DETERMINANTS OF RECURRENT DIARRHOEA DISEASE AMONG CHILDREN OF UNDER-FIVE YEARS RESIDING IN TANDALE WARD.

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DETERMINANT OF RECURRENT DIARRHOEA DISEASE AMONG CHILDREN UNDER FIVE YEARS RESIDING IN TANDALE WARD.

By

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A dissertation submitted in (Partial) fulfillment of the requirements for the Degree of Master of Science in Public Health of

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CERTIFICATION

The undersigned certify that he has read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled, *"**Determinants of recurrent diarrhoea disease among children under five years residing in Tandale ward."*** in fulfillment of the requirements for the degree of Master of Public Health of Muhimbili University of Health and Allied Sciences.

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Dr. S. Mamuya

(Supervisor)

_____

Date

DECLARATION AND COPYRIGHT

I, **Catherine Leonard Francis Sembua**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature_____ Date_____

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DEDICATION

This work is dedicated to my parent Hilda Leonard Sembua. Special dedication to my beloved brothers Francis and John and my young sister Mary, my lovely son Said and daughter Blandina who gave me social and psychological support during the course of study. I also thank them for the tolerance they incurred during my absence.

ABSTRACT

Background: Recurrent diarrhea among under-five children is a serious public health problem in Tanzania as it contributes much to under-five morbidity and mortality and overall disease burden in the country. The prevalence of diarrhea recurrence among under-five children in this study was 37% which is higher than that obtained from Kinondoni DHI records (22%) before the study.

Limited studies have been conducted on diarrhea recurrence within the country; most of them were focused on the single episode of diarrhea. This descriptive cross-sectional study was conducted to determine the prevalence of recurrence diarrhea among under-five children in Tandale ward.

Broad objective: To determine the prevalence of recurrence diarrhea and factors associated with it among under-five children in Tandale ward from July 2016 to June 2017.

Materials & methods: A cross sectional study was conducted with a sample of 420 households with under- five children in Tandale Ward. Both purposive and simple random sampling technique was used to select the study population. Data were collected by using observation checklist and interviewer administered questionnaire. Mothers/caretaker of under-five was asked the questions on diarrhea recurrence of under five children in his/her household. A chi squared test was used to determine the association between independent and outcome variables and it was considered significant if P-value is less than 0.05. Univariate and Multivariate logistic regression technique was used to determine independent predictors for recurrent diarrhea among under-five children**.**

Results:

A total of 420 households with mother/care takers who had under-five children were recruited into the study. Out of 420 caretaker, 343(81.7%) were child's mothers The mean age of the care givers were 30 years (SD±9.89), with a range of 17 to 49 years. The majority of them 308 (73.3%) had attained a primary level of education and most reported to be housewives. The prevalence of recurrent diarrhea was found to be 37.

Under-five children whose caretaker age was between 18-20 were 2 times more likely to diarrhea recurrence compared to older age (AOR=2.30, 95%CI=1.23-4.31), whereby under-five children live in a household with large number of people were 2 times more likely to diarrhea recurrence than those in a small size (AOR=2.336,95%CI=0.873-6.247) and those under-five children who live in Kwatumbo area/street was 4.39 times more likely to suffer diarrhea recurrence compare to those who live in Sokoni are/ street (AOR = 5.39 (95% CI 3.08-9.44) . Those

Conclusion: The findings in this study shows high prevalence of recurrent diarrhoea (37.8 %) Reducing congestion and overcrowding in the household will reduce the high prevalence of diarrhea recurrence in under-five children in Tandale ward Kinondoni.

Waste water from overflowing toilets and soak away pits being spread all over the ground.

This indicates that the ground is highly contaminated with feces. Children may ingest feces from the ground during playing and crowing on the ground. Also it is habit of children to consume some amount of soil, now for the case of Tandale they consume microorganisms contained in it.

Recommendation: According to the findings of the study other studies should be conducted in the same area by detailed description of the methodology to find out extent of environment contamination by microorganisms from the fecal matter and suggest for the better way to remediate the environment.

Health intervention programmers including increase priority in waste water management and reducing congestion and overcrowding in the household will reduce the high prevalence of diarrhea recurrence in under-five children in Tandale ward Kinondoni.

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ABBREVIATIONS

CHMT	Council Health Management Team
DED	District Executive Director
DHIS	District Health Information System
HWT	Households Water Treatment
HWTSS	Households Water Treatment and Safe Storage
MDG	*Millennium Development Goals*
MMOH	Municipal Medical Officer of Health
MoH	Ministry of Health
MoHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
MOHSW	Ministry of Health and Social Welfare
MUHAS	Muhimbili University of Health and Allied Sciences
NBS	National Bureau of Statistics
NSGRP	National Strategy for Growth and Reduction
OCGS	Office of the Chief Government Statistician
SDG	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
TDHS	Tanzania Demographic and Health Survey
UNICEF	United Nations International Children's Emergency Fund
WASH	Water Sanitation and Hygiene
WHO	World Health Organization

DEFINITION OF TERMS

Diarrhea	Is defined as having three or more loose or watery stools in a twenty-four hours period, as reported by the mother/caretaker of the child (1)
Hand washing at critical time	is to wash hand at important time such as after using the toilet, before preparing food, before eating, after cleansing up a baby who has defecate and before feeding a child (2)
Improved latrine	The latrine with a washable floor, walls and door for privacy, a roof and safely contain fecal matter from contact with human being. The following types of latrines are considered improved in Tanzania's context: Pour-flush/flush latrine; Improved Pit Latrine; Ventilated Improved Pit latrine; Composting latrine; Ecological sanitation and Mound / raised pit latrine(3)
Recurrent diarrhea	is defined as four or more episodes of acute watery diarrhea during one year (4)
Shared Latrine	latrines which are used by more than one Households (3)
Under-five children	Are the children age 0 -59 months.

CHAPTER ONE

1.0 INTRODUCTION

1.1Background information

Diarrhea disease among under-five children is serious global public health problem as it contributes much to under five morbidity and mortality and the overall disease burden globally (5). Recurrent diarrhea among under-five children is common in most developing countries including Tanzania. The problem is more serious in developing countries especially in countries of Latin America, Asia and sub Saharan Africa.

Recurrent diarrhea is defined as four or more episode of acute watery diarrhoea in one year period (4).

It is transmitted through fecal oral route where by microorganisms from feces of infected persons comes into contact with the food, fluids such water and environment which in turn becomes ingested by another person through fingers/ contaminated hands.

In most low and middle income countries children suffer frequent with recurrent diarrhea disease (6).Diarrhea disease has been acknowledged as a significant underlying cause of malnutrition in children through a combination of forced low-nutrient intake, reduced absorption, and increased nutrient excretion (1).In turn the disease leading the weakened immune systems and impaired growth, development and higher case fatality rates (7), (8).

Poor sanitation and hygiene is directly linked with diarrhea disease. It is estimated that 842,000 deaths occurs annually word wide due to diarrhea diseases which could be prevented by improved water, sanitation and hygiene services. (9)

Different studies have been carried to establish different factors that lead to diarrhea recurrence. Some studies have shown the disease to be associated with poor access to safe drinking water, basic sanitation facilities, and hygiene practice which are estimated to account for 58% of diarrheal deaths (3).

Other studies have explained different factors associated with diarrhea disease including improper solid waste disposal, poor food handling practices, processing and preservation, poor housing conditions and poor sewerage system.

The national sanitation campaign is being implemented currently throughout the country with the aim of preventing water and sanitation related diseases including diarrhea. The main focus of the campaign being, water treatment and safe storage, improved latrine use and hygienic practices at household levels and communities in general. The emphasis is to cut off the diarrhea disease transmission cycle and hence reduce the incidences of the diseases especially to under-five children.

Kinondoni district is among the districts implementing this campaign, but despite of the efforts being made, diarrhea prevalence within the district is still high, Tandale ward being the leading ward with the prevalence of 22.5%, according to the TDHS report 2012. Therefore more efforts are needed in order to prevent diarrhea and its recurrence within the district.

1.2 Problem statement

Diarrhea disease is a serious global public health problem. It is the second leading cause of morbidity and mortality to children under five years old (5). Every year, the disease kills around 525 000 children globally, with more than 1.7 billion childhood diarrhea cases (10). In 2010, more than 7.6 deaths occurred globally due to diarrhea diseases (5). The problem is high in developing countries of sub Saharan Africa where diarrhea accounts for more than 12.5% of the deaths of under-five mortality (11). In Tanzania, Diarrhea is the second killer of under five children accounting for more than 12% of the under five mortality annually (12).

Studies have shown the diseases to be associated with poor access to improved water, sanitation and hygiene services (3). Other studies have explained different factors associated with diarrhea disease including improper solid waste disposal, poor food handling practices, poor waste water disposal and inadequate sewerage system (5).

The effects of diarrhea diseases are more common to under-five children as it deprives the nutritional status of a child leading to poor brain development and malnutrition. Malnourished children can have poor growth and become prone to many other diseases. Also the disease have impact to the economy of the family as well as the economy of the country since the family will use most of its resources in dealing with patients also the nation uses most of its recourses in treating those patient.

