

**ASSOCIATION BETWEEN POOR SANITATION PRACTICES WITH DIARRHEAL
DISEASE OCCURRENCE IN NAMATALA SLUM, MBALE DISTRICT:
A CROSS SECTIONAL STUDY**

**SYDNEY NSUBUGA
MASTER OF PUBLIC HEALTH**

**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE AWARD OF MASTER
OF PUBLIC HEALTH DEGREE OF
BUSITEMA UNIVERSITY**

MAY, 2018

DECLARATION

I Sydney Nsubuga, declare that this dissertation is my original work. It was done in partial fulfillment for the award of Masters of Public Health of Busitema University. This work has not been published by any other person before or submitted for any other academic qualification in other institutions. I have referenced other work cited in here appropriately.

Sign

Date.....

APPROVAL

This dissertation is submitted as partial fulfillment for the award of Master of Public Health of Busitema University with our approval as supervisors.

1. Dr. George Wilson Khaukha (A.I.M.L.S, BSc, MSc, PhD)

Lecturer

Head of Department – Biochemistry and Molecular Biology,

Faculty of Health Sciences,

Busitema University.

Sign

Date

2. Dr. Peter Olupot-Olupot, MB.Ch.B, MPH, PhD

Associate Professor,

Faculty of Health Sciences, Department of Public Health,

Busitema University - Mbale Campus.

Sign

Date

DEDICATION

To all those that contributed and continue to contribute towards sustainable solid waste management and sanitation solutions in informal settlements

ACKNOWLEDGEMENT

Firstly I would like to thank the faculty of health sciences at Busitema University for providing an enabling environment for my Master's program. Secondly the Head of department Public Health Dr. Jayne Byakika – Tusiime, my supervisors Dr. George Wilson Khaukha and Dr. Peter Olupot-Olupot whose scholarly advice enriched this work.

My gratitude goes to my family especially my wife Leah and our two Children; Bill and Mitchell whose love continuously energized and encouraged me all through my studies and writing this work.

ACRONYMS AND ABBREVIATIONS

ADB	–	African Development Bank
BUFHS	–	Busitema University Faculty of Health Sciences
<i>C. freundii</i>	–	Citrobacter Freundii
CFU	–	Colony forming units
DALYS	–	Disability adjusted life years
DHO	–	District Health Officer
DHS	–	Demographic Health Survey
<i>E. coli</i>	–	Escherichia Coli
ECD	–	Early Child Development
HSWM	–	Household Solid Waste Management
IRB	–	Institutional Review Board
ISWM	–	Integrated Solid Waste Management
MF	–	Membrane filtration
MDGs	–	Millennium development goals
MMLG	–	Mbale municipal local government
MOH	–	Ministry of Health
NTU	–	Nephelometric Turbidity units
NWSC	–	National water and Sewerage Corporation
PCU	–	Platinum cobalt units
SDGs	–	Sustainable development goals
SWM	–	Solid Waste Management
TSI	–	Triple Sugar Iron
TTC	–	Thermo tolerant Coliforms
UNHS	–	Uganda National Health Survey
UN-HABITAT	–	United Nations Human Settlements Agency
UNICEF	–	United Nations International Children’s Emergency Fund
UPE	–	Universal Primary Education
WHO	–	World Health Organization

OPERATIONAL DEFINITIONS

Household	Group of two or more persons living together and make common provision for food or other necessities for daily living and are affected by poor waste management practices.[1]
Household Solid waste	Organic and inorganic substance at the household that is rendered useless including feces and fecal contaminated material. [1]
Poor Solid waste management	Any approaches and processes used to find solutions to waste that inadvertently become harmful to humans and the environment.[1]
Poor Sanitation	Means that promote human contact with hazards of waste especially feces. These hazards may be microbiological, biological, physical or chemical.[2]
Diarrhea	Three or more episodes of loose watery stool in one day. [3-5]
Diapers/Napkins/Pampers	Any cloth or paper material used for cleaning children buttocks and anus after passing stool.[6]
Infrastructure	Physical household amenities used in the management of solid waste. This may include latrines or toilets, litter cans, composite pits or dumping sites.[1, 7]
Care giver	A person eighteen years and older whose responsibility is to keep watch and custody of children under five years – usually the mother who will respond to the questionnaire.[4, 6]
Recycling	Involves the collection and processing of materials and making them into new products, for example, collecting plastic bottles to make other bottles or other things.[1]

Composting	Is a natural process of breaking down organic garbage (like vegetable peelings) into a soil like material which can be used for farming and gardening.[1]
Reuse	Is the practice of making means to an item more than once, for example, a glass jar to store supplies, or plastic bags as trash bags.[1]
Segregation of waste	The process by which residents or households divide their trash or garbage into different categories depending on the level of composition for appropriate disposal.[1]
Household Environment	The household and the surrounding area where the people live or reach.[1]

TABLE OF CONTENTS

DECLARATION	i
APPROVAL	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
ACRONYMS AND ABBREVIATIONS	v
OPERATIONAL DEFINITIONS.....	vi
ABSTRACT.....	xi

CHAPTER ONE

1.0 Introduction and Background	1
1.1 Statement of the problem	4
1.2 Justification.....	6
1.3 General Objectives.....	6
1.4 Specific Objectives	7
1.5 Conceptual Frame Work.....	7

