FACTORS THAT INFLUENCE HAND WASHING PRACTICE AMONG PRIMARY SCHOOL CHILDREN IN ARUSHA RURAL DISTRICT COUNCIL, ARUSHA REGION, TANZANIA

By

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CERTIFICATION

The undersigned certify that she has read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled ***Factors that Influence Hand Washing Practice among Primary School Children in Arusha Rural District Council, Arusha Region, Tanzania,*** in (partial) fulfillment of the requirements for the degree of Master of Public Health of Muhimbili University of Health and Allied Sciences.

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Date: 11th October 2010

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DEDICATION

This work is dedicated to my lovely mother Angela and my late father, Dr. Moses Mbeb for aspiring me to take a health carrier.

ABSTRACT

Background: Hand washing is the single most important and cost-effective method prevention of diseases such as diarrhea among children and adults. Many interventions h been done in Tanzania focusing on primary care takers. Nevertheless, hand wash proportion is still low. Hence more hand washing promotion interventions are needed and the behavior to be effective, proper hand washing must be learnt from childhood so tha becomes a routine habit throughout life. Since, school children are good behavior cha agents, this study focused on primary school children's hand washing practice. **Objective**: aim of this study was to determine factors influencing hand washing practice among prim school children. **Materials and methods**: A cross- sectional analytical study based quantitative research methods was conducted from June to July 2010 involving 527 grade to seven primary school children of both sexes in Arusha rural district council using a tested self administered questionnaire. Data analysis: Frequency distributions, Chi-square multiple logistic regression analyses were performed by SPSS version 13.0. **Results:** O 18.8% of participants fulfilled the criteria of washing hands with soap, before eating, a using the toilet by using the required time. More than half (55.7%) of the children were aw of issues related to hand washing practice. Only one school had hand washing stations none of the schools provided soap for hand washing. Bivariate analysis indicated t significantly ($p<0.001$) higher proportion of children who perceived pressure from impor referents (42.1%) washed hands as compared to those who did not perceive pressure (11.5 Whereas, self efficacy and attitude were not significantly associated with children's h washing practice. Controlling for age, sex, grade and school location multiple logi regression further indicated that; pressure from important referents continued to be hig associated with hand washing [Adjusted OR= 0.2, 95% CI;0.1,0.3; $p<0.001$]. Likew children of lower grades were more likely to wash hands than those of higher grades [AC 2.4, 95% CI; 1.3, 4.6; $p=0.007$]. **Conclusion:** The findings of this study demonstra important referents and grade of school children were significantly associated with their h washing practice.

TABLE OF CONTENTS

Contents **Pag**

CERTIFICATION.....

DECLARATION AND COPYRIGHT.....

ACKNOWLEDGEMENT.....

DEDICATION.....

ABSTRACT.....

TABLE OF CONTENTS.....

LIST OF TABLES.....

LIST OF FIGURES.....

LIST OF ABBREVIATIONS.....

DEFINITION OF KEY TERMS:.....

CHAPTER 1.0 INTRODUCTION.....

1.1 Background.....

1.2 Problem analysis diagram.....

1.3 Statement of the problem.....

1.4 Significance of the Study.....

1.5 RESEARCH QUESTIONS.....

1.5.1 Main research question.....

1.5.2 Specific questions.....

1.6 OBJECTIVES.....

1.6.1 Broad Objective.....

1.6.2 Specific Objectives.....

CHAPTER 2.0 LITERATURE REVIEW.....

2.1 Hand washing practice among primary school children 1
2.2 Hand washing awareness among primary school children 1
2.3 Relationship between school children's hand washing practice and social demographi characteristics. 1
2.4 School children's attitudes towards hand washing practice 1
2.5 School children's self efficacy towards hand washing practice 1
2.6 Relationship between school children's hand washing practice and pressure fro important referents. 1
2.7 School Hygiene facilities 1
CHAPTER 3.0 METHODOLOGY 1
3.1 Design of the Study 1
3.2 Area of the study 1
3.3 Study population 1
3.4 Sample and sampling methods 1
3.4.1 Sample size estimation 1
3.4.2 Sampling technique 1
3.5 Data collection procedures 1
3.6 Data analysis 1
3.6.1 Construction of dummy variables and coding for analysis 1
3.6.2 Statistical analysis 1
3.7 Ethical considerations 1
CHAPTER 4.0 RESULTS 2
4.1 Social demographic characteristics 2
4.2 Proportion of school children's hand washing practice 2
4.3 Hand washing awareness status among school children 2
4.4 Personal factors influencing school children's hand washing practice 2
4.5 Social factors influencing school children's hand washing practice 2

4.6 Bivariate association between school children's hand washing practice and socia demographic characteristics, personal and social factors 2
4.7 Multiple logistic regression 2
4.8 School hygiene facilities 2
CHAPTER 5.0 DISCUSSION 2
5.1 Proportion of school children's hand washing practice 2
5.2 Hand washing awareness among primary school children 2
5.3 Relationship between children's hand washing practice and social demographic factor 2
5.4 School children's attitude towards hand washing practice 3
5.5 School children's self efficacy towards hand washing practice 3
5.6 Relationship between school children's hand washing and pressure from importan referents 3
5.7 Hygiene facilities in primary schools 3
5.8 Study strengths 3
5.9 Study Limitations 3
CHAPTER 6.0 CONCLUSION AND RECOMMENDATIONS 3
6.1 CONCLUSION 3
6.2 RECOMMENDATIONS 3
REFERENCE 3
APPENDICES 4
Appendix 1 4
QUESTIONNAIRE (ENGLISH VERSION) 4
Appendix 2 5
SCHOOL OBSERVATION CHECKLISTS (ENGLISH VERSION) 5
Appendix 3 5
CONSENT FORM (ENGLISH VERSION) 5

