well as prepare food, fetch water, do laundry and sweeping. They often take responsibility for repairing shelter interiors. Thus, when household survival strategies depend to some extent upon waste collecting and re-use, women's work is closely linked to the nature and availability of wastes.

When wastes are diverted to new uses, or competition for these wastes increases, the energy and time spent by women on household needs increases. On the other hand, if there is competition for waste materials as a valuable resource, women often have limited access to these materials (Scheinberg *et al.*, 1999). In periods of economic recession, women are likely to increase waste re-use as the financial resources shrink (*Ibid.*). When they earn their own income with waste picking usually the whole amount is used to meet the needs of the household and, only if there is excess is it used for the satisfaction of their own needs. This contrasts with men who earn their income through waste picking. They commonly first satisfy their own needs first and then the needs of the household. According Scheinberg *et al.* (1999), women tend to see money as belonging to the family, while men consider money as belonging to them personally. Thus, as far as the willingness to pay and ability to pay women manage to pay more bills even when they have less money than men. Moreover, women may have a higher willingness to pay for services, which relate to family health (*Ibid.*)⁸.

The subordinate status of women and their low level of education, may affect their general access to and control of resources. In many cultures women are not allowed to study (Moser, 1993). Therefore, since they lack education they mostly perform manual jobs. Thus the "waste" materials and waste related activities might be the only ones,

⁸ For instance, in Honduras barrio during planning sessions women were seen to invest in the waste system and men in roads.

which are available to them (figure 3.2) (Muller and Schienberg, 1997). In comparison to men, women engage mainly in activities requiring lower levels of education and skills (waste picking from dumpsite; sorting and washing, rather than working at machines) and a more limited range of physical activity (collection, rather than transportation). They also earn less than men since most of them collect waste for household consumption and not for selling. However, when they sell the materials, they are more vulnerable to exploitation by waste dealers and middleman and sometimes are robbed (Muller and Schienberg, 1997). Furthermore, women do not have the range of social-cum-business contacts over a wide area of the city that men often have, and which give access to personal credit and favorable market opportunities (Muller and Schienberg, 1997). This situation increases the vulnerability and the poverty of women.

Women and children are seen to work on a regular basis in scavenging activity (figure 3.2), since this activity doesn't involve much hard work and energy (Rapten, 1998). However they are more exposed to diseases because of unsanitary work conditions. Women and children are important component of the informal recycling industry. Although women are widely active in waste picking and salvaging, micro-enterprises and other incentives in waste sector seem to be more often initiated, operated and managed by men. This situation can be illustrated by the research conducted in other fields, which has shown that often men push women out of employment or income opportunities if conditions improve (Muller and Schienberg, 1997).

Women in developing countries play a minimal role in decision-making processes. This situation is reinforced by patriarchal values, tradition, culture and religions. On the other hand, women face a general lack of access to institutional credit mechanisms. This contributes to the low self-esteem of women, fear of society, fear of laws, fear of men, and above all, fears of violence creates a vicious inter-generational circle of poverty and deprivation (Rapten, 1998).

Women, as waste workers, face cultural bias in several ways. Muller and Schienberg (1997), argue that both men and women waste workers face the disrespect and outright

scorn of fellow-citizens, as handling untreated waste materials is considered demeaning. In addition, women who are cleaning public places, such as streets or bus stations, are often insulted or harassed. Working in remote sites like waste dumps or factory sites, they may be assaulted and raped.

The insights from the discussion suggest that a gender-sensitive approach can increase the effectiveness and efficiency of most waste management systems and enhance the position of women. Women form a special group among scavengers and in the recovery and recycling sector. Therefore, it is important to recognize their particular needs attempting to improve the social conditions of scavengers. A gender differentiation and attention to women scavengers is necessary (Scheinberg *et al.*, 1999). Acknowledging this differentiation in practice can have important implications for analyzing existing conditions as well as for formulating suitable policies.

3.4.5. Health risk perceptions

From the onset, it is important to state that this conceptual framework focuses on the perceptions of scavengers vis-à-vis health risks. The framework addresses health risks from a socio-economic perspective, and not necessarily a pure medical one. The perceptions of health risk in scavenging differ from individual to individual. Importantly, these perceptions are derived from cultural, economic, societal, and educational background, and individuals respond to these differently (Rapten, 1998). Rapten (1998: 26) argues that "these differences are important in designing public health policies and have not recently been considered".

An urban planner might consider municipal waste a health and environmental hazard. However, many poor who earn their livings as scavengers look on urban waste as an economic resource from which marketable products can be derived (*Ibid.*). Public health impacts of municipal solid waste can occur at all stages of the waste cycle. Mismanagement of waste at each point in the cycle has the potential to introduce both short and long-term health impacts. Groups at risks from MSWM are urban poor such as populations of unserved areas, especially pre-school children (as they seldom move

out of their neighbourhood and are likely to play around the uncollected waste heaps); waste operators and waste pickers; workers in facilities that produce infectious, toxic and cancer-causing material; people living close to waste disposal facilities; and populations supplied with water polluted by waste dumping (UNEP/IETC, 1996).

Urban poor are potentially at greatest risk because firstly, their living environment suffers as a result of bad local waste management and secondly, many people are forced to work with waste to provide a livelihood (Appleton *et al.*, 2000). The combined effects of uncollected wastes (on the surrounding environment of the urban poor), poor handling, and inadequate disposal safeguards for municipal wastes have always had implications for public health (UNEP/IETC, 1996). Some implications for public health are direct transmissions of diseases and spread of epidemics; loss of a healthy urban and amenable environment; and most importantly, the social reinforcement of poor hygiene habits and practices, all of which contribute to a vicious cycle of poverty (*Ibid.*).

The nearby dumpsite population may be exposed to high noise levels from disposal operations, to air pollution from the dust and smoke produced on the dump, to pests and flies encouraged by the concentration of organic waste and to an aesthetically displeasing landscape.

Scavenging activity is a hazardous occupation, poverty driven, and involves the most vulnerable population of the community namely women and children. The mixed nature of municipal waste and the inclusion of hazardous waste and excreta (although in small quantities) in the urban waste stream expose the scavengers to health risks. Furthermore, the potential spread of AIDS and other infectious diseases through the discharge of health care wastes in general urban waste streams is a growing threat (UNEP/IETC, 1996). In sorting materials, the scavengers come in contact with disease-causing germs and other health hazards such as injuries from broken glass, metal, needles, scalpels and infusion sets (Raptan, 1998).

UNEP/IETC (1996:397) observed that the health status of scavengers is very low and their life expectancy is far below the average for the countries in which they live. Besides, they argue that scavengers suffer from a lot of accidents, which may result from the movements of trucks, and bulldozers on the site, spontaneous fires starting inside the waste, from methane gas explosions inside the dump, from collapse of waste hill mounds, and from infected wounds, arising from contact with sharp object. They are also exposed to infections such as:

- Dermal and blood infections resulting from direct contact with waste and from infected wounds;
- Ophthalmologic and respiratory infections resulting from exposure to infected dust and ash;
- Zoonosis resulting from bites by wild or stray animals feeding on waste or surviving in gray water (such as malaria and ebola); and
- Enteric infections including those transmitted by insects feeding on waste (such as cholera, parasites).

And lastly, they are exposed to chronic respiratory diseases resulting from exposure to dust and to toxic and carcinogenic substances.

Nowadays, city authorities in developing countries have realized that scavenging in fact has benefits (Rapten, 1998). Instead of eliminating this informal waste recycling activity performed by scavengers, most governments are working with non-governmental organizations and community groups in an effort to reduce the health risks of scavenging and to make scavenging a more profitable activity (*Ibid.*).

3.5. APPLICATION OF THE FRAMEWORK

The framework which has been conceptualized is a representation of a hypothetical recycling system based on scavenging at an urban waste dump. The elements, process and linkages evident from the preceding literature review, and discussion with colleagues have been identified and depicted in figure 3.2, page 50. The framework was used to direct the formulation of questions and to analyze the findings.

Poverty is considered to be the condition that drives scavenging from the dump. An extensive waste recovery and recycling operation is mostly managed through poverty groups in the slums and around the waste dump. Medina (1997) stated that most studies report that human scavengers constitute the poor segment of the populations of developing countries. Because this is so and because of the high incidence of poverty in Mozambique in general, and in Maputo in particular, it is postulated that many people will endeavour to alleviate poverty by scavenging from the site, particularly those, including women and children, who find little opportunity in the formal labour market. This will lead to competition among scavengers which requires informal or formal organization and rules on who may access resources from the dumpsite, when they may do so, and what they may gather.

Their poverty also means that scavengers cannot afford to travel long distances to the site, and neither can they afford to transport gathered resources long distances. Thus poverty limits who may usefully access the site to those who either live at the site or, at least, nearby. It also structures the market for collected materials in that they have to be disposed of locally either within the household or to local markets.

Living and working at the site exposes scavengers to health risks. Some of these arise from competition and a desire to minimise competition; and some arise from other factors such as exposure to risk of sexual molestation and from the nature of waste materials and process that release toxic materials polluting water and air. This is aggravated by lack of access to facilities such as toilets and potable water, which increases the risk of the proliferation of diseases such as cholera, malaria and skin infection. This situation can be summarized in figure 3.2.

Poverty is the driving force in the economy of Mozambique. The conceptual framework was used to structure the questionnaire around five main sections, namely the driving forces of scavenging, organization of scavengers and scavenging activities; the reaction

from the national and local authorities; the gender dimension on scavenging activity; and the health risks. These sections are also used in presenting the findings.