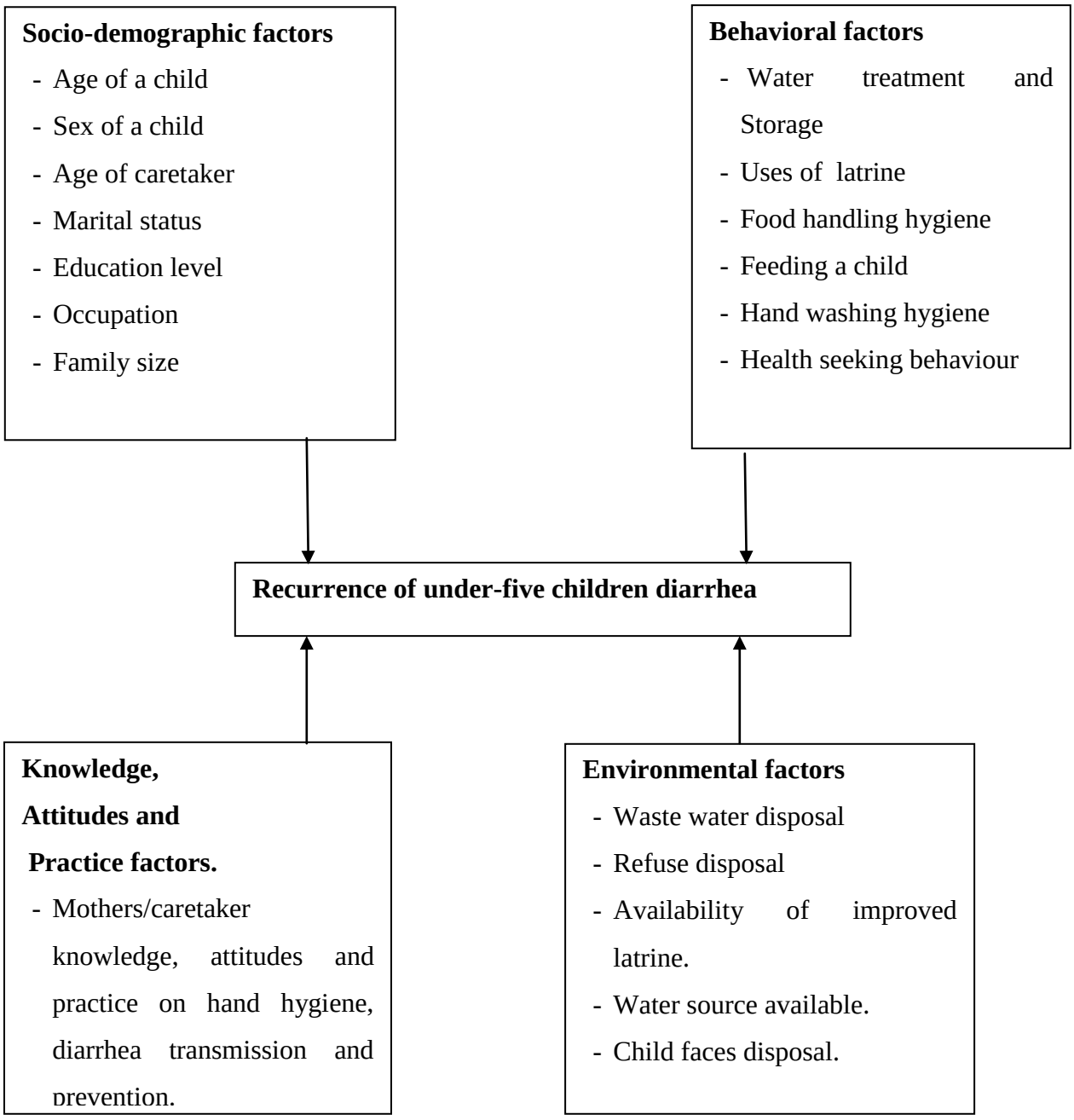
Different interventions including health education and promotion, vaccination, IMCI and the National sanitation campaign have been implementing in order to cut off diarrhea transmitting cycle.

Limited studies have been conducted on diarrhea recurrence within the country; most of them were focused on the single episode of diarrhea.

This study was conducted to determine prevalence recurrent diarrhea and associated factors among under-five children in Tandale ward Kinondoni District.

1.3 Conceptual framework:

Recurrence of under-five children diarrhea diseases in households.



Conceptual Frame work.

Conceptual frame work that illustrate the relationship between recurrence of diarrhea disease and behavior of hand washing and environmental factors among caretaker of under-five children in a household.

On the outside of the frame work are the factors such as knowledge and attitudes of caretakers on diarrhea transmission and prevention, behavioral factors of hand hygiene, water treatment and storage and latrine use. Other factors are socio demographic factors and environmental factors. All this factors influence the recurrence of diarrhea among caretaker of under-five children. On the centre of the frame work is the diarrhea recurrence of under-five children.

1.4 Rationale of the study

The thesis addresses an important issue of determine recurrence diarrhea among under-five children in Tandale ward Kinondoni. It also examine the factors associated for under-five diarrhea recurrence. This study provide important information that could be used to develop or improve sanitation intervention to control and prevent recurrence of diarrhea disease in Tandale ward and in the whole Kinondoni District

1.5 Research questions of the study

1.5.1 Main research question

What are the factors associated with the recurrence of diarrhea among under-five children in Tandale ward?

Sub question

1. What is the proportion of children under-five years in the households of Tandale ward are having recurrence of diarrhea?
2. To what extent do socio demographic factors associates with the recurrence of diarrhea among children under-five years in the households of Tandale ward?
3. What is the mother/caretaker hygiene behaviors associated with recurrence of diarrhea among children under-five years in the households of Tandale ward?
4. What are the environmental factors associated with recurrence of diarrhea among children under-five years in the households of Tandale ward?

1.6 Objectives of the study

1.6.1 Main objective of the study.

To determine the prevalence recurrent diarrhea and associated factors among children under-five years in Tandale ward from July 2016 to June 2017..

1.6.2 Specific objectives of the study

1. To determine the prevalence of recurrent diarrhea among children under-five years in Tandale ward from July 2016 to June 2017.

2. To determine the socio-demographic factors associated with recurrent diarrhea among children under-five years in Tandale ward from July 2016 to June 2017.

3. To determine the mother/caretaker hygiene behavior associated with recurrent diarrhea among children under-five years in Tandale ward from July 2016 to June 2017.

4. To determine environmental factors associated with recurrent diarrhea among children under-five years in Tandale ward from July 2016 to June 2017.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Prevalence of rrecurrence diarrhea among children under-five years

In Tanzania, the prevalence of the recurrence diarrhea disease is 12% among under-five years of age. Also the available information revealed that the disease is slightly higher in urban in term of prevalence compared with rural areas (13). Furthermore data from Kinondoni district revealed that there are 5471 cases of under-fives diarrhea in Kinondoni in the period of the first three months of the year 2017 (14).

In Ethiopia a study for environmental determinants of diarrhea recurrent among under-five children in Nakemte town a semi urban area found a prevalence of under-five diarrhea recurrence of about 28.9%, this is due to lack of sanitation facilities and poor disposal of waste water(15). Also the study by issaka Canton in Ghana found a prevalence of under-five children diarrhea recurrence to be 38%.

Study conducted in Ibadan, Nigeria showed that the prevalence of under-five recurrence diarrhea was about 31% in the study area, the figure was relatively higher when compared with findings from southern part of Ethiopia which was 25.5% (16). The high prevalence in the current study could be due to the different in basic environmental and behavioral characteristic of caretakers.

The study conducted in Mbour Senegal indicated that, mothers poor hand washing practice was associated with diarrhea morbidity, this finding was similar with the result obtained from another study in Ghana and Nigeria, where the prevalence of diarrhea recurrence was higher among children whose mother had poor hand washing practice before child feed. (15)

Another study done in Gigjig town Somalia show prevalence of diarrhea recurrence among under-five children was 14.6%, this prevalence was relatively lower as compared to findings of studies done in other parts of Ethiopia which report higher prevalence such as:

Nekemte (28.9%) Eastern Ethiopia (22.5%) Sheko district (25%) and west Gojam (18%) this might be attributed to different in socio demographic and environmental factors.(15)

2.3 Hand washing behavior among caretaker of under five children with diarrhea disease.

Hand washing practices remain as a problem; most of people do not wash their hands with soap at critical times, such as after using the toilet, before preparing food, before eating, after cleaning up a child who has defecated, and before feeding a child. A review of hand washing behavior research from 11 countries found that only 17% of child caretakers wash their hands with soap after using the toilet (10).

Study conducted in Southern Ethiopia 2012 indicated that mother's poor hand washing practice was associated with diarrhea recurrent morbidity by 45%, different study indicated that the risk of developing diarrhea was higher among children whose mothers had poor hand washing practice before child feed (16) Since mother are the main caregiver for their children they should wash their hands in order to prevent diarrhea recurrence.

Other study conducted in Senegal conclude that, hand washing practice of mother before food preparation was associated with lower risk of diarrhea recurrence among under-five children. Also the case control study by Nguyenu (16) demonstrate that incidence of diarrhea recurrence among under-five children was significantly higher in families where mothers less often wash their hands before feeding their children.

Takenash et el (15) also demonstrate the risk of diarrhea was high among children whose mother do not always wash their hand with soap before feeding (Adjusted OR= 1.38, CI=0.