Appendix 4 6
QUESTIONNAIRE (SWAHILI VERSION) 6
Appendix 5 7
CONSENT FORM (SWAHILI VERSION) 7

LIST OF TABLES

Table Page

1: Social demographic characteristics of school children and their school environment.....21

2: Proportions of children's hand washing practice, personal and social Factors.....22

3: Distribution of children's hand washing practice by social demographic characteristics.....23

4: Distribution of children's Hand washing practice by their attitudes, self efficacy and important referents.....26

5: Adjusted and unadjusted Odds Ratio and 95% Confidence interval (CI) for children's hand washing practice according to important referents and social demographic characteristics.....27

LIST OF FIGURES

Figure Page

Problem Analysis diagram on primary school children's hand washing practice 4

LIST OF ABBREVIATIONS

AMREF	African Medical and Research Foundation
CDC	Center for Disease Control and prevention
HWD	Hand washing Day
HWWS	Hand Washing With Soap
MOHSW	Ministry of Health and Social Welfare
NSHP	National School Health Program
PHASE	Personal Hygiene and Sanitation Education
RAS	Regional administrative Secretary
REDET	Research and Education for Democracy in Tanzania
SPSS	Statistical Package for the Social Sciences
TIE	Tanzania Institute for Education
UNICEF	United Nations Children's Fund
URT	United Republic of Tanzania
WHO	World Health Organization
WSP	Water and Sanitation Program

DEFINITION OF KEY TERMS

Hand washing is the act of cleansing the hands with the use of water or another liquid an soap, for the purpose of removing soil, dirt, and/or microorganisms.

Hand washing with soap at critical times: means washing hands with soap after using th toilet and before eating.

Hand washing facilities: These include running water, washing stations (stands/sinks/basi toilets and soap.

School health promotion: is when health interventions are conducted in schools aiming at extending the measures into the community.

School children: Are young children attending primary education, usually still under the care/guidance of parents or guardians.

Practice: is an act of translating an idea into action.

Awareness: is the state or ability to perceive, feel or to be conscious of events, object sensory patterns.

Attitude: is generally a positive or negative view of a person concerning a certain thin event.

Self efficacy: is belief in one's ability to perform a task or act.

Important referents: are the people who act as role models upon children.

CHAPTER 1.0 INTRODUCTION

1.1 Background

Hand washing is the single most important method for prevention of infectious disease such diarrhea among children and adults. Hands can be contaminated with faces, body fluids, desl chairs, doorknob, handles, tape holder, dust and floor. These can be vehicles of bacteria, vi and parasite (CDC, 2009a). Furthermore, infectious disease causing agents can enter the bo when the unwashed hands touch the nose, mouth or eye. When a person with respirat infections sneezes or coughs the droplets that remain in the hands if contacts another perso hands and that person touches his or her mouth, eyes and nose without washing hands, th the person can be infected with respiratory infections such as influenza or common col (Rabie et al, 2006). This underscores the fact that hand washing will not only prevent diarrh but also several other infectious diseases such as acute respiratory infections. Worldwide, t observed rates of Hand washing with soap at critical moments (i.e. after using the toilet) ran from 0 to 34% (WHO, 2008b).

Hand washing significance was first discovered by Holmes in 1843, working in an obstet ward where about 25% of women delivering were dying from childbed fever (*puerper sepsis*). Investigations of Holmes found out that it was transmitted through contaminat hands of doctors when delivering mothers. Moreover, the idea was turned down by medi specialists (Case, 2009). In 1847 Semmelweis proved that hand washing was effective in t prevention of infections and demonstrated that childbed fever incidence could be reduced fr 13% to 2% or less when appropriate hand washing practices are done by medical worke However, the idea was also mocked by health practitioners (Lerman, 2008). Despite the roc beginnings, hand washing has become one of the most important aspects in protection agai spread of infections worldwide.

Children are known to be highly susceptible to diseases such as diarrhea and respirat infections (Berg, 1988). Studies have recommended hand washing as the best means preventing diarrheal diseases transmission although it's not the sole route of transmissi

(Okyay et al, 2004; Curtis et al, 2001). Hands should be washed after visiting the toilet, befor eating, after eating, after sneezing or coughing, when hands are visibly soiled, after handlin garbage or dirt, after handling pets, animals or animal waste, after cleaning a baby's face before touching young infants and children (CDC, 2009b). Furthermore, it is recommended t wash hands with soap because soap breaks the dirt and grease that carries most of the germ which cannot be removed by water alone (WHO, 2008b). It has been indicated th improvement of availability of water alone reduces diarrhea disease by about one third (Esre et al, 1991; Huttly et al, 1997). Whereas, hand washing with soap reduces diarrhea risk up 47% (WHO, 2004). Therefore, if more efforts will be put on hand washing promotion mo lives will be saved.

