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## RESEARCH ARTICLE

### POLLUTION AND URBAN LIFE: A CASE STUDY IN THIKA MUNICIPALITY, KENYA

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#### ABSTRACT

Due to increased pollution activities in the world today, it is important to embrace the sustainable development principle. The principle of sustainable development is that the integration of economic, social and environmental concerns. Sustainable development recognizes that the economy and the environment are closely interrelated. Much economic activity uses up materials and resources, including forests and minerals, and creates waste products. Yet many economic activities, including agriculture, fishing and tourism, are also dependent on a healthy environment. The general objective of this study was to assess the contribution of the community as it formed social groups to combat the pollution problem in Thika Municipality, Kenya. To achieve the objectives of this study, both quantitative and qualitative research methodologies were used. The qualitative phase consisted of face-to-face interviews/administered questionnaires. In addition, the qualitative phases consisted of several focus group discussions and in-depth interviews to selected members of the community. In essence, the qualitative phase was used to provide more insights and findings obtained from the quantitative phase. In order to arrive at the targeted sample of 60 house-holds, the researcher visited the community. Among the major findings, air, water and solid waste pollution were adversely mentioned as the problem the community failed to quantify on pollution awareness. On the other hand, noise pollution was not considered to be harmful in any way to the community. This was due to the limited knowledge of the community. The major effects of pollution enumerated, included the destruction of buildings and other structures.

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#### INTRODUCTION

Our future starts now. In the Bible story of creation, Genesis Chapter 1 Verses 1-31, after some six days of creative work "God looked at everything He had made and He was very pleased. And so on the 7<sup>th</sup> day he decided to take a rest". The world must be a beautiful place in which to live and work as its wonderful environment was what God had in mind. We are living in a world which our creator did not have in mind - a polluted world. God created life but man is continually destroying life by pollution. Pollution is the release of harmful environmental contaminants or substances. Even relatively benign products of human activity are liable to be regarded as pollution if they precipitate negative effects later on. The main objective of this study was to investigate issues related to community involvement in pollution management in Thika Municipality in Thika District. As early as 1990, Thika was one of the most polluted urban centres in Kenya. This was evidenced by the amount of social action against some of the major industrialists who were considered to be responsible. The KEL chemical plant was one of these and the residents sought to have it closed. Greater Thika supported the outcry that culminated in a demonstration led by a Catholic priest Fr. Ndikaru Wa Teresia [the author of this document]. The anti-protest and demonstrations were well publicized through the local dailies and therefore attracted national interest. The community brought the government authority to Thika to

establish the cause of the outcry. The polluting industries were on the defensive. The official government report on the investigation strongly suggested a detailed analysis of the problem, but the necessary resources were lacking. Thika town is one of most heavily industrialized municipalities in Kenya and over one hundred thousand people in Thika and its environs are exposed to industrial pollution. This study has made an attempt to follow up and assess the effects and activities of the community groups in pollution prevention. This will provide a sociological perspective on pollution control and management in Thika, which is generally missing in the available and existing literature.

#### Lack of Comprehensive Environmental Policy Guidelines

For effective and result-oriented policies, proper capacity in the drafting process is needed. Kenya is faced with the major problem of lacking sufficient trained personnel to undertake this kind of work. This may be possibly due to the integrated nature of these policies. As such, the drafting process is long, often requiring the input of expert support from the developed world. Therefore, most policies in Kenya are not as comprehensive as they ought to be. This leads to gaps in the implementation phase of these policies thus the described and expected results of the policy objectives and goals are not adequately met.

#### Poor Policy Implementation

There is a very big gap between policy formulation and policy implementation. Most of the formulated policies are not

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effectively implemented. This is mainly attributed to the fact that governments have not been able to promulgate comprehensive legislation to deal with environmental protection. For proper implementation of these policies, there needs to be legal and institutional frameworks in place. This is a must. Poor funding of policy objectives implementation is one of the serious problems affecting environmental management efforts in Africa and Kenya is no exception. Due to economic depression in Kenya: Kenya government allocates little funds towards environmental protection. Despite donor funding, the finances are not adequately sustainable. This discourages efforts made to protect the environment through the proposed policy instruments. On the other hand, corruption and misuse of public funds, a characteristic of the Kenya government aggravated this problem further. A major rethinking is required for successful environmental implementation. More emphasis is being directed towards private sector involvement.

