

# **ECONOMIC DETERMINANTS OF DOMESTIC WATER MANAGEMENT AT HOUSEHOLD LEVEL ON DIARRHEAL CASES AMONG CHILDREN UNDER FIVE YEARS OF AGE IN KANGEMI, NAIROBI COUNTY**

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## **ABSTRACT**

Diarrheal diseases are one of the major causes of morbidity and mortality in developing countries particularly in children. Unsafe drinking water, along with poor sanitation and hygiene, are the main contributors to an estimated 4 billion cases of diarrheal diseases annually, causing more than 1.5 million deaths, mostly among children less than five years of age. The prevalence of diarrhea in Kangemi is at 17% among children with peak period at age 6-11 months. About 95% of Kangemi residents have no access to good sanitation and only 19% of livelihoods have access to piped water. The broad objective was to establish economic determinants of domestic water management at household level on diarrheal cases among children under five years of age in Kangemi, Nairobi County. This study employed a descriptive cross-sectional study design to determine the determinants of domestic water management at household level on diarrheal cases among a target population of children between 0-59 months. The study was done in Kangemi, Westland Sub County Nairobi County. The study Parents were parents of children below the age of 59 months. This research study used a stratified random sampling method to select and sample the Parents. The primary data that was used to collect data is use of questionnaires and complemented by use

of in-depth interview guides. The secondary data was obtained from records obtained from; scholarly journals, books, professional reports and papers by authorities in research. Quantitative data was analyzed using Statistical Package for Social Sciences (SPSS) software package, version 22. On the other hand, qualitative data was analyzed through categorization and organized into themes, patterns and dimensions. The data was presented in Tables and figures. The study established that economic determinants of domestic water management at household level affect diarrheal cases among children under five years of age in Kangemi, Nairobi County as shown by 79.2%. The study concluded that economic determinants significantly influence on management of domestic water at household level and diarrheal morbidity in Kangemi. The authorities in Kangemi area should grant special attention to poorer households when implementing strategies for population access to safe and reliable water, that there is need to empower women through financial awareness and education and that Ministry of health should conduct training and awareness programs on diarrhea detection and treatment.

**Key Words:** *economic determinants, domestic water management, household level, diarrheal cases, children, Kangemi, Nairobi County*

## **INTRODUCTION**

Globally, more than 1.3 million deaths in 2015 were caused by diarrhea which was fourth leading death cause among less than 5 years' children. However, the greatest burden is on poor people who are not able to get safe water, sanitation and immediate medical care. In high-income regions another obvious cause of hospital admissions and outpatient visits is acute infectious diarrhea which still remains a significant health threat in the world. Diarrhea

prevention as well as treatment is difficult as a result of pervasive infrastructural, political, and socioeconomic challenges which comprise safe water and sanitation access, awareness as well as health care access. Diarrhea as well as its etiologies burden estimates is often formed annually as global burden part diseases, injuries, and risk factors (GBD, 2015).

In Ethiopia, the rate is 88% per 1000 people which implied that the strength towards less than 5 years' mortality reduction in Ethiopia is still under consideration for the realization of the MDG which targets reduction of mortality rate for under-five by 2/3 between 1990 and 2015. In Ethiopia in 2010, 8% of all mortalities for under-5 as well as 13% of under-5 children morbidity are accounted by diarrhoea. The children proportion having diarrhoea was only 32% for where guidance or treatment was sought from a provider of health care (KNBS et al., 2011).

As per Millennium Development Goal (2011), sub-Saharan Africa has the under-five mortality highest levels. More than 8 children die before the age of five years (129 deaths per 1000 live births) that is nearly double the average in unindustrialized regions and around eighteen times the average in industrialized regions (UN, 2011). In Eastern and Southern Africa region observed average annual reduction rate (AARR) in the under 5 years of age mortality rate (U5MR) for 1990-2006 period was 1.4% that is observed as inadequate to achieve Millennium Development Goal 4 as well as would need an AARR of 9.6% between 2007 to 2015 if Millennium Development Goal 4 is to be attained by nations in this region (UNICEF, 2008).

Kenya is among the fifteen countries that account for over 75 percent of all deaths from diarrhoea among children under-five years of age annually. Until recently, Kenya's development has been focusing on the urban areas. This has led to a large influx of migrants from the rural to the urban areas. Together with political and economic instability, this influx has forced more people to live below the poverty line, concentrated in informal settlements in the city for example Kangemi. The African Population Studies indicates that Nairobi is one of the regions in the country with relatively high prevalence of diarrhea (Magadi, 2004). This has been explained mainly in terms of poor sanitation in the large and densely populated low-income areas. Slum areas are generally characterized by poor access to appropriate means of excreta disposal and lack of safe drinking water.