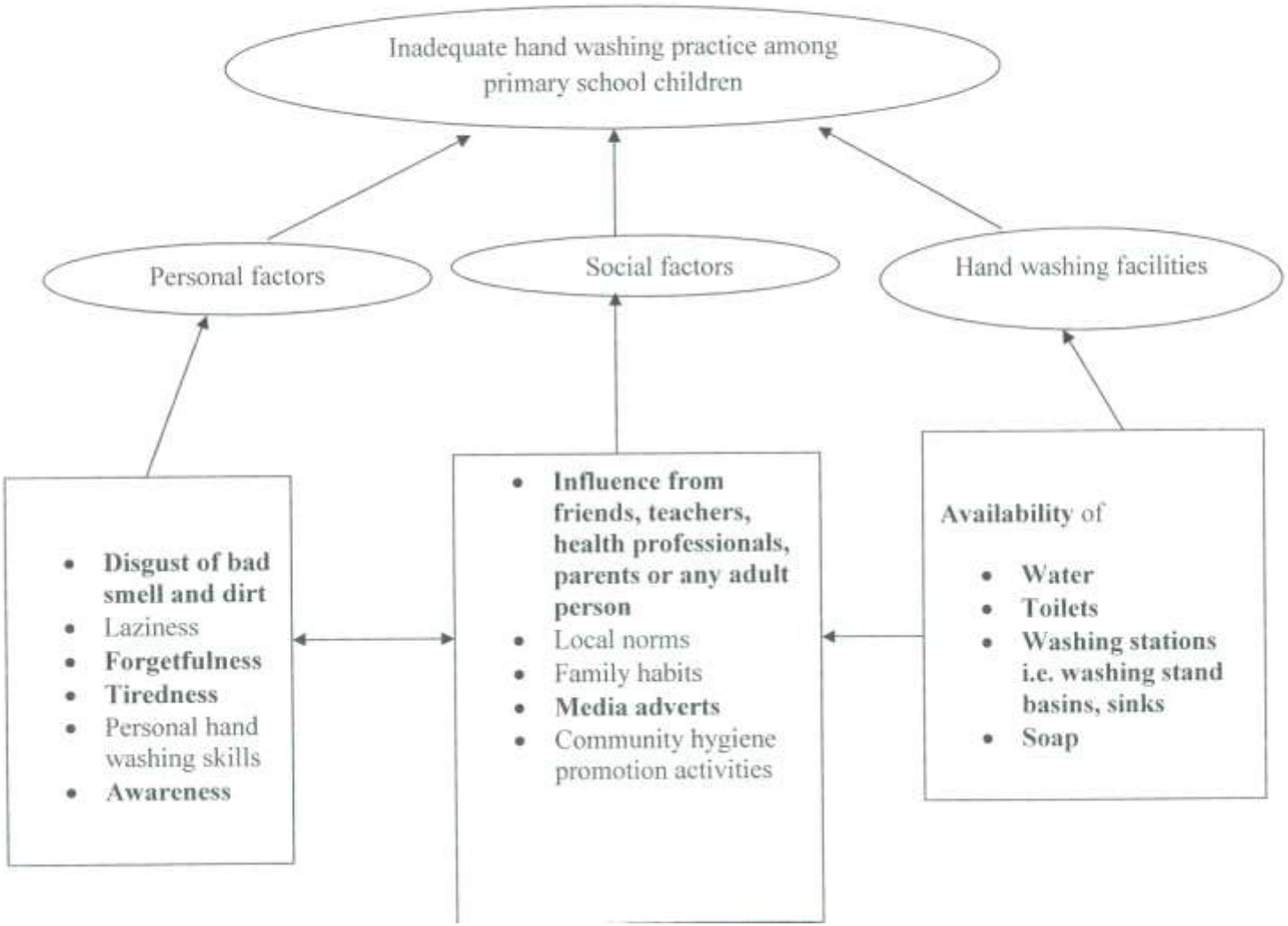
Hygiene promotion initiatives in Tanzania have been focusing on the provision of wate sanitation facilities and water treatment but very little on personal hygiene promotio (Rukunga, 2005). The Tanzania School Health Program advocates among other thin provision of safe water, environmental sanitation and safety and health education in schoo (URT, 2000). This is in line with the WHO initiative on school health promotion (WH 2009a). However, in school settings there is inadequate provision of basic water suppl sanitation facilities and children have poor hygiene habits. Thus, the incidence of maj childhood illnesses increases.

Hand washing interventions have been done among primary care takers in Tanzan Nevertheless, hand washing proportion is still low (Danquah et al, 2007; Curtis et al, 200 Curtis et al, 2009). Hence more hand washing promotion interventions are needed and for t behavior to be effective. Proper hand washing must be learnt from childhood so that becomes a routine habit throughout life. Since, school children are good behavior chan agents (Onyango-Ouma et al, 2004; WHO, 2008b), this study focused on primary scho children's hand washing practice.

1.2 Problem analysis diagram

The possible factors that could influence hand washing practice among individuals a illustrated in the figure bellow. These factors include personal and social factors, as well hand washing facilities/services. Because of the complexity of the model only a fe independent variables were used as indicated in bold in the schematic diagra

Problem Analysis diagram on primary school children's hand washing practice



1.3 Statement of the problem

Hand washing with soap is the most effective, feasible and cost-effective means of preventing worm infections, diarrhea and acute respiratory infections among children and adults (Luong, 2003; Curtis et al, 2003; Rabie et al, 2006; Luby et al, 2004). The main purpose of washing hands is to cleanse away pathogens or chemicals which can cause personal harm or disease. Hand washing with soap can reduce incidences of diarrhea diseases and thus save approximately 1 million lives per year (Curtis et al, 2003; Fewtrell et al, 2005; Ejemot et al, 2008). Furthermore, worldwide about 400 million school aged children are infected with worms due to poor hand washing practices. These worms consume nutrients from children and therefore causing abdominal pain and malfunction, impair their learning capacity and thus reduce school attendance (Luong, 2003; Nandrup-Bus, 2009; Mooijman et al, 2005). The concern is not only about school children's health but it goes beyond that since often they can be highly influential in promoting good health for their younger brothers and sisters and other family members (Water Aid,2010).

There are several factors that could influence hand washing practice. These could be either personal, social factors or access to hand washing services/facilities (Lopez-Quintero et al, 2009; Scott et al, 2007; Danquah et al 2007; Rukunga et al, 2006; Bandura, 1991; WHO, 2009c). In order to change people's hand washing behaviors, there has to be a firm understanding of these factors. Personal factors can; disgust of smells or dirt, laziness, forgetfulness, tiredness, personal hand washing skills, awareness status, nurture (Curtis et al, 2005; WHO, 2008b; Danquah et al, 2007; Rukunga et al, 2006; Ebong, 1994). The social factors could be; local norms, family habit, influence from friends, teachers, health professionals, parents or any adult, media and community hygiene promotion activities (Curtis et al 2009; Rukunga et al, 2006; Trunnell et al, 2005). In addition, there are hand washing facilities that enable the practice to take place includes; availability and accessibility of water, toilets, soap, hand washing stands i.e. washing basins, containers and sinks (Curtis et al, 2009; Scott et al, 2007; WSP, 2007; Bergqvist, 2008; Rukunga et al, 2006). These factors have been determined in most studies which were mainly focused to primary care takers, community

members and health workers. However, limited information on these influential factors i given on school children.