### Public Attitude and Lack of Awareness

The Africa general public attitude towards environmental protection is poor. In Kenya, the structural problems of poverty and unfavourable social attitudes can militate against well intended efforts in environmental protection. Public involvement in environmental protection can act as a good springboard for the success of the implementation of environmental policy in Kenya.

## RESEARCH METHODOLOGY

### Site Description

The Makongeni communities residing around the Thika Municipality formed the target of study. Thika district has a population size of 647,000 with the majority living in Thika Municipality. Thika town has 120,000 people from various ethnic groups. Thika Municipality is located 1°05' north of the equator. Thika Municipality is 45 kilometres away from Nairobi, Kenya's capital, and lies North East of the same. In 1910, the British Settlers who eventually established coffee and sisal plantations initially used this spot as a stopover. A railway line was later built to facilitate transportation of the farm produce. Makongeni Estate is located to the west of Thika Municipality and was chosen as the study area due to its proximity to the industrial belt (Thika District Development Plan, 1997).

### Sampling

Sampling serves the main purpose of avoiding bias in the selection of the sample and helps achieve a maximum accuracy for a given outlay of resources. In this study, a simple random sampling procedure was used to determine which family was to provide the person to be interviewed. The researcher also used purpose sampling; this will be based on the assumption that the researcher is capable of meeting the respondents who will supply the required information. These were chiefs, headmen and managers, local leaders and church leaders who in their opinion were able to supply the required information. In order to arrive at the targeted sample of 60 house-holds, the researcher visited the community. Therefore, the units of analysis were the individual units about which descriptive or explanatory statements were made. Individual community members were the most typical units for our research. We

centred our analysis on the members of the community working in the factories and tenants to help us generate more evaluative data. This was more on their awareness, perception and attitude of the pollution in their locality.

## METHODS OF DATA COLLECTION

In-depth interview and focus group discussion (FGD) were used extensively to clarify the major ideas obtained from the quantitative phase (questionnaires). The questionnaire was a set of questions of open or closed types together with spaces for filling in the responses. The use of the questionnaires guaranteed confidentiality and control over the interview environment. A focus group discussion was convened to obtain further qualitative data to support existing gaps in the quantitative data collected. The focus group discussion is important because, the respondents showed points of agreement and disagreement covering the study variables that were not well captured in the in-depth interview. The in-depth interviews (face-to-face) consisted of discussions on specific topic with selected key informants (elders, headmen, councillors, chairmen of various groups) to obtain more information. Discussion with key informants entailed formal and informal interviews. These interviews were important because; they generated individual opinion, feeling and perception about the topic of pollution, which might not have been captured in the structured interview. The secondary sources were reviewed from various books, internet data, newspapers, video, magazines, journals, periodicals and reports, especially from United Nations, World Bank and World Health Organization. The Library research will also involve the analysis of historical records that are recorded notes; photographs, tapes and films will be analyzed.

### Data Analysis

After the fieldwork, the data collected was categorized under quantitative and qualitative data. The quantitative data contained information on numerical values of respondents while qualitative data consisted of respondents' views and opinions on the study. Having collected data from the primary sources quantitative data was put into a spread-sheet manually and then exported to Statistical Package for Social Science (SPSS) programs. SPSS was used to organize, analyse and present statistical data. These packages designated to provide high-speed statistical analysis of data by the computer.

### Data Presentation

#### Sample Characteristics

The following subsection details the demographic characteristics of the sample with a view to looking at the possible causes of variations in views and response as far as pollution prevention is concerned.

#### Sex Distribution

This study was carried out from a random sample of 60 households, 60% and 40% were males and females respectively. This proportion does not differ very much from the 57% -43% distribution by gender data provided by the Central Bureau of Statistics on the results of the 1999 Kenya population and housing census. However the sex ratio indicates that Thika Municipality is predominantly male.