In Nairobi county informal settlements, clean water is limited and most residents do not have access to it predisposing them to high risk of contracting waterborne diseases (Mulama, 2007). Sanitation facilities are also lacking in the informal settlements; toilets and sewerage systems do not exist in some settlements thus human waste runs throughout the settlements in open sewers. The drainage systems in place lack the capacity to serve the large population and its waste (UN-Habitat, 2011). This study will review how determinants of domestic water management at household level is related to diarrhea cases among children less than five years of age in Kangemi, Nairobi County and analysis will be done to identify household water treatment in preventing diarrhea and health impact.

According to Kimani (2013) diarrhoeal disease attributable to water, sanitation and hygiene among under five in Kasarani sub-county, Nairobi county and found that water consumed in

Kasarani was a risk for childhood diarrhoea ( $p=0.019$ ) with tap water showing a significantly higher contamination 13.7% than household water container 7.2% for T. Coli bacteria. Further, according to Ikuu, (2014) community and household environmental factors had a positive impact on diarrhoea of children under five years of age in Korogocho slum. However, access to and sharing of toilet facilities was not found to be statistically significant in occurrence of diarrhoea in children below five years of age. In addition, according to Mbungua, (2013) age of child and residence of mother are more likely to influence childhood diarrhea in which higher education level of mother was associated with lower incidence of childhood diarrhea and that household characteristics had statistically significant influence on childhood diarrhea included sources of drinking water and household size. This study was to establish the determinants of domestic water management at household level on diarrheal cases among children under five years of age in Kangemi, Nairobi County.

## **PROBLEM STATEMENT**

In Kangemi Constituency, Nairobi County, the health of the under five years' children is negatively affected by inadequate water and sanitation and the rate of diarrhoea among these children in Kangemi is more than 40% of the total cases in Nairobi county (Well, 2005). The major contributors of diarrhoea of under five years have been found to be contaminated drinking water and food, lack of proper toilet facilities, ineffective disposal of household wastes, lack of hand washing practice after visiting toilets and before handling foods as well as low education levels especially among mothers of under five years' children. Poor sanitation and contaminated water have escalated transmission of diseases causing diarrhea as well as cholera, dysentery, and typhoid. Inadequate toilets in Kangemi area have forced most residents to inappropriately dispose their human waste by disposing it to rivers and even near water sources. This has made it impossible to effectively manage water and provide high quality water for residents in Kangemi area. Inadequate waste disposal drives the infection cycle of many agents that can be spread through contaminated soil, food, water, and insects such as flies. There are various strategies that have been initiated in Kangemi to improve access to water and also enhance sanitation. For instance, EU initiated a project known as External Investment Plan meant for improving access to clean water and included installing water storage tanks and expanding the sewer network. In addition, WSUP is currently supporting tertiary sewer network extensions in Kangemi, so that households can access affordable and improved sanitation by promoting sewer connections and upgrading of toilets in the area. Despite these efforts, most of residents in Kangemi are still not able to access clean and quality for domestic use. In addition, poor sanitation is still a problem in area. This provides the gap that this study seeks to bridge by how domestic water management improves quality of water used at household level and hence reducing the diarrheal cases among children under five years of age in Kangemi sub-county, Nairobi County.

## **OBJECTIVE OF THE STUDY**

To identify economic determinants of domestic water management at household level on diarrheal cases among children under five years of age in Kangemi, Nairobi County.

## **LITERATURE REVIEW**

The economic status is determined by the activities that household members engage in to earn income. Economic factors are major determinants of childhood survival at individual, household and community level. The household income is a significant factor in determining the life standards of the household members. It regulates various aspects of the household lives such as the housing type, education and healthcare. Additionally, the access to water and the water sourcing behaviour of households are influenced by Income in a great way (Arouna et al., 2009).

### **Income Level of the Residents**

This is the amount of money that residents have access to and rights to use and determines the state of the residents housing and also access to enough clean water or to sanitary fecal waste disposal. Low income level is attributed to poor housing, dirty floors and also inadequate access to clean water as well as poor sanitation. Income of the household is among the key access to water and sanitation facilities factors (Smith et al., 2013).