In Tanzania as well as other developing countries, studies have reported hand washin proportion ranging from 13 to 19% among primary care takers in households (Danquah et a 2007; Tumwine et al, 2002; Paynter, 2008). However, the solution for this is not as simple a only providing hand washing education because often the majority already knows about th importance of washing hands and still the practice is low. As stated by Gakuo (2009) that i order to influence behavior change, it is important to integrate hygiene practical intervention and hygiene education programs.

Most of the retrieved studies have explored on primary care taker's hand washing habits educational programs, factors affecting the practice, practical demonstrations and han washing motivating factors (Curtis et al, 2000; Curtis et al, 2009; Danquah et al,2007), all wit the aim of increasing the frequency and compliance of hand washing practice withi households. So far records show that 12 % of illnesses among Tanzanian children age between 0 to 14 years are due to diarrhea (MOHSW, 2009). This shows the necessity o imparting hygiene promotion interventions among children. However, few hand washin interventions have been done in Tanzania as well as other developing countries focusing o school children (Lopez-Quintero et al, 2009; Nandrup-Bus, 2009; AMREF, 2010; MOHSW 2009). Although national initiatives through hand washing day have been made aiming a promoting school children's hand washing practice (WHO, 2010; WHO, 2008c) furthe interventions are needed so as to increase school children's frequency and compliance to han washing practice. This can be achieved by involving school children in school healt promotion activities because schools are regarded as appropriate settings in which crucia interventions can be developed (URT, 1988; NSHP, 2000; TIE, 2010; WHO, 2009a Mooijman et al, 2005). Therefore, due to limited information on school children's han washing practices, this study aimed at determining the factors that influence school children t wash hands so as to come up with school hygiene intervention strategies.

1.4 Significance of the Study

This study results will provide information on the proportion of children's hand wash practice and their awareness status on hand washing so as to identify which aspects need to strengthened in school hygiene promotion activities. Furthermore results will provide insig on personal and social factors and an overview of the school hand washing facilities t influence hand washing practice.

Findings can be used in making recommendations on improvement of school hand hygi interventions since hand washing plays an important part in reaching the millenni development goals by decreasing child mortality, improving health status and impr effective use of water and sanitation services. Furthermore, this study will provide additio information.

1.5 RESEARCH QUESTIONS

1.5.1 Main research question

What are the factors that influence hand washing practice among primary school children i Arusha rural district council in Arusha Region?

1.5.2 Specific questions

1. What proportion of school children practice hand washing behavior?
2. What is the awareness related to hand washing practice among school children?
3. What are the personal factors that influence hand washing practice among schoo children?
4. What are the social factors that influence hand washing practice among schoo children?
5. What hygiene facilities are available in primary schools?

1.6 OBJECTIVES

1.6.1 Broad Objective

To determine the factors that influence hand washing practices among primary school children in Arusha district council.

1.6.2 Specific Objectives

1. To determine the proportion of school children's hand washing practice in Arusha district council.
2. To assess hand washing awareness among school children in Arusha district council.
3. To assess the relationship between school children's hand washing practice and social demographic characteristics
4. To assess school children's attitudes towards hand washing practice
5. To assess school children's self efficacy towards hand washing practice
6. To assess the relationship between school children's hand washing practice and pressure from important referents.
7. To identify available hygiene facilities in primary schools.

CHAPTER 2.0 LITERATURE REVIEW

Safe water supply, improved sanitation and hygiene promotion activities in schools are crucia in making a school to become health promoting. World Health Organization estimates tha 88% of diarrheal diseases are caused by inadequate water supply, inadequate sanitation an hygiene (WHO, 2004). In developing countries every year more than 2.2 million people di from diseases associated with lack of access to safe drinking water, inadequate sanitation an poor hygiene (WHO-UNICEF, 2008). For instance, 51%, 46% and 50% of the total populatio in Kenya, Tanzania and Uganda respectively have no access to improved water supply an also 13% (Kenya), 10% (Tanzania) and 25% (Uganda) had unimproved sanitation facilitie (WHO/UNICEF, 2000). Since the economy in these countries has not changed much over th past decade, it is unlikely that the situation has improved (REDET, 2007).

Schools are good environment in which children learn and practice health promoting activitie such as personal and environmental hygiene (NSHP, 2000). In Tanzania the school healt promotion package is part and parcel of the School Health Program which advocates for sa water supply, environmental sanitation and safety, hygiene promotion, screening, healt education, first aid, counseling, vaccination, recreation, school lunch and communit involvement (NSHP, 2000).

It is recommended by CDC that for hands to be washed properly demonstrations having th following steps should be provided in school settings; wet hands with running water and appl soap, then rubbed vigorously creating friction for at least 20 seconds with a special attentic paid to the wrist, back of hands, between the fingers and under the nails and finally rinse under running water then dried with paper towel (CDC, 2009a; CDC, 2009b).

2.1 Hand washing practice among primary school children

In developing countries hand washing is still being practiced to a very low extent especially critical moments i.e. before eating and after using the toilet. In Colombia 36.6% of scho children reported to wash hands with soap always or very often after using the toilet ar before eating. However, only 3% of school children always washing hands for at least 2

seconds whenever hands were contaminated. In addition, these children reported to was hands rarely after coughing or sneezing (Lopez-Quintero et al, 2009). Moreover, in Ugand 54% school children were observed washing hands after using the toilet but only 5% use soap (WSP, 2007). Therefore, this implies that appropriate hand washing is still a proble among school children.