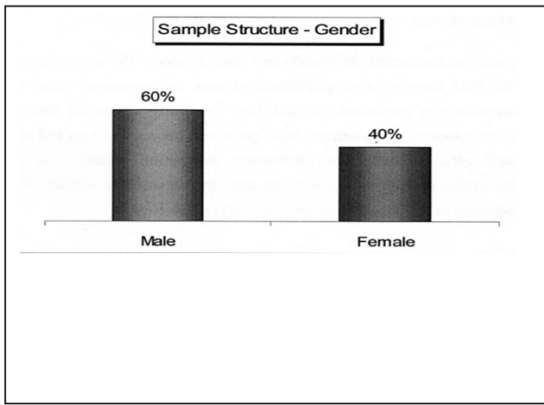


Figure 1: Sex

**Age Groups**

From the sample characteristics achieved from this survey, 13% of the respondents were 15-20 years of age at the time. 33% were between 21 and 26 years. 40% ranged between 27 and 32 years while another 13% were between 33-38 years. As such, the Thika Municipality constitutes a young population. From the random sample no person over 50 years was included in the sample frame.

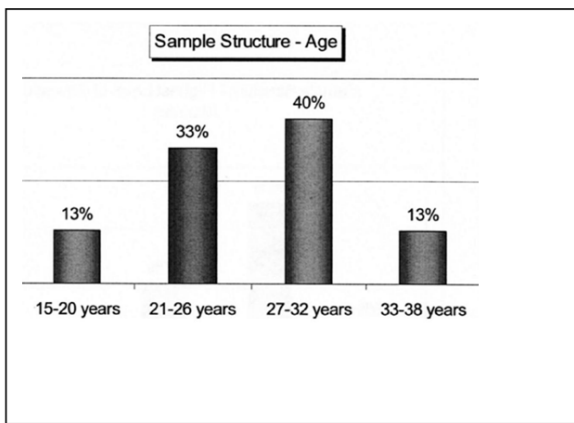


Figure 2: Age

**Educational Attainment**

Literacy levels indicated were fairly high with respect to the level of educational attainment.

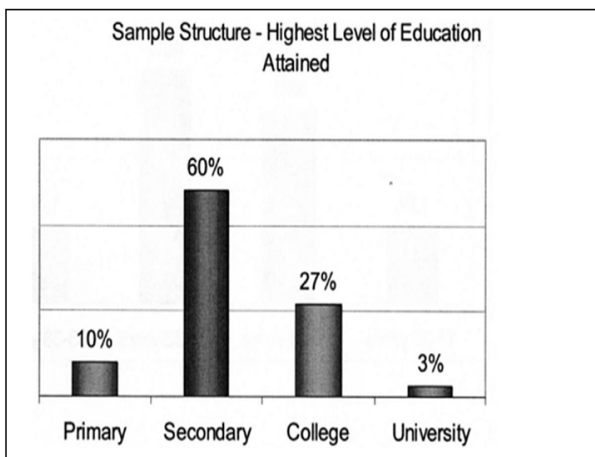


Figure 3: Highest Level of Education

For example, 10% of all the respondents had primary school education certification. 60% had either not finished or finished high school. A further 27% had pursued post secondary education in polytechnics and diploma offering colleges. Only 3% had university education.

**Marital Status**

From the findings of this study, 50% of the respondents were married, 48% were single. Only 2% indicated that they were single parents.

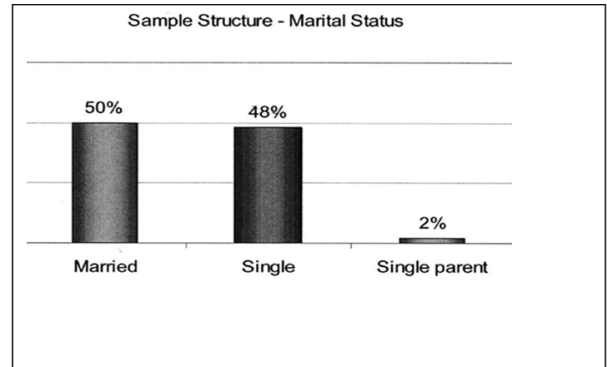


Figure 4: Marital Status

**Employment**

In spite of Thika Municipality being an industrial town, unemployment still looms heavily. In essence 12% of all interviewed respondents were employed in the public sector. 15% were privately employed, a further 30% were self-employed while the majority (43%) were unemployed.

