

# Statistical Analysis of Informal Settlements and Environmental Management in Mbale Municipality, Uganda

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**Abstract:** *The study examined the impact of informal settlement on environmental management. Self-administered questionnaire and interview guide were used to gather information from one hundred and forty-five household respondents and seven key informants in Namatala ward. The data collected were then analysed with the aid of Statistical Package for Social Sciences. The study identified the socioeconomic effects of informal settlements which include road inaccessibility, poor waste collection, and poor waste disposal, inadequate open space for dumping, and rapid production of waste and community conflicts. Results indicated that environmental management in informal settlements depend on community role. Findings have shown that a strong positive relationship exist between community role and environmental management which is statistically significant. Results have also revealed that community role and education level of community have 42.2% effect on environmental management in informal settlement which is statistically significant. The study recommends that community should play roles in managing the environment and identify possible strategies to improve environmental management in informal settlements. Therefore, there is a need to sensitize the local community on environmental education in order to improve environmental management in informal settlements. Local governments should implement community infrastructure upgrading. NGOs and local governments need to conduct domestic waste minimization campaign. There is also need to provide economic incentives to the poor in urban community. Local officials at all levels should cooperate so as to make easy the inspection of developments during construction.*

**Keywords:** Informal Settlements; Environmental Management; Community Role; Strategic.

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## I. INTRODUCTION

The world state of settlements shows that more than 50 percent of people live in informal settlement especially in cities of developing countries with the expanding population due to rural-urban migration and natural birth rate (UN Habitat, 2005). African countries are facing serious situation of informal settlements, about 70 percent of the African population are living in informal settlements (Lupala, 2002). Informal settlements are growing in three ways; in number, in areas and in a population with a growth rate of 4 to 7 percent per year in Sub-Saharan Africa (Kombe and Kreibich, 2007). The informal settlements in post -industrial countries are expanding in the area because of growing affluence, in Africa the increasing demand for urban space is determined by population growth and rural urban migration (UN Habitat, 2005).

One reason for this migration is prospect those cities offer is observed that young people from rural areas see no future in their home villages and move to agglomerations for seeking possibilities of getting employment, education and access to social infrastructure, consequently, limiting the attempts taken by development actors to improve environmental management in cities of developing countries.

Development actors that include the World Bank and United Nations Human Habitat have formulated and implemented various strategies, programmes and projects such as Community Infrastructure Upgrading and Environmental Planning and Management, both aiming at improving the capacity of the City Council and Municipalities to plan, coordinate and manage urban development (Kombe, 2010). There are limited initiatives taken by development actors to address the provision of services related to environmental management, particularly, controlling of pollution and degradation of air, water and land (Ndezi, 2011). Yet simultaneously, there is frequent deterioration of environmental quality in Namatala ward to the extent that one cannot expect the environment to be sustainable for much longer. Therefore, this study has examined the impact of informal settlements on environmental management in Namatala ward of Mbale municipality.

## II. LITERATURE REVIEWS

Globally, environmental management in informal settlements is affected by socioeconomic activities performed by people who are living in informal settlements which are associated with urban city. These socioeconomic activities include agriculture, furniture manufacturing, industries, trade as well as income

generating activities performed by majority of low-income earners such as furniture manufacturing, food vending, car wash and garages (Martin and Satterthwate, 2004). The unsustainable development of these socioeconomic activities contributing much to pollution and environmental degradation such as water, air and land resources to a great magnitude compared to the actions taken to improve environmental sustainability in urban communities (UN Habitat, 2008).

Kombe (2005) pinpointed out that, multifaceted problems of environmental management in informal settlements requires action of both national and local levels, the private sector and civil societies including community organizations to be involved, affordable land housing options, environmental education, basic services and settlements infrastructures must made available, community must plan for better settlements in respect to environmental infrastructure and be responsible in daily activities related to environmental management. Environmental management in informal settlements could be improved by developing strategic vision through effective participation of local and national stakeholders by identifying priority issues and actions to improve housing conditions and its surrounding environment, urban services and local economy.