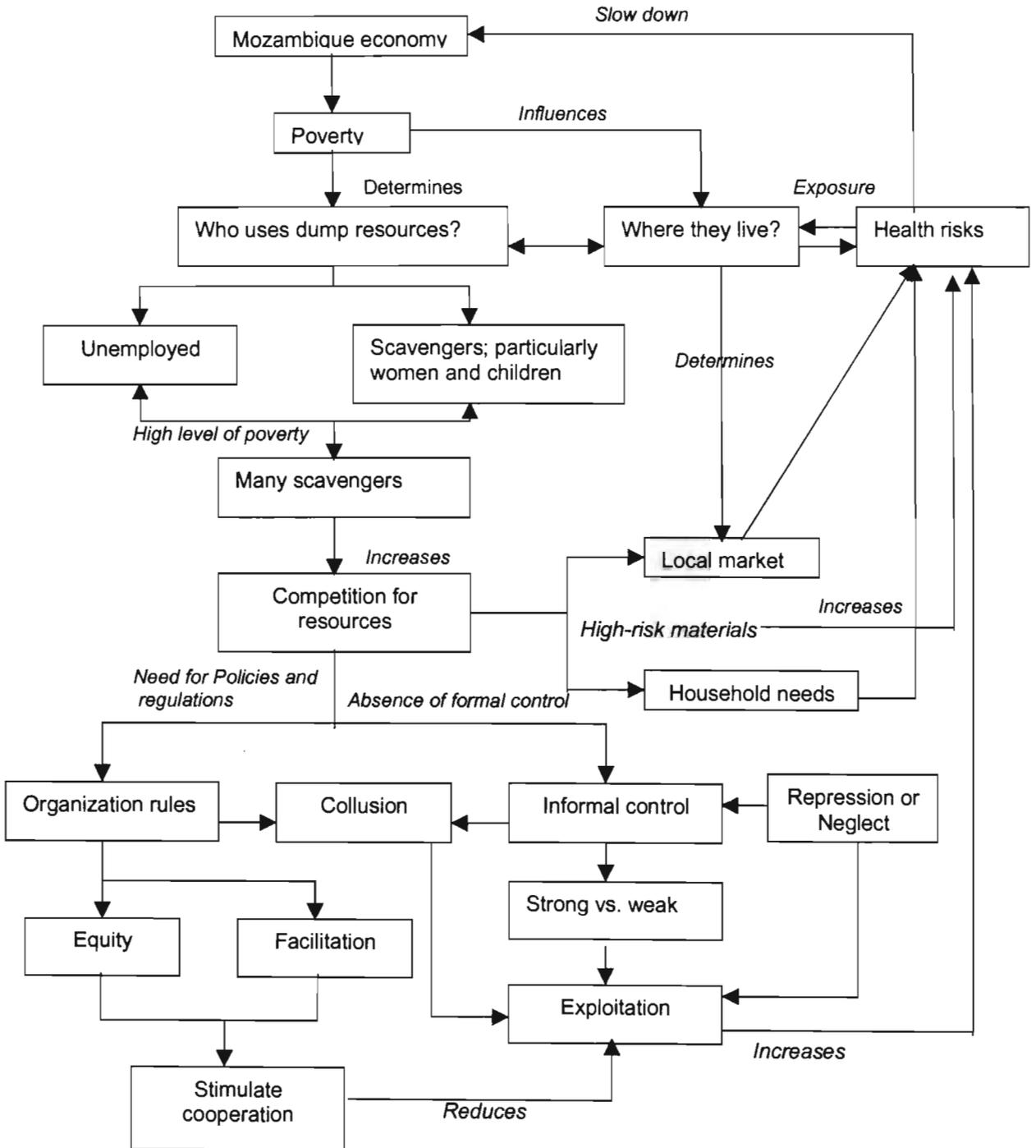


Figure 3.2. A conceptual framework depicting a hypothetical recycling system at a dump site in a poor community. Poverty is the driving force; in this case the economy of Mozambique.

3.6. CONCLUSIONS

The review of literature has enabled the construction of a conceptual framework depicting the hypothetical structure of scavenging activity at a dumpsite in a city characterized by a large poor population. In this framework, poverty was considered as the major driving force for scavenging. Other issues considered in the conceptual framework were the organization of scavengers and scavenging activities where issues of exploitation of scavengers by the middlemen and sometimes by members of local governments were noted and the possible way to reduce the exploitation of scavengers through the organization of themselves into co-operatives.

The third element discussed in the conceptual framework was the reaction from the national and local authorities. Four kinds of reactions from authorities were discussed in the conceptual framework, namely: repression, neglect, collusion, stimulation. Repression and neglect are the general reactions of authorities towards scavengers in developing countries. Stimulation of scavengers is a desirable reaction in any economy where the level of poverty is high and where many people survive through scavenging activity.

The fourth element discussed was the dimensions of gender in scavenging activity. In this the importance of women and children as waste pickers was described as well as their vulnerability to exploitation and abuse from the male scavengers. In trying to help scavengers, gender differentiation and attention to women scavengers particularly is necessary. And finally, the fifth element was the health perceptions among scavengers. Scavengers' health is permanently at risk because of their handling waste. Women and children are the most vulnerable group since they stand a long time in unhealthy environments such as dumpsites or landfills in direct contact with waste. Understanding the working conditions of scavengers and supporting them can reduce the health risk and make scavenging a more profitable and safe activity.

RESEARCH METHODOLOGY**4.1. INTRODUCTION**

The aim of this chapter is to present the research methodology of the study. This is presented in the following sequence: literature review, conceptual framework, methods used in gathering information including non-scheduled interviews, scheduled structured interviews, focus groups and observations. The survey process as well as the possible limitations of the study and the interpretation process is outlined.

4.2. LITERATURE REVIEW

A literature review was undertaken in order to establish the current knowledge about waste management in general and informal recycling and resource recovery in particular. The objective was to achieve an understanding about informal waste recovery at international and local level. Furthermore, the literature was reviewed in order to construct a conceptual framework for directing the study in this dissertation. Use was made of published material and materials from on line electronic media.

4.3. CONCEPTUAL FRAMEWORK

The most important component of the methodology of this dissertation is the conceptual framework that was depicted in chapter 3, figure 3.2. An intensive literature review was undertaken in order to generate the conceptual framework. The conceptual framework has two components: specific and a general one.

Before constructing the specific framework, a general framework of Municipal Solid Waste Management (MSWM) was constructed in order to give the reader a broad picture of waste management systems (figure 3.1). This was done to also identify the points where informal recycling and resource recovery fit into a general waste management system. The conceptual framework established the philosophical basis of the research and redirected the in-depth review of literature and the structuring of questionnaires.

4.4. DATA COLLECTION

A variety of methods were used to collect data from the scavengers such as non-scheduled interviews, non-scheduled structured interviews, scheduled structured interviews, direct observation and the use of a focus groups (Bless and Smith, 1995). The combination of these methods aimed to compensate for the weakness of one method with the strengths in another and to facilitate a willingness to participate in the survey by those collecting at the dumpsite.

4.4.1. The non-scheduled interview

A non-scheduled interview is a method of getting people to express their views broadly on a certain issue. This method consists of asking respondents to comment on widely defined issues (*Ibid.*). The respondents are free to expand on the topics as they see fit, to focus on particular aspects and to relate their own experiences. The researcher is not supposed to intervene, and he/she will only intervene to ask for clarification or further explanation, but not to give directives or to confront the interviewee with probing questions (*Ibid.*).

This kind of interview was used by the researcher as an exploratory research method to gather information from the officials at the Maputo Municipal Council and the senior officer at the National Directorate of Geology. The researcher was able to get a general picture of the operations at Hulene Dumpsite and of scavenging before going to the site.

4.4.2. The scheduled structured interview

A questionnaire with a set of questions, fixed wording and sequence of presentation, was prepared in order to conduct these interviews, (illustrated in appendix). The questionnaire was presented to each respondent in exactly the same way to minimize the role and influence of the researcher and to enable a more objective comparison of the responses (*Ibid.*). The interviewer used this method on the first two days. However, after the respondents started complaining about the time spent in the interview the researcher changed the method to a non-scheduled structured interview.

4.4.3. The non-scheduled structured interview

In this type of interview a list of issues to be investigated is made prior to the interview (Oka and Shaw, 2000). It is called non-scheduled because the interviewer is free to formulate other questions and the respondents are not confronted with already stated definitions, they are free to choose their own definitions, to describe a situation or to express their particular views and answers to problems (*Ibid.*). In these interviews the researcher kept the same headings used in the questionnaire and asked the respondent to explain the situation. Moreover, the researcher asked for clarifications where necessary.

4.4.4. The focus groups interview

Another method used in this dissertation was focus group interviews. This is a form of group interviewing where interaction within the group is based on topics that are supplied by the researcher (Morgan, 1997 cited by Gibbs, 1997). Focus groups are a group of individuals selected by researchers to discuss and comment on, from personal experience, the topic that is the subject of the research (Gibbs, 1997).

The researcher adopted a focus group interview procedure because respondents were complaining about the interviews taking too much of their time. The researcher selected five groups for interviews. The questions were given to the entire group, which then gave answers to the researcher. When the focus group was heterogeneous, different answers were given to the researcher, and sometimes the male respondents threatened women respondents. Thus, later on the researcher separated the focus groups, and worked with a group of women separated from the focus group of men. This kind of interview was attempting to document respondents' attitudes, feelings, beliefs, experiences and problems at Hulene dumpsite. Most women respondents' beliefs and feelings appeared to be hidden when the researcher was interviewing women and men together.

4.4.5. Observation

Observation was another method used by the researcher. Covert and overt observation methods were used. The covert observation method was undertaken before the interview had started. In this method people do not know that they are being observed (Oka and Shaw, 2000). The researcher went to the site with a team of field workers from the Department of Geology. The team was drilling a borehole, 200m away from the dumpsite, for the population living around the dumpsite. The researcher was taking pictures and making observations of the scavengers' activities at the same time. In this position, the researcher was able to observe people cooking and eating at the dumpsite, and producing crops in the dumpsite. However, during the interview the majority of male respondents, refused to acknowledge such practices took place. Only women, in focus groups, pointed out that some people cooked, and ate at the dumpsite.

The overt observation method was undertaken during the interview. With this method people knew that they were being observed and they behaved in a different way (Oka and Shaw, 2000). During the first day of the interview the researcher was not allowed to go to certain areas in the dumpsite where people were eating and cooking. However during the following 9 days the researcher gained the confidence of some of the respondents and was allowed to go to all the areas of the dumpsite. Moreover, the respondents appeared to behave naturally.

