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**PROJECT PROPOSAL FOR SOLID WASTE COLLECTION RUMBEK MUNICIPAL COUNCIL.**

**A PROJECT REPORT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DIPLOMA IN WATER, SANITATION AND HYGIENE (DIPLOMA WASH) IN THE UNIVERSITY OF STRATEGIA NETHERLAND**

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ABSTRACT

There exists excellent opportunities for Rumbek municipal council to provide a wide range of urban services including waste management in the informal settlement, which have a direct positive impact on community health, creation of employment, income generation and poverty reduction.

The purpose of this study is to see how a municipality involves the community in the solid waste management project in order to solve the problem of uncollected waste after the failure of Rumbek town council to do so. The study examines the performance of the existing solid waste collection and disposal practices, community willingness to participate and identifying problem s relating to the solid waste management system of the Rumbek community. The findings have been used in preparing an improved solid waste collection project proposal required by the municipality.

ABBREVIATIONS:

CBO:-Community Based Organization

CDS: - City Development strategy

EPM: - Environmental Planning Management

IDP:-Integrated development Plan

RMC:-Rumbek municipal council

MSW: - Municipal Solid Waste

NGO: - Non Governmental Organization

RCC: - Refuse Collection Charges

SWM: - Solid Waste Management

DWSH: - Directorate of water, sanitation and hygiene.

IPHR: - inspector for public health Rumbek

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CHAPTER 1 INTRODUCTION.

Rumbek municipality was established in 2016 after south sudan got her independent, it was administered by town clerk under town council lakes state.

It has been realized that the task carried out by town council was big and it need to be promote to became municipal council, the department of solid waste management employ many people under two umbrella the supervisors and the waste collectors who were basically mandate in market and public institutions.

The social norms of Agar community of Rumbek and public perception about waste collector has cause stigma to people who accept to work as waste collector in the market giving some people low opinion of this job.

The area being used by municipality is just an open field which has not been fence; it is 4 km away from town (P.D.U waste field)

**1.1 overviews**

A common problem among Rumbek community is lack of appropriate institutional

Mechanisms to carelessness address the solid waste management question. Rapid urbanization, abject poverty and inadequate management capacity at the municipal level have constrained the ability of municipalities to provide basic collection and disposal services, resulting into numerous social and environmental ills. Urbanization and rapid economic growth in the country has resulted into large increase in refuse output

Solid waste management (SWM) is one of the basic services that are currently receiving wide attention in the urban agenda of many developing countries. Seik (1997) has reported that lack of effective SWM can result in environmental health hazards and has negative impact on the environment. This extends wider than just the geographical boundaries of the town or municipalities.

Inadequate solid waste collection services in unplanned urban settlements are one of the serious problems in South Sudan. In most cases the majority of the uncollected waste is generated in the poorer neighborhoods. The city is growing at a rate of 7% per annum and it is estimated that about 70 % of the population live in informal or unplanned settlements. There are several reasons why it is often a low priority to collect solid waste from low-income areas. These include difficult access, low social status, and lack of land tenure, awareness, lack of incentives to collectors and lower value of waste produced.

**1.2 Background information of the Rumbek Municipal council**

**1.2.1 Background**

Rumbek municipality was first called town council in 2005 when C.P.A was sign headed by the appointed person called town clerk.

The roles and responsibilities of town council were to oversee the risk of poor sanitation by establishing waste management department under the supervision of (IPHR) inspector for public health Rumbek town council.

It has status of being governmental institution located in the town near freedom square and Akon Buoi cultural center is behind it.

**1.3 Problem Statement**.

Poor solid waste collection and disposal is a threat to public health and reduces the quality of life for urban residents’ especially in-unplanned settlements. Rumbek area is one of the typical examples of such settlements. The municipal council has failed to solve the problem of solid waste management in P.D.U field of Rumbek municipality as evidenced by roadside heaps of uncollected waste. The municipal council engaged a private contractor in the area who failed to provide the service in this unplanned area. Reasons for the failure include difficult access due to insecurity, low social status, lack of awareness and lack of incentives to collectors and lower value of waste.

**1.4 research hypothesis**

To study the existing solid waste management practices and collect information which will assist in preparing a solid waste collection project proposal required by the Municipality of Rumbek.

**1.5 Research Objectives**

The objectives of the research are:

- To examine the performance of the existing solid waste collection and disposal practices.

- To establish whether the community is willing to participate and contribute towards solid waste management.

- To identify and locate where the problems are within the solid waste management system.

- To use the research findings for designing an improved and sustaining solid waste management project proposal.

**1.6 Research Questions**

In order to achieve the above objectives, the following questions should be answered;

- What are the existing methods practiced in the collection and disposal of solid waste?

- How does the community participate and contribute towards solid waste management?

- What are the problems related to the solid waste management system?

- How can the delivery of an appropriate solid waste management service should be improved and sustained?