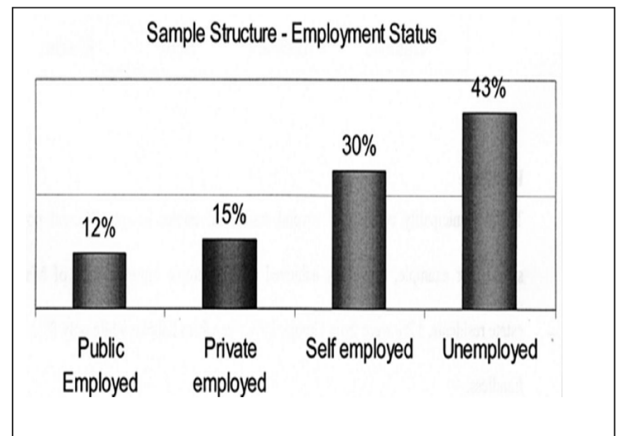


Figure 5: Employment Status

**Religious Affiliation**

The religious affiliation of the sample is not very diverse, considering the fact that the majority are Christians (96%). Actually 36% stated that they were Catholic, 60% Protestants. 2% indicated that they were Seventh Day Adventists while another 2% indicated that were Muslims.

**Residence**

Thika Municipality consists of several residential estates having different population sizes. For example, this study achieved a 50% sample representation of Makongeni estate residents. 17% were from Umoja, 25% were from Kiboko while only 8% were landless.

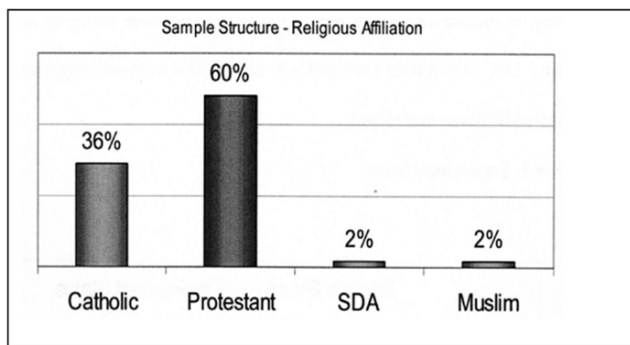


Figure 6: Religious Affiliation

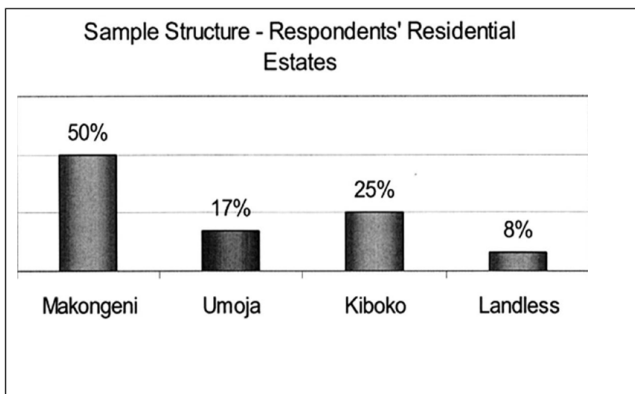


Figure 7: Residential Estates

**Assessment of Available Information**

Information is essential in any decision making process in any society. There are various channels by which the community can gain access to vital information. This study evaluated the sources of information available of Thika Municipality residents with a view of establishing a link between their perception and actions as it concerns the pollution problem. Residents of Thika Municipality are quite diverse in the way they obtain general information. In this case general information constitutes daily news and events and other informative issues. They rely mainly entirely on the mass media for information. A total of, 78% of the respondents stated that they obtained information from watching programs on the television, which largely included current affairs programs and daily news. 97% actually indicated that they obtain information via the use of radios. 73% of the respondents interviewed indicated that they have access to newspapers, which provide them with current information. 25% indicated that magazines also constituted their source of general information.

Only 12% mentioned that they attended barazas regularly at the local administrative offices to be briefed about community related issues. In terms of the source of information obtained most often, 28% answered in favour of television, 73% in favour of radios while only 3% indicated the reading of newspapers and magazines. Radio therefore is the most relied upon media of obtaining current information not the use of television and print media. Asked which source of information was used in the previous week, 32% indicated television, 65% radios and 2% newspapers. This study was also interested in generally establishing the major sources of information on environmental news. This was important in assessing whether the information obtained had any environmental utility. About 33% indicated that they obtained general environmental

information via the televisions, 50% indicated in favour of radio while 10% indicated the reading of newspapers. Those who obtained information via other methods only constituted 5% of these magazines (2%) and other sources (3%). The radio emerged as the most popular mode of obtaining information even about environmental news. However, the use of electronic media in obtaining information about Thika Municipality's environmental situation is low. A new dimension in information availability and dissemination is evident. This is via verbal communication. However this does not feature highly amongst other information sources. Altogether, the availability of information on pollution problems in Thika is a key factor in awareness creation about the severity of the problem. This is expected to yield high awareness levels of the looming pollution disaster in Thika.