4.5. THE SURVEY PROCESS

Once the questionnaire had been formulated and translated into Portuguese, the process of conducting the survey was initiated. The research process at the dumpsite was completed in 10 days. In this period 49 respondents were interviewed. This number includes individual respondents and respondents organized in five focus groups of six respondents each.

The most crucial factor was how the researcher was going to enter the dumpsite. The researcher sought a male who could translate from Portuguese to the local language

(Ronga) and who could act as a bodyguard, since is not safe to interview scavengers alone. The field workers from the Department of Geology had given the researcher some hints on how best to enter the dumpsite. However, using such methods would take the researcher more time. The researcher decided to enter the dumpsite in the company of a tractor driver, the only official member of the Municipal Council at the dumpsite. The tractor driver was very reluctant to introduce the researchers to the scavengers. Fortunately, the researchers met a young lady, who was very active at the dumpsite. She immediately introduced us to the site and called other people for interviews. She was the “gatekeeper”. A gatekeeper is a person who introduces a researcher into the field (Oka and Shaw, 2000).

Working with the gatekeeper made the researcher's life easy at the dumpsite. For instance, on the first day when she discovered that some teenager boys were planning to grab the researcher earrings, a watch and camera, she secretly warned the researcher to leave the dumpsite, and after that she advised the researcher not to bring with her a camera, earrings, watch, cell phone and other valuable objects. On the same day the “gatekeeper” was accused by the same boys of protecting the research team, and they threatened to beat her if they discovered that she was receiving money from the research team.

In the following days we worked with the gatekeeper and with the leader of the teenager scavengers. The research translator and the bodyguard spoke to the leader of the teenager scavengers and they and he agreed to be interviewed and to let other people be interviewed in return for a certain amount of money. The symbolic amount was fixed at 2000,00Mt (less than one (1) rand) per person. No pictures were allowed to be taken. However, we managed to take some pictures secretly. This payment helped made some respondents more responsive to interviews. It also helped in preventing solving what

happened on the first and second day, when scavengers agreed to be interviewed, but immediately they saw a car bringing waste to the site, they all ran after the car in order to get some goods. As a result, we found ourselves standing alone and waiting for

respondents, who were occupied looking for goods. This emphasised to us the critical dependence of scavengers on materials arriving at this site. It also provided us with an idea of the value of such materials since it took a relatively small reward to secure their attention.

Gaining access to the scavengers "world" was very complex and difficult. The same teenager boys returned and threatened us again and asked for money and sometimes broke the agreements which were made before. It was difficult to maintain any agreement with these boys because they appeared to be drug addicted and always drunk. However, the majority of scavengers, particularly old men and women, welcomed our study and helped us by giving more detailed information. Sometimes they agreed to be interviewed without being paid. After some time, particularly on the fourth day, the teenager boys ignored us and we worked in "peace".

4.6. POSSIBLE LIMITATIONS TO THE STUDY

There were some limitations to this study. Wherever possible attempts were made to mitigate the effects of the limitations. The first limitation was the literature. There is a lot of literature which deals with waste management in general. However, little has been published on informal recycling and resource recovery by scavengers. Asian authors write most of the literature in this field, but there is not much which illustrates the African situation.

Language was the second limitation. The majority of the scavengers at the Hulene dumpsite speak "Ronga" a local language. In order to overcome this problem the researcher asked for an experienced translator who was used to working in the field. This problem was minimised also because the researcher is able to understand "Ronga" and she speaks it reasonably well. Thus, the researcher was able to note when the respondent was unable to understand the question and when the translator gave wrong translations.

The third limitation was the respondents' lack of time. Most of the respondents complained that they did not have time for being interviewed. This situation was overcome by paying the respondents to spend their time in interviews. Moreover, a combination of methods such as the non-scheduled interview, the non-scheduled structured interview, the scheduled structured interview, direct observation and the use of focus groups were used in order to minimise the demands on their time. Non-scheduled structured interviews were used when we noted that respondents were tired. Focus groups were used from the fourth day onwards in order to save the respondents' time.

The fourth limitation was the working conditions at the dumpsite. The Hulene dumpsite working conditions were not easy particularly for the research team. The adverse conditions such as smell, flies, smoke, ash, dust and rubbish all over, contributed to the illness of the researcher on the third day after working at the dumpsite. The research team therefore decided to work at the dumpsite during daily short periods of time (3 Hours) from 8 to 11 o'clock. This situation contributed to the long overall period of time spent by the research team gathering information at the dumpsite (10 days).

The fifth limitation was the difficulty in taking pictures of the real situation at the dumpsite. Since teenager scavengers did not allow us to take pictures of the site, some aspects of scavengers' activities will not be illustrated or confirmed with visual information. However, the research team managed to take some pictures of the dumpsite and the scavengers' activities.

4.7. DATA ANALYSIS

The approach to data analysis in this dissertation is qualitative. There is inevitably some degree of subjectivity in interpreting and assessing the responses of the respondents particularly when the process involves non-scheduled interviews, non-scheduled structured interviews and focus group interviews. However, this subjectivity was overcome by comparison of the answers gained, when using different methods.

During data collection, initial data analysis was being made through probing responses as they arose. For instance, to establish the number of hours spent at the site on a daily basis, this question was followed by probing about the usual time of arrival and departure from dumpsite. This allowed the researcher to think about the formulation of the next question to ask in the conversation. According to Shaw (2000), doing data analysis while collecting data is called the “principle of interaction between data collection and analysis”.

At the simplest level, qualitative analysis involves examining the data to determine how the respondents answered the questions. Answers to questions or issues were aggregated according to the majority of similarities in answers. The greater the number of similar responses the more likely the view expressed has a strong foundation among scavengers. The results were expressed as the number of respondents holding a common view. However, sometimes the common views were hidden. The respondents, mainly male respondents, were hiding information, such as the incidence of cooking, eating at the dumpsite and the sexual harassment of women.

From the observation method the researcher was able to perceive where the “common view” was different from the facts. Thus, observation, helped the researcher to interpret and understand phenomena, and allowed the researcher to judge whether views expressed were indeed commonly held among the respondents.

Data reduction refers to the process of selecting, focussing, simplifying, abstracting, and transforming the original data obtained by interviews (Miles and Huberman, 1994). Data was condensed for the sake of manageability and also in order to address the issues intelligibly. Data reduction forces choice about which aspects of the assembled data should be emphasized, minimized, or set aside completely for the purpose of the project at hand (*Ibid.*).

Data display goes beyond data reduction to provide an organized, compressed assembly of information that permits the drawing of conclusions (*Ibid.*). A display can be an extended

piece of text or diagram, chart, or matrix that provides a new way of arranging and thinking about the more textually embedded data (*ibid.*). The results of data analysis and interpretation are presented in the next chapter.

4.8. CONCLUSIONS

The complexity of the conceptual framework (figure 3.2), led the researcher to choose the structured interview as the main research method. However, it soon became apparent that this had two major disadvantages: it took too much time, distracting scavengers from their work; and it did not allow for probing to expose hidden feelings. The benefits of being open to adapting methods to suit the "real life" situation are clearly evident from the experiences gained in this study.

RESULTS PRESENTATION**5.1. INTRODUCTION**

This chapter presents the results of the study undertaken at the Hulene dumpsite, the interviews with the director of the Solid Waste Department and with staff of the department of environment at municipal council, as well as personal communications of some senior officers of the Maputo Municipality.

The chapter presents the issues in a sequence defined in the conceptual framework (chapter three): driving forces of scavenging activity, organization of scavengers and scavenging activities, reaction from the national and local authorities, the gender dimensions on scavenging activity, and finally the health risk associated with scavenging activity.

5.2. DRIVING FORCES OF SCAVENGING

The Hulene Dumpsite was opened in the 1960's and is still in operation some forty years later. There are people who claim to have been involved in the collection of waste from that time until now as shown in the table 5.1.

Table 5.1: Years of scavenging activities by respondents (n=49)

0-5 years	6 -10 years	> 10 years
29 (59%)	15 (31%)	5 (10%)

According to the scavengers interviewed at the Hulene dumpsite, the forces that drive them to seek resources at the dumpsite are:

- lack of well paying formal sector employment opportunities (45% of respondents n=49);
- lack of any form of income because they are single mothers (21% of respondents n=49);
- poverty (18% of respondents n=49);

-
- lack of any form of income as widows (10% n=49)
 - lack of any form of income as orphans (6% n=49)

Most of the people interviewed chose to be scavengers because of poor conditions surrounding their lives. For instance, 53% had lost their jobs. Thirty nine percent were either single mothers or widows attempting to get some money at the dumpsite for their family expenses. Eight percent of scavengers were former street children coming from a variety of backgrounds. For example, some had lost their parents during the civil war and were also displaced from their original place of residence. Others had run away from their homes due to a variety of reasons, becoming street boys or girls and ending up as scavengers.

Eighty six percent of the respondents who collect waste from the Hulene dumpsite are from the vicinity; 12% come from other townships and 2% live at the dumpsite. Eighty eight percent of respondents chose to work from this dumpsite because it is nearest to home and is the biggest site in Maputo city. However, 12% of respondents chose to work at the dumpsite because it is the biggest site in Maputo city and receives a lot of waste for disposal. Those who live nearby the dumpsite (86%) take only 5 minutes to reach the dumpsite and those who live in other townships take about one hour to travel from home to the dumpsite. Two percent of scavengers said that they start work when they want to as they live at the dumpsite. All respondents answered that they do not use transport to go to the dumpsite.

The majority of respondents (84%) arrive at the dumpsite and start work between 7 and 9 o'clock in the morning and the rest (16%) between 5 and 6 o'clock. Fifty seven percent of scavengers answered that they leave the dumpsite between 12 and 2 o'clock while 43% between 4 and 5 o'clock in the afternoon.