**1.7 Rationale and Significance of the study (justification of study)**

Provision of basic infrastructure services to the urban poor and ensuring their right to livelihood and access to resources is central to the concept of urban sustainability and poverty eradication in developing countries. According to UNCHS (1996) one way of estimating the scale of poverty in urban centers is to base it on the number of people who live in poor quality houses or neighborhoods that lack the basic infrastructure services such as SWM.

Several approaches have been suggested in order to improve SWM in developing countries including Tanzania. Chan, (1998) has reported environmental awareness campaigns through mass media and advertisements to promote public awareness on SWM and other environmental issues. In another study, Anjum and Deshazo, (1996) proposed an approach based on integrating demand-side information into the planning, Kaseva and Gupta (1996), Seik (1997), and Kaseva (2001), recommended an enhanced solid waste recycling as a sustainable approach towards SWM in developing countries. One of the SWM approaches adopted by Dar es Salaam City Council is contracting out waste collection and disposal services to private solid waste collectors and disposal contractors.

The problem of accumulation of uncollected solid waste particularly in low priority areas such as unplanned settlements has contributed to poor sanitation and low quality of life.

To a large extent the solid waste collection efficiency depends on the involvement and participation of the communities themselves in supporting the whole concept.

Furthermore, it also depends on the useful information and lessons from current best practices in the provision of this important service. Such information and lessons can be obtained only through research and studies; hence a research such as this can assist in the improvement and performance of solid waste management in the urban settlements.

**1.8 Research scope and limitation of the study.**

The study will examine the process of solid waste collection practice in Rumbek town and P.D.U areas. The sample size is 200 households represented by the heads of the households and community leaders obtained through stratified random sampling of the two areas. Equal chances were given to the members of the community from the two streets and also the representation provides the same community status. Due to limited resources in terms of time and finance the sample represents 18.6 % of the total households at Rumbek.

CHAPTER II

**2.0 LITERATURE REVIEW**

The review was based on empirical sources, theoretical reviews and policy papers, where a number of books, publications, journal articles and Acts have been cited- Also articles (electronic) from different web sites were cited.

**2.1 Theoretical Review**

***Solid Waste Management definition*.**

This is a term used to refer to the process of cleaning the environment by getting rid of the solid waste materials. Yhdeg o Ibid, (1985) defines SWM as the entire process of generating waste, collecting and transporting waste, and storing waste at transfer stations, street cleaning, disposing waste and waste recovery, recycling and reuse. Justine Ansch, (2001) on his part defines community based solid waste management projects as activities carried out by members of the community to clean up their neighborhood and or to earn income from solid waste. Examples are collection of solid waste, the sale of recyclable, recycling and composting activities.

**2.1.1 Conventional Approaches to Planning of solid waste management of the urban Environment**.

In this approach the municipal councils is the sole responsible party in managing the solid wastes. They collect the waste from source in the communities, Central Business district (CBD), industries and institutions and transport it to the disposal sites. (Mgana S, 1996) For centuries, efforts to address the urban planning and management have been guided by conventional approaches (Armstrong, 1987, Mattingly 1988 ; Halla, 1999 , Majani, 2002). I n developed countries mechanisms of conventional approaches have successfully tackled these challenges and many evidences of such successes are remarkable in the United States of America, the United Kingdom, Germany and the rest of Europe (Halla, 1999, 2002). The same approaches have been used to tackle similar challenges in the developing countries including Tanzania with very little success not able to provide significant solutions to major problems including solid waste management.

Management of Municipal Solid Waste (MSW) presents a major challenge for many Sub -Sahara African cities where rapid growth, social and cultural changes, wide spread poverty, inadequate an d weak local governance and limited financial resource s all contribute to increasing pollution and waste disposal problems. (Onibokun, 1999 in Karanja e t al). The inability of responsible local authorities to provide effective and reliable solid waste management services including solid waste disposal (Kalwani ,2003) Onibokun, (1999) also found that there are several problems related to SWM caused by conventional approaches. For example, inappropriate solid waste management causes air, soil and water pollution leading not only to environmental degradation but also to a growing catalogue of human health problems. Irresponsible solid waste dumping contaminates surface and ground water supplies. In industrial and urban areas, washing "away" solid wastes can clog drains, creating stagnant water for insect breeding and potential for floods in rainy seasons. Uncontrolled burning and irresponsible incineration has a significant influence on air pollution. Organic wastes dumped in landfills generate greenhouse gases, and untreated leachate pollutes surrounding soil and water bodies such as ground water supplies. These environmental problems include only the impacts of solid waste disposal; they exclude the impact of environmental damage resulting from extraction of resources and processing materials, and the World Bank estimates that 95 percent of a product's environmental impact occurs before it is discarded as solid waste.

Problems of waste accumulation have become a serious threat to the health situation of many of its inhabitants. Overall, mechanisms of conventional approaches have been failing to address urban challenges (World Bank 1986, in Halla 1999:9 4 World Bank 2001:13). According to B.K Majani, (2000), the failure of the conventional approaches has resulted into a set of complex environmental problems that require more effective approaches to address. The conventional approaches have failed to address problems due to their serious conceptual and practical weaknesses, Halla, (1994). The diagram below illustrates the conventional approach (see figure No 1).