**Pollution Awareness**

This study aimed at quantifying general awareness issues as it concerns pollution in Thika Municipality. Awareness assessment was seen to be a major factor in establishing community response to this problem. It was found out that 98% of the residents claimed to be aware of pollution problems in Thika. Only 2% indicated that they were not aware of any pollution related problems in Thika Municipality. The latter may constitute new residents within the town. In addition respondents were asked to indicate the different types of pollution they knew about and the ones currently being experienced in Thika Municipality. The results indicate that 97% of the respondents are aware of water pollution problems, 90% are aware of air pollution, 97% are aware of solid waste pollution while only 55% are aware of noise pollution.

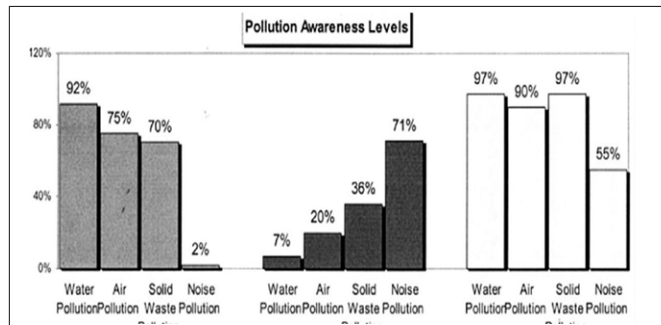


Figure 8: Pollution Awareness Levels

From the residents' perspective, the results provided above show water pollution to be the most familiar type of pollution, together with solid waste. Air pollution is also known but by a slightly lower percentage. Noise pollution is the least known. Water pollution is known due to industrial activities in Thika. For example, most leather industries release their tannery effluence into the nearby rivers, which supply the local residents with domestic water especially during dry seasons. Likewise solid waste pollution is equally familiar due to the fact that most industries do not adhere to the local authority's regulations on dumping solid waste at designated areas. Instead, some industries dump this waste near residential areas. In addition, there is a lot of domestic solid waste in the residential areas mostly in polythene bags. This has affected the general cleanliness of estates. Noise pollution is least known. This is due to the fact that very few residents live next to heavy industries with noisy machinery. The residents do not consider motor vehicle noise as being a type of pollution.

**Table 1. Duration of Involvement with a Community Based Organization**

	Totals	Gender		Age				Highest Level of Education		
		Male	Female	15-20 years	21-26 years	27-32 years	33-38 years	Secondary	College	University
Total	11	9	2	2	3	4	2	6	4	1
	100%	82%	18%	18%	27%	36%	18%	55%	36%	9%
Less than one year	3	3	0	0	3	0	0	1	2	0
	27%	27%	0%	0%	2%	0%	0%	9%	18%	0%
Between 1 and 3 years	5	3	2	2	0	2	1	4	1	0
	45%	27%	18%	18%	0%	18%	9%	36%	9%	0%
Between 4 and 6 years	3	3	0	0	0	2	1	1	1	1
	27%	27%	0%	0%	0%	18%	9%	9%	9%	9%

**Table 2. Position of Membership**

	Totals	Gender		Age				Highest Level of Education		
		Male	Female	15-20 years	21-26 years	27-32 years	33-38 years	Secondary	College	University
Total	11	9	2	2	3	4	2	6	4	1
	100%	82%	18%	18%	27%	36%	18%	55%	36%	9%
Chairman	1	1	0	0	1	0	0	0	1	0
	9%	9%	0%	0%	9%	0%	0%	0%	9%	0%
Secretary	1	0	1	0	0	1	0	1	0	0
	9%	0%	9%	0%	0%	9%	0%	9%	0%	0%
Treasurer	1	0	1	1	0	0	0	1	0	0
	9%	0%	9%	9%	0%	0%	0%	9%	0%	0%
Member	8	8	0	1	2	3	2	4	3	1
	73%	73%	0%	9%	18%	27%	18%	36%	27%	9%