Most (78%) of the scavengers interviewed work from Monday to Saturday at the dumpsite and 22% work every day from Monday to Sunday. Those who work from

Monday to Saturday do not work on Sunday because they go to church. After church, 26% (out of 78%) of scavengers return to the dumpsite but 74%, which are mainly women, stay at home and do other household chores like laundry and cleaning.

Fifty nine percent of scavengers interviewed observed that Tuesday to Friday are the busiest days at the dumpsite; 29% said that there are no special days and 12% of scavengers said that all the days are busy excluding Sunday. They also linked the collection of waste to specific hours. The majority (76%) of scavengers observed that the vehicles coming to the dumpsite increase between 9 and 10 o'clock, 8% said between 7 to 8 o'clock and 16% said that there is no special time.

Table 5.2. Resources collected by scavengers (n=49)

Items	Total of respondents	Percentage
Scrap metal aluminium and copper	31	63%
Cans	22	45%
Wire	21	43%
Cotton and sponge	13	27%
Bottles	12	24%
Papers	11	22%
Small stone for construction	10	20%
Fire wood and charcoal	8	16%
Plastic bags	7	14%
Food	6	12%

Scavengers pick from the dumpsite a variety of items (table5.2). All respondents indicated that scrap metal (aluminium and copper) are most valuable, followed by wire, cans, bottles, small stones for construction and finally paper. Scrap metal (aluminium and copper) is easier to sell, and fetches a good price. Wire, bottles and cans are also easy to sell and they get paid reasonable prices.

All respondents said that they do select items, which they collect from the dumpsite; 82% of the respondents said they take anything valuable and do not specialize in taking only one item; 18% of respondents said that they do specialize in the collection of certain items. They look for more valuable things, or things that are easier to sell

because the demand is high, such as scrap metal (aluminium), cans and wire. However, when they do not encounter these items, all respondents said they take anything valuable; 14% of the respondents said that they would give unwanted items to someone else, whilst 86% of respondents said that they would sell to some one else at the site.

Most (76%) of the respondents pick items from the dumpsite in order to sell, while 16% gather for both household use and to sell. However, 8% gather only for household use. A large majority (84%) said that they do not earn enough from their work at the dumpsite to maintain their household, and that they do not have others sources of income. Only 16% of scavengers said that they could maintain their household family with income from the dumpsite. Income derived from the dumpsite varies a lot from day to day; 45% of scavengers said that they earn per day between 1000 to 5000Mt (Mozambican currency corresponding to around R0.40 to R2.00), 39% said that they earn between 5000 to 10,000Mt (R2.00 to 4.00) and 16% between 10,000 to 20,000Mt (R4.00 to 8.00) per day.

All respondents observed that there is a growing demand for the material taken from the dumpsite. Sixty seven percent of the respondents observed that there had been changes in demand since they had been collecting waste from Hulene dumpsite; the remainder (33%) claimed that there had not been any changes since they had been collecting materials. Those who answered that there had been a change in demand justified this opinion by saying it was easier to sell the products. However, it was noted that it had become much more difficult to find the items since the numbers of scavengers at the site had increased.

All respondents answered that after collecting the material, should no one buy it at the dumpsite, they transported it on their heads to sell elsewhere, should they not take the material home for household consumption and use. The people collecting cans store them at the dumpsite and later call for a vehicle to take the cans for recycling. The scavengers also get paid for loading the cans onto the vehicles.

Table 5.3. A generalized depiction of respondents' perceptions of demand for materials taken from the dumpsite

Items	Demand				Reasons
	V. high	High	Medium	Low	
Scrap metal aluminium and copper	✓				Highly saleable because there is market
Cans		✓			Saleable
Wire	✓				Highly saleable
Cotton and sponge		✓			Saleable
Bottles		✓			Saleable
Papers		✓			Saleable
Small stone for construction			✓		Not very easy to sell
Fire wood and charcoal				✓	Difficult to sell/mainly for household consumption
Plastic bags			✓		Difficult to sell – small market
Food				✓	Difficult to find/mostly for household consumption

The materials collected by scavengers are very important for the economy of their families, for instance 92% of scavengers answered that the materials which they pick from the dumpsite are critically important for their family and 8% said that they are very important for their economy. All respondents use the income derived from the dumpsite on their family expenses. On average there are 6 people per family or per household. However, some have more than 6 as illustrated in the table 5.4.

Table: 5.4. Size of Household

Household size	Number of respondents
1	2
2	3
3	1
4	6
5	5
6	3
7	9
8	12
9	2
10	4
11	1
12	1
Mean= 6	Total = 49



Plate 1. Women, children and men scavengers picking resource materials from Hulene dumpsite. On the right is an officer worker from National Directorate of Geology.



Plate 2. A moment after waste has been dumped. Shows women, men and children picking waste, and teenager boys on top of waste.

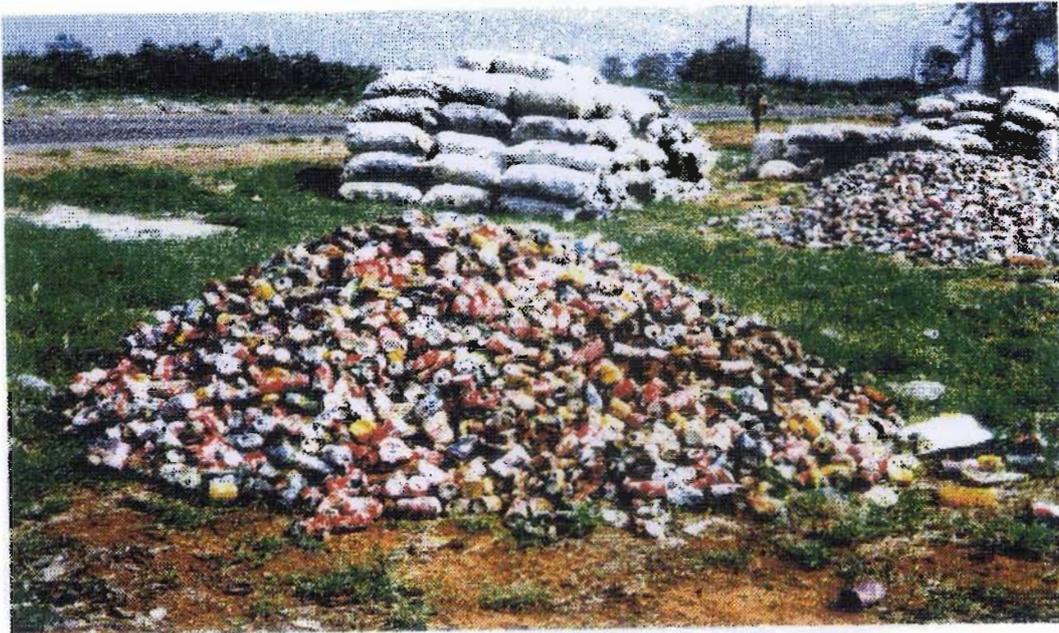


Plate 3. Collected cans have been stored and packed, before being taken for recycling.

5.3. ORGANIZATION OF SCAVENGERS AND SCAVENGING ACTIVITIES

While almost half (45%) of the respondents claimed that there are more than 500 scavengers at Hulene dumpsite, the rest (55%) felt it is difficult to count the scavengers because there is no registration, and day-by-day new scavengers come to the dumpsite. However, all respondents think that there are too many scavengers working at the Hulene dumpsite. They explained that this could be noted because nowadays it has become very difficult to find materials at the dumpsite. In the absence of better estimates a figure of 500 is used in this study.

All respondents claimed that no one formally controls the collection of resources at the dumpsite. Additionally they explained that they do not pay any fee in order to collect from the dumpsite. However, teenager scavenger groups intimidate the new comers mainly women at the dumpsite. About half (47%) of the scavengers claimed that they were molested by the "old"⁹ scavengers on their first time at the dumpsite. They were robbed, bitten, and two women were raped in 1999.

⁹ "Old" used to describe those scavengers who have operated for many years at the dumpsite

All respondents stated that they are not organized in any way, and due to this situation, problems always arise between the people collecting at the dumpsite. Most (80%) of the respondents answered that the problems are related to thefts. Fifteen percent said that problems also arise in disputes over the items collected when both parties claim that the item belongs to him or her; and 5% indicated that problems arise during the "integration period" normally when "old" scavengers at the dumpsite mistreat the new comers at the site.

Commenting on the severity of problems encountered, 14% said that theft is a very serious problem, 35% said that it is serious problem, 31% not very serious and 20% said that it is not a problem at all. All the respondents observed that normally when the problems arise at the dumpsite they are not taken to the officials of justice or authorities for resolution; the scavengers solve the problems by themselves. All respondents said that those who have experienced problems of being robbed or bitten normally end up being integrated in the group, after some time. Respondents said that if the material was stolen from women they did not do anything about the thefts, even if they knew the person who had stolen the materials. However, if the thieves stole from a man, and if he knew the thieves, they resolved the problems by themselves and normally the most powerful win the dispute.

Eighty six percent of the respondents said that they sell their products directly at the dumpsite, to people who come to the site to buy. They didn't know if they were buying for resale or use. Eight percent of scavengers, those who are involved in the collection of small stones for building, said that they sell the material at their home and also they have had a new site at the sidewalk of Julius Nyerere avenue, since 1998. Those who have children say they send their children to sell the stones at the site; those who do not have someone to sell the items at the site, sell the items from home. Normally people know that they sell small stone for construction and they go to their houses. Six percent of scavengers said that they sell their items at the market as street vendors.

Those who have a site for selling the materials say they do not pay any fee for the site and they do not experience any problems related to the site. They do not need to pay the people who sell their products at the site since usually it is a member of the family. All respondents observed that normally the buyer does not accept the first price the seller establishes and they bargain to find consensus.

5.4. REACTION FROM THE NATIONAL AND LOCAL AUTHORITIES

The authorities are not active at the site. They seldom go there as confirmed by all the respondents, except when there are problems in the city and the authorities suspect that the teenager scavengers are involved, then the authorities go to the site and arrest some of scavengers or beat them. Apart from these incidents, all respondents said that the general attitude of the authorities to the scavengers is one of tolerance and neglect.