Figure No 1: Solid waste Management Model before EPM Intervention

|  |
| --- |
| Problem  Approach  Mechanism  Output |

**2.1.2 Alternative Approaches to Planning of SWM of the Urban Environment.**

EPM is an alternative approach to urban planning and management has been introduced in preference of conventional urban development planning and management approaches based on grounds that issues that need to be addressed in cities, as already pointed out, are beyond the competence of only conventional approaches (Majani, 1998). The aim of EPM is to enhance the capacity of actors in the public, private and popular sectors to planning and manage the urban environment. In practice however, EPM does not differ significantly from the conventional approaches, except that it is flexible and embodies transparence, acts on priority issues that are crucial t o a community, emphasizes partnerships and the need to tap private sector resources to provide public services (Majani, 2002).

Many countries have thus responded to the problem of urban waste by introducing solid waste management systems that encourage a public/ private partnership. Community groups are encouraged to form associations that deal among other issues with the solid waste management. Private contractors have also been invited to participate.

Solid waste management is a public service and local governments or respective municipal agencies are basically responsible for its delivery. It is therefore imperative that municipal authorities remain in charge of this task to achieve an overall consistent SWM system on a municipal-wide and regional level. However this does not mean that government authorities have to deliver the actual collection services themselves. In fact, private enterprises or CBOs can, under appropriate conditions, provide solid waste collection, transfer, transport, and disposal services more efficiently and at lower costs than the public sector (Mgana S, 1996). It is evidenced that communities are more than willing to provide for themselves urban service like waste management when local authorities are unable to do so (Kim Peter, 1998).

The Government role then shifts to that of facilitator and supervisor of the service. It is undeniable that every collection scheme, including non-governmental approaches, requires some support from the municipal authorities to achieve sustainability. Hence, municipal enterprises an d organizations must be included whenever possible in the planning of such schemes. The diagram below illustrates the alternative approach of planning SWM in the urban environment (see figure No 2).

Figure No 2: Solid Waste Management Model after EPM Interventions

Problem

SWM

EPM

Approach

Mechanisms

The RMC and CBOs as lead partners in the partners in SWM practices provision

Participation and partnership between the actors in the public, private and popular sector

Waste generation; household , business operators, institutions and industries now in the provision of SWM services.

* Timely and reliable SWM services
* Enhanced environmental cleanliness
* Job creation and income generation

Outputs

**2.2 Empirical Review**

Economic development, urbanization and improving living standards in cities, have led to increase in the quantity and complexity of generated waste. Management of Municipal Solid Waste (MSW) resulting out of rapid urbanization has become a serious concern for government departments, pollution control agencies, regulatory bodies and also public in most of the developing countries. Rapid growth of population and industrialization degrades urban environment and places serious stress on natural resources, which undermines equitable and sustainable development. Inefficient management and disposal of solid waste is an obvious cause for degradation of environment in most cities of the developing world. A review of case studies below justifies the situation in different developing countries.

These case studies include the solid waste management i n Dar es salaam city by

Mbuligwe and Kassenga, (2004) followed by a case study of KIMWODA a CBO in

Kinondoni Hanna Nasif Dar es salaam by B.B.K.Majani, (2000). Experience from other developing countries include case studies of solid waste management in Cape Town by Fourie F, 2000; A case study of solid waste management in Dhaka City, Bangladesh by Syed Mohmood Anwar, (2005) ; A community based initiative s in solid waste management a t Faisalabad in Karachi by Mansoor Ali an d Marielle Snel and a case study of solid waste management in Mumbai (India) by Sarika Kansal (2001)

**2.2.1 Existing solid waste management practices in Rumbek .**

In the study of Rumbek town- and P.D.U area in western lakes state Rumbek, the problem of SWM has been addressed through the mechanism of both conventional and alternative approaches to urban planning management The conventional practices have largely been unsuccessful therefore coordinated efforts under EPM practices have been adopted.

**(a) The waste stream and waste disposal practices**.

The major source of RUMBEK solid waste can be categorized as; households, commercial, institutions and street refuse. In south Sudan, the waste stream encompassing all sources of waste includes; self- disposal, discharge, illegal dumping, recycling, collection, and final disposal as reported by RUMBEK town and P.D.U, (2017). I n the case of self-disposal, the waste generated by a source is disposed of by the source itself within its premises. Typical examples of self-disposal methods are burying of waste in pits and burning. Discharge means that the waste generated by a source is given away to a waste collector or discharged at a certain place from where it can be collected by another party. This includes placing the waste at an approved collection point or in a waste collection truck.

Illegal dumping implies that the waste generated by a source is dumped in the vicinity of the source or in a place where such a practice is prohibited, such as at the roadside, in open spaces, in drains, and in valleys. Recycling means the waste generated by a source is sold or given away for reuse or recycling. Common items for recycling include paper, plastic, metal and glass. In the case of collection, the waste generated by a source at a certain place is collected by another party for transport to a final disposal place. Some scavenging may take place prior to the collection. Final disposal implies that the waste collection is transported to the official city disposal site.