Informal settlements upgrading applied to any sector-based intervention on the settlements that result in quantifiable improvement in the quality of life of the residents affected (Abbott, 2008). The flow of information from the residents to development actors who are concerned with informal settlements and environmental management improve technical decisions and increase resident's decision-making role and participation in environmental management issues (Davis, 2007). According to Domingo (2002), economic approach for managing environment come in many different forms, but generally, works by making people face the environmental costs they impose on society. Economically, this approach includes charges or mental improvements, including subsidies in environmental preconditions, tax and financial support. Economic incentives also include enforcement initiatives such as fines for non-compliance with regulation, legal liability for taxes. A report by United Nations Habitat (2006) has revealed that Urban Planning and Settlements Planning in most developing countries have failed to provide adequate shelter option for urban poor, settlements expansion lack for behind the actual urban development and most urban expansion is unplanned and unauthorised. Often, huge informal settlements are developed in a vacant land which contributed negatively on environmental management. United Nations Habitat and United Nations Environment Programme (UNEP) launched the Sustainable Cities Programme (SCP) in 1991. The programme entails environmental care of informal settlements in third World countries. The SCP includes a wide range of cross sectoral interventions, typically, involving in solid waste management, environmental health, water resource management, urban transport and air pollution, as well as activities specifically targeted at benefiting the urban poor. Central to SCP there is Environmental Planning and Management (EPM) that prescribes certain logical steps in a participatory way intended to involve all stakeholders of concerns. According to United Nations–HABITAT and United Nations Environment Programme report (2008), the international recognition of the fact that environmental protection and resource management must be integrated with socioeconomic issues culminated in 1992, Rio Earth Summit. The idea was captured in the definition of Sustainable Development as defined by the World Commission for Sustainable Development, also known as Brundland Commission in 1987 as; "Development that meets the needs of the present generation without compromising the ability of future generation to meet their own needs"

### III. METHODOLOGY

#### Research Design

The study employed Cross-sectional design in this study and both qualitative and quantitative approach of research was used. The reason for selecting this type of design was due to the fact that it allows studying different groups of respondents at one point of time. It also provided a suitable room for gathering the required data from different groups such as household members as well as governmental and nongovernmental officials at one point in time through the use of questionnaires, interview and observation methods of data collection. The study was conducted in Namatala ward, Mbale Municipality in industrial division. The sample size of the study was 148 household respondents and 7 key informants from LC I, LC II, physical planner and environmental officer thus, made a total of 155 respondents.

#### Data Collection, Analysis and Sample Procedure

Data collection methods used in this study to collect primary data were included questionnaires, interview and observations. Both probability and non-probability sampling techniques were deployed to select appropriate respondents. With probability sampling, simple random sampling was used to pick the respondents from households, while with non-probability sampling; purposive sampling was used to select respondents from key informants such as chairman LC I, LC II, Physical Planner and Environmental officer. Data from household respondents were coded, tabulated and analysed in SPSS (statistical package for social science) which frequencies and cross tabulation was used and findings were presented by frequencies and percentages in tables. On the other hand, chi-square was used to test the dependence of environmental management and community role. Spearman coefficient correlation was also used to test the strength of association between community role and environmental management. Regression analysis was used to test the effect of community role and education level on

environmental management in informal settlements. Information from key informants such as chairman LC I, LC II, Physical Planner and Environmental Officer was used to complement data from household respondents.

#### IV. FINDINGS

##### Demographic Characteristics of Respondents

**Table 1: Distribution of Respondents by Sex**

Sex	Frequency	Percent
Male	68	46.9
Female	77	53.1
<b>Total</b>	<b>145</b>	<b>100.0</b>

Source: Results of Analysis (2019)

Results in Table 1 show that the majority 53.1% of respondent were female while 46.9% were male. The findings show that majority of respondents who participated the study were female compared to male. This further means the study was free from gender-based bias as both genders were represented.

**Table 2 Distribution of Respondents by Age**

Age of Respondents	Frequency	Percent
Below 18	3	2.1
18-30	73	52.3
31-43	54	37.4
44 and above	15	10.3
<b>Total</b>	<b>145</b>	<b>100.0</b>

Source: Results of Analysis (2019)

Results in Table 2 show that majority 52.3% of respondents were aged between 18-30 years, 37.4% were aged 31-43 years, 10.3% aged 44 and above while only 2.1% were aged below 18 years. The findings show that most of residents in Namatala were aged between 18-30 years.

**Table 3: Distribution of Respondents by Education Level**

Education level	Frequency	Percent
Informal	21	14.5
Primary	64	44.4
Secondary	39	29.9
College and above	21	14.5
<b>Total</b>	<b>145</b>	<b>100.0</b>

Source: Results of Analysis (2019)

Results in Table 3 indicate that majority 44.4% of respondents had attended primary school, 29.9% attended secondary school, 14.5% attended college and above while only 14.5% had informal education. The findings show that the majority of respondents who have participated the study had primary education.