The senior government official noted that the municipality does not have a policy on recycling waste materials. However, the respondent is aware of two enterprises that are involved in recycling waste materials, Vulcano factory (for cans) and Sucata lopes (for scrap metals). The respondent said that he is aware of scavenging at the dumpsite but the municipality does not act against the scavengers neither do they help them.

5.5. GENDER DIMENSIONS

About half (24) of the sample (49) interviewed at the Hulene dumpsite were women. All respondents answered that women and children collect materials from the dumpsite. About 75% of women interviewed at the dumpsite are not married. Of the 25% who are married only half (12%) have their husbands involved in the collection of items at the dumpsite. All single women interviewed at the dumpsite were heads of their households.

Table: 5.5. Views of respondents on gender issues (n=49)

Questions	Males		Females	
	yes	no	yes	no
Is there a gender division in gathering items from the dumpsite?	20%	80%	85%	15%
What items do women like picking?	90% n/s)	10%(s)	70% (s)	30% (n/s)
Do women sell items picked at the dumpsite?	90%	10%	70%	30%
What do you do with the income derived from items sold at the dumpsite?	100% (He)	-	100% (He)	-
Do women have special problems?	15%	85%	100%	
Do women receive any special treatment?		100%		100%

S=saleable;

N/s=non saleable

He= household expenses

The majority of men (80%) said that there is no gender division on gathering items from the dumpsite, the remainder 20% said that there is a gender division in gathering items from the dumpsite. However 85% of women said that there is gender division on items gathered at the dumpsite in the sense that teenager scavengers always grab from the women the most valuable items. They also observed that some schemes for selling waste items are better handled by men. Fifteen percent of women respondents said that there is no gender division on waste picking, women as well as men take the items that they want.

Women sell the items gathered from the dumpsite but in comparison with men, they sell a small quantity, because they are more likely to pick non-saleable items such as charcoal, wood and food for their household consumption. Twelve percent of women observed that although all men said that they contribute to the household expenses, they are more likely to have this as a second priority, even if the wives see their husbands receiving money at the dumpsite. Thus the gender determines what the people may do with money earned.

All respondents answered that about 40% of women work with children of all ages and all genders at the dumpsite. A large majority (85%) of the 24 women interviewed said that normally no one does household work while they are working at the dumpsite. Fifteen said that while they were at the dumpsite there would be someone (members of family and children) who would do the household chores.

All (100%) of the women interviewed at the dumpsite do not work the same hours as men. Normally women are involved with other household activities when they are not at the dumpsite. They wake up very early and do some household activities after which they go to the site around 8 to 9 o'clock. Between 12 and 2 o'clock, they leave the site to prepare meals and do other household chores. All the women interviewed (24) said that they prefer to work in the morning, because during the afternoon they have other household chores to do like cooking, carrying water and sweeping.

All women observed that the problems faced by women are different from those experienced by men: for instance, troublesome scavengers do not abuse men because they know that men can fight. But women, particularly those that are not married cannot fight so they suffer from abuse every day. All women respondents said that at the dumpsite they are abused, insulted, and robbed, for instance, two women were raped in 1999 at the dumpsite.

5.6. PERCEPTIONS OF THE HEALTH RISK

Fifty nine percent of the respondents affirmed that working at the dumpsite could cause them health problems. The remainder (41%) of the respondents said that there is no linkage between a health problem and working or being exposed to the dumpsite. For those who had pointed out that there was a relation between health and working at the dumpsite, the most common health problems, which they claim are: first colds and headaches; second diarrhea, third malaria, fourth accidental cuts and lastly backache. The most common sickness among scavengers is colds and the most serious is diarrhea. Colds include the inflammation of mucous membrane of the nose and throat caused by heavy atmospheric dust and ash loads and smell at the dumpsite.

Twenty two percent of the respondents said that when they have money they visit a doctor at least twice a month due to problems of diarrhea and malaria, but if they do not have money they go to the Christian NGO called *Ministério Arco-Iris Igreja Pentocostal – Comunhão na colheita*; or they wait for them to come to the dumpsite on Fridays. This NGO helps the scavengers on health issues and shelter. The remainder (78%) of the respondents said that they do not go to the hospital; they wait until Friday when the doctors from *Ministério Arco-Iris* come.

All respondents observed that there is no control on what scavengers take or do not take from the dumpsite. But, they affirmed that there are materials that they do not collect due to the risk that these materials pose to them. These items are from the healthcare sector, namely waste from hospitals. However, when healthcare wastes arrive at the dumpsite, police find it necessary to accompany the vehicle in order to prevent scavengers collecting from this waste. They dump and burn the healthcare waste in a separate hole. The police only leave the dumpsite when the waste is completely burned.

All respondents claimed that healthcare and medical laboratory waste¹⁰ are two types of hazardous waste being dumped at Hulene dumpsite. They were not aware of any other sources of hazardous waste. Since some private vehicles cannot be identified, the respondents were of the opinion that there could be other types of hazardous waste being dumped at the dumpsite. Furthermore, all the respondents indicated that some of the healthcare waste is dumped separately at the dumpsite and burned, whilst the rest is dumped on the general waste side. The respondents observed that apart from burning there is no other special treatment to which healthcare wastes are submitted. All respondents observed that waste from MEDIMOC is also dumped at the general waste site, which makes it easier for the scavengers to pick through this type of waste.

¹⁰ The medical laboratory waste comes from Medical Laboratory of Mozambique (MEDIMOC).

All respondents observed that usually they do not take any precautions in order to minimize health risks. They normally do not treat the items, which they pick from the dumpsite in any special way. Since the buyers come in the dumpsite there is no time nor are there facilities to treat the materials. When they take the items to their house they wash the items with water and sometimes with soap when they think the item is dirty. All respondents observed that they do not take any precautions when they wash the materials. All respondents said that they do not have any facilities such as toilets, clean water, storage place for their food and personal things at the dumpsite.

All respondents observed that the nearby population, those who are not involved in picking items from the dumpsite, complain about the site mostly because of smoke, bad smells, dust, noise, contamination of ground water, crime, and aesthetic reasons.

Forty eight percent (48%) of the respondents said that there are people who cook at the dumpsite (these can be seen in plate 4, page 74). But, the remainder (52%) said that there is no one who cooks at the dumpsite. Those who said there was cooking, observed that all kind of scavengers are involved in this, such as people who come to collect the waste and people who live at the dumpsite. They cook all kind of meals. Normally if they find something at the site and if they are hungry they cook and eat.

Most of the respondents (70%) said that there are people who produce crops at the dumpsite, whilst the remainder (30%) said that no one practises this. Seventy percent of the respondents indicated that those who practise crop production come from the neighborhood. They also indicated there no conflicts between the people who produce crops and those who collect materials from the dumpsite.



Plate 4. Scavengers eating at the dumpsite. Notably 52% of respondents said that no one cooks and eat at the dumpsite.

5.7. CONCLUSIONS

This chapter presents the results of the study of scavengers undertaken at the Hulene dumpsite. The chapter presents the findings in the sequence defined in the conceptual framework chapter three. Poverty was seen to drive poor people to scavenging activities. In fact more than half of respondents survive by means of the dumpsite resources because they had lost their jobs. Single mothers, widows and orphans are others groups seen at the dumpsite.

The choice of materials to collect is firstly determined by the re-sale or re-use value of waste materials, and secondly by the relative ease with which extraction, handling and transport is effected. Scrap metal, especially aluminium and copper, cans, wire, cotton and sponge as well as bottles and papers tend to attract more attention than organic and biodegradable materials such as food.

It is estimated that at least 500 hundred scavengers are engaged in picking materials, however no one formally controls the collection of resources at the dumpsite. This situation allows the teenager scavenger groups to take control over others scavengers, worsening the situation of women and children who sometimes see their gatherings being taken by the teenager group. Authorities are not active at the site, which situation contributes to making the scavengers feel that they are neglected, and merely tolerated in their activities.

More than half of scavengers know that working at the dumpsite could adversely affect their health. However, poor livelihood circumstances force them to continue relying on the dumpsite. The frequent health problems affecting the scavengers include colds, headaches, diarrhea, as well as accidental cuts. An international Christian NGO is trying to minimize suffering of this group by helping them with medication. Some scavengers cook and eat at the dumpsite, but they do not wish outside people to know about this practice. The absence of basic facilities also undermines the conditions of this group. The nearby people's health is also at risk due to smoke, bad smells, dust and to contamination of ground water.

CHAPTER SIX

DISCUSSION

6.1. INTRODUCTION

This chapter presents a discussion of the findings. It derives its structure from the conceptual framework presented in chapter three. The discussion is based on the perceptions of the respondents and their interpretations by the researcher. Furthermore, the chapter evaluates how useful the framework was for guiding the research and for presenting results of informal recycling and resource recovery at the Hulene dumpsite. The gender dimension is not discussed as a separate section; it is incorporated in all the elements of the conceptual framework.

6.2. DRIVING FORCES OF SCAVENGING

The conceptual framework postulated that poverty is the driving force of scavenging. This was observed in the study conducted at Hulene dumpsite where all the respondents answered that they work at the dumpsite because they are poor. Unemployed adult males, single mothers and widows form a wide group among scavengers, followed by teenagers and orphaned children. Among the female scavengers, single women form a big group and they are the heads of their families. Thus, scavenging constitutes an adaptive response to scarcity, particularly for the poor, unemployed and displaced people.

The conceptual framework suggests that poverty will influence where poor people live. Thus, poor people are more likely to live in unhealthy environments such as in the dumpsite or nearby. The majority of Hulene dumpsite scavengers come from Hulene B, the vicinity of Hulene dumpsite. Most of these people were displaced people at the time and established themselves in the Hulene peri-urban area during the civil war. These people make their living through scavenging. However, it is not only local people who use the dumpsite for earning income, other poor people from distant peri-urban areas are also seen at the Hulene dumpsite. This suggests that, the users of the dumpsite resources are not determined only by the proximity of people to the dumpsite, but mostly by their poverty levels and indirectly by their lack

of formal employment. That people traveled some distance to retrieve materials from the site was not expected in the conceptual framework. That this traveling does occur despite the low earnings reported, indicates the desperate situation in which people find themselves, and the critical importance to them of the resources available from the site.