**(b) Waste collection and transportation**

The two researchers also established that, the existing system of waste collection involves collection and transportation of waste from source or intermediate points in the waste stream to the disposal point. Typically, trucks with a 7 tons capacity and higher are used for long distance transport. Handcarts are used to collect and transport waste from neighborhoods that are inaccessible by motorized vehicles. The handcarts usually discharge at a point from where DCC trucks pick it for eventual transport to the disposal site. Handcarts are also used for collection and transportation of waste to unofficial transfer points or illegal disposal sites. In addition to the DCC, there are licensed private contractors who provide solid waste collection services. Large institutions and industries collect and transport their waste to the disposal site on their own or using contractors

Major problems facing solid waste collection and transportation services in the city include inefficiency of the transportation system due to frequent vehicle breakdowns; inadequacy of collection vehicles; and inaccessibility of some waste sources, such as unplanned undeveloped areas due to poor road conditions . Additionally, crew productivity is low. Furthermore, some private contractors’ returns from waste collection services provision are non-economic except in commercial or industrial areas. These problems are aggravated by non-enforcement of relevant solid waste management by laws and regulations by the DCC.

**(c) Resource recovery and recycling**

Recovery of resources form solid waste is achieved mainly through recycling, which is mostly practiced by individuals. Kaseva M. E, (2002) comment that recycling provides an opportunity to recover some benefits from municipal refuse; particularly in the form of long term energy and resource savings. At the same time while waste disposal prevents environmental degradation and pollution, benefits in terms of energy and useful materials are obtained from what is otherwise unwanted and offensive materials. It is therefore currently widely accepted that the sustainable approach to waste management must emphasis waste reduction from the generation point, recycling of the materials and recovery of nutrients, chemicals and energy values of the waste.

Resource recovery takes place to different extents at the source and disposal places, and applies mostly to household and commercial waste.

**(d) A Case study of SWM in Dhaka City Corporation (DCC)**

DCC employees, who are responsible for waste management service, were not working with professional attitude. They would like to see CBO taking the whole work at local level. Note that, they do not have proper guidelines and criteria for selecting CBOs for this job. DCC did not do proper monitoring on the waste management a t field level.

Moreover, modern and effective technology was lacking in DCC. When many developing countries are practicing GIS as a modern tool for waste management in their cities, DCC thinks GIS as simply a tool for map presentation. DCC does not have the skilled and trained manpower of GIS technology that can provide adequate support to the Conservancy Department of DCC for proper waste management. In these circumstances, the possible way to integrate GI S for solid waste management can be engaging consultant who can contribute independently. As for example, the consultant can check how the existing waste bins are serving the community. Then he can find out some suitable locations for the new waste bins. As first he can choose a smaller area of Dhaka city. Then DCC can implement the consultant's proposal in that area and evaluate the performance of the proposal in the time being. GIS thus be integrated partially in DCC for solid waste management.

(i) How GIS finds an optimum location of waste bin

GIS is practiced for solid waste management elsewhere in the world including some developing countries but not in Bangladesh. He found that, DCC has no guidelines for locating waste collection bins in an area. They do not even have any proper instrument to analyze how the waste bin serves the people around. In these circumstances, he used GIS to analyze the existing service area of the waste bins in Kalabagan and then select some suitable locations of the waste bins in the area.

He got the actor (household)'s view that, they need to have waste bin nearby or walking distance. Then he needed something that could help him to analyze the spatial and service coverage of the existing waste bins. With the GIS interpretation, he could easily analyze that the existing bins are too few and not located well to get a good service area.

In addition, the service areas of the three existing bins are overlapping each other to big extent. GIS interpretation also shows that most of the Kalabagan area is not covered by the existing waste bins within acceptable distances.

(ii) Simply GIS is not enough optimizing the locations of garbage collection point s to ensure efficiency and cleanliness is ambiguous. However, an improved solid waste management is not possible without an immense amount of grass roots interaction.

He observed Solid Waste management (SWM) is not simply a matter of technology or GIS. GIS in a way can deliver an ideal, preferable system but it cannot make things work without proper participation of all the stakeholders. When he worked with GIS to find out suitable locations for the waste bins in Kalabagan area, it seems that modern technology could solve the problem. However, in practical situation the work might not g o with the theoretical result, especially where people and other actors act otherwise. In this case the analysis of the actor's perspective in solid waste management in Kalabagan area becomes important. GI S can participate to the solution of problem by producing alternative technical solution, but there are some social factors and practical conflicts remain unconsidered. He concluded that the solution, which comes out after GIS interpretation, might not work if the social, cultural and other malpractice will not be overcome. The actors need to behave, as they are supposed to. In a third world country like Bangladesh the systematic and well-behaved actors may be expected in a remote future. So, any solution should be worked out within the frame out of the existing actor's environment. Though the modern technology like GIS cannot have direct benefit for implementation work, but it has fruitful utilization in other way when the authority needs to seat with different stakeholders to resolve the conflict among each other.