Households' income levels are one of the determinants of which establish their water and sanitation facilities and services accessibility. This is as a result of the fact that groups of low-income are barely have the ability in affording high fees for piped water connection and thus connectivity being limited (Gigon, 2011). Improved drinking water source awareness and the demand revealed that a wealth index for household's have a key role in households' drinking water quality demand in which there is a likelihood of safe and reliable water consumption (Fotue, 2013).

### **Source of Income**

This is where the money comes from which may be employment, business or donors. In a study by Mahama (2013) to explore the factors which affected the families to access water and sanitation facilities which are enhanced in five selected low-income communities in Accra revealed that the likelihood of accessing as well as using enhanced water for drinking water was statistically affected by income (wealth). Kimenyi et al., (2010) noted that households' status of the economy is linked closely to services such as water affordability. Therefore, families having unreliable income source have a likelihood of using water from sources that are not improved.

There are three ways in which the income is related to health: through the GNP of countries, the individuals' income as well as the inequalities based on income between rich nations and geographic areas. There exist two ways in which income may be causally associated with health: via directly affecting the necessary material conditions for survival biologically as well as via affecting participation socially and a chance to circumstances of life. The lesser the services as well as goods are given to the public by the community, the more significant personal income is for health. Currently under the circumstances in U.S, a counteracting policy improving differences in income in terms of tax as well as systems of the benefit and of justification of the provision to the public (Albert et al., 2010).

### **Access to Water Supply**

There are increasing cases of city water pipes illegal tapping out of desperation, a strategy for survival, which may concede the water supply safety via cross-contamination. When households become better-off, they are much more likely to choose improved quality water (Totoum et al., 2012). Most of the households which are poor have lower-quality services access than rich families (Fewtrell, et al., 2000). Less poor families have more stable water networks connection while majority of the urban poor who live in the slums are disproportionately underserved (World Bank, 2003).

Majority of the cases, have no direct connection to public utility for the poor families. Such families struggle with high water prices but also rely on water vendors who sell to them at low prices and water of poor quality. In addition, the subsidized water benefits accrue generally to richer families who are connected to public network. The families that are poorer do not benefit of these subventions because they have water supplies that are irregular or non-potable as well as having to buy water from sources that are not subsidized (Fotue, 2013).

The household head occupation meaningfully affected the kind of source of water by family. The family expenses which is a key factor compelling family to depend on unaltered sources therefore the deduction that authorities need to give a lot of attention to the poor families while executing access to safe and reliable water strategies (Koskei, et al., 2013).

### **Access to Health Facilities**

Inadequate access to the health services greatly affects the individuals' status of the health. For instance, there is a less likelihood for the individuals without health insurance to take part preventive care as well as a delayed medical treatment. The challenges facing the access to health services can result to unmet health needs, recipient of the proper care, being not able to have preventive services and hospitalizations which may be prevented (Kimenyi et al., 2010).

It is important in accessing comprehensive, quality health care services in a bid to promote, maintain health, prevent, manage disease, and reduce needless disability and achieving health equity for all Americans. Health Services access is essential since it accesses health services implies personal health services timely use to attain the outcomes of the health outcomes as well as affecting the individuals physical, social and mental status of the health and life quality. It needs 3 particular steps: having access to the health care system, location accessibility of where health care services are needed (availability geographically), getting a health care provider trusted by the patient and ability to communicate with (personal relationship) (Fotue 2013).

## **THEORETICAL FRAMEWORK**

### **The Social Cognitive Theory**

The study was anchored on Albert Bandura's theoretical framework of Social Cognitive theory which postulates that people are driven, not by inner forces, but by external factors (Bandura, 1986). This model suggests that human functioning can be explained by a triadic

interaction of behavior, personal and environmental factors. This is often known as reciprocal determinism.

In a bid to increase the self-efficacy levels, it is significant to offer resources and support needed to improve on confidence of the individuals. There is a suggestion by other scholar that in raising the behavior change self-efficacy need to be approached in small steps series. Bandura noted that even when there is strong sense of efficacy among the individuals, they might not perform the behavior if they would not have motivation (Clasen, et al., 2008).

This is a suggestion that having an interest to change behavior of anyone it is very significant to give a motivation and for the change of the behaviors. He further reveals that environment shaping might inspire change in behavior. This includes provision of change in behavioral opportunities, helping with the alterations as well as offering support socially. It is key in recognizing environmental challenges may deter change in behavior. This theory is relevant to this study as it tries to highlight the determinants of domestic water management at household level on diarrheal cases.