Not only that but also the evaluation result of two large-scale campaigns done in rural of Tanzania one focused on sanitation and the other on hand washing, implemented by the Tanzanian Government from 2009–2011, revealed that the hand washing campaign had limited and mixed results: more people washed their hands before preparing or eating food, but not after contact with feces (17).

2.4. Environmental hygiene factors and recurrent diarrhea among under- five children

2.4.1 Water sources, treatment and storage in the house hold of under-five children with diarrhea disease.

Water is essential for health and the maintenance of well-being. The health aspects of hygiene, prevention of infection and nutrition all depend on access to water and quality of water. Also water plays an important part in rest and relaxation as well as in cleanliness and supply of basic needs. Interventions to improve water quality at the source, along with treatment of household water and safe storage systems, have been shown to reduce diarrhea incidence by as much as 47 per cent .Inappropriate storage conditions and dirty water storage containers are factors contributing to increased microbial contamination and decreased microbial quality compared to treated water sources or water stored in improved vessels (18).

Diseases caused by contaminated water consumption and poor hygiene practices are the leading causes of death among children worldwide especially in developing countries. In most of the studies done show the common bacterial pathogen isolated is *Escherichia coli* and defied as the common cause of childhood diarrhea (19)

In adequate of water in households and in the neighborhood is largely linked to the diarrhea disease. It is anticipated in cities to have very low morbidity and mortality due to diarrhea due to presence of purified water, sanitation, drainage, and waste removal (20).

However, the situation in Dar es Salaam is quite difference to expectation. The neighborhoods with inadequate provisions of water or sanitation and with unsanitary living conditions are often more likely to suffer the burden of diarrheal disease and record higher rates of mortality of under-5 children (20) (21)

Previous studies revealed that poor supply of drinking water and lack of proper septic tanks and toilets, especially in urban area increases the risk of diarrheal morbidity and mortality and the infant mortality rate (22) (23) (24)

Poor household water treatment and safe storage is influenced by availability of home water treatment option, cost of the treatment methods, low acceptability of treated water and use of ineffective water treatment methods and knowledge of existing water treatment technologies.

2.4.2Type of latrine used and child faces disposal in the household.

Availability of hygienic improved latrine allow safe disposal of human excreta and reduce transmission and ingestion of fecal-oral pathogens (25). Defecation in open areas or in the poor hygienic latrine increases the risk for the member of household to suffer with diarrhea especial children. Studies show that improved hygienic latrines are effective in reducing diarrheal disease by about 30% and improving child growth. According to the study done in Mozambique showed that, child mortality is associated with unavailability of improved latrine. These findings are consistent with other observational studies that showed an association between lack of latrine and child mortality in rural Mozambique (13).

A recent meta-analysis of observational studies showed that piped sewerage systems are associated with a 30% lower incidence of diarrhea and up to 60% lower diarrheal incidence when the starting sanitation conditions are extremely poor(23). Lastly, the finding of the case control study done in Tanzania showed that absence of latrine was associated with an increased risk of diarrhea. The study also revealed that availability of water for anal and hand cleansing after using the toilet, presence of dirty and faces on toilet floors and foul smell around the toilet were important t factors predisposing children to diarrhea.

Study carried out in rural Malaysia reveled that having no latrine in the house was not associated with diarrhea, while in availability of water for washing the anus and hand in that house which had latrine was significantly associated with diarrhea.

Most toilets smelled due to the factors that these facilities were not always flushed or washed immediately after use; thus attracting house flies and suggesting poor hygiene practices. The presence of these flies and fecal matter on the toilet floor are potential risk factors for diarrhea and other fecal oral disease transmission.

Waste water disposal methods and availability of drainage system in the household.

Management of waste water in urban settings especially in Tandale ward is very difficult due to the congestion and poor infrastructure of waste water disposal system. Removal of waste water from residential household to the final disposal point requires proper disposal system. According to Angelina Mandate (1998), Kinondoni Dar es salaam city is characterized by poor waste disposal infrastructure. For so long now the city authority has fail to construct proper waste water disposal system nor planned residential areas to reduce congestion and allow easier accessibility for emptier vehicle to pass and remove waste water from residential source and final disposal point.(26) Improper waste water disposal may be due to the fact that there is no sewerage system in the place and the households are highly congested to the extent that the waste water particularly from over flooding toilets contaminates the ground where children plays and crows hence they may eat the soil and other dirty from the ground as a result they come into contact with diarrhea causing agents. Several studies show that, household which discharge waste water in open space may cause diarrhea recurrence. MMOH (2003) study explains that poor management of waste water contributes to diarrhea recurrence in the district. The study further reviled that, Kinondoni District has a serious blockage of waste water disposal system. Very little has been done by respective authority to repair or build new system.

CHAPTER THREE

3.0. MATERIALS AND METHODS

3.1. Study area

This study was conducted at Tandale ward in Kinondoni District located in Dar es Salaam region. The ward has a total of 6 streets, 4158 households and 54,781 people. The streets in Tandale ward are Pakacha, Mtogole, kwa tumbo, Mkunduge, Muharitani and Sokoni**.** The area is characterized by highly populated and congested where by management of waste water become very difficult. There is poor infrastructure of sewerage system which forced the household members to practice improperl methods of waste water disposal by discharge waste water into open space and cause contamination of the environment. The ward was selected as study area because it has high incidences of diarrhea cases than other wards in Kindondoni District (22.5% as per TDHS 2012). Also under-five diarrhea is the second among the top ten diseases in Tandale ward after malaria.

3.2. Study Design

The design of this study was a descriptive cross section involving quantitative data collection approach

3.3. Study population

The study population was all households with under-five children in Tandale ward

3.4 Sample size

The minimum sample size for the households was determined by using the formula:

$$n = \frac{Z^2 * P (1 - P)}{E^2}$$

Where;

P = Prevalence of under-five diarrhea recurrence (24%) according to Ministry of health data.

Z = Confidence level (Z = 1.96 for 95%)

E = Margin of error 5% (0.05)

The power of the study was 80%

$$n = \frac{1.96^2 * 0.24(1 - 0.24)}{0.05^2}$$

n = 280

Then multiply by 1.5 for the design effect.

Therefore n = 420 households with under-five children.

3.6 Inclusion criteria

The inclusion criteria were all households with under-five children that were present in Tandale ward for the last 12 months

3.7 Exclusion criteria

The exclusion criteria were all households with under-five children where the parents or care givers had mental or hearing problems and child headed households

3.8 Sampling procedure

Both purposive and simple random sampling technique was used to select the intended study population.

Firstly, Kiondoni district and Tandale ward was purposively selected to participate in the study because it has a large number of diarrhea cases among under-five children reported in the year 2016/2017 compared to other wards of the district.

Secondly, At ward level, the list of all streets was obtained, and then three streets were randomly selected to represent the ward. The selected streets were Kwa Tumbo, Mtogole and Sokoni.

Thirdly, In each of the selected street, the first household was selected by spinning a bottle at the center of the street. Each household with a child under-five years of age was included in the study. At an instance where a household had more than one child was selected to participate by a simple random technique. In each household with under-five child, mother or care giver of a child was interviewed to get various factors for recurrence of diarrhea.

3.7 Variables

Dependent variables

Recurrent diarrhea among under-five children (Yes/ No)

Independent variables

- **Socio-demographic factors**
  - Age of the child
  - Sex of the child
  - Age of the caretaker was measured in years;
  - Marital status of the parent/caretaker was indicated as married, unmarried, divorced and widowed
  - Education level of the parent/caretaker was indicated as none, primary, secondary and college;
  - Occupation of the parent/caretaker was indicated as business women, civil servant and house wife;
  - Family size number was measured as number of household members
- **Environmental factors**
  - Waste water disposal was indicated as disposal of liquid waste in septic tank/latrine pit, in seepage pit and anywhere in open space
  - Refuse disposal was indicated as disposal of waste in refuse pit then collected by Municipality, in refuse pit then collected by private establishment, dumped in street/open space ,burned and buried in pit
  - Availability of hand washing facility was indicated as the presence of dedicated place for hand washing with water and soap (observation method was used)
  - Availability of latrine was indicated as flush/Pour flush to sewer, flush/Pour flush to septic tank, flush/Pour flush to pit latrine, flush/pour flush to elsewhere, ventilated improved pit latrine, pit latrine with slab, pit latrine without slab/open pit and no facility/bush.

- Type of water source was indicated as piped water, water from open well, water from borehole, surface water, rain water and water vendors.

- **Behavioral factors**
  - Uses of water treatment was indicated as boiling, use of chlorine (water guard), use water filters (ceramic filters),solar disinfection, let it stand and settle and filter with cloth
  - Uses of water Storage utensil was indicated as bucket with a lid, bucket without a lid, small pans and jerry cans
  - Uses of improved latrine was indicated be as uses of toilet and not use of toilet
  - Washing hand in critical times was indicated as washing hands before meals, after using the toilet, before preparing food, before feeding a child and after handling a child faces
  - Uses of soap for hand washing
  - Place for hand washing.
  - Available soap for hand washing place.