**Table 3. Importance of Community Participation in Pollution Management**

	Totals	Gender		Age				Highest Level of Education			
		Male	Female	15-20 years	21-26 years	27-32 years	33-38 years	Primary	Secondary	College	University
	60	36	24	8	20	24	8	6	36	16	2
	100%	60%	40%	13%	33%	40%	13%	10%	60%	27%	3%
Very Important	51	29	22	8	18	19	6	5	29	15	2
	85%	48%	37%	13%	30%	32%	10%	8%	48%	25%	3%
Important	6	4	2	0	0	5	1	1	5	0	0
	10%	7%	3%	0%	0%	8%	2%	2%	8%	0%	0%
Neutral	2	2	0	0	2	0	0	0	1	1	0
	3%	3%	0%	0%	3%	0%	0%	0%	2%	2%	0%
Slightly Important	1	1	0	0	0	0	1	0	1	0	0
	2%	2%	0%	0%	0%	0%	2%	0%	2%	0%	0%
Mean Rank	1.22	1.31	1.08	1.00	1.20	1.21	1.50	1.17	1.28	1.13	1.00

**Table 4. Attitude Measurement on Selected Pollution Issues in Thika Municipality**

	Total	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean Rank
Pollution is a big problem in Thika Municipality	60	46	9	3	2	0	1.35
	100 %	77%	15%	5%	3%	0%	
Industries are major polluters	60	34	17	7	2	0	1.62
	100 %	57%	28%	12%	3%	0%	
Pollution is also got from domestic fuel consumption	60	9	20	22	9	0	2.52
	100 %	15%	33%	37%	15%	0%	
Thika is polluted because the local government does nothing	60	29	11	14	4	2	1.98
	100 %	48%	18%	23%	7%	3%	
If pollution in Thika is not checked it could be a disaster	60	56	3	1	0	0	1.08
	100 %	93%	5%	2%	0%	0%	
Pollution problem in Thika Municipality is still increasing	60	43	13	3	1	0	1.37
	100 %	72%	22%	5%	2%	0%	

### Perceptions of Different Types of Pollution

In addition to establishing the awareness levels of different types of pollution in Thika Municipality this study also established how the residents perceived the problems related to them. In terms of their perception with respect to the worst type of pollution in Thika, the respondents answered as follows: water pollution (32%), air pollution (42%), 23% solid waste pollution. A further 3% indicated that noise pollution was the worst in the area. Air pollution once was considered as being very detrimental to public health in the region as mentioned extensively in FGDs. The respondents were asked to indicate the type of pollution that required immediate attention. A total 55% mentioned water pollution, 57% mentioned air pollution, and 53% solid waste pollution while only 3% indicated that noise pollution required immediate attention. In terms of severity of the types of pollution in Thika, the respondents were asked to rate the severity along a 5-point semantic differential scale ranging from not severe (score 1) to very severe (score 5). Water pollution was seen to be the most severe with a mean rank of 3.15. Air pollution was second with a mean of 3.05. Solid waste pollution had 2.75 while noise pollution had 1.19. Water and air pollution have emerged as the most severe. This is consistent with the views shared in the focus group discussions. Air pollution on the other hand is viewed as the worst type of pollution while solid waste pollution affects the residents most. Water pollution was viewed to be the one that requires immediate attention.

### Sources of Pollution

Pollution awareness goes hand in hand with knowledge on the sources of the pollution. The residents gave varied responses and ideas when asked about the sources of pollution they knew of. An overwhelming majority of 92% knew about industrial fumes, 67% mentioned industrial effluence, 3% mentioned stoves and firewood, 78% mentioned domestic waste, 20% knew of hospital refuse while 97% mentioned sewage waste water. In addition, the respondents were asked to indicate what they considered to be the source that contributes highly to environmental pollution in Thika. They answered as follows: 32% indicated that industrial fumes were most lethal, 12% industrial effluence, 18% domestic waste while only 2% sewage as the one that contributes highly to environmental pollution in Thika municipality.

### Perceptions about the Major Effects of Pollution

The respondents reported several problems such as corrosion and destruction of structures. About 30% of the respondents indicated that air pollution in Thika is characterized by the emission of noxious gases. These gases when mixed with water vapour in the atmosphere form different kind of acids that rain back on to the surface of the earth. These acidic droplets land on tin roofs and other structures. From observations, most tin roofs of Thika municipality are brown in colour due to rust and corrosion resulting from the acidic droplets on the roofs. This reduces the durability of the tin roofs. This view accounted for 30% of all responses.