2.2 Hand washing awareness among primary school children

Hand washing practice depends on the knowledge acquired concerning the practice (Lope Quintero et al, 2009; Scott et al, 2007). Most schools have lessons on hygiene issues and thu leading to a high rate of awareness among children. Nevertheless possession of knowledg does not necessarily guarantee the performance of the corresponding behavior. For exampl in Nigeria, although school children had good knowledge on hygiene they still could not b able to put the knowledge into practice due to inadequate school sanitation facilities (Ebon 1994). In Tanzania, some initiatives have been done through the introduction of hand washir campaign programs in schools (Curtis et al, 2009; NSHP, 2000). Moreover, awareness c ways of preventing parasitic infections among primary school children in Tanzania was four high in the intervention schools compared to those in control schools (Lansdown et al, 2002 Nevertheless, it has to be noted by Pete (1986) that the effects of hand washing education schools were not sustained over time. Therefore, there is a need to reinforce factors that wi sustain hand washing practice.

Media advertisements are good initiatives used to improve people's awareness and eventual put it into practice. World Health Organization report shows that Ghana introduced TV ar radio adverts explaining how contamination on hands can only be removed by simply washir hands with soap. These adverts target mostly primary care takers and school children (WH 2008a). In Pakistan the introduction of safe guard program has succeeded to empower mo than 5 million school children (6-11 years) from 10,000 schools with hygiene education ar demonstrations on how to wash hands (WHO, 2008c). In Peru, mass media HWWS campaig has not yet been launched but they have implemented the behavior change program ar reached almost 500,000 women and school children. However in Vietnam, 86% of its targ

was based on interpersonal communication programs on importance of washing hands with soap at critical times where 540,000 sessions have been done engaging almost 1 million women of reproductive age and school children (Amelink et al, 2009). In Tanzania, at least 8 million women of reproductive age and children are exposed to hand washing with soap program through the "Hands to be proud of" campaign aired in four radios stations. This was launched in February 2009 (Amelink et al, 2009) and since it is anticipated that media information will help people improve their hand washing practices more efforts need to be done.

2.3 Relationship between school children's hand washing practice and social demographic characteristics.

School children's hand washing practice can be related to social demographic characteristics such as sex, age, tribe, residence, grade, religion and parent's education level. In Colombia, mother's education level was found being associated with school children's hand washing intentions while age, gender, type of school, and father's education was not at all related (Lopez-Quintero et al, 2009). Furthermore, Pete (1987) reported better hand washing practice among female as compared to males children. Another study reported hand washing behavior difference between rural and urban settings (Fenton et al, 2010).

2.4 School children's attitudes towards hand washing practice

Attitudes can act as influential factors among children hand washing practices depending on their belief and expected outcome (Ajzen et al, 1980). Since attitudes are regarded as determinants of people's behavior it is important to modify people's behaviors and beliefs (Ajzen et al, 1980; Lopez-Quintero et al, 2009). This was one of the factors found highly associated with children's hand washing behavior in Colombia (Lopez-Quintero et al, 2009).

2.5 School children's self efficacy towards hand washing practice

Self efficacy has been found being the most important factors which enables a person to actually do the act of washing hands as required Ajzen et al, 1980; Ajzen (2002). It was reported by Lopez-Quintero et al (2009) that a high level of control over behavior predicts a

person's proper hand washing practice. Children can easily adopt a behavior only if they h control over the practice but if not adaptation becomes a problem.

2.6 Relationship between school children's hand washing practice and pressure from important referents.

Important referents like friends, parents, health professionals, teachers or other adults a from parents are among the role models of children (Davis, 2010; Lopez-Quintero et al, 20 For example, In Colombia, parents (88.5%), schools (66.7%) and the media (56.8%) were most sources of hand washing information to children (Lopez-Quintero et al, 20 Furthermore, a study done in Ugandan schools found teachers as barriers to children's h washing practice since they were not emphasizing on the importance of washing hands (W 2007).

2.7 School Hygiene facilities

Hygiene facilities that influence hand washing include water, washing stations (i.e. si basin), soap and accessible toilets. In Colombia, 18.9% and 16.7% children stated not to w hands due to lack of clean water and soap respectively (Lopez-Quintero et al, 20 Moreover, in Nigeria, it was observed that due to inadequate hygiene facilities in schools, did not allow children to effectively practice the knowledge they had acquired (Ebong, 19 In India, only 10% of the schools had adequate hand washing points with soap (Majra et 2010).

Water supply is inadequate in most developing countries (WHO/UNICEF, 2000). Availabi of water has a crucial impact on the frequency of hand washing among individuals (Curti al, 2000). Example in Malawi about 12% of primary schools do not have safe water su (Bergqvist, 2008). Thus, makes it difficult for children to practice hand washing whil schools. However, experience has shown that even adequate provision of hygiene facilitie schools is not enough to improve children's health if it is not well integrated with effec hygiene promotion initiatives (Mooijman et al, 2005).

CHAPTER 3.0 METHODOLOGY

3.1 Design of the Study

A cross- sectional analytical study based on quantitative research methods was carried out from June to July 2010.

3.2 Area of the study

The study was conducted in Arusha rural district council in Arusha region, north-eastern p of Tanzania mainland Arusha rural district council which is boarded by Arusha municipal and Meru district council. Administratively it is divided into 3 divisions and 20 wards. T district covers an area of 1700 square kilometers and has a population estimated to be 319,2 Young people (aged 10 – 20 years) are estimated to be 103,424. The major ethnic group Waarusha and the minor are Maasai, Chagga, Pare, Rangi, and Nyiramba. The district has 1 primary schools of which 98 are government and 7 are privately owned schools. The to enrolment of primary school children is approximately 90% (Arusha Rural District Coun Education Department, 2009.). Water is one of the facilities required for hand wash practice but in the district has inadequate water supply since the required amount of water 42 million liters daily but the actual supply is only about 31 million liters daily (REDE 2007). Moreover, the district has limited information on hand washing practice.