3.9 Data collection tools

a) Semi structured questionnaire with both closed and open ended questions were used to collect information on social demographic factors, behavioral factors, knowledge and attitude factors.

b) Observation checklist were used to collect information on environmental factors such as presence and use of latrine, presence of functional hand washing facilities with soap, general cleanliness, materials used for latrine construction and open defecation practices

3.10 Recruitment and Training of research assistants

Four research assistants with Environmental health background were recruited and oriented on the study to assist the principal researcher on data collection. The research assistants were supervised every day in the field to ensure accuracy and completeness of filling of the data collection tools. At the end of the day, the principal researcher and research assistants checked all questionnaires to ensure that there was no missing information.

3.11 Pre testing

Prior to data collection, the questionnaire and the observation checklist were pre tested in Ilala District to check if the questions were well understood, with proper logic and sequence to generate meaningful information. Restructuring, modifications and amendments of the questions were done where necessary before producing a final data collection tool.

3.12 Data collection procedures

Data collection at Household level

Prior to the visit to the study area the research assistants were familiarized with the study area to undertake a survey in a particular day. Mothers or care givers to be interviewed were informed on the aim and purpose of the study and asked for consent to participate. Once he or she has agreed the researcher interviewed him or her to collect different information and variables regarding recurrence of diarrhea among under-five children. Thereafter, the researcher used the observation checklist to assess the household sanitation and hygiene status. The things that were assessed using a checklist includes presence and use of latrine, presence of functional hand washing facilities with soap, general cleanliness, Household water treatment and safe storage etc. Before leaving, a researcher thanked the interviewee for participating and then proceeded with other households.

Validity and Reliability of Data

The English versions of the interview guide were translated into Kiswahili language to be used for interview. The language used for discussion was Kiswahili but later the information was translated in English language for analysis. The data were collected by trained research assistants with knowledge on environmental health so as to minimize errors during data collection. At the end of the day, the research team had a debriefing meeting to discuss how the exercise went on, challenges and possible ways of mitigating them.

Data management and Analysis

The collected data were sorted and checked on daily basis on their completeness and consistence.

The collected data were coded and then entered into Statistical Package for Social Sciences (SPSS) for cleaning and analysis. Descriptive statistics such were used to summarize and describe obtained data. Frequency and percentage of households with improved latrines and functional hand washing facilities provided the proportional of households with improved sanitation facilities. Independent and dependent variables were cross tabulated so as to find out the relationships. Chi square test was used to compare proportions and p-value were be used to interpret the significance of the statistical test.

3.13 Ethical issues

Ethical clearance was obtained from Muhimbili University of Health and Allied Sciences research and publication Committee for conducting this research. Apart from that, letters to seek permission to conduct the research was sent to the Executive Director of Kinondoni Municipality. Participants were given written informed consent form to make informed choice to participate in the study. The consent provided information on the purpose of the study and the method to be used for data collection from the participants. Also the research assistants provided assurance on confidentiality to study participant. Participants were given the contacts of the chairman of Muhimbili University of Health and Allied Sciences (MUHAS) research and publication Committee and told to free contact him in case of any issues arise during data collection.

CHAPTER FOUR

4.0 RESULTS

4.1 Socio demographic characteristic of participant. Table 1 shows the socio-demographic characteristics of study participants A total of 420 children under-five years of age were enrolled in the study. All of **the parents/caretakers were** women. Majority of them (81.7%, n=343) were parents (mothers).The parents/caregivers were in the age between 25-35 years with the mean (SD) age was 30 (9.9) years. The majority of them had attained a primary level of education 308(73.3%) and most of the caretaker 277(66%) reported to have no formal occupation (housewives). Majority 253(60.2%) lived in a family size of 6-10 people. More details in table1 below.

Table 1: Socio-demographic characteristics of the mothers/caretakers and child (N=420)

Variable	Frequency (%)	Percentage (%)
Caretaker relationship		
Mother	343	81.7
Non mother	77	18.3
Sex of the child		
Male	212	50.5
female	208	49.5
Age of a child		
1 - 12	47	11.2
13 -24	107	25.5
25 -36	143	34.0
37 -48	105	25.0
49 -60	18	4.3
Age of caretaker(years)		
18-24	113	26.9

25-35	226	53.8
36-45	80	19.1
45+	1	0.2
Education Level		
None	44	10.5
Primary	308	73.3
Secondary	65	15.5
College	3	0.7
Occupation		
House wife	277	66
Businesswoman	109	25.9
Civil servant	27	6.4
Others	7	1.7
Marital status of caretaker		
Married	285	67.9
Single	135	32.1
Street		
Kwatumbo	196	46.7
Mtogole	100	23.8
Sokoni	124	29.5
Family size		
1-5	83	19.8
6-10	253	60.2
11+	84	20.0

4.2 Prevalence of recurrent diarrhea among children under-five years of age.

Table 2 shows prevalence of diarrhea and recurrent diarrhea among under-five children in Tandale. A total of 261 (62.2%) reported to have at least one episode of acute watery diarrhea in the past one year whereas 159 (37.8%) reported to have 4 and more episodes of Acute watery diarrhea in one year thus making the prevalence of recurrent diarrhea in this study to be 37.8%

(95% CI= 33.3% - 42.6%). Kwatumbo area/Street had higher prevalence of recurrent diarrhea 94 (48%) compared to other street.

Table 2: The proportion of households with under-five children with recurrence diarrhea

Attribute	**Total (%)**	**Street**		
		Kwatumbo	**Mtogole**	**Sokoni**
Prevalence of recurrent Diarrhea	159 (37.8)	94 (48)	23 (23.0)	42 (33.9)
At least one episode of AWD	261 (62.2)	93 (87.2)	73 (73.0)	95 (76.6)

4.3 Socio demographic factors of mother/caretaker associated with recurrent diarrhea among children under-fives.

Table 3 shows socio-demographic information of the mothers/caretakers by diarrhea recurrence. There were significant association between age of caretaker (**P=0.031**), education level (**P=0.007**), marital status **(P=0.001),** street of residence **(P=0.001)** and family size of the mother/caretaker (**P=0.001**)

Table 3: Socio demographic information of the mothers/ caretakers by diarrhea recurrence

Variable	Recurrent Diarrhea		P-Value
	Yes	No	
Caretaker relationship			
			0.631
Mother	128 (37.3)	215(62.7)	
Non mother	31 (40.3)	46 (59.7)	
Sex of the child			**0.144**
Male	73 (34.4)	139 (65.6)	
Female	86 (41.3)	122 (58.6)	
Age of a child (month)			**0.121**
1 - 12	11(23.4)	36(76.6)	
13 - 24	43(40.2)	64(59.8)	
25 - 36	61(42.7)	82(57.3)	
37 - 48	39(37.1)	66(62.9)	
49 - 60	5(27.8)	13(72.2)	
Age of caretaker (years)			**0.031**
18-24	55 (48.7)	58 (51.3)	
25-35	80 (35.4)	146 (64.6)	
36-45	24 (30.0)	56 (70.0)	
45+	0	1 (100.0)	
			0.007
Education level			
None	13 (29.6)	31 (70.4)	
Primary	131 (42.5)	177 (57.5)	
Secondary	15 (23.1)	50 (76.9)	
College	0	3(100.0)	
Marital status			**0.001**
Married	93 (32.6)	192 (67.4)	
Single/widowed	66 (48.9)	69 (51.1)	

Occupation			**0.764**
	House wife	104(37.6)	173(62.4)
	Businesswoman	44 (40.4)	65 (59.6)
	Civil servant	8 (29.6)	19 (70.4)
	Others	3 (42.9)	4 (57.1)
Street			**0.001**
	Kwatumbo	94 (48.0)	102 (52.0)
	Mtogole	23 (23.0)	77 (23.0)
	Sokoni	42 (33.9)	82 (66.1)
Family size			**0.001**
	1-5	15 (18.1)	68 (81.9)
	6-10	110 (43.5)	143 (56.5)
	11+	34 (40.5)	50 (59.5)

4.7 Hand hygiene behavior associated with recurrent diarrhea.

Table 4: shows the association between various hand washing behavior and practice by recurrent diarrhea among under-five children. Majority 379(90.2%) of participants had no place for washing hand whereas only 23(5.5%) of participants reported to have soap in their hand washing place. Also 261(68%) of caretaker did not practice hand washing in critical times.

The results in Table 4: show that there was no significant association between wash hand in five critical times, use of soap for hand washing and available soap for hand washing except the availability of places for hand washing (**P- value = 0.009)** More details in table 4 below.

Table 4: Association between hand washing behavior and recurrent diarrhea.

Variable		Diarrhea recurrence		P-value
	Total	Yes	No	
Wash hand in five critical time				
Yes	159	74(37.0)	85(39.1)	**0.201**
No	261	85(63.0)	176(62.3)	
Use soap for hand washing				
Yes	200	76(37.7)	137(62.3)	**0.338**
No	220	83(38.0)	124(62.0)	
Place for hand washing				
Yes	41	19(36.9)	22(63.1)	**0.009**
No	379	140(46.3)	239(53.7)	
Available soap for hand wash				
Yes	23	9(31.1)	14(58.9)	**0.210**
No	**397**	150(39.8)	247(60.2)	

4 8: Water source, water treatment method and storage by recurrent diarrhea.

Table 5 below summarizes the association between recurrent diarrhea and the type of water sources, water treatment method and storage. Most of the caretaker 274(76.8%) reported to use pipe water and 217(55%) of care taker were use different method of treating water before drinking, where as 98(77.2%) reported to boil water as a treatment method.