### Increase in the Incidence of respiratory illnesses and other Infections

From among the responding residents 92% mentioned that they suspect a relationship between respiratory illnesses and

incidence of air pollution. A study from KENGO indicated that for the last 15 years, medical records have shown an increase in outpatients suffering from respiratory disorders, which is attributed to both domestic (in t door) and industrial (outdoor) pollution. General demographic information from Thika municipality indicates an increase in mortality rates both for human beings and livestock, which is generally associated with pollution. For example, 17% mentioned livestock mortality, 12% human mortality and 5% infant mortality to have risen with all types of pollution being perceived as the major cause for the increase in the mortality rates. Diseases and ailments that directly emanate from pollution such as cholera outbreaks, significantly impact on mortality rates (human).

### Destruction of Crops and Vegetation

This view was registered by only 2% of all the respondents. They claimed that pollution in Thika has had negative impact on agricultural production and other vegetation. Some respondents even claimed that some vegetation near the chemical industries withered and dried possibly due to the effluence.

### Institutional Capacity for Pollution Prevention in Thika Municipality

Due to the increase in pollution levels in Thika Municipality attempts have been made by relevant organizations to control and manage it. This study was interested in obtaining the perceptions of the respondents in relation to the relevance of the existing institutions in pollution prevention control and management.

### Awareness of Institutional Organizations

The respondents were asked to mention what organizations they were aware of that operated public related functions in the areas. As many as 98% were aware of the local authorities as represented by the municipal council, 37% acknowledged knowing women and youth interest groups, Another 7% indicated their knowledge about active community based organizations in the area, 3% identified some non-governmental organizations active in the area, 8% were aware of a few international organizations that ran projects within the municipality, 52% indicated religious groups while a further 13% mentioned other small private organizations. In reference to the awareness of the above institutions that play key developmental roles in the community, this study further investigated how the residents perceive their participation in pollution control among other important activities.

### Perception of Institutional involvement in Pollution control

In terms of aiding in pollution control 90%, of the respondents acknowledged the efforts made by the local authorities. Asked to state the institutions, which they felt should be in charge of pollution management in Thika Municipality, 98% (majority) indicated that municipal council should be in charge. 13% mentioned women and youth groups, 10% mentioned NGOs, 7% mentioned international institutions, while 12% thought that religious groups should take an upper hand. In relation to the organizations that have been given mandate to manage pollution, 95% indicated that local authorities are the government's wing in providing basic social capital such as clean living environments and other services. Only 5% thought

that this mandate rested on other institutions other than the Municipal Council. In addition to the perceptions reported above the respondents were also asked to indicate which organization had so far made the greatest efforts in pollution control and prevention. 57% indicated that local authorities had so far made the greatest efforts. Women and youth groups were only mentioned by 5%, of all respondents. Religious groups were thought to have made great efforts by 5% of all respondents while 7% of all respondents indicated private organizations.

### **Community Participation in Pollution Prevention in Thika Municipality**

The membership of the residents in an environmental management related Community Based Organization is very low. Actually, only 18% of the residents belong to one of the five available groups. In terms of gender representation in membership: 25% of all males and only 8% of all females belong to one of the groups. Age wise, 25% of people aged between 15-20 yrs, 15% of 21-26yrs, 17% of 27-32yrs and 25% of 33-38yrs belong to one of the CBOs managing pollution in Thika Municipality. In terms of educational background, none with primary school educational certification belongs to a group. 17% with secondary education, 25% with college education and 50% with university education belong to a group. Majority of the respondents who claimed to be members of a Community Based Organizations has been involved in them for a considerably long time. 27% have been members for less than 1 year, 45% have been involved in a period ranging from 1 to 3 years. A further 27% have been in the groups for over 4 years.

Table 4 shows the variation in the duration of involvement with a CBO regarding gender, age and highest level of education. It seems that more males than females have been involved in the CBOs. Another finding is that people between age 21 and 32 seem to be the most active in CBO participation. Also the education level seems to influence participation in the sense that more years in school are related to less involvement in Community Based Organizations. This becomes evident from the 73% mentioned in non-official positions. The remaining official positions: Chairman, treasurer and secretary represent less than 10% of the respondents. As shown in the table above males occupy the official positions. Age does not seem to offer any large variations as far as positions held are concerned. Further still, education level has little importance with positions held within the Community Based Organizations.