3.3 Study population

The study population was grade five to seven primary school children of both sexes in Arus rural district council. Children in the lower classes were excluded from the study since th were of younger age (below 8 years) and were not able to understand and respond properly questions during pre testing of the tool.

3.4 Sample and sampling methods

3.4.1 Sample size estimation

The minimum sample size (n) was obtained using the following formula (Kirkwood, B.R, 2003):

$$n = \frac{Z^2 P (100-P)}{E^2}$$

Where:

P = Proportion of primary school children who practice improper hand washing = 66.4% (Lopez-Quintero et al, 2009).

E= margin of error set at 6%

Z= standard normal deviate set at 1.96 for 95% confidence level

$$n = \frac{1.96^2 \times 66.4 (100-66.4)}{6^2} = 238$$

Therefore, addition of non response rate10% rounded off to a total = 262

To control for design effect the total study population was doubled=262 x 2= **524** i.e. clustering necessitates a much larger sample size (Shackman, 2001).

3.4.2 Sampling technique

A multistage cluster random sampling technique was used to select the sample. This was dc in two stages as described below:

1st stage; A list of government and privately owned schools was obtained from the distı council education department. Out of a total of 105 schools, 4 schools were select us simple random sampling by lottery method.

2nd stage; considering the calculated sample size 524, the number of participants from eac school was not less than 120 children. In each school one stream from class 5, 6 and 7 we randomly selected since each stream had at least 40 children. The study was carried out durir the last week close to midterm vacation hence attendance was high. All children in th selected streams who were present at the time of the study were selected as study participants

3.5 Data collection procedures

The data was collected using questionnaire and observation checklist. The questionnai collected information on children's hand washing practice, knowledge, personal and soci factors influencing the practice. The observation checklist collected information on hygier facilities provided in schools. The questionnaire was translated from English to Swah language. The Swahili version was the one used during data collection which was pre-teste by 15 students from different primary schools in Dar es Salaam city before been administere to the study participants so as to assess the language appropriateness, duration taken filling th questionnaire and comprehensiveness of the questions. Prior to data collection two researc assistants were recruited and trained on the aim of the study, meaning of each questions, ho school children were required to fill the questionnaires and how to provide assistance to scho children when required.

In each school, selected children were gathered in classes or school halls. A brief explanatic of the study aim was given by the principle researcher. Then teachers were asked to leave th venue in order to provide more freedom for the children to answer the questions witho tension. Students were informed on the confidentiality of the information they gave and th participation was voluntary. Then consent forms were distributed to all children and we collected after been signed. Afterward distribution of questionnaires was done since a selected children consented to participate in the study. The maximum duration spent b participants in filling the questionnaire was 30 minutes.

3.6 Data analysis

3.6.1 Construction of dummy variables and coding for analysis

The questionnaire assessed children's hand washing practice, knowledge, personal and
factors influencing the practice and the observation checklist was used to observe hy
facilities provided in schools. Hand washing practice was assessed based on 4 criteria r
to hand washing techniques i.e. use of soap, hand washing with soap after using the
hand washing with soap before eating and hand washing using the required time (at lea
20 seconds). Items measuring each criterion was scored on a 5 point frequency scale ra
from 5="always" to 1="never". The 5 point frequency scale was dichotomized whereby
who answered 1="never" to 3="often" were classified as non washers (score 1) and 4=
often" to 5="always" were classified as washers (score 0). The dichotomized items
added up to create summative index. Children who reported 4="very often" to 5="alway
all 4 criteria were classified in the "proper hand washing" category.

Awareness of children on hand washing was assessed based on ten questions relat
infectious disease transmission, hand washing techniques and health outcomes associated
hand washing (e.g. Hands should be washed with soap even after touching someone's ha
In each item those who answered correctly scored 1 and those who answered wrongly s
0. Those who got 6 or more questions were regarded as "more aware" while those who
or less were regarded as "less aware".

Personal factors were assessed using questions on children's attitude and self efficacy
on the 4 point likert scales. Respondents were asked on the importance of washing
whenever dirty or smelling bad. The scale ranging from 1="very important" to 4= "not
important" was dichotomized. The dichotomized items were added up to create summ
index. Then children who reported 1="very important" or 2="somewhat important" for
questions were classified as having "positive" attitude over hand washing practice (sc
while those who reported 3= "not very important" or 4="not at all important" were clas
as having "negative" attitude over hand washing practice (score 1). Respondents were
asked on their degree of confidence of not forgetting to wash hands with soap and wash

even if they felt tired. The scale ranging from 1="very confident" to 4="not at all confid was dichotomized. The dichotomized items were added up to create summative index. children who answered "1=very confident" or "2=somewhat confident" for both ques were classified as being "confident" (score 0) while others who answered 3="not confident" or 4="not at all confident" were classified as "not confident" (score 1).

Social factors were assessed using 5 important referents (parents, teachers, friends, h professional and adults besides parents) based on the 5 point frequency scale ranging 5="always" to 1="never". The 5 point frequency scale was dichotomized whereby those answered 1="never" to 3="often" were classified as perceiving less pressure from impo referents (score 1) and those who answered 4="very often" to 5="always" were classifie perceiving high pressure from important (score 0). The dichotomized items were added u create summative index. Then children who answered 4="very often" or 5="always" for questions were classified as being pressured by important referents to wash hands with s Respondents were also asked about whether or not they have ever got information on h washing from sources such as radio, television, leaflets and billboards. Those who answ "Yes" (score 0) were asked to state whether or not they got motivated by the information.