Participant was asked about type of container used for water storage, 285(778%) store their drinking water in a bucket with lead and majority of caretaker draw water from container by using a cup. However, there was no significant association between any of the factors and recurrent diarrhea as far as P- value is not less than 0.05.

Table 5: Type of water source, water treatment methods and storage by diarrhea recurrence.

Variable	Total	Diarrhea recurrence		P-Value
		Yes	No	
Source of water used				
Pipes	354	136(38.4)	218(61.6)	**0.126**
Open well	38	14(48.8)	24(51.2)	
Water vendor	28	9(33.3)	19(66.7)	
Method of water treatment used				
boiling	127	48(37.8)	79(62.2)	**0.399**
Chlorine use	90	31(34.4)	59(65.6)	
Filter with cloth	5	1(56.0)	4(44.0)	
Do you treat your drinking water				
Yes	217	80(36.9)	137(63.1)	**0.142**
No	203	79(38.9)	124(61.1)	
Container for water storage				
Bucket with lead	285	105(36.8)	180(63.2)	**0.837**
Bucket without lead	45	19(42.2)	26(57.8)	
Small pan	34	11(32.4)	23(67.6)	
Jerry pans	27	24(66.0)	32(71.3)	
Other	29	14(48.3)	15(51.7)	
How do you draw water from container				
Small pan	99	42(42.4)	57(57.6)	**0.369**
Pour direct from container	23	9(39.1)	14(60.9)	
Use cup	285	103(36.1)	182(63.9)	
Others	13	5(41.7)	8(59.3)	

4.9: Environmental factors associated with recurrence of diarrhea disease among under-five children.

Table 6 below shows the environmental hygiene factors associated with recurrent diarrhea among children under-fives. It was found that 335 of household used improved latrine and 194 of latrine had faces around the pit hoe. Also the results showed that 39 and 30 of caretaker dispose their child faces by left it everywhere and coved by soil respectively.

The results of this study show that 387 of household have no place for hand washing beside the toilet. Moreover 24 of household dumped their waste open in the street and 170 of household discharged their waste water anywhere in the open space.

There is a significant association between the availability of wash hand place beside the toilet (P-value =0.011) and means of wastewater (p-value= 0.012) by diarrhea recurrence. Other factors does not shown any significant relationship.

Table 6: Environmental hygiene factors and diarrhea recurrence among under-five children

Environmental hygiene factors	Diarrhea recurrence		Total (n)	P - Value
	Yes	No		
Type of latrine used				**0.101**
Improved	123(76.4)	216(23.6)	335	
Not improved	35(83.5)	45(16.5)	85	
Faces seen around the pit hole				**0.085**
Yes	19(38.9)	37(61.1)	56	
No	140(33.6)	224(66.5)	364	
Available place for washing hand beside the toilet				**0.011**
Yes	15(37.5)	18(62.5)	33	
NO	144(45.2)	243(54.8)	387	
Where do you disposal your child feces				**0.514**
In the toilet	117(35.5)	213(64.5)	330	
Left in open every where	16(41.0)	23(59.0)	39	
Cover by soil	14(46.7)	16(53.3)	30	
Others	12(57.1)	9(42.9)	21	
Where do the household Dispose waste				
In refuse pit then collected by Municipal	86(42.0)	119(58.0)	205	
In refuse pit then collected by private company	63(32.6)	130(67.4)	193	**0.142**
Damped open in street	10(52.6)	12(48.9)		
Waste water disposal method				
In septic tank	64(35.8)	115(64.2)	179	
In pit hole	23(38.3)	37(61.7)	70	
Anywhere in open space	68(79.8)	105(60.7)	170	**0.012**

4.10: Univariate analysis of independent predictors for recurrent diarrhea among children under-fives years.

Table7 shows logistic regression analysis of independent variable and diarrhea recurrence. Results shows that under-five children whose mothers has none education their child had recurrent diarrhea (**P=0.000**), age of the caretaker are also significant associated with under-five diarrhea recurrent **(P=0.031)** and those who lived in Mtogole street were recurrence diarrhea (**P=0.009**). Under-five children lived in a family size of 6-10 people were recurrent diarrhea (**P=0.01**). Marital **status (P=0.001)** of mothers is significant associated with under-five diarrhea recurrent and use of soap to wash hand show significant association for diarrhea recurrent among under-five children. Household waste water disposal method is significant associated with under-five diarrhea recurrent (**P=0.013).**

Table 7: Univariate analysis of independent predictors for recurrent of diarrhea among under-five children

Variable	Crude OR OR (95% CI	P - Value
Age of caretaker		
18 -24	0.51 (0.33 -0.86)	**0.031**
25 -36	0.72 (0.08 -9.84)	
37 -48	1.23 (0.19 -8.65)	
49+	Reference	
Marital status of caretaker		
Married	0.31 (0.18 -2.82)	**0.001**
Single/widow	Reference	
Education level		**0.017**
None	0.32 (0.26- 3.74)	
Primary	0.78 (0.07- 8.73)	
Secondary	0.26 (0.022- 2.98)	
Collage	Reference	
Street		**0.012**
Kwatumbo	3.02 (1.89- 4.81)	
Kwamtogole	1.53 (0.89- 2.61)	
sokoni	Reference	
Family size		**0.013**
1 -5	0.40 (0.22 -0.75)	
6 -10	1.13 (0.69 – 186)	
11+	Reference	
Wash hand in critical time		**0.210**
Yes	0.870 (0.213 -3.550)	
No	Reference	
Use of soap to wash hand		**0.018**

Yes	0.71 (0.48 -1.04)	
No	Reference	
Type of latrine used		**0.121**
Improved	0.63 (0.38 -1.03)	
Not improved	Reference	
Available soap at the place		**0.133**
Yes	0.62 (0.26 -150)	
No	Reference	
Waste water disposal metho		**0.013**
In a septic tank	0.50 (0.3 -0.83)	
In a pit latrine	1.17 (0.51-2.651))	
Anywhere in open space	Reference	

Multvariate analysis of independent predictors for recurrent diarrhea among children under-fives.

Table7 shows logistic regression analysis of independent variable and diarrhea recurrence. Results shows that under-five children whose their caretaker has 25-36 age are 2 times more likely to recurrent diarrhea **(P=0.016).** Children lived in Mtogole street were 4 times more likely to recurrence diarrhea (**P=0.000**) and those who lived in Sokoni street were 2 times more likely to recurrence diarrhea (**P=0.042**). Under-five children lived in a family size of 6-10 people were 2 times more likely to recurrence diarrhea than those who lived in small family size (**P=0.041**). Under-five children whose household does not use soap to wash hand were more likely to diarrhea recurrence than those who use soap **(P=0.043).** Under-five children whose house hold discharge their liquid waste anywhere in open space were more likely to recurrence diarrhea than those who were disposed in latrine pit (**P=0.03**).

Table 8: Multivariate analysis of Independent predictors for recurrent of diarrhea among under-five children.

Variable	Crude OR OR (95% CI)	P -value
Age of caretaker		
18 -24	Reference	
25 -36	2.30 (1.23 -4.31)	**0.016**
37 -48	1.39 (0.19 -0.80)	**0.048**
49+	0.47 (1.26 -3.21)	
Marital status of caretaker		
Married	0.56 (0.33 -0.94)	**0.04**
Single/widow	Reference	
Education level		
None	1.386 (0.101 -19004)	**0.807**
Primary	3.163 (0.252 -39.578)	**0.372**
Secondary	1.325 (0.099 -17.775)	**0.832**
Collage	Reference	
Street		
Kwatumbo	4.076 (2.061 -8.059)	**0.000**
Kwamtogole	2.169 (1.027 -4.583)	**0.042**
Sokoni	Reference	
Family size		
1 -5	1.144 (0.411 -3.185)	**0.797**
6 -10	2.336 (0.873 -6.247)	**0.041**
11+	Reference	
Hand wash in critical time		
Yes	0.938 (0.199 -4.430)	**0.936**
No	Reference	

Use of soap to wash hand		
Yes	0.562 (0.322 -0.983)	**0.043**
No	Reference	
Type of latrine used		
Improved	0.610 (0.292 -1.273)	**0.188**
Not improved	Reference	
Waste water disposal method		
In a septic tank	0.514 (0.285 -0.927)	**0.027**
In a latrine pit	1.168 (0.466 -2.932)	**0.740**
Anywhere in open space	Reference	

CHAPTER FIVE

5.0 DISCUSSION

5.1: Prevalence of under-five diarrhea recurrence.

Study conducted in Ibadan, Nigeria showed that the prevalence of under-five recurrence diarrhea was about 31% in the study area, the figure was relatively higher when compared with findings from southern part of Ethiopia which was 25.5% (41). The high prevalence in the current study could be due to the different in basic environmental and behavioral characteristic of caretakers.

Our study showed that the twelve month prevalence of households with under-five children with recurrence of diarrhea disease was found to be 37.8%. This prevalence is higher than that reported by Kinondoni district health profile (22%) in 2014. The difference in prevalence between the two studies might be due to under reporting in health care facilities and failure of mothers/caretaker to attend to the health facilities in all diarrhea cases. Based on these facts, the proportion of households with under-five children with recurrence of diarrhea disease as found in this study might be the true prevalence in the ward. This finding is higher than the study done in different parts of the southern western Ethiopia which was about 33% and 36.5% in Manna district and Jima town, respectively (27, 28)

5.2: Socio-demographic factors associated with recurrence of diarrhea among under-five children

Several studies shows that age of a child, sex of a child, number of a child live in a household, caretaker age, marital status, level of education, family size and caretaker occupation has significant relationship with diarrhea recurrent.