6.3. ORGANIZATION OF SCAVENGERS AND SCAVENGING ACTIVITIES

The framework postulated that as the concentration of scavengers at the Hulene dumpsite increases, the competition over resources would also increase. This was substantiated by respondents. As the competition over resources increases, conflicts among scavengers also increases, and the need for organization is felt. In the absence of rules and regulations, as is the case of scavengers at the Hulene dumpsite, informal organizations arise. In informal organizations, the principle of strong versus weak prevails. Although all the respondents stated that there is no organization among scavengers at the Hulene dumpsite, an informal organizational structure exists: the teenager group is the leader group followed by men. This reflects very strongly the factors of both power and gender on the leadership within the informal organization.

Women and children form the weak group and they are the most vulnerable to exploitation, predominantly in the form of theft. That some respondents among the strong group answered that theft is not a serious problem is not surprising seeing as though they are not likely to be victims of theft. In contrast, weak groups who consisted mainly of women, children and old men pointed out that theft is a very serious problem. They were not comfortable when talking about theft, which illustrates just how acutely they feel their vulnerability to exploitation. It seems that they were afraid of something, which clearly shows that strong power relations exist. These power relations in turn, are translated into a form of informal authority and control even though this was not expressed as such in the respondents.

Further evidence of an informal organization is seen in the way in which collected materials are marketed. Two pathways involving quite dependent type and level of organization become evident. Some materials are marketed through a "community process" in which family or others community members "sell on" materials. In other cases, especially when special technology is required to re-use materials such as cans, these are sold to parties outside the communities.

The findings support the contention of the conceptual framework that there is evidence of organization in both the collection and the marketing of materials.

6.4. REACTION FROM THE NATIONAL AND LOCAL AUTHORITIES

There is no policy for formal recycling so items of value arrive at the dumpsite presenting opportunities for informal recycling. This would benefit the municipality but it does not invest in recycling or reclaiming. So, the service is performed by scavengers to the detriment of their health. Consequently, the authorities make no attempt to regulate the work of scavengers or to promote equity as implied in the framework.

There is no policy about the disposal of toxic waste. For example, medical waste is not effectively burnt because of lack of appropriate facilities that can burn the waste at the required high temperature. However, the authorities apply some enforcement in an effort to improve the health conditions of scavengers.

The study suggests that some 500 people with an average household size approximately of six people¹¹ (that is 3000 people) have some degree of direct dependency on resources obtained from the site. The real number is considerably larger when the secondary beneficiaries (those who purchase foods) and their families are taken into account. Clearly a policy framework needs to be very sensitive because it can affect the survival of so many people, particularly given the economy of Mozambique.

¹¹ This is the mean of the responses to household size (see table 5.4).

6.5. HEALTH PERCEPTIONS

From the framework presented in chapter three and the answers of respondents, it can be confirmed that scavenging is a hazardous occupation, poverty driven, and involves the most vulnerable sector of the community, namely women and children. While sorting waste for selling or household consumption, scavengers come in contact with disease-causing germs and suffer other health hazards such as injuries from sharp waste such as syringes, broken glass and scalpels. Moreover, the authorities do not provide convenient medical services (clinics) so this cost is also deferred to collectors and or NGOs. This illustrates the seriousness and complexity of the health risks at the dumpsite.

The framework also postulated that where people live or the dwelling place could cause health problems. It is widely recognized also by some scavengers, that living near or in (as in the case of some scavengers in Hulene dumpsite) does cause health problems, because there is no getting away from the garbage and the drainage tends to be poor. Health problems may also be caused by the contamination of groundwater, which is widely used by the nearby population. Finally, health problems may also be caused through contamination of air or by disease vectors such as mosquitoes, flies and rats. Whilst these risks cannot be totally avoided it is evident that the major risks could be minimized by simple action such as providing clean water, washing facilities and separating hazardous waste from other waste.

The materials collected from the dumpsite are a health high-risk in the sense that they are picked from a contaminated environment. Therefore, in selling these materials at the dumpsite or when they take them home for household consumption, other people, besides the scavengers are exposed to health risks even though they may have no direct contact with the dump.

Further, the framework suggests that competition and exploitation are situations which increase health risks. Evidence indicates that competition for scarce resources has led to violence and to the formation of power groups which use physical abuse in order to secure a greater share of resources. It is also evident that other activities needed for survival limit the time scavengers (especially females) can spend on site. This finding does not fully support the framework's notion that competition would result in longer working hours in search for items at the dumpsite.

The framework postulates that having facilities, organizations and rules to try and promote equity can reduce the health risks. This is the desired situation. This could be achieved through the involvement and support of government, when it realizes that scavenging activity brings benefits to poor people and to the society in any poor country. Providing basic facilities such as toilet and clean water can prevent some of the health problems of the scavenger group and therefore can reduce the cost to the government of treating illness associated with the scavenging activity. Whilst it was not possible to discuss this in any detail, the results show that people experience illnesses requiring frequent medical attention. Mostly this cost is being deferred by authorities to the NGOs.

The conceptual framework was developed to facilitate a systemic analysis of the informal recycling system. It is the expectation that a framework would make it easier for authorities to understand and monitor such activities. In doing so they would gain a better appreciation of the cost and benefits of informal recycling which would, in turn, help with a formulation of appropriate policies and strategies. An evaluation of the conceptual framework is, therefore, important to indicate the framework's strengths and weaknesses which have emerged from the study.

6.6. AN EVALUATION OF THE CONCEPTUAL FRAMEWORK

In order to understand the usefulness of the framework, an evaluation is presented. The evaluation is based on a description of the framework's strengths and weaknesses.

Strengths

1. A strength of the conceptual framework lies in its ability to identify poverty as the driving force of scavenging.
2. The framework is presented as a process, linking poverty (as the driving force for scavenging), to the implications of scavenging for the local and national economy, thus making it more encompassing and more apparent to administrative and policy makers.
3. The framework presents a heuristic variable analysis which provides a better understanding of the scavengers' complex activities and life.
4. The framework is robust as it is able to adopt to the systematic changes in response to, for example, policy interventions. It could be used for further research into the subject addressed by this study.

Weaknesses

1. The framework has weaknesses in explaining the link between location and the people using the dumpsite. Despite the fact that there are people from far away places using the dumpsite, the framework suggests that people from places near to the dumpsite would be the users.
2. The framework suggests that competition will increase with the time spent at the dumpsite. But then there may be other factors playing a role: these (eg. Household duties) need to be reflected in the conceptual framework.

CONCLUSIONS AND RECOMMENDATIONS

In this dissertation, a conceptual framework was developed in order to understand the situation of scavengers and scavenging activities. The conceptual framework depicted poverty as a driving force for scavenging. Thus, scavenging represents an important survival strategy for the poor, in which individuals recover materials from waste in an attempt to satisfy their needs.

Scavengers respond to market demand and not to environmental considerations. Authorities in most developing countries do not understand the social, economic and environmental benefits of the recycling and resource recovery activities carried out by scavengers. Consequently, urban planners and city administrators might consider scavengers as problems and municipal waste as health and environmental hazards. In contrast, the scavengers consider municipal waste as a source of their income. However, the mixed nature of municipal waste and the inclusion of hazardous waste and excreta (although in small quantities) in the urban waste stream, exposes the scavengers to health risks. These risks are exacerbated by power structures and aggressive behaviour within the groups of scavengers.

There is no formal organization of scavengers, a view supported by local authorities. This leads to the prevailing informal organization and exploitation of vulnerable groups, particularly women and children. Nevertheless, there is some degree of organization on the marketing side, where some scavengers sell their gatherings at the informal site on Julius Nyerere Avenue, and others who are involved in collection of cans, pack them for recycling.

In terms of management of the Hulene dumpsite, some level of organization is noticeable in the disposal of medical waste. For example, workers from the municipality ensure that the medical waste is burnt before leaving the site. However, given that effective disposal of medical waste requires very high temperatures, it is unlikely that

the potential health risks are completely eliminated considering the methods used to burn medical waste.

Scavengers do not benefit from any support from the national or local authorities. Neglect seems to be the prevailing policy and occasionally, oppression is practiced by the police.

The gender dimensions are strongly portrayed in the scavenging and recycling activities. Women are the most vulnerable group. They suffer from exploitation by a "strong group" of teenager scavengers. Women also suffer from verbal and physical abuse and are sometimes even subjected to rape. This contributes to their feeling of insecurity and it exacerbates their health risks. All scavengers are exposed to health risks due to the nature of their activity, which forces them to be in direct contact with waste, and sometimes with hazardous materials. Women perform diverse tasks (at home and in scavenging). This causes them to work long hours at the dumpsite just to survive. Nearby populations are also exposed to health risks due to the contamination of ground water, inhalation of smoke, bad odors and then also risk physical aggression perpetuated by the teenager groups.

The objectives of the study were to: identify the driving forces of scavenging activities; illustrate the organization of scavengers and scavenging activities; recognize the reactions of the national and local authorities to scavenging activities; understand the gender dimensions of scavenging activity and make recommendations to improve the health conditions of scavengers. The findings contribute materially to meeting these objectives.

The framework presents an analysis of the variables relevant to scavenging from the dumpsites. This facilitates a better understanding of the scavengers' activities and the formulation of suitable policy interventions. The framework can be used to direct further research on the subject addressed in this dissertation.

RECOMMENDATIONS

This study has shown that scavenging constitutes a means of livelihood for poor people. More than 500 hundred scavengers operate at the Hulene dumpsite. With an average household size of six people, 3000 people survive through the recovery from waste resources. In the Mozambican economy, prohibition of scavenging would be undesirable, since this activity brings benefits to the scavengers themselves and to society in general. The activity should be supported and stimulated and not persecuted.