### **Community Participation in Pollution Management**

When asked to give their opinion on the importance of community participation in management 85% of the members thought it to be very important, 10% thought that it was important while 2% did not have an opinion. A further 2% thought that it was slightly important. Basically according to findings, community participation is viewed as being very important. The mean rating on the importance variable for all groups is less than 1.5. This means that community participation is ranked highly as being a very vital component in community welfare.

### **Mechanisms Employed by Community Based Organizations**

This study also aimed at establishing the views of the residents as it concerns the mechanisms used for pollution prevention and managed by the Community Based Organizations: 45% of the respondents identified estate cleanups, 28% peaceful demonstrations against the industrialists who are key sources of pollution, 20% that awareness creation and advocacy for environmental protection was another mechanism. Giving environmental education information to schools and other institutions showed concern by 12%. Environmental projects design and implementation and the soliciting of environmental development funds were mentioned by 5%.

### **General Attitudes to Pollution Problem in Thika Municipality**

In this study, some general statements were developed to measure the attitudes of Thika Municipality's residents towards pollution in their environment. The table below shows the attitude measurements and the mean ranks of the respondents.

## **DISCUSSION**

### **Summary, Conclusions and Recommendations**

This section provides a summary of the findings that emanated from this study and subsequent conclusions and recommendations made. Awareness of general pollution in Thika Municipality is generally high (98%) basically due to observation of current pollution events in the area. However new residents in the community could possibly account for the remaining 2% that are unaware. Water, air, and solid waste pollution are well known. This is due to the fact that they affect the residents directly. On the other hand noise pollution is little known being embedded in people's lives as a way of life and perceived as a mild disturbance but not as a kind of pollution. Many residents do not consider noise to be pollution. In terms of the major sources of pollution in Thika, industrial fumes featured prominently. Municipal sewage on the other hand is equally known as industrial effluence. Domestic waste also featured but not as prominently as the ones stated above. Very few of the residents were aware of any kind of pollution from hospital sources.

Water pollution on the other hand is the one that is currently causing a lot of concern even though air pollution also featured prominently. Historically, air pollution was seen to be the key issue of main concern. However shifts in perceptions have occurred since. Noise pollution on the other hand is not perceived as a problem to the residents. It seems that noise pollution in the area is tolerated and is also seen to have no adverse effects on the residents. According to the residents, water pollution requires immediate attention more than air pollution possibly due to the fact that during drought, polluted rivers become the only alternative source of domestic water. In this regard, air pollution comes second in the list as far as different types of pollution are concerned. Solid waste pollution on the other hand also featured prominently. Both industrial and domestic wastes characterize this type of pollution. Industrial waste dumped near residential areas also is a cause for concern. However, domestic solid waste is the one that affects many of the residents. In particular polythene waste is seen to be very problematic due to the fact that it is non-

biodegradable. Community involvement in combating pollution is very minimal. With high awareness levels it was expected that this would translate into more involvement of the community in efforts geared towards pollution management. This has been attributed to lack of proper awareness and support of groups that would provide this kind of opening to the residents. Other causes are lack of knowledge about existing groups operating in the area, ineffective groups and other commitments. The major mechanisms employed in pollution management in Thika municipality have been mainly estate cleanups. A few years ago public demonstrations took a centre stage in efforts made by the community in alleviating pollution related problems. Formal programmes directed towards awareness and insurances on pollution management coupled with environmental education in the area were seen to offer better sensitization for increased participation in pollution management by the community.

### Recommendations

Awareness creation as it concerns noise pollution is needed. This is supposed to help workers who work with noisy machines in the industries to have quality occupational health and safety. The Municipal Council should initiate new and effective programmes needed to manage pollution in the area. This should also include an increase in the frequency by which these programmes are carried out. This institution should also be ready and available to aid any local initiatives geared towards pollution management in the area. There is need to improve the local setting of the environmental situation in Thika Municipality. This calls for collective responsibilities by all stake holders who should initiate collaboration that would benefit the local residents. These stakeholders include the government, local authorities, local communities, industrialists, local religious leaders and other leaders in the area.

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