The study conducted in Ethiopia show that elder age caretaker experience in looking after child compared to younger age. In this study caretaker whose age was between 18-20 their child was 2 times more likely to diarrhea recurrence compared to other age (AOR=2.30, 95%CI=1.23-4.31) this is due to the factors that low age caretaker does not experience to take care of the child compare to elder one.

This finding is the same from the study conducted in Burundi on under-five diarrhea recurrent (29), where by aged people shown to provide good care than young caretaker.

Study conducted in Lesotho shows that mothers' literacy influences hygiene practice, child feeding and sanitation practices which in turn were important factors for diarrhea recurrence. This study found that children whose mothers/caretakers have low education were more likely to have recurrence diarrhea compared with those whose mother/caretaker were educated. In our study, caretaker with none education their child had more diarrhea recurrent compared to those with primary and secondary education. This is because education is one of the determinants of health, as the education level increases the ability of the care taker to prevent her child from diarrhea also increases. These findings were similar with a study conducted in western Ethiopia (30) whereby educated mothers their under-five chance of suffering diarrhea was low.

The study conducted in Gojam showed that, family size was associated with diarrhea recurrence (OR=2.07 and OR=2.3 respectively. The association between the family size and the diarrhea recurrence to under-five can be explained as the family member's increases also diarrhea recurrence increases .Our study showed that under-five children live in a household with large number were 2 times more likely to diarrhea recurrence than those in a small size (AOR=2.336,95%CI=0.873-6.247). These findings are similar with the findings of the study conducted in Southern Ethiopia (16), whereby as the family size get larger the chance of diarrhea recurrence increases to under-five children. This is because of crowding which deteriorate the hygiene condition which in turn increases the chance of contact with micro organisms.

This study showed that, caretaker who live in Kwatumbo area/street their child was 4.39 times more likely to suffer diarrhea recurrence compare to those who live in Sokoni are/ street (AOR = 5.39 (95% CI 3.08-9.44) P-value =0.000). Also mother/caretaker who live in Mtogole area/street their child were 2.30 times more likely to suffer diarrhea recurrence than those who live in Sokoni street.(AOR = 2.30 (95% CI 1.23 -4.30) . Kwatumbo and Mtogole area are characterized by congestion and overcrowded where by more than ten people lived in one household.

Also the area had poor infrastructure where by waste water disposal system are not properly installed hence cause unhygienic disposal of wastewater from over flow latrine. Due to highly congestion in the area, there are no enough places for septic tank construction hence household members tend to discharge waste water everywhere in the open space. This situation may cause contamination of the household surrounding environment where child are played, and also contamination of pipe water can occur due to blockage of water supply pipes.(31)

5.5 Hand washing behavior and practice among caretaker of under-five children

Study conducted in Southern Ethiopia 2012 indicated that mother's poor hand washing practice was associated with diarrhea recurrent morbidity by 45%, different study indicated that the risk of developing diarrhea was higher among children whose mothers had poor hand washing practice before child feed (32) Since mother are the main caregiver for their children they should wash their hands in order to prevent diarrhea recurrence.

Our study shows that caretaker does not wash their hands by using soap; in multivariate analysis use of soap to wash hand had significant associated with under-five diarrhea recurrent (AOR=0.514 ,95%CI=0.322-0.983).

Study conducted in South Ethiopia 2012 indicated that mothers poor hand washing practice was associated with diarrhea morbidity (32) this is because mother are the best caretaker for their children so they should wash their hands with soap in order to prevent diarrhea recurrence and other hygiene related disease. Knowledge of hand washing should be emphasis in the community.

5.6 Environmental factors associated by diarrhea recurrent among under-five children

Water source, treatment and storage

Study findings found in Mbour Senegal explain that they did not found significant association between drinking water sources and occurrence of diarrhea (15) this might be due to the small sampled household in terms of drinking water sources. In our study we did not find any significant association between water source, water treatment, and water storage and diarrhea recurrence.

Hand washing facilities and available soap beside the latrine.

Study conducted in Eastern Ethiopia October 2012 also found that a hand washing facilities where soap and water are located near the latrine for hand washing are important determinants for good hand washing practice (15)

In this study 82.9% of household had no place for washing hands beside the latrine, only about 5.5% of caretaker had soap in their hand washing place. This is due to low social economic condition of caretaker in Tandale area where by house hold caretaker were unable to provide specific place for washing hands which has soap and enough water.

this may remove discrepancy between what caretaker said and did, and was suggested that reported hand washing behavior over estimated observed behavior are supported by availability of water and soap in place of hand washing as indicator of hand washing behavior.

Type of latrine used in the household

In this study, it was found that 54(78.3%) of those who did not have improved latrine their child suffer diarrhea recurrence, and 175(67.3%) of those house hold used improved latrine their child also suffer diarrhea recurrence. Availability of improved latrine is important factor for diarrhea control and prevention, also standard latrine at the household can prevent diarrhea recurrence by 90% compare to the low standard. Unavailability of latrine and poor latrine has an influence to the recurrence of diarrhea among households with under-five children.

These findings are consistent with other observation studies that showed an association between lack of latrine and child mortality in rural Mozambique (13). We found that diarrhea recurrence was not significantly associated with type of toilet and the presence of toilet. This findings is in line with a recent study from Senegal, where no association between presence of latrine and recurrence of diarrhea.

Waste disposal method (Refuse disposal)

Our study shows that 80.7% of household care taker who damped the waste open in street their child suffers diarrhea recurrence. Furthermore 70.8% of those who dispose waste in refuse pit then collected by established company their child suffer diarrhea recurrence for the period of 12 month.

This is due to the factor that household member required to pay some revenue for their waste before transported to the dumping site. During our study it was also discover that some household kept their refuse pit in the house hold, and most of the pit were not coved therefore attract house fly. There was no any significance association between diarrhea recurrences and damping the waste in the street. This contradict in a study carried out in Mbour Senegal, indiscriminate disposal of solid waste was significantly associated with the high rate of diarrhea recurrence (33). Open disposal of waste around the house was a risk factor diarrhea among household with under-five children.

Child faces disposal.

Simple hygiene behavior, especially child faces disposal have been suggest to reduce the recurrence of diarrhea among under-five children. The outcome of this study showed that 81.5% of those who dispose their child faces through covered by soil, their child suffer diarrhea recurrence. In some culture children faces are regarding as harmless, for this reasons caretaker may not properly handling the child faces. (34) (9). However evidence from Tanzania showed that child faces are equally as hazardous as adult faces and may contain even higher concentration of pathogens than those of adults due to the children increase interaction with contaminated material in their surroundings.

Faces seen around the latrine pit hole.

The presence of fecal matter on the toilet pit/floor and presence of flies increase the recurrence of diarrhea and other fecal oral disease transmission among under-five children. In our study 36(76%) of those who household latrine has faces around the pit hole/floor, their child suffer diarrhea recurrence. Study on hygiene and sanitation reviled that availability of water for anal and hand cleaning after using the toilet, presence of dirty and faces on toilet floors and foul smell around the toilet were important factors predisposing under-five children to diarrhea recurrence.

Waste water disposal methods.

Several studies show that, household which discharge waste water in open space may cause diarrhea recurrence. MMOH (2003) study explains that poor management of waste water contributes to diarrhea recurrence in the district.

The study further reviled that, Kinondoni District has a serious blockage of waste water disposal system. Very little has been done by respective authority to repair or build new system.

Our study showed that there is significant relationship between the means of waste water disposal and diarrhea recurrence among household with under-five children. This study find that those household which discharge waste water everywhere in open space has more likely to diarrhea recurrence than those who were discharged in latrine pit (AOR = 0.514, 95% CI= 0.285– 0.927 .Study conducted in Mbour Senegal also showed the same results that open disposal of west water around the household were a risk factor for diarrhea recurrence. (15)

Improper waste water disposal may be due to the fact that there is no sewerage system in the area and the households are highly congested to the extent that the waste water particularly from over flooding toilets contaminates the ground where children plays and crows hence they may eat the soil and other dirty from the ground as a result they come into contact with diarrhea causing agents. Several studies show that, household which discharge waste water in open space may cause diarrhea recurrence.

5.7 Study limitations.

There is a possibility of recall bias in the study; some of the respondents were unable to recall well on how many times the child had diarrhea throughout the year.

CHAPTER SIX

CONCLUSSION AND RECOMMENDATION

The findings in this study shows high prevalence of recurrent diarrhoea (37.8 %) which is higher than that reported in the DHS (2014), the difference may be due to under reporting in the district or failure to attend into the health facilities in each episode of diarrhoea. Among all factors waste water disposal methods, family size, street of resident, waste water disposal and place for hand washing are the factors associated with diarrhea recurrence in Tandale ward. Reducing congestion and overcrowding in the household will reduce the high prevalence of diarrhea recurrence in under-five children in Tandale ward Kinondoni. Waste water from overflowing toilets and soak away pits being spread all over the ground.