CHAPTER III

3.0 RESEARCH METHODOLOGY

3.1 Introduction

Both qualitative and quantitative methods were used to collect primary and secondary data in the form of self-administered questionnaires that were used to obtain important information about solid waste collection in Rumbek area. Each item in the questionnaire was developed to address a specific objective of the study. Heads of households and the community leaders completed the questionnaires and responses were good from all respondents approached. Also, interviews were used via municipal councils and local authority leaders for other issues not covered in the questionnaires. Observations and past experience of the researcher were also part of the methodology in this study.

**3.2 Research Design**.

Figure No 3: Research design Methodology

The study is designed as shown on the followings chart:

Selection of study area SWM

Identification of study area

Literature review

Problem identification

Objective of the study

Scope and focus of the study

(Solid waste collection)

Selection of targeted case study (Rumbek municipality)

Secondary data collection literature

Primary data collection

Conducting final interviews

Structuring final interview question

Analyzing the shortcoming & feedback

Questionnaire, literature and observation

Presentation of the finding

Analyzing of the finding

Proposal for solid waste collection

Areas of further studies

Future guidelines & recommendation

**3.3 Unit of Inquiry**

The major unit of inquiry was the two areas of RUMBEK and P.D.U areas, which are under Rumbek municipal council Respondents from the two areas came from heads of households and community leaders.

**3.4 Sampling Techniques**.

Both stratified random and simple random sampling has been used to select major units of inquiry for the study. The sample size was 200 households represented by 185 heads of the households obtained through stratified random sampling and 1 5 community leaders of the two areas and simple random sampling of the selection of households.

This was done in order to give equal chances to the members of the community from the two areas and also the representation provided the same community status.

**3.5 Data Collection methods**

Questionnaires, interviews and observations have been used in this study to obtain important information about solid waste collection. Each item in the questionnaire was developed to address specific objective of the study including examining the performance of the existing solid waste collection. Structured or closed ended and unstructured open-ended questionnaires were formulated for the purpose of this study.

Self-administered questionnaires were distributed to the heads of households and leaders in the community. This was done so to make sure there is proper understanding of the questions and return of all questionnaires (See appendix No 5 of data collection and processing)

Structured and unstructured interviews were another source of primary data collected.

Interviews were conducted with the CBO leaders, local government leaders including two cell leaders, ward chairpersons of the two areas (RUMBEK and P.D.U) the inspector for public health Rumbek and the municipal Solid Waste management Officer mention a few.

Observation was done by several visits in the community. Another method used to collect secondary data used was literature review. Review of different materials

**3.6 Data Analysis Methods**

Once the questionnaire has been administered, the masses of raw data collected were systematically organized in a manner that facilitated analysis. Both descriptive and statistical analysis was anticipated; therefore the responses in the questionnaire were assigned numerical values. Coding, entering data and analysis was done using Microsoft Excel

CHAPTER IV

4.0 STUDY FINDINGS AND RECOMMENDATIONS

**4.1 Introduction**

Cleanliness is a major factor that influences development of any nation, which is otherwise hampered due to improper solid waste practices. Rumbek municipal council has great opportunity in solving this problem in the community.

Starting a community solid waste collection project needs a prior study of the community, which will assist in understanding extent of the problem, the existing and expected success and challenges of the project.

The findings of this study include the demographic features of the community, the existing solid waste practice s in terms of collection and disposal methods and the condition of the cleanliness in Rumbek. Other findings include the community participation in terms of the level of awareness, acceptance of payment of refuse collection fees and the community health. The recommendations of the findings aim at enhancing the solid waste collection project in the community.

**4.2 Demographic features**

One hundred and eighty five (185) heads of households and fifteen (15) community leaders were approached an d completed the questionnaires from the two area s of Rumbek and P.D.U. The respondents were mal e 60.20 % while women were 39.80%. Background characteristics of the respondents include age, sex, education and source of income. These parameters were used in one way or another to assess whether any or some of these have any influence on the respondents behavior.

The study indicated that out of the 200 respondents, 10 5 (52.5%) were of young generation between 18-3 4 years, while 84 (42%) were aged between 35-59) and the remaining 11 (5.5%) were old people of over 60 years (see table 1 below).

Table No. 1: Categorized age of respondents

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | frequency | Percentage | Accumulative% |
| Age between 18 and 34 | 105 | 52.5 | 52.5 |
| Age between 35 and 59 | 84 | 42 | 94.5 |
| Above 60 | 11 | 5.5 | 100 |
| Total | 200 | 100 |  |

Source: Field study, 2004

The above information shows the existence of the working group estimated to reach 94.5% (i.e. 52.5% added to 42%) of the Rumbek community, is able to participate in solid waste collection both in terms of employment and payment of the refuse collection fees.

**4.3 Solid Waste Management Practice in Rumbek.**

The solid waste collection and disposal practice in the two areas of Rumbek and

P.D.U was similar due to the fact that, private contractors were engaged in the areas.