- The municipal authorities should establish a policy which acknowledges the important role played by, and the benefits derived from the scavengers and their activities. The policy should promote the welfare of those depending on scavenging for survival.
- The municipal authorities should develop and implement a strategy to give effect to the policy. The strategy should consider the potential advantages of co-operatives which can provide a formal structure that would bring benefits to the scavengers.
- In the intervention by the municipal authorities they should bear in mind that women and children are important components of the informal recycling industry. They should recognize gender differentiation and pay particular attention to the needs of women scavengers.
- Importantly, while the bulk of the responsibility hinges on the municipality, it should be borne in mind that there is a strong need for the national government to establish an appropriate legal and policy framework. Only when such a policy and legal environment is in place can the municipality play an even much more focused role in waste management. This is a challenge beyond the scope of this study, but needs serious consideration in the future.

-
- The dumpsite is a source of materials that are purchased as input into some industries within Maputo. This is especially true for the paper, scrap metal and cans. This is an important finding, and future studies should consider incorporating this variable into the conceptual framework so that it can be investigated and hopefully understood better.

REFERENCES

I. PUBLICATIONS

Abrahamsson, H. and Nilsson, A. (1998) *Ordem Mundial Futura e Governação Nacional em Moambique*. Chalmers Reiprocentral, Göteborg

Austral (1998) *Proposta para a Elaboração de Estudos na Area dos Resíduos Sólidos de Maputo*. Conselho Municipal da Cidade de Maputo.

Aina, A. T., Anzorena, E.J., Davila, J. D., Mitlin, D., Satterthwaite D. and Bartlett S. (2000) *Poverty Reduction and Urban Governance*. "Environment & Urbanization" Vol 12 April (pp. 137-152). IIED London, UK.

Bless, C. and Higson-Smith, C. (1995) *Fundamentals of Social Research Methods; an African Perspective* (2nd ed). Juta and Co, Ltd, Cape Town.

Brown, A. M.M. (1998) *Revising Community Based Natural Resource Management: A case Study of the Tchuma Tchato Project in Tete Province, Mozambique*. University of Natal, Pietermaritzburg.

Brown, L.R. (1993) *State of the World. A worldwatch Institute Report on Progress Towards a Sustainable Society*. WW Norton & Company. New York.

Chambers, R. (1983) *Rural Development. Putting the Last First*. Longman, London.

Conselho Municipal de Maputo (2000) - *Proposta de Intervenção do Sector Privado no Serviço de Recolha e Condicionamento de Resíduos Sólidos*. CMM. Maputo.

Cornell, L. (2000) *Aid and Debt*, Unit 15. In De Beer, F. and Swanepol, H. (Eds.) *Introduction to Development Studies* (2nd ed) (pp. 245 – 269). Oxford University Press Southern Africa, Cape Town.

De Beer, F. (2000) *The Community of the Poor*, Unit 1. In De Beer, F. and Swanepol, H. (Eds) *Introduction to Development Studies* (2nd ed) (pp. 1 – 17). Oxford University Press Southern Africa, Cape Town.

Dejene, A. and Olivares, J. (1991) *Integrating Environmental Issues into a Strategy for Sustainable Agricultural Development*. The case Study of Mozambique. World Bank Technical Paper number 146, Washington, D.C. 20433, U.S.A.

United Nations Conference on Environmental and Development (UNCED) (1992) *Agenda 21: A Programme for Action for Sustainable Development*. United Nations, New York.

Elliot, J. A. (1999) *An Introduction to Sustainable Development* (2nd ed). Routledge, London.

GoM and UN (1990) *The Emergence Situation in Mozambique*. United Nations, New York.

Haan, H. C., Coad, A. and Lardinois I. (1998) *Municipal Solid Waste Management: Involving Micro-and Small Enterprises; Guidelines for Municipal Managers*. International Training Centre of the ILO, SKAT, WASTE.

Miles, M. B. and Huberman, A. M. (1994) *Qualitative Data Analysis: An Expanded Sourcebook* (2nd ed). Thousand Oaks, CA:Sage.

Morais J. (1988) *The Early Farming Communities of Southern Mozambique*. Central Board of National Antiquities and Eduardo Mondlane University, Department of Archaeology and Antropology, Maputo – Mozambique, Stockolm Sweden.

Moser C. O. N. (1993) *Gender Planning and Development*. Routledge, London.

Moçambique n° 23 (1998) *Quem tem Medo do Planeamento Urbano?*. Ministério para a Coordenação da Acção Ambiental (MICOA), Maputo, Moçambique.

Nhambire J. (1998) *Quem tem medo do planeamento Urbano*. Moçambique n° 23. Ministério para a Coordenação da Acção Ambiental (MICOA), Maputo, Moçambique.

✓ **Palmer Development Group, (1996)** *Evaluation of Solid Waste Practice in Developing Urban Areas of South Africa*, Water Research Commission (WRC)

UNEP/IETC (1996) *International Source Book on Environmentally Sound Technologies for Municipal Solid Waste Management*. Technical Publication Series n°6. UNEP International Environmental Technology Centre, Osaka/Shinga.

UNEP (1997) *Environmental Law Training Manual*, Published by the United Nations Environment Program. United Nations, New York.

UNITED NATIONS (1994) *Manual for Hazardous Waste Management*, Volume I Reference Text. United Nations, New York.

✓ **Rapten, L. K. (1998)** *Community Participation in Municipal Solid Waste Management in Developing Countries: The Role of the Informal Sector* UNDP/Yale Collaborative Programme the Urban Environment, New Haven.

ON-LINE REFERENCES

Appleton J. and Ali M. (2000) *Health care or Health Risks? Risks From Healthcare Waste to the Poor*. Well. URL:<http://www.lboro.ac.uk/well/studies/t326.htm>.

Digregorio M. (1995) *Recycling in Hanoi*. URL:<http://www.hartford-hwp.com/archives/25b/003.html>.

ECA/SRDC-SA. (1998) *Economic and Social Conditions in Southern Africa: 1996-97*, ECA Programmes SA-SRDC News and Publications, URL:http://www.uneca.org/eca_programmes/srd...ns/economic_social_conditions_in_s_a.htm.

Gibb, A. (1997) *Social Research Update*. Issue Nineteen, Department of Sociology, University of Surrey, Guilford GV25XH, England, URL: <http://www.soc.surrey.ac.uk/sru/SRU19.html>.

International Monetary Fund (IMF) (2000) *IMF concludes IV Consultation with Mozambique*, Washington, D.C. 20431 USA. URL:<http://www.imf.org/external/np/sec/pn/2001/pn0104.htm>.

Medina M. (1997) *Informal Recycling and Collection of Solid Wastes in Developing Countries: Issues and Opportunities*, United Nations University – UNU/IAS. URL: <http://www.ias.unu.edu>.

Medina M. (1998) *Scavenging and Integrated Bio-systems: Some Past and Present Examples*, Proceedings of the Internet Conference on Integrated Bio-Systems. URL: <http://www.ias.unu.edu/proceedings/icibs/medina/paper.htm>

Mozambican authorities (2000) *Republic of Mozambique Interim Poverty Reduction Strategy Paper*. URL: <http://www.imf.org/external/np/prsp/2000/moz/01/index.htm#ap-part2>.

Mozambique2 (Undated) *New business in Roads*

URL: <http://www.vegamedia.com/mozambique/mozam2.html>

✓ **Mongkolnchaiarunya J. (1999)** *Implementing Waste Management Projects in an Effective Way in Cambodia, Lao PDR, Vietnam and Thailand*, Urban Environment Management. URL: <http://www.cuc.ait.ac.th/tp/outreach/waste.htm>.

Oka, T. and Shaw, I. (2000) *Qualitative Research in Social Work*. URL: <http://pweb.sophia.ac.jp/~t-oka/qrs.html>

Ogawa H. (undated) *Sustainable Solid Waste Management in Developing Countries*, Paper presented at the 7th ISWA International Congress and Exhibition, Parallel Session 7. <http://www.soc.titech.ac.jp/uem/waste/swm-fogawa1.htm>.

Oepen M. (1992) *Waste pickers and the informal recycling Market in Indonesia – “A sector Analysis”*. URL: <http://www.bandung21.or.id/pdf/permulung.pgf>.

Peters, K. (1998) *Community-Based Waste Management for Environmental Management and Income Generation in Low-Income Areas: A case Study of Nairobi, Kenya*. (Edts): City Farmer, Canada's Office of Urban Agriculture. URL: <http://www.cityfarmer.org/NairobiCompost.html>.

Schienberg A. and Muller M., 1997 - *Gender and Urban Waste Management*, URL: <http://www.soc.titech.ac.jp/uem/waste/swm-gender.html>.

Schienberg A., Muller M. and Tasheva E. L. (1999) – *Integrating Gender into Community Waste Management : Project Management Insights and Tips from an E-mail Conference, 9-13 May 1998*. URL: <http://www.waste.nl/dochtm/wd12/wd12.htm>

Untitled document and undated document - published in
URL: http://www.globenet.org/preceup/pages/fr/chapitre/etatlieu/approchr//aang_e.htm
02/02/2001.

Van de Klundert, A. V. and Lardonnois, I. (1995) *Community and Private (Formal and Informal) sector Involvement in Municipal Solid Waste Management in Developing Countries*. URL: <http://www.soc.titech.ac.jp/uem/waste/swm-finge1.htm>.

The World Bank Group (2001) – *Understanding and Responding to Poverty*. URL: <http://www.worldbank.org/poverty/mission/up1.htm>.

APPENDIX

GUIDE FOR SEMI-STRUCTURED INTERVIEW FOR PEOPLE WHO WORK AT HULENE DUMPSITE

I am Leonor Joaquim Domingos, I'm a student at the Centre of Environment and Development at University of Natal and I'm doing my master thesis on "Waste Management in Maputo city: a case study of Laulane township". In Mozambique I'm working at Centro de Formação Agrária (CFA) Maputo and I do not belong to any local or national authority.