This indicates that the ground is highly contaminated with feces. Children may ingest feces from the ground during playing and crowing on the ground. Also it is habit of children to consume some amount of soil, now for the case of Tandale they consume microorganisms contained in it.

6.2 RECCOMMENDATION.

1. According to the findings of the study other studies should be conducted in the same area by detailed description of the methodology to find out extent of environment contamination by microorganisms from the fecal matter and suggest for the better way to remediate the environment.
2. Health intervention programmers including increase priority in waste water management and reducing congestion and overcrowding in the household will reduce the high prevalence of diarrhea recurrence in under-five children in Tandale ward Kinondoni.
3. Effective education programs that emphasize hygiene behavior on hand washing should be strengthened by environmental health officer (EHO) in educating caretaker on hygiene and sanitation through house to house visit.
4. Strengthening the effort of improve infrastructure especially construction of proper drainage system from the household to the final disposal point.

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APPENDICES

Appendix I: Informed Consent English version.

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
DIRECTORATE OF RESEARCH AND PUBLICATIONS, MUHAS
CONSENT FORM
ID-No:…….

Consent to participate in the study

Greetings, I Catherine from Muhimbili University and allied sciences am working on this research project……As one of the workers in such units, I would like to talk to you about this issue.

Purpose of the study

The purpose of the study is to conduct an assessment of recurrence of under five diarrhea disease and associated factors in households at Tandale ward in Kinondoni district. Your being asked to participate in this study because you have particular knowledge and experiences that may be important to the study.

What Participation involves

If you agree to participate in this study the following will occur:

You will be trained for interview and answer question on recurrence of under five diarrhea disease and associated factors in the house hold. Your comments will be acted upon to improve the situation in this area. You will be interviewed only once for approximately 20-25 minutes.

No identification information will be collected from you during this interview, except your age marital status and level of education.

Confidentiality

I assure you that all information collected from you will be confidential. Only individual working with me in this research will have access to the information. We will be compiling a report which will contain your responses without any references to individuals. We will not put your name or other identifying information on the record of information you provided. You may refuse to answer any particular question and may stop the interview at any time.

Right to with draw and Alternatives

Taking part in this study is completely your choice. If you choose not to participate in the study or if you decide to stop participating in the study you will not get any harm. You can stop participating in this study at any time, even if you have already given your consent. Refusal to participate or with draw from the study will not involve penalty or loss of any benefits to which you are otherwise entitled.

Benefits

The information you provided will help to make assessment of recurrence of diarrhea disease and associated factors in household at Tandale ward and we hope to communicate findings to decision marker at the district and region level to plan and implement interventions that will help to improve this condition.

In case of injury

We do not anticipate that any harm will occur to you or your family as a result of participation in this study.

Whom to contact

If you ever have questions about this study, you should contact Principal Investigator, Catherine Sembua, Muhimbili University of Health and Allied Sciences (MUHAS), P.O.BOX 65001, Dar es salaam. If you have questions which need further clarification, as a participant you have a right to contact Chairman of the University Research and Publications Committee, P.O.Box 65001, Dar es salaam, Tanzania. Tel: 2152489

Signature:

Agreement of the Participant

Do you agree?

Yes

No

I…….have read and under stood the contents in this form. My questions have been answered. I agree to participate in this study.

Signature of participants……..……

Signature of research assistant……

Date of signed consent……

Appendix II: Informed Consent Swahili version

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

DIRECTORATE OF RESEARCH AND PUBLICATIONS, MUHAS

FOMU YA RIDHAA

Namba ya utambulisho:…….

Ridhaa ya kushiriki katika utafiti huu

Habari! Jinalangu naitwa Catherine Sembua kutoka chuo kikuu cha Muhimbili, nafanya kazi katika mradi huu wa utafiti wenye lengo la kupima marudio ya mara kwa mara ya ugonjwa wa kuharisha na sababu zinazo pelekea ugonjwa hou kuendelea kwa watoto wenye umri chini ya miaka mitano katika kaya za kata ya Tandla Manispaa ya Kinondoni.

Malengo ya utafiti

Utafiti huu unalengo la kuchunguza juu ya marudio ya marakwamara ya ugonjwa wa kuharisha kwa watoto wenye umri chini ya miaka mitano katika kaya za kata ya Tandale na sababu zinazo pelekea ugonjwa huu kuendelea. Unaombwa kushiriki katika utafiti huu kwasababu unauelewa wa kutosha ambao unaweza kuwa muhimu katika utafiti huu.

Ushiriki

Ukikubali kushiriki katika utafiti huu yafuatayo yatatokea

Utapewa mafunzo ya jinsi ya kuhoji na kujibu maswali yahusuyo sababu zinazo pelekea marudio ya marakwamara ya ugonjwa wa kuharisha kwa watoto wenye umri chini ya miaka mitano. Mapendekezo yako yatasaidia kudhibiti kuendelea kwa ugonjwa huo. Utahojiwa maramoja tu kwa muda usio zidi dakika 25. Hakuna taarifa zozote za utambulisho zitakazo kusanywa wakati wa usaili isipokuwa umri, hali ya ndoa yako na kiwango cha elimu.

Usiri

Nakuhakikishia kwamba taarifa zote zitakazo kusanywa kutoka kwako zitakuwa ni siri, niwatu wanao fanya kazi katika utafiti huu tu ndio wanaweza kuziona taarifa hizi. Hatutaweka jina lako au taarifa yoyote ya utambulisho kwenye kumbukumbu za taarifa utakazo toa.

Haki ya kujitoa na mbadala wowote

Ushiriki katika utafiti huu ni haki yako, kama utachagua kutoshiriki au utaamua kusimamisha kushiriki hutapata madhara yoyote. Unaweza kusimamisha kushiriki katika utafiti huu muda wowote hatakama ulisha ridhia kushuriki. Kukataa kushuriki au kujitoa kushiriki katika utafiti hakuta sababisha adhabu yoyote au upotevu wa faida yoyote unayo takiwa kupata.

Faida

Taarifa unazotupa zitatusaidia kujua sababu zinazo pelekea kurudia rudia kwa ugonjwa wa kuharisha kwa watoto wenye umri chini ya miaka mitano katika kaya za kata ya Tandale Manispaa ya Kinondoni. Namatokeo ya utafiti yatapelekwa kwa viongozi wa wilaya na Mkoani ili waweze kupanga mipango ya jinsi yakuboresha hali hii.

Endapo utaridhika

Hatutegemei madhara yoyote kutokea kwa kushiriki kwako katika utafiti huu.

Watu wa kuwasiliana nao

Kama unamaswali katika utafiti huu unaweza kuwasiliana na Mratibu mkuu wa mradi Catherine Sembua, chuo kikuu cha Muhimbili, S.L.P 65001, Dar es salaam. Kama una maswali ambayo yatahitaji ufafanuzi zaidi,kama mshiriki una haki ya kuwasiliana na Mwenyekiti wa kamati ya utafiti na uchapishaji, Chuo Kikuu Cha Afya Na Sayansi Shirikishi Muhimbili, S.L.P 65001, Dar es salaam, Tanzania. Simu namba: 2152489.

Sahihi

Unakubali?

Ndio

Hapana

Mimi…….nimesoma /nimeielewa fomu hii na maswali yangu yamejibiwa .Nakubali kushiriki kushiriki katika utafiti huu.

Sahihi ya mshiriki…….

Sahihi ya mtafiti msaidizi……

Tarehe ya makubaliano……..

APPENDIX III: Questionnaire (English Version)

MUHIMBILI UNIVERSITY OF ALLIED HEALTH SCIENCES SCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES

QUESTIONNAIRE FOR ASSESSMENT OF RECURRENCE OF UNDER FIVE DIARRHOEA DISEASE AND ASSOCIATED FACTORS IN HOUSEHOLDS AT TANDALE WARD

IDENTIFICATION
1. QUESTIONNAIRE ID NO:_____
2. DISTRICT:_____
3. WARD:_____
4. STREET:_____
5. INTERVIEWER NAME:_____
6. DATE OF INTERVIEW:_____/_____/2017

SECTION I: SOCIO-DEMOGRAPHIC INFORMATION			
Q1	Caretaker relationship	1. Mother 2. Grand Mother 3. Household servant 4. Others _____	
Q2	Sex of care taker	1. Male 2. Female	
Q3	What is the age of Caretaker (age in complete years)	Years _____	

Q4	What the age of the Mother, if caretaker is not mother (age in complete years)	Years_____	
Q5	Child parent marital status?	1. Married 2. Unmarried 3. Divorced 4. Widowed	
Q6	What is the highest level of education of caretaker?	1. None 2. Primary 3. Secondary 4. College	
Q7	What is the highest level of education of Mother?	1. None 2. Primary 3. Secondary 4. College	
Q8	What is your Occupation?	1. Business women 2. Civil servant 3. House wife 4. Other, specify: _____	
SECTION II: HOUSEHOLD MEMBERS INFORMATION			
Q9	How many people live in your household?	_____	
Q10	How many people are under the age of 5?(Select one without bias)	_____	