The collection capacity is low, not able to reach most of the community members. Apart from their low incomes, 54.05% of Rumbek community agrees to participate in the cleaning programme to make their environment clean.

Table No. 2: Participating in existing cleaning program

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | frequency | Percentage | cumulative% |
| Yes | 100 | 54.05 | 54.05 |
| No | 85 | 45.95 | 100 |
| Total | 185 | 100 |  |

Source: Field study 2004

Information from the inspector for public health and Community leaders shows that the contractor serving Rumbek town area dropped the service. The reason for dropping the service could be similar to those provided by Adrian Coad, (2003) i.e. difficult access, low social status, and lack of awareness, lack of incentives to collectors and lower value of waste. However, the major constraints facing the contractors include high cost of transportation of municipal waste to the dumpsites at P.D.U area in Rumbek county and lack of required working tools and safety gears. The only tipper being use by the municipality is in poor running condition with frequent breakdowns blocking the poor accessible roads sometimes with loads of refuse collected which threaten the health an d sanitary condition of the community. Most of the contractors consider solid waste collection as a small business notwithstanding its high cost of operation.

Apart from the contractors there are informal solid waste collectors and scavengers. The informal solid waste collectors do house to house collection at individual households as requested. This is not practiced in Rumbek area, which is lacking the contractors' services. The informal collectors normally practice illegal dumping and some dump the waste along the main road where the municipal trucks can collect. The scavengers collected materials such as metal, bottles both plastic and glass from the collected waste to be transported and from the surroundings within the households.

**4.3.1 Waste collection and disposal methods**

Illegal dumping is a common practice in most of the unplanned settlements. It ranges from burning the waste, burying and illegal dumping sites. At least a good number of people, (56.76%) use dustbins to collect waste before disposition. 27.03% burry or burn their waste but it is very difficult to such a congested area, which shows that they will resort to join those who throw waste everywhere (16.22%).

Table No 3: Waste disposal Method

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | frequency | Percentage | Cumulative % |
| Burry/burn | 50 | 27.3 | 27.3 |
| Dustbin | 105 | 56.76 | 83.78 |
| Anywhere | 30 | 16.22 | 100 |
| Total | 185 | 100 |  |

Source: Field study 2004

According to the Rumbek Municipal council (Waste Management and Refuse Collection Fees) By-laws section 5 under the Local Government Finance Act of 2008 which was repealed in 2017, " every occupier and or tenant of any residential dwelling shall provide and maintain to the satisfaction of the authority, a receptacle for domestic refuse of not less than 50m3 and fitted with a good and effective lid and shall daily cause to be placed within such receptacle the domestic refuse from the said residential dwelling in so far a s the said receptacle shall be sufficient to contain the same. "

Although 56.76% of the respondents admitted to keep their waste in dustbins for easy collection by the contractor, but the researcher observed that 95 % of the storage containers do not conform to the requirement s of the municipal bylaws. Storage containers such as open baskets, plastic bags and polythine bags have been used instead. There was no separation of organic and non-organic waste, which simplifies sorting of materials for recycling or reuse.

**4.3.2. The condition of cleanliness**.

About the condition of cleanliness at their locality the stud y revealed that 19 % respondents claimed to be good, 43.5% said it was fair and 37.5% claimed that it was poor (table No. 4 below).

Table No.4: Condition of cleanliness

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | frequency | percentage | Cumulative % |
| Good | 38 | 19 | 19 |
| Fair | 87 | 43.5 | 62.5 |
| Poor | 75 | 37.5 | 100 |
| Total | 200 | 100 |  |

Source: Field study, 2004

**4.4. Community Participation in SWM**

**4.4.1 Level of awareness**

The public awareness on environmental issues is an important aspect, which cannot be overlooked. This is because, for sustainability purposes of SWM, the first stakeholder is the producer of the waste. This means awareness is necessary and should be given its due weight. The level of education of the people facilitates the understanding and solving the environmental concern. There is a great relation between education and awareness. The level of awareness of a person depends on the level of education. The more educated one is the more sense of awareness on different aspects is expected.

Table No. 5: Education Levels

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | frequency | percentage | Cumulative |
| Higher education | 17 | 8.5 | 8.5 |
| Secondary | 50 | 25.0 | 33.5 |
| Vocational training | 27 | 13.5 | 47.0 |
| Primary | 100 | 50.0 | 97.0 |
| Adult education | 4 | 2.0 | 99.0 |
| No education | 2 | 1.0 | 100 |
| Total | 200 | 100 |  |

Source: Field study, 2004

The survey revealed that above 50% of the community have not reached above primary education level, which gives a picture of the low education level for people residing in that area.

According to (REPOA, 2003) baseline report 12.5% of the community members were without any education. In this case majority of the community members are illiterate therefore it is rather difficult for them to digest some concepts, which are necessary for proper waste management practice. Although the level of awareness see m to be low, about 70.8% of the community member claimed to be aware of the local government duties on solid waste. From the survey it has been noted that even the level of awareness of community leaders is low.

Some respondents (46.67%) from leader's category claimed that they were not satisfied with the government participation in solid waste collection, (table 6).