**Table 4 Distribution of respondents by marital status**

Marital status	Frequency	Percent
Single	15	10.3
Married	85	58.6
Widowed	12	8.3
Divorced	33	22.8
<b>Total</b>	<b>145</b>	<b>100.0</b>

Source: Results of Analysis (2019)

Results in Table 4 reveal that majority 58.6% of respondents were married, 22.8% were divorced, and 8.3% were widowed while only 10.3% were single. The findings indicate that the majority of respondents who participated the study were married compared those who were divorced.

**Table 5 Distribution of respondents by occupation**

Occupation	Frequency	Percent
civil servant	42	29.0
self employed	48	33.1
Business	26	17.9
Others	29	20.0
<b>Total</b>	<b>145</b>	<b>100.0</b>

Source: Results of Analysis (2019)

Results in Table 5 shows that the majority 33.1% of respondents were self-employed, 29.0% were civil servant, 17.9% were business owners while only 20.0% were others like farmers. The findings show that the majority of respondents were self-employed.

**Table 6 what attracted you in this locality?**

Respondent's opinion	Frequency	Percent
Affordable rent	18	12.4
Easy access to other services	64	44.1
Affordable land	34	23.4
Others	29	20.0
<b>Total</b>	<b>145</b>	<b>100.0</b>

Source: Results of Analysis (2019)

Results in Table 6 show that the majority 44.4% of respondents were attracted by easy access to other services in Namatala ward, 23.4% were attracted by affordable land, 12.4% were attracted by affordable rent while only 20.0% were attracted by other things. The findings indicate that the majority of respondents were attracted by easy access to other services that are there in Namatala ward.

**Table 7 how did you acquire this plot?**

Respondent's opinion	Frequency	Percent
Inherited	22	15.2
Purchased	57	39.3
Exchanged	12	8.5
Others	54	37.7
<b>Total</b>	<b>145</b>	<b>100.0</b>

Source: Results of Analysis (2019)

Results in Table 7 indicate that the majority 39.3% of respondents had purchased their plots, 37.7% acquired their plots on other ways, 15.2% had inherited while only 8.5% had exchanged with others. The findings show that majority of respondents acquired their plots through purchase.

Based on interview conducted with local officials, majority of local officials said kibanja (land without title) landholding is most landholding that has more informal settlement compared other types of landholding like freehold and leasehold. This means that 37.7% of houses in Namatala ward were built without approved plan since obtaining approved plan one need to have land title.

**Table 8 how do you assess environmental management in informal settlements?**

Respondent's opinion	Frequency	Percent
Increasing	35	24.1
Decreasing	66	45.5
None	44	30.3
<b>Total</b>	<b>145</b>	<b>100.0</b>

Source: Results of Analysis (2019)

Results in Table 8 show the level of environmental management in informal settlement, it shows that the majority 45.5% of respondents agreed that environmental management was decreasing in informal settlement, 30.3% agreed it was none meaning that it was just constant, however 20.4% agreed it was increasing. The findings show that environmental management in informal settlements was decreasing.

**Table 9 how you assess the roles of community in managing the environmental resources at your cell**

Respondent's opinion	Frequency	Percent
Increasing	31	21.4
Decreasing	76	52.4
None	38	26.2
<b>Total</b>	<b>145</b>	<b>100.0</b>

Source: Results of Analysis (2019)

Results in Table 9 show the level of community role in managing environmental resources, it shows that the majority 52.4 % of respondents agreed that the roles of community in managing environmental resources were decreasing, 24.1% agreed it was none meaning that it was just constant, however 26.2% agreed it was increasing. The findings show that the roles of community in managing environmental resources were decreasing. Based on interview conducted with local officials, the majority of local officials said that the community had not played their roles well in managing the environment although they play some but they are at minimal.

**Table 10 Chi-square analysis between environmental management and community role**

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	100.801 <sup>a</sup>	4	<b>.000</b>
<b>Likelihood Ratio</b>	96.055	4	<b>.000</b>
<b>Linear-by-Linear Association</b>	60.490	1	<b>.000</b>
<b>N of Valid Cases</b>	<b>145</b>		

Source: Results of Analysis (2019)

Results in Table 10 show chi-square analysis, it shows that environmental management depend on community role since P-value (0.000) <0.05 and we conclude that the level of environmental management in informal settlements significantly depends the level of community role.

**Table 11 Spearman correlation between environmental management and community role**

Correlations			Environmental management	community role
<b>Spearman's rho</b>	Environmental management	Correlation Coefficient	1.000	.648**
		Sig. (2-tailed)	.	.000
		N	145	145
	Community role	Correlation Coefficient	.648**	1.000
		Sig. (2-tailed)	.000	.
		<b>N</b>	<b>145</b>	<b>145</b>

Source: Results of Analysis (2019)

Correlation is significant at the 0.01 level (2-tailed)

Result in Table 11 show Spearman Correlation Coefficient which is 0.666, this shows that there is a strong positive relationship between community role and environmental management. This means as community role increases, environmental management increases, the relationship is statistically significant at 1% level of significant since the P-value (0.000) <0.01. The findings have shown that there is significant relationship between environmental management and community role.