Q11	Age of a child	_____	
Q12	Sex of the child	1.Male 2.Female	
Q13	Have this child under the age of five in your household have diarrhea in the past 12 months (Past year)	1. Yes 2. No	
Q14	How many times this child under the age of five have diarrhea in the past 12 months?	_____	
TYPE OF WATER SOURCE, WATER TREATMET METHODS AND WATER STORAGE.			
Q15	What is the main source of drinking water for members of your household	1. Piped water 2. Water from open well 3. Water from borehole 4. Ruin water 5. Water vendors	
Q16	Do you do anything to make water safer to drink?	1. Yes 2. No	If no skip to question 21
Q17	What do you usually do to make the water safer to drink?	1. Boiling 2. Use of chlorine (water guard) 3. Let it stand and settle 4. Filter with cloth 5. Other:_____	

Q18	Why do use this method for making water safer?	1. Cost 2. I don't know other option 3. The method is effective 4. Cheap 5. I don't know6. 6. Other_____	
Q19	Why don't you treat your drinking water	1. Availability 2. Costs 3. Bad taste and smelly of treated water 4. I believe water is safe from the source 5. I am used to drink untreated, nothing happen to us 6. I don't know	
Q20	Which container do you store water for drinking (observe and write answers)	1. Bucket with a lid 2. Bucket without a lid 3. Small pans 4. Jerry cans 5. Other:_____	
Q21	How do you draw water from your container	1. Use small pan 2. Pour directly from container 3. Use cup 4. Other:_____	

SECTION 5. HAND HYGIENE PRACTICE AND BEHAVIOUR			
Q22	When do you wash hands?	1. After using the toilet 2. Before eating 3. Before preparing food 4. Before feeding a child 5. After cleansing a child who is defecate 6. After handling a child faeces	
Q23	Do you use soap?	1. Yes 2. No	
Q24	Is there a place for washing hands (observe)	1. Yes 2. No	
Q25	Is there a soap in a place they wash their hands (observe)	1. Yes 2. No	
Q26	What kind of toilet facility do members of household usually use	1. Flush/Pour flush to sewer 2. Flush/Pour flush to septic tank 3. Flush/Pour flush to pit latrine 4. Flush/pour flush to else where 5. Ventilated improved pit latrine 6. Pit latrine with slab 7. Pit latrine without slab/open pit 8. No facility/bush 9. Others:_____	

Q27	Is there feces around the pit hole/slab/floor of latrine (observe)	1. Yes 2. No	
Q28	Do you have hand washing Facility around/beside the toilet?	1. Yes 2. No	
Q29	Where do you dispose your Under- five child feces?	1. In the toilet 2. Left it open every where 3. Covered by soil 4. Other_____	
Q30	Where do the household primarily dispose of Household waste?	1. In refuse pit then Collected By Municipality 2. In refuse pit then Collected By Private Establishment 3. Dumped In Street/Open Space 4. Others_____	
Q31	Where do you dispose your Liquid waste?	1. In septic tank/latrine pit 2. In seepage pit 3. Anywhere in open space 4. Others _____	

Appendix IV: Questionnaire (Kiswahili Version)

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI CHA MUHIMBILI

SHULE YA AFYA YA JAMII NA SAYANSI YA JAMII

DODOSO LA UTAFITI KUTATHMINI UGONJWA WA KUHARISHA MARA KWA MARA KWA WATOTO WENYE UMRI CHINI YA MIAKA MITANO NA VISABABISHI VYAKE KATIKA KAYA ZILIZOCHZNGULIWA KUTOKA KATA TANDALE

1. NAMBA YA DODOSO:_____
2. WILAYA:_____
3. KATA:_____
4. MTAA:_____
5. JINA LA MUHOJAJI:_____
6. TAREHE YA MAHOJIANO:_____/_____/2017

SEHEMU YA I: TAARIFA ZA MSHIRIKI

Q1	Usiano wa mlezi na mtoto	1. Mama 2. Bibi 3. Baba 4. Mfanyakazi wa ndani 5. Nyingine _____	
Q2	Jinsia ya mlezi	1. Mwanamke 2. Mwanaume	

Q3	Umri wa mlezi (Miaka kamili)	Miaka _____	
Q4	Umri wa mama, kama mlezi siyo mama yake mtoto (Miaka kamili)	Miaka_____	
Q5	Hali ya ndoa ya wazazi wa mtoto	1. Wameoana 2. Hawajaoana 3. Wamepea na taraka 4. Mzazi mmoja amefariki	
Q6	Ni nini kiwango cha juu cha elimu cha mlezi	1. Sijasoma 3. Elimu ya msingi 4. Elimu ya Sekondari 5. Chuo 6. Haihuski	
Q7	Ni nini kiwango cha elimu cha mama wa mtoto ?	1. Sijasoma 2. Elimu ya msingi 3. Elimu ya Sekondari 4. Chuo 5. Haihuski	
Q8	Kazi ya mama wa mtoto?	1. Mkulima 2. Mfanyabiashara 3. Mfanyakazi wa kuazjiriwa 4. Mama wa ndani 5. Nyingine taja: _____	

SEHEMU YA II: TAARIFA ZA WANAKAYA			
Q9	Je kwenye kaya hii kunaishi watu wangapi?	_____	
Q10	Je kuna watoto wangapi wenye umri chini ya miaka mitano? (Chagua mmoja bila upendeleo)	_____	
Q11	Umri wa motto	_____	
Q12	Jinsia ya motto	1.Mwanaume 2.Mwanamke	
Q13	Je mtoto huyu mwenye umri chini ya miaka mitano katika kaya yako amewahi kuugua ugonjwa wa kuharisha ndani ya miezi1 2 iliyopita ? (Mwaka 1)	1. Ndiyo 2. Hapana	Kama jibu hapana nenda swali la 15
Q14	Je ameharisha mara ngapi katika kipindi cha miezi kumi na mbili iliyopita?	_____	
Q15	Kuna sabuni sehemu ya kunawia mikono? (angalia)	1. Ndiyo 2. Hapana	
Q16	Chanzo chenu kikuu cha maji ya kunywa kwa kaya yenu nikipi?	1. Maji ya bomba 2. Visima vifupi 3. Visima virefu 4. Maji ya mvua 5. Maboza	

Q17	Je unatumia njia yeyote kusafisha/kutibu maji ya kunywa	1. Ndiyo 2. Hapana	Kama hapana nenda swali 32
Q18	Huwa unatumi njia gani kuyasafisha/kutitibu maji ya kunywa ili yawe salama	1. Kuchemsha 2. Kutumia water guide 3. Naacha yatulie 4. Nayachuja na nguo 5. Nyingine	

SEHEMU YA III: CHANZO CHA MAJI ,NJIA YA KUSAFISHA MAJI NA UWEPO WA VIFAA VYA KUTUNZIA MAJI			
			Kama hapana nenda swali namba 29
Q19	Kwanini unatumia njia hiyo?	1. Gharama 2. Sina njia mbadala 3. Njia hii ina ufanisi wa kiwango cha juu 4. Rahisi 5. Sijui 6. Nyingine _____	
Q20	Kwa nini hausafishi/huyatibu maji yako ya kunywa	1. Hamna vitakatisho 2. Gharama 3. Maji yaliyotakatishwa sipendi ladha yake 4. Naamini maji ni	

		salama 5. Nimekuwa nakunywa maji yasiyo tibiwa bila matatizo 6. Sijui 7. Nyingine_____	
Q21	What container do you store water for drinking (observe)	1.Ndoo yenye mfuniko 2.Ndoo bila mfuniko 3.Bakuli 4.Jug 5.Nyingine taja	
Q22	Huwa mnachukuaje maji ya kunywa kutoka kwenye chombo yalikohifadhiwa	1. Bakuli 2. Tunamimina 3. Tunatumia kikombe 4. Nyingine taja_____	
Q23	Huwa mnafurahia ladha na harufu ya maji yenu yaliyotibiwa?	1. Ndiyo 2. Hapana 3. Sijui	
Q24	Mnatumia choo cha namna gani?	1. Kimeunganishwa kwenye mtandao wa maji taka 2. Kimeunganishwa kwenye makaro ya maji taka 3. Ni cha shimo na wanaflush 4. Wanaflush kwa	

		kutapisha 5. Ni cha shimo chenye bomba la hewa 6. Ni cha shimo chenye cement slab/magogo 7. Ni shimo lisilo na slab 8. Hamna choo/vichakani 9. Nyingine:_____	
Q25	Je kuna kinyesi kipo juu ya choo au kwenye sakafu ya choo(Angalia)	3. Ndiyo 4. Hapana	
Q26	Je kuna sehemu maalum ya kunawia mikono karibu/pembeni ya choo	1. Ndiyo 2. Hapana	
Q27	Je huwa unatupa wapi choo cha watoto wenye umri chini ya miaka mitano?	1. Chooni 2. Kinaachwa kizagae kila mahala 3. Kinafukiwa ardhini 4. Nyingine taja_____	
Q30	Takataka za kaya hii huwa mnatupa wapi?	1. Zinawekwa wenye pipa/kizimba cha takataka baadaye zinakuja kuchukuliwa na Manispaa 2. Zinawekwa kwenye pipa/kizimba cha takataka baadaye	

		zinakuja kuchukuliwa na kampuni binafsi 3. Zinaachwa kwenye mazingira ya mtaani 4. Kwenye shimo 5. Nyingine _____	
Q31	Maji machafu huwa yanaenda wapi?	1. Chemba ya maji machafu 2. Shimo la kuhifadhia maji machafu 3. Yanaachwa yazagae kwenye mazingira 4. Nyingine ___	