School hygiene facilities were observed using a checklist which consisted of "Yes" and answers. A hygiene index was computed using a combination of 4 facilities in sch (running water +soap + hand washing stations + toilets). Those schools with at least 2 facilities were regarded as having medium amount of required hygiene facilities while t with less than 2 facilities had low amount of required hygiene facilities.

Other information collected was about sex, age (9–12, 13≥), tribe, grade, religion, par education (secondary or higher education and others), home hygiene facilities (clean w hand washing stations, soap and toilets). Given the different options respondents were asked to state what hindered them from using soap when washing hands i.e. cost of soap

even if they felt tired. The scale ranging from 1="very confident" to 4="not at all confide was dichotomized. The dichotomized items were added up to create summative index. Tl children who answered "1=very confident" or "2=somewhat confident" for both questi were classified as being "confident" (score 0) while others who answered 3="not v confident" or 4="not at all confident" were classified as "not confident" (score 1).

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3.6.2 Statistical analysis

Data from the close ended structured questions were entered and cleaned while the open en questions were edited, coded, branched, entered and cleaned before analysis. The analysis performed using SPSS version 13.0. The sample size was 524 but there was an increase participants therefore the total sample size analyzed was 527. Data has been presented u frequency tables and cross tabulations. Frequency distributions were done and the proport were compared using chi-square test at bivariate analysis. In multivariate analysis u multiple logistic regressions, the outcome variable was hand washing practice while independent variables were self efficacy, important referents, age, grade and sex. Unadju odds ratios (ORs), adjusted odds ratios (AORs), their corresponding 95% confidence inte (CIs) and Nagelkerke R^2 were computed.

3.7 Ethical considerations

The study was approved by the Muhimbili University of Health and Allied Sciences Rese and Publication committee. A letter of introduction to the Arusha rural district cou education department was written by the school of Public Health and Social Science Preliminary meeting was done with the District education Officer explaining the aim of study and permissions to conduct the study was obtained where by a list of all primary sch was provided. After a random selection of the schools the district education Officer wrot introductory letter to all heads of selected schools and asked to provide full cooperation necessary support. Written informed consent was requested and obtained from all sele children after explaining the objectives, assurance of confidentiality of their respon voluntary participation and benefits of the study.

CHAPTER 4.0 RESULTS

4.1 Social demographic characteristics

A total of 527 children participated in the study whereby 29.4%, 29.4% and 41.2% were fron grade 5, 6 and 7 respectively. Out of the total participants 44.4% were males and 72.9% wer in the schools located in the semi rural areas. The average age of participants was 12.3 ± 1. years. Most children (72.9%) were in schools with medium amount of required hygien facilities. Other social demographic characteristics of the study participants are presented i ***Table 1***.

4.2 Proportion of school children's hand washing practice

Overall, children who fulfilled the criteria of washing hands with soap, before eating, aft using the toilet by using the required time constituted 18.8%, whereas 66.3% used soap whe washing hands, 69.1% washed hands with soap after using the toilet and 56.3% before eatin while only 31.4% wash hands using the required time as recommended by Centre for Diseas Control and Prevention (CDC, 2009b). A good number of children (76.3%) had positiv attitude towards the importance of washing hands and 71.8% were found confident to was hands. However, only 22.8% of participants perceived pressure from important referents t wash hands with soap (***Table 2***).

4.3 Hand washing awareness status among school children

More than half (55.7%) of the participated children were found more aware of importa aspects associated with hand washing practice (***Table 2***). Grade seven children 122(60.1% were found more aware compared to children from grade five and six 142(52.4%). Howev grade was not significantly related to awareness status (χ^2= 2.8; p=0.1)

Table 1: Social demographic characteristics of school children and their school environment.*Total (N=527)

Characteristics		Number(n)	Percentage (%)
Age group	9-12	287	55.7
	13-17	228	44.3
Sex	Male	234	44.4
	Female	293	55.6
Grade	Five and six	310	58.8
	Seven	217	41.2
Religion	Christian	446	84.8
	Islam	80	15.2
School location	Semi Rural	384	72.9
	Rural	143	27.1
School hygiene index	Medium	384	72.9
	Low	143	27.1
Father's education	Secondary or higher	357	67.9
	Others	169	32.1
Mother's education	Secondary or higher	325	62.1
	Others	198	37.9

***Numbers do not add up to total due to missing data {e.g. age group and religio**

Table 2: Proportions of children's hand washing practice, personal and social factors.*Total (N=527)

CHARACTERISTICS	Number (n)	Percentage (%)
Hand washing practices		
Overall proper hand washing	96	18.8
Use soap when washing hands	344	66.3
Hand washing with soap before eating	292	56.3
Hand washing with soap after toilet use	360	69.1
Hand washing with soap for about one minute	163	31.4
Awareness levels		
More aware	264	55.7
Less aware	210	44.3
Personal factors		
Positive attitude	397	76.3
Self efficacy	374	71.8
Social factors		
Pressured by important referents	116	22.8

***Numbers do not add up to total due to missing data.**

Table 3: Distribution of children's hand washing practice by social demographic characteristics.*Total=527

Characteristics		Total No. of Responses	Hand washing practice (HWP) Proper HWP n (%)	Significance
Age group	9-12	280	51(18.2)	χ^2=0.2;
	13-17	221	44(19.9)	df=1;p=0.6^{ns}
Sex	Male	234	37(16.4)	χ^2=1.4;
	Female	247	59(20.6)	df=1;p=0.2^{ns}
Grade	Five and Six	300	67(22.3)	χ^2=6.1;
	Seven	212	29(13.7)	df=1;p=0.01*
Religion	Christian	434	81(18.7)	χ^2=0.03;
	Islam	77	15(19.5)	df=1;p=0.9^{ns}
School location	Semi Rural	373	61(16.4)	χ^2=5.2;
	Rural	139	35(25.2)	df=1;p=0.02*
Awareness status	More aware	259	50(19.3)	χ^2=0.4;
	Less aware	206	35(17.0)	df=1;p=0.5^{ns}
Father's education	Secondary or higher	346	65(18.8)	χ^2<0.01;
	Others	146	31(18.8)	df=1;p=1.0^{ns}
Mother's education	Secondary or higher	314	61(19.4)	χ^2=1.2;
	Others	194	35(18.0)	df=1;p=0.7^{ns}

***Numbers do not add up to total due to missing data {e.g. age, sex, grade and religion}**
Note: *p≤ 0.05, ** p≤ 0.001 and ns = Not statistically significant

4.4 Personal factors influencing school children's hand washing practice

Most children reported that it is important to wash dirty or bad smelling hands (76.3% and 71.8% respectively). Those confident not to forget to wash hands or wash hands even when tired were 83.7% and 81.6% respectively.