### **Ecological Systems Theory**

This Ecological Systems Theory was advanced by Urie Bronfenbrenner (1917-2005) to describe how child growth as well as development is affected by the surroundings. He highlighted various aspects or the environment levels which affect the development of children, including the microsystem, the mesosystem, the exosystem, as well as macrosystem. The microsystem is the small and immediate environment the child is living in which includes any immediate associations or individuals they interact with like their immediate family or caregivers and their school or day care. The interaction of these groups or organizations with the child affects the growth of the child and more hopefully nurturing these associations may improve the growth of the child. Additionally, the reaction of a child to the people in the microsystem affects their treatment in return. Every child's special genetic and personality traits influenced biologically also termed as temperament, results in influencing the treatment towards them by others (Curry, et al., 2015).

Bronfenbrenner's next level, the mesosystem, describes how the different parts of a child's microsystem work together for the sake of the child. For example, if a child's caregivers take an active role in a child's school, such as going to parent-teacher conferences and watching their child's soccer games, this will help ensure the child's overall growth. In contrast, if the child's two sets of caretakers, mom with step-dad and dad with step-mom, disagree how to best raise the child and give the child conflicting lessons when they see him, this will hinder the child's growth in different channels (Freeman, et al., 2009). The ecosystem level includes the other people and places that the child herself may not interact with often her but that still have a large effect on her, such as parents' workplaces, extended family members and the neighborhood. For example, if a child's parent gets laid off from work, that may have negative effects on the child if her parents are unable to pay rent or to buy groceries; however, if her parent receives a promotion and a raise at work, this may have a positive effect on the child because her parents will be better able to give her physical needs (Fuller, et al., 2014).

Bronfenbrenner's final level is the microsystem, which is the largest and most remote set of people and things to a child but which still has a great influence over the child. The microsystem includes things such as the relative freedoms permitted by the national government, cultural values, the economy, wars (Nzioki, et al., 2009). These things can also affect a child either positively or negatively. This research focused on this model since it is concerned about the determinants of domestic water management at household level on diarrheal cases among children under five years of age in Kangemi, Nairobi County.

## **RESEARCH METHODOLOGY**

The study employed descriptive study design, which was cross-sectional in nature or approach. This research design was considered suitable as a result of its nature of obtaining data which was gathered from Parents in Kangemi, Nairobi County. The total population of this study was 88,709 people living in Kangemi informal settlement of Nairobi City County (KNBS Census Report, 2019). The study targeted 2,681 parents with 0 to 59 months old children in 1,915 households in Kangemi area, Nairobi County. The sample size was calculated using Yamane (1967:886) formulae. The Yamane formula was formulated by Tara Yamane in 1967 to determine the sample size from a given population of 2681. It is applicable when calculating a sample size when the population size is known. The formula is as shown below:

$$n = \frac{N}{1 + N(e^2)}$$

Where: N = is the target population; e = is the precision rate (error to make at 0.05); n = is the sample size.

$$n = 2681 / (1 + 2681(0.05)^2) = 184$$

The adjusted sample size will be  $184 * 90\% = 166$

Therefore, a sample size of 166 parents (mothers and fathers) with 0 to 59 months old children was considered to be adequate sample for the study. This study used a mix sampling methods to select and sample the Parents. The purposive sampling method was used to select Nyumba Kumi units that were sampled and number of parents with 0 to 59 months old children in unit determined. Systematic sampling method was applied to select the parents from each Nyumba Kumi that were then placed in the different strata as per the units. Finally, the random sampling with proportionate allocation technique was used and 184 respondents with 0 to 59 months old children from each stratum were proportionately accessed in the Kangemi Constituency. All the children under five years living in a household had equal chances and were included in the sample frame. This was also including households having twins and only parents who had children under five years of were the ones who were interviewed. The mothers or guardian with children aged 0-59 months who were unwilling to participate in the study was excluded. The primary data was collected using questionnaires and complemented by use of in-depth interview guides. The secondary data was also obtained from sources including; scholarly journals, books, professional reports and papers by authorities in research. The analysis of the quantitative data was done by use of Statistical Package for Social Sciences (SPSS) software package, version 25. All the questionnaires