Table 6: Satisfied with government participation

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | frequency | percentage | Cumulative% |
| Yes | 8 | 53.33 | 53.33 |
| No | 7 | 46.67 | 100 |
| Total | 15 | 100 |  |

Source: Field study 2004

Also in response towards the question on the community capability in participating in solid waste collection, the majority of leader s (40% ) confessed that the Rumbek community is not capable.

Table No.7: Community capability on solid waste collection

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | frequency | percentage | Cumulative% |
| Paying contractors | 3 | 20 | 20 |
| Manpower | 3 | 20 | 40 |
| Not capable | 6 | 40 | 80 |
| Not sure | 3 | 20 | 100 |
| Total | 15 | 100 |  |

Source: Field study 2004

**4.4.2 Payment for refuse collection fees**

Willingness to pay is a rather central point, because it is important for the success of a community-based solid waste management project and it is related to many other aspects such as the motivation of operators an d households and the reliability of the service.

Community perception of fees and of the waste collection service is essential for its willingness to pay. Poor perceptions of residents who think they have already paid for collection through property tax or lack of trust for the service reduces willingness to pay for refuse

The Rumbek municipal council (waste management and refuse collection fees)

Bylaws of 2000ssp, requires every household and every occupier of trade premises to pay at the en d of every month refuse collection charge as provided for in the first schedule of the by law. In this study it was observed that 54.05% of the members were participating in the cleaning program under the private contractor while 45.95% were not interested.

Table 8: Participating in existing cleaning program

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | frequency | percentage | Cumulative % |
| Yes | 100 | 54.05 | 54.05 |
| No | 85 | 45.95 | 100 |
| Total | 185 | 100 |  |

Source: Field study 2004

People who participate in the cleaning program do so in various ways. While 80% of them (from RUMBEK) were paying collection fees to contracted company , 17% provided manpower, while 3% claimed to provide collection centers.

Table 9: If you participate, how?

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | frequency | percentage | Cumulative |
| Paying | 80 | 80.00 | 80.00 |
| Manpower | 17 | 17.00 | 97.00 |
| Dump site | 3 | 3.00 | 100 |
| Other | 0 | 0.00 | 100 |
| Total | 100 | 100 |  |

Since the place is congested and there is waste everywhere, the other portion (45.95%) of the community who were not participating in the cleaning program showed their willingness to participate accounting for 96.47% of the respondents while 3.53% were not interested to participate as illustrated in the table 10 below.

Table No. 10: Ready to participate now?

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | frequency | percentage | Cumulative % |
| Yes | 82 | 96.47 | 96.47 |
| No | 3 | 3.53 | 100 |
| Total | 85 | 100 |  |

Source: Field study,2004

Members of Rumbek community are poor but they are not willing to stay in a dirty environment. They are able to use their meager resources to ensure that the area remains clean. When asked on how they expected to participate in the program, 71.76% respondents were ready to pay, 16.47% agreed to contribute manpower, 3% rejected to participate and 8.24% ready to give other resources (table 11).

Table 11: How will you participate?

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | frequency | percentage | Cumulative |
| Paying | 61 | 71.76 | 71.76 |
| Manpower | 14 | 16.47 | 88.24 |
| Other | 7 | 8.24 | 96.47 |
| Reject | 3 | 3.53 | 100 |
| Total | 85 | 100.00 |  |

Source: Field study 2004

**4.5 Community health and solid waste**

Uncollected solid waste creates the most dangerous risks to human health because the distance between people involved and waste is very short and done by untrained people.

Also on-site storage is everywhere, thus, difficult to control.

Solid waste breeds high-risk insects, which can cause malaria, bacillary dysentery, and amoebic dysentery. Flies and mosquitoes can travel several kilometers, but the shorter the distance the larger the risks. There are many common diseases in Rumbek and the leading one is malaria that account for 63.24% compared to other diseases as shown in the table 12 below.

Table No.12 Common Diseases at RUMBEK

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | frequency | percentage | Cumulative |
| Malaria | 117 | 63.24 | 63.24 |
| Diarrhea | 10 | 5.41 | 68.8.65 |
| Malaria & Diarrhea | 41 | 22.16 | 90.81 |
| Cholera | 4 | 2.16 | 92.97 |
| Other | 13 | 7.03 | 100 |
| Total | 185 | 100 |  |

Source: Field study, 2004

The study indicated that 22.1% of RUMBEK community members are affected by both malaria and diarrhoea. There are few cases of cholera at 2.16% and other diseases reaches 7.03%.

When the leader were asked on the causes of such diseases, 40% of the respondents claimed that the major reason was, lack of health education, dirty environment at 26.6% while both dirt and lack of education contribute to 33.3% (table 13).