I am asking for permission to interview the people who "work" at this dumpsite in order to obtain information for my study of a Master's degree. The following questionnaire is intended to find out how people are benefiting from the materials they collect at the dumpsite in Laulane Township in Maputo and also what problems they experience. This questionnaire is confidential, people are not required to identify themselves and they may choose whether they wish to participate or not. The data collected at the dumpsite will be used for study purpose and may be used to inform the authorities on the importance of access to materials for the people who collect there. It will also help the authorities appreciate problems that I may experience. After collecting the data I will return to discuss my findings with those who chose to participate in the study.

A) IDENTIFICATION

1. Name (optional - this is to enable me to provide feedback on findings. Names will be confidential)

2. Would you like to be informed of the findings of the study? Yes _____ No _____

B) DRIVING FORCES OF SCAVENGING

3. For how many years have you been collecting things at the site? _____

4. What made you decide to collect from the site? _____

5. Where do you live? _____
_____ How far do you have to travel to come to the
dumpsite? _____

6. How long does it take you to travel from home to the dumpsite? _____

7. What time do you arrive _____ and leave _____ the site?
8. Is it important to be at the site on certain days _____ and at certain times _____?
9. If yes, on what days _____ and at what times _____?
10. How many days a week do you spend at the dumpsite? _____
11. If less than seven days a week why do you not spend more time at the site?

12. How do you travel to and from the site? _____
13. How much does it cost you to travel each day? _____
14. Did you have to obtain permission to collect at the site? _____
If yes, from whom? _____
15. Did you choose this site in preference to other possible sites? _____
If yes, why did you choose it? _____

16. What do you collect from this site? _____
Plastic bags _____, cans _____, bottles _____, fire wood, _____ construction
materials _____ wire _____, scrap metal _____, pills _____, others _____.
17. Can you collect anything you find useful or valuable? _____
If not, who determines what you may collect? _____

18. Do you take whatever you find or do you select certain items? _____
If you find something you do not require do you: leave it _____, give it to
someone else _____, or sell it to some one else at the site _____?
19. From the above range of materials which are the most valuable?
Plastic bags _____, cans _____, bottles _____, fire wood _____, construction
materials _____, wire _____, pills _____, others _____
20. Why do you think they are most valuable? _____

21. Why did you start coming to the site? _____

22. For what purpose do you collect materials from the dumpsite?
Selling _____, or household use _____, both _____, others _____
23. How many member of your family collect from the site? _____
24. What genders and ages are they? _____

25. How important are the materials collected for your household economy?
Critical _____, Very-Important _____, Important _____, not very important _____
26. How many people are in your household? _____
27. How many people and of which gender in your household earn income from
formal employment _____, from informal employment _____
28. For what do you use the income derived from materials collected at the
dumpsite?

29. Do you earn enough from your work at the dumpsite to maintain your
household? Yes _____ no _____.
If not, how do you supplement the household income? _____

30. Is your income from the materials collected at the site fairly stable or does it
vary a lot from one day to the next or from one month to the next? _____

31. If you are sick and unable to collect does someone else collect for you? _____
If yes, is it usually a family member? _____ or a friend _____
32. Do you mind telling me that how much you earn from this activity? _____
33. What are other sources of your household income? _____

C) ORGANIZATION OF SCAVENGERS AND SCAVENGING ACTIVITIES

34. Do you have to pay anything in order to collect materials from the dumpsite? _____

35. What determines how much you have to pay? _____
36. How much do you have to pay? _____
37. How often do you have to pay? _____
38. What happens if you are not able to pay? _____

39. To whom do you have to pay? _____

40. Who controls the use of resources from the dumpsite? _____

41. Do you experience problems with access to the site for collecting? _____
42. What problems do you experience in gaining access? _____

43. How do you overcome the problems you experience? _____

44. Is there a demand for the materials taken from the dumpsite? _____
45. How easy is it for you to sell the materials you collect?
Very easy (rank for each material) _____ easy _____ not very
easy _____ quite difficult _____
very difficult _____
46. Has the demand changed since you have been collecting? _____
How has it changed? Much more difficult _____, More difficult _____ easier
_____ much easier _____.
47. Do you sell to a middle person(s) or directly to the market? _____

48. Why do you choose to sell directly _____ or through a middle
person(s) _____.

49. Does the middle person(s) purchase from you at the dump, or do you take the items to him / her? _____

50. Where is his or her site located? _____

51. How is the price for the materials established? _____
 If you sell directly to the market do you have a site from which you sell your items? _____
 If you have a site, who sells your gatherings? Family members _____
 Genders _____ and age _____.
 Friend/partner _____ genders _____ and age _____
52. Where is your site? _____
 How long have you had the site? _____
53. Do you have to pay for it ? yes _____ or no _____
 if yes how much? _____
 To whom? _____
54. Do you experience problems with your site? _____
 If yes what sort of problems do you experience _____

55. Do you have to pay the person(s) who operate at your site? _____

56. How do you determine how much to pay? _____

D) ORGANIZATION OF PEOPLE AT THE DUMPSITE

57. How many people are engaged in collecting at this site? _____
58. Do you think that there are too many people at the site? _____
 (Explain your answer) _____

59. Are the people collecting at the site organised in any way?

60. If yes describe how they are organised and operate _____

61. Do problems arise between people collecting at the site? _____
If yes describe the problems and explain how they are resolved _____

62. Do you specialize in the collection of certain materials? Yes _____ no _____
If yes, which materials? _____

63. Why are you collecting those materials? _____
Bigger demand _____, higher value _____, easy to store _____ easy
to transport _____, others _____.
64. How do you transport material away from the site? _____
Do you have to pay to transport material? _____ If yes how is the price
determined? _____

65. Do you store the materials collected from the site? _____
If yes, where? _____
66. What facilities do you have at the site? access to toilets _____, access to
clean water _____, storage place for your food and personal effects _____
67. Is theft of materials a problem? _____ Very serious _____, serious
_____, not very serious _____, not a problem _____.
68. What do you do if materials are stolen?

E) THE REACTION FROM THE NATIONAL AND LOCAL AUTHORITIES

69. Are authorities active at the site?
Continuously _____, regularly _____, occasionally _____, seldom _____, never _____.
70. What is the attitude of the authorities at the site?
Very supportive _____, supportive _____, not supportive _____, antagonistic _____.
71. What problems with the authorities do collectors experience at the site? _____

72. How are these problems resolved? _____

F) GENDER DIMENSION ON SCAVENGING ACTIVITY

73. Do men, women and children collect from the site? _____
74. How many women are involved in this activity? _____
75. Is gender important in the control of collecting at the household level _____ at the site level? _____.
76. Is the collection of materials at the dumpsite divided by gender? _____

77. If yes, what do the women take in the dump site? _____

78. Do women sell their products? _____ or they use at home? _____
79. If they don't sell on the market what are the reasons? _____

80. Does gender determine what women may do with the materials collected in dumpsite? _____

81. Does gender determine what women may do with the money they obtain from selling materials collected from the site? _____

82. Do women work with children at the dumpsite? _____

83. What ages and genders of children do you have working with you at the site? _____

84. How many children, what ages and gender do you have that are not working at the site? _____
Why are they not working at the site? _____
If not working at the site who takes care of them at home? _____

85. While women are working at the dumpsite who does the households activities?

86. Do women work the same hours as men? yes. _____, or no _____
If not why (explain the reasons) _____

87. Which are the hours or period of time which women prefer? _____
Why? _____

88. What problems do women experience working at the site? _____

89. In what way, if at all, are these different from those experienced by men? _____

90. What is the marital status of the women which are working at the dump site?
Married? _____ if married, is your husband also involved in the activity at the
dump site? yes. _____, or no _____
Single? _____ Are you the head of the household? yes. _____ or no. _____
If yes how big is your household? _____
If no who is the chief of the family or the head of household? _____

G) PERCEPTIONS OF THE HEALTH RISK

91. Does working at the site cause you any health problem or ill effect? Yes ____ or no ____.
92. If yes, what are those problems? _____

93. From the problems you have mentioned which are the most common and most serious? _____

94. Have you had to visit a clinic and/ or doctor due to that problem? _____

95. How often do you have to visit a clinic and/or doctor due to health problems that you believe are a result of working at the site? _____

96. Which clinic, hospital or health practitioner did you visit? _____
97. Do you take any precautions to minimise health risk? _____
if yes what are they? _____
98. Are there any controls over what you may and may not collect because of potential health risks? _____
If yes, who imposes those controls and do you support the regulations? _____

99. Are there items you do not collect because of the health risk?. yes ____ No ____
If yes, which items do you avoid? _____

100. Are there other people who collect these items? _____

101. Do you treat the items that you collect in any way before you sell or use them?

102. What are the reasons you believe it is necessary to treat them? _____

103. Where do you treat them? _____

104. How do you treat them? _____

105. How do you dispose of waste? _____

106. Do you take any precautions when treating these items? yes ____ or no ____
If yes which precautions do you take? _____

107. Where do the materials at the site come from? _____

108. Are there sources of items which you believe are potentially hazardous? ____
If yes, which sources? _____

109. Are potentially hazardous materials dumped separately at the site? yes ____
No. _____. If yes, Where are the hazardous materials dumped?

110. Does the place for hazardous materials receive a special treatment? Yes ____
No _____. If yes, Which treatments are imposed in the hazardous material
place? _____

111. Do people living near the site complain about the site? Yes ____ No _____.
If yes, what do they complain about? _____

112. Do the people live at the dumpsite? Yes _____ or no _____.
If yes, since when have they lived the dumpsite? _____
_____ and why do they live there? _____

113. Do people cook at the dumpsite? Yes _____ or no _____.
If yes, who practices this activity? People who live at the dumpsite? _____
or people who come to the dump site for collecting? _____

114. Which meals do they prepare? Breakfast _____ lunch _____ dinner _____.
115. Do people practice crop production at the dumpsite? Yes _____ or no _____
116. Where do those people come from? Neighborhoods or are they the same people who live at the dumpsite _____ work at the dumpsite _____?
117. Are there any problems between the people who do agriculture and with the people who collect the materials from the site? _____

This is the end of interview

Thank you very much for your time and collaboration.
Maputo, September
2000