**Table 12 Regression analysis for environmental management, education level and community role. Model Summary**

Model	R	R Square	Adjusted R Square	Sig.
1	.650 <sup>a</sup>	.422	.414	.000 <sup>b</sup>

Source: Results of Analysis (2019)

Results in Table 12 show R-square 0.422 this indicates that community role and education level of community have 42.2% effect on environmental management in informal settlements. These results are statistically significant since p-value (0.000) < 0.05. This means that community role and education level have positive effect on environmental management in informal settlements which is statistically significant.

**Objective one: Socioeconomic effects of informal settlement in environmental managements**

**Table 13 Feedback on socioeconomic effects of informal settlement**

Socioeconomic effects of informal settlement	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
Informal settlements promote street road inaccessibility	4.8%	0.0%	12.4%	82.8%	0.0%
Informal settlements lead to poor waste collection	5.5%	0.0%	8.3%	26.2%	60.0%
Informal settlements lead to poor waste disposal	8.3%	2.1%	0.0%	26.2%	63.4%
Informal settlements result inadequate open space for dumping	7.6%	1.4%	2.1%	32.4%	56.6%
Informal settlements create rapid production of waste	13.8%	2.1%	6.9%	23.4%	53.8%
Informal settlements promote community conflicts	11.7%	2.8%	5.5%	16.6%	63.4%

Source: Results of Analysis (2019)

The results in table 13 reveal that informal settlements promote street roads inaccessibility, lead to poor waste collection and poor waste disposal, also result inadequate open space for dumping, create rapid production of waste and promote community conflicts.

Based on interview conducted with local officials, the majority of local officials said that informal settlements lead to road inaccessibility, poor disposal of waste and community conflicts. They further said that informal settlement lowers development

**Objective two: Community roles in managing the environment in informal settlements**

**Table 14 Feedback on community roles in managing the environment in informal settlements**

Community roles in managing the environment	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
Financial contribution	2.1%	2.1%	40.0%	55.9%	0.0%
Material contribution	0.0%	8.3%	29.0%	26.9%	35.9%
Formulation of environmental management committee	2.1%	20.0%	17.9%	29.0%	31.0%
Implementation of bylaws in environmental management	5.5%	17.2%	26.2%	22.1%	29.0%
Minimization of domestic waste	3.4%	20.0%	23.4%	26.2%	26.9%
Environmental education	12.4%	24.1%	12.4%	21.4%	29.7%
Community participation in environmental management	7.6%	19.3%	26.9%	26.9%	19.3%
Implementation of community infrastructure upgrading	8.3%	17.2%	22.8%	21.4%	30.3%

Source: Results of Analysis (2019)

The results in Table 14 show that the community do contribute financial and material as part of their role in managing the environment. It has also revealed that the community participate the formulation of environmental managements committee, implement bylaws in environmental management, minimize domestic waste, participate in environmental management, participate the implementation of community infrastructure upgrading as part of their role in managing the environment.

Based on interview conducted with local officials, the majority of local officials said that the community do minimize domestic waste, sensitize others on environmental education. They further said that the community also support all government interventions

**Objective three: strategies to improve environmental management in informal settlements**

**Table 15 Feedback on community roles in managing the environment in informal settlements**

Strategies to improve environmental management in informal settlements	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
Implementation of community infrastructure upgrading schemes	1.4%	0.0%	13.8%	82.8%	2.1%
Environmental education	0.0%	1.4%	8.3%	20.0%	70.3%
involving private sectors in environmental management	1.4%	7.6%	5.5%	22.1%	63.4%

Community participation in environmental management	4.8%	2.8%	3.4%	31.7%	57.2%
Bylaws on environmental management	6.2%	2.1%	16.6%	31.7%	43.4%
Economic incentives	1.4%	11.0%	6.9%	30.3%	50.3%
Domestic waste minimization campaign	6.2%	6.2%	8.3%	22.1%	57.2%
Formulation of environmental management committees	5.5%	10.3%	12.4%	32.4%	39.3%
Renovation of environmental management infrastructure	4.1%	10.3%	15.9%	35.2%	34.5%
Creation of dumping sites	9.0%	9.0%	4.8%	24.1%	53.1%

Source: Results of Analysis (2019)

The results in Table 15 show that implementation of community infrastructure upgrading, environmental education, community participation in environmental management and implementation bylaws on environmental management, economic incentives, domestic waste minimization campaign, creation of dumping sites were good strategies to improve environmental management in informal settlements,

Based on interview conducted with local officials, the majority said that the strategies to improve environmental management are; environmental education and implementations of development plans. They further said community participation is also good strategy.