Table 13: Causes of disease in the area

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | frequency | percentage | Cumulative |
| Dirty | 4 | 26.67 | 26.67 |
| Lack of health education | 6 | 40.00 | 66.67 |
| Dirty/ lack of health education | 5 | 33 | 100.00 |
| Other | 0 | 0.00 | 100.00 |
| Total | 15 | 100 |  |

Source: Field study, 2004

Positive participation and involvement of members of the RUMBEK community will reduce the problem of solid waste management in the area despite of limited ability to dispose the ever-increasing waste generated. The area is overpopulated making it more vulnerable to dangerous epidemic diseases i.e. cholera, meningitis, etc. Health education should be provided together with government effort in upgrading the settlement to allow proper management of waste.

**4.6 CONCLUSION AND RECOMMENDATIONS**

**4.6.1 Conclusion**

Excellent opportunities exist for RMC to provide a wide range of urban services, including waste management, in informal settlements. Community Based Organizations have man y perceive d advantages, for example participation by the community and collective decision making enhance the use of the service and cost recovery. Community investment starts with internal resources, ease of collection of payment as owners and users of the service who live in the same area where the service is provided. Effective response to complaints is easy to access the providers of the service and ownership by community members result in a better care of equipment and a closer relationship with the beneficiaries of the service. Because of its impact on community health, waste management fit s well with the concern s of those groups dealing with issue s o f community concern.

As for community members not directly active in the RMC, they need to participate in waste management by separating their waste s a t source so that contamination is prevented and the work of CBOs and waste pickers is facilitated.

The success of community base d SW M project depend s to a large extent on the participation of the community from the initial stag e of designing the project , t o implementation, monitoring and evaluation. Efforts to protect the environment, the use of law enforcement a s strategy to ensure waste generators apply appropriate solid waste disposal practices has failed and fallen far short of the expected outputs. Community solid waste management strategy augurs very well with the ongoing initiatives to protect the environment while at the same time supporting livelihoods through employment creation, income generation and poverty reduction. Community participation may comprise varying degrees of involvement of the local community. It may range from the contribution of cash, kind and labor to consultation, changes in behavior, involvement in administration, management and decision-making.

This study has demonstrated the base for designing a community based soli d waste collection project at RUMBEK. It has been evidenced that the performance of the existing solid waste management practice in Rumbek is poor. The major problem is low capacity of solid waste collection evidenced by haphazardly dumping of the uncollected waste. This also proves the illegal dumping practices exercised by the community members, who include throwing waste haphazardly, burning or burying. The survey has also proved the existence of unclean environment where only 19% of the community members declared the environment to be good.

Therefore, the study of the existing solid waste management practice at Rumbek justifies the need of the proposal for solid waste collection project. The survey has established the willingness of the community to participate and contribute toward s soli d waste management despite of the low level of awareness, which is a result of low education level of majority of the community members. Furthermore, the chance that solid waste management being a high-ranking community problem will be possible when the initiative for the project should com e from the community itself. If solid waste management is not a felt need, this will certainly have consequence s to their participation in the service and their willingness to pay. A possible solution to the problem of lack of community priority for solid waste management is education.

**4.6.2 Recommendations**

There is no standard methodology for analyzing the extent to which RMC play a role in delivering effective solid waste management, for this remains a relatively new development. The future of solid waste management depends on the quality of the cooperation of the local government with NGOs and CBOs and citizens themselves. It has been shown that CBOs in solid waste management ought to be an essential component of new developments in this area. The future of municipal waste management depends not only on the effectiveness of local government, the operator of public services, but also on the attitude of citizens, and on the key role of CBOs to shape and develop community participation, as the reality of formal waste management.

For proper implementation of solid waste collection project it is recommended that:

(1) In order to have positive participation the CBO should facilitate campaigns and workshops/seminars for sensitizing and raising the awareness of the community in solid waste management issues. The provided knowledge should include not just the financial obligation of the households but also other benefits of the service. Education is the major solution to problems of low participation of households, which comprises issues such as low community priority for solid waste management, low willingness to participate in collection systems and in keeping public spaces clean, and low willingness to pay.

Also benefits and practice of separation of wet and dry waste at source and schedule of collection should be observed. Creating of this awareness must not only be included at the outset of a project, but should be carried on throughout. In this regard there is a need for having strong leadership.

(2) Sustainable willingness to pay and payment in relation to achievement will increase willingness to pay because household s will receive an observable benefit.

Willingness to pay has to be studied beforehand to conceive acceptable ways of payment that are financially affordable by the households. Due to the fact that not all service fees charged are affordable there is a nee d o f introducing different fees and different collection systems for different generators of waste. Households in the unplanned area should pay a low fee and send their garbage to communal bins, which are simple to empty to the waste collection vans. Clinics, restaurant s and hotels, etc. should be charged a higher cost that covers fee for door-to-door collection. Fees should be based on the amount of garbage-produced and/or on the income level of the household.

(3) Rumbek Municipal Council can assist community-based solid waste systems in different ways. One-way is the provision of facilities (equipment, collection sites, etc.); others are the establishment of legislation, financial assistance, and promotion. The council has to plays a highly positive role in stimulating community-based solid waste management. The council can, for example, stimulates a neighborhood sorting and recycling plant by doubling the sales of recyclables. This money can be invested in local projects, selected by the community.

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