received will be referenced and items in the questionnaire will be coded to facilitate data entry. After data cleaning which entails checking for errors in entry, descriptive statistics such as frequencies, percentages, mean score and standard deviation will be estimated for all the quantitative variables and information presented in form of tables and figures. The qualitative data from the open-ended questions and interview guides will be analyzed using thematic content analysis and presented in narrative form. Multiple regression analysis was utilized for inferential data analysis. Multiple regressions were used since it is the method that utilizes two or more independent variables in predicting the dependent variable. In addition, the analysis of the qualitative data was grouped and analyzed thematically. In description of data sets patterns and general trends including exploration of each of the study variables independently:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where: Y= Management of domestic water at household level and diarrheal morbidity;  
 $\beta_0$ =Constant;  $\beta_1$ ,  $\beta_2$  and  $\beta_3$ =Regression coefficients;  $X_1$ =Economic determinants;  
 $X_2$ =Demographic determinants;  $X_3$ =Education determinants;  $\varepsilon$  = error term

## **RESEARCH RESULTS**

The study established that Low income level that was attributed to inadequate access to clean water and poor sanitation and inadequate access to the health services greatly affected the individuals' status of the health. These findings agree with Kimenyi et al., (2010) which stated that the status of a household economy is linked closely to services such as water affordability. Therefore, families having unreliable income source have a likelihood of using water from sources that are not improved.

The study also found that households with low-income are unable to afford high fees for piped water connection and that there is inadequate access to piped water by most of the households and that accessing comprehensive and quality health care reduces child morbidity. These findings are in line with Kimenyi, et al., (2010) who argues that the challenges facing the access to health services can result to unmet health needs, recipient of the proper care, being not able to have preventive services and hospitalizations which may be prevented. The lesser the services as well as goods are given to the public by the community, the more significant personal income is for health.

Further, the study found that most of households does not depend on employed family members to access quality water and that the members of the households have not received training on diarrhea detection and treatment. These findings concur with Smith et al. (2013) who noted that households' income levels are one of the determinants of which establish their water and sanitation facilities and services accessibility. This is as a result of the fact that groups of low-income are barely have the ability in affording high fees for piped water connection and thus connectivity being limited. In addition, Fotue (2013) argued that the household head occupation meaningfully affected the kind of source of water by family. The family expenses are key factors for compelling family to depend on unaltered sources therefore the deduction that authorities need to give a lot of attention to the poor families while executing access to safe and reliable water strategies.

## **INFERENCE STATISTICS**

The researcher conducted a multiple regression analysis to test the relationship between the variables. This showed how the dependent variable is influenced by the independent variables.

**Table 1: Model Summary**

<b>Model</b>	<b>R</b>	<b>R Square</b>	<b>Adjusted R Square</b>	<b>Std. Error of the Estimate</b>
1	0.838	0.703	0.694	1.104

From the findings, the independent variables were statistically significant predicting the dependent variable since R square was 0.694. This implied that 69.4% variations in Management of domestic water at household level and diarrheal morbidity in Kangemi, Nairobi are explained by economic determinants, demographic determinants and education determinants. Other determinants of Management of domestic water at household level and diarrheal morbidity in Kangemi, Nairobi that were not covered in this study accounted for 30.6% which form the basis for further studies.

**Table 2: ANOVA Test**

<b>Model</b>		<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
1	Regression	291.109	3	97.036	78.091	.000
	Residual	123.018	99	1.243		
	Total	414.127	102			

From the ANOVA Table, p-value was 0.000 and F-calculated was 78.091. Since p-value was less than 0.05 and the F-calculated was greater than F-critical (2.6965), then the regression relationship was significant in determining how economic determinants and demographic determinants and education determinants influenced management of domestic water at household level and diarrheal morbidity in Kangemi, Nairobi. This implies that economic determinants, demographic determinants and education determinants have significant influence on the Management of domestic water at household level and diarrheal morbidity in Kangemi, Nairobi.

## **CONCLUSIONS**

The study concluded that economic determinants significantly affect domestic water management at household level on diarrheal cases among children under five years of age in Kangemi, Nairobi County. This was attributed to the fact that Low income level is attributed to inadequate access to clean water and poor sanitation and that inadequate access to the health services greatly affects the individuals' status of the health. In addition, households with low-income are unable to afford high fees for piped water connection, most of households does not depend on employed family members to access quality water and that the members of the households have not received training on diarrhea detection and treatment

## RECOMMENDATIONS

1. The authorities in Kangemi area should grant special attention to poorer households when implementing strategies for population access to safe and reliable water.
2. The government should promote inclusive and sustainable human development and work to reduce poverty in all its dimensions.
3. The local community in Kangemi area should be made to understand the importance of economic use of water through aggressive awareness campaigns to promote effective and measurable social change.

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