#### V. Discussion of Findings

The study identified the socioeconomic effects of informal settlement which include road inaccessibility, poor waste disposal and collection, inadequate open space for dumping, rapid production of waste and community conflicts. The results support the findings of Martin and Satterthwate (2004). According UN Habitat (2008) these socioeconomic effects are contributing much to pollution and environmental degradation such as water, air and land resources to great magnitude compared to actions taken to improve environmental sustainability in urban communities. The study also examined community role which include minimization of waste, sensitization of others on environmental education and participation in implementing community infrastructure upgrading. Results of chi-square analysis indicated that environmental management in informal settlements depend on community. The results support the findings of Kombe (2005). According to kombe (2005) stated that environmental management in informal settlements could be improved by developing strategic vision through effective participation of local and national stakeholders. The results of spearman coefficient correlation show that there is strong positive relationship between community role and environmental management in informal settlement. This implies as the level of community role increases the level of environmental management in informal settlements will also increase. The relationship is statistically significant  $p$ -value  $<0.05$ . The results of regression analysis indicated community role and education level of community have positive effect on environmental management in informal settlements.

Finally, the study found the possible strategies to improve environmental management in informal settlements which include environmental education, domestic waste minimization campaign, and implementation of community infrastructure upgrading and economic incentives.

#### VI. Conclusions

Based on empirical findings the followings conclusion is established:

The socioeconomic effects of informal settlements include but not limited; road inaccessibility, poor waste disposal and collection, inadequate open space for dumping and community conflicts. The study concluded that environmental management in informal settlement depend on community role and there is a strong positive relationship between them, therefore the level of community roles should be increased by using the different



strategies found such as environmental education and domestic waste minimization campaign in order to improve environmental management in informal settlements and have sustainable environment.

### Recommendations

The study therefore recommends that there is a need to sensitize the local community on environmental education in order to improve environmental management in informal settlements. Local governments should implement community infrastructure upgrading. NGOs and local governments have to conduct domestic waste minimization campaign. There is also need to provide economic incentives to the poor in urban community. Local officials at all levels should cooperate so as to make easy the inspection of developments during construction.

### VII. References

1. Abbot, J. (2008). *An Analysis of Informal Settlements Upgrading and Critique of Existing Methodological Approach*, Retrieved on 11st February 2013 from <http://www.sciencedirect.com/bib3>
2. Domingo, C. S. (2002). *Environmental Geography, (1stEdition)*. JMC Press, Dortmund
3. Davis, J. (2007). *Towards Sustainable Urban Paradigm: Cities – Problems or the Solutions*, East Inc, Nairobi, Kenya
4. Kombe, W. J. (2005). *Land Use Dynamic in Peri-Urban areas and their Implication on Urban Growth*. United Nation – HABITAT Article, volume 29 (1)
5. Kombe, W. J and Kreibich, V. (2007). *Informal Land Management in Uganda*, Oxford Press, London
6. Kombe, W.J. (2010). *Land Use Dynamic in Peri-Urban Areas and their Implication on the Urban Growth*, Oxford Press, London
7. Lupala, J. (2002). *Urban Types in Rapidly Urbanising Cities: Analysis of Formal and Activity in Greece*, Management of International Business and Economic Cited Retrieved 3<sup>rd</sup> August 2012 From World Wide Web: [www.cctiz.com](http://www.cctiz.com)
8. Martin, D and Satterwaite, D. (2004). *Earwig Squatter Citizens, Local Government, Civil Society and Urban Poverty reduction*, Earth scan, West Inc, London
9. Ndezi, Tim. (2011). *The Limit of Community Initiatives in Addressing Resettlements in Kampala*, Retrieved 3<sup>rd</sup> August 2012
10. UN-Habitat (2005). *United Nations Centre of Human Settlement: The state of the World Cities*, Oxford University Press, London
11. UN HABITAT, (2008). *The State of African Cities: A Framework for Addressing Urban Challenges in Africa*, Nairobi- Kenya
12. UN HABITAT, (2006). *The State of the World Cities*, East Inc. Geneva-Swiss
13. UN HABITAT and UN Environment Programme, (2008). *Environmentally Sustainable and Urbanization*. Nairobi-Kenya
14. United Nations Conference on Environment and Development, (1992). *Convention to Combat Desertification*, Rio de Janeiro, Brazil