CHAPTER TWO

LITERATURE REVIEW

2.1 The socioeconomic, demographic and environmental characteristics of households whose children develop diarrhea.....	11
2.2 The association between poor household sanitation and waste management practices: Infrastructure, sociocultural and economic challenges with diarrhea occurrence in children.....	14
2.3 Water Source contamination by Poor sanitation and Solid waste leading to diarrhea occurrence.....	17
2.4 The Prevalence of Diarrhea among Children under five years in Uganda	18

CHAPTER THREE

MATERIALS AND METHODS

3.0 Study Area.....	21
---------------------	----

3.1 Target Population.....	22
3.2 Study Population.....	22
3.3.1 Inclusion criteria	22
3.3.2 Exclusion criteria	23
3.4 Study Design.....	23
3.5 Sample Size Determination	23
3.6 Sampling Strategy.....	24
3.7 Laboratory Analysis.....	24
3.8 Study variables.....	24
3.8.1 Data Collection	25
3.8.2 Data Analysis plan.....	25
3.8.3 Ethical Consideration.....	26
3.8.4 Dissemination of Study Findings.....	27
3.8.5 Limitations.....	27

CHAPTER FOUR

RESULTS	27
---------------	----

CHAPTER FIVE

DISCUSSION

5.0 Introduction.....	43
5.1 Prevalence of diarrhea in children less than five years in Namatala.	43
5.2 The Socioeconomic, demographic and environmental characteristics of households with diarrhea occurrence in Namatala	44
5.3 Association of diarrhea occurrence in Children under five years with sanitation, waste management practices and infrastructure.....	47
5.4 Water source contamination with Microbial organisms in Namatala.....	48

CHAPTER SIX
CONCLUSION

6.0 Introduction.....	50
6.1 Recommendations.....	51
6.1.1 Implementation of the “3 Rs” and “S” of waste management.....	51
6.1.2 Collection and transportation of waste from households.....	52
6.1.3 Consistent water supply and Water treatment.	52
6.1.4 Health Education and Sensitization	52
6.1.5 Community based solid waste management.....	53
6.2 Future Research	53
References.....	54
APPENDIX I	59
QUESTIONNAIRE	59
APPENDIX II.....	69
INFORMED CONSENT TO PARTICIPATE IN THE STUDY:.....	69
APPENDIX III.....	73
Work plan	73
APPENDIX IV	74
Analysis of Water Samples from Namatala.....	74
APPENDIX V.....	75
Culture appearance, gram stain and biochemical reactions of the isolates.....	75
APPENDIX VI	76
PICTURES.....	76
APPENDIX VII	79
APPEARANCE OF CULTURE PLATES	79

ABSTRACT

Despite global commitments to improve settlements over the next couple of years, sanitation remains a huge challenge in most informal settlements. Municipal and local governments seem to have neglected part of their prime responsibility of solid waste management which has led to huge amounts of waste to be indiscriminately disposed along streets, water sources and within residential locations. This leads to contamination of both food and water causing water and food borne diseases. Poor sanitation including poor solid waste management leads to more serious public health and environmental risks each of them having socioeconomic and political effects within and outside societies. This dissertation focuses on the sanitation struggles surrounding informal settlements amidst a decentralization form of governance.

The objective was to study the association between poor sanitary practices with diarrheal disease occurrence in the cosmopolitan suburb of Namatala in order to raise community and MMLG awareness to contribute towards the prevention and control of diarrhea in Mbale.

A community based cross-sectional survey with households as units of study was conducted. The study population were children under five years of age and data were obtained from their mothers and care givers. Diarrhea was the outcome of interest. Quantitative data was collected using a standardized questionnaire survey administered by trained research assistants. Quantitative data analysis was done using a statistical software, Stata edition 14 created by StataCorp. Bivariate and multivariate analyses were done using Chi-square and logistic regression to determine the association between diarrheal disease occurrence and other factors within the household environment.

422 respondents including 144 men (34.1%) and 278 women (65.9%) aged 17-74 years were interviewed. 83.6% of the respondents had gone through formal education and 16.4% never had

formal education. 65.2% were unemployed and 34.8% were employed. 55% had no income, 45% had monthly income of at least 50,000UGX (\$15). Respondents were concerned about the poor state of their household environment with household garbage (66.03%), open defecation (19.95%), sewage pollution from pits and toilets (12.35%) reported as the major factors affecting the household environment. 82.46% of the households used pit latrines located outside their premises and often these were shared. 70.7% stored unsegregated solid waste in plastic polythene bags. The main source of drinking water for the households was reported to be public stand pipes (70.31%) and only one household reported obtaining drinking water from the river representing 0.24%. This however, may have been a Hawthorne effect as many households were seen collecting water from dug wells. 66.11% of the households were built using semi-permanent materials. 45.73% of the households reported having a child less than five years with diarrhea within three days preceding the survey. Dumping of waste, presence of vectors and breeding sites within households, the age of the care giver, the employment status of the household head, type of toilet/latrine used by the household and location of toilet/latrine within or outside the household were associated with occurrence of diarrhea in children less than five years. All the water sources sampled had positive cultures for Enterobacteriaceae pathogens; *Escherichia Coli* and *Citrobacter Freundii* both of which originate from the gut of humans and animals.

In conclusion, open defecation as a determinant of diarrhea occurrence is still a common practice in Namatala and this brings into perspective the need to emphasize sanitation and hygiene programming in informal settlements with vulnerable pastoral migrants. This and other factors suggests a link between poor sanitary practices in Namatala and the contamination of water sources leading to diarrheal disease occurrence in children less than five years of age.