4.5 Social factors influencing school children's hand washing practice

The most stated referents were parents (76.2%), health professionals (74.4%) and teachers (72.5%). The reasons reported for not washing hands were lack of soap at school (58.0%), cost of soap (15.0%) and lack of soap at home (11.0%). Majority of children (91.6%) reported having received information on hand washing from sources such as television, radio, billboards and leaflets. The most cited sources of information about hand washing were from the television (58.4%) and radio (28.7).

4.6 Bivariate association between school children's hand washing practice and social demographic characteristics, personal and social factors

Bivariate associations using chi-square test indicated that significantly ($p = 0.01^*$) higher proportion of children in lower grades (22.3%) washed hands as compared to those in the higher grade (13.7%). Children in the school located in semi rural area (25.2%) significantly ($p = 0.02^*$) washed hands compared to those in schools located in semi rural areas (16.4%). Other variables such as age, sex, religion, hand washing awareness, father and mother's education were found not significantly associated with school children's hand washing practice (***Table 3***).

Children pressure by important referents (42.1%) significantly ($p<0.001^{**}$) washed hands compared to those not pressured by important referents (11.5%). Other variables such as attitude ($p=0.1$), self efficacy ($p=0.1$) and exposure to hand washing information from information sources (radio, TV, billboards, leaflets) were not significantly related with hand washing practice (***Table 4***).

4.7 Multiple logistic regression

Multiple logistic regression analysis controlling for grade, school location, sex, age a important referents showed significant effect in terms of adjusted odds ratios (OR) and 9 CI of some of the independent variables on hand washing practices considered in table Corresponding Nagelkerke R^2 was 0.18.

Those who felt pressure from important referents were more likely to practice "proper" ha washing than those who did not feel pressure from important referents [Adjusted OR 0.2,95% CI;0.1,0.3; p<0.001]. Children of lower grades were more likely to wash hands th those of higher grades [AOR = 2.4, 95% CI; 1.3, 4.6; p=0.007]. Age, sex and school locat remained not significant predictors of hand washing practice (***Table 5***).

4.8 School hygiene facilities

Three out of four schools had running water supply and all the schools had toilets. Only school had hand washing stations and none of the schools provided soap for hand washing.

Table 4: Distribution of children's Hand washing practice by their attitudes, self effica and important referents.*Total=527

Factors		Total No. of responses	Proper HWP n (%)	Significanc
Attitude	Positive	384	66(17.2)	χ^2=2.2;
	Negative	121	28(23.1)	df =1;p=0.1 ^{ns}
Self efficacy	Confident	364	74(20.3)	χ^2=2.1;
	Not confident	143	21(14.7)	df =1;p=0.1 ^{ns}
Important Referents				
	Pressured	114	48(42.1)	χ^2= 54.4;
	Not pressured	382	44(11.5)	df =1;p<0.001*
Hand washing information sources				
	Yes	470	92(19.6)	χ^2=2.6;
	No	42	4(9.5)	df =1;p<0.1 ^{ns}

***Number do not add up to total due to missing data**

Note: *p≤ 0.05, ** p≤ 0.001 and ns = Not statistically significant

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	No	42	4(9.5)	df =1;p<0.1 ^{ns}

***Number do not add up to total due to missing data**

Note: *p≤ 0.05, ** p≤ 0.001 and ns = Not statistically significant

Table 5: Adjusted and unadjusted Odds Ratio and 95%Confidence interval (CI) for children's hand washing practice according to important referents and social demographic characteristics

Factors	Adjusted OR (95% CI)	Unadjusted OR(95% CI)
Important referents	0.2(0.1,0.3)**	0.2(0.1,0.3)**
Grade	2.4(1.3,4.6)*	1.8(1.1,2.9)*
School location	1.4(0.8,2.4)^{ns}	1.7(1.1,2.8)*
Sex	0.7(0.4,1.2)^{ns}	0.8(0.5,1.2)^{ns}
Age	0.7(0.4,1.3)^{ns}	0.9(0.6,1.4)^{ns}

***Multiple Logistic regression analyses: *p≤ 0.05, ** p≤ 0.001 and ns = Not statistically significant. Nagelkerke R^2 =0.18 Model χ^2= 58.7, p≤ 0.001 df = 1**

CHAPTER 5.0 DISCUSSION

5.1 Proportion of school children's hand washing practice

This study documents the association between hand washing practice and social demograph characteristics, personal and social factors among school children in Arusha rural distri council. Results from this study revealed small proportion of school children practicing prop hand washing practice, which is washing hands with soap after using the toilet and befo eating for the required time as recommended by Centre for Disease Control and Preventio Similar findings were also reported in national survey conducted in Tanzania which found lo hand washing practice among school children (URT, 2008). Compared to the findings of t study done in Colombia (Lopez-Quintero et al, 2009), Tanzania has much lower proportio of children who practice proper hand washing. Generally, global figures indicate ha washing is practiced to a low extent (WHO, 2008b). Hence more hygiene empoweri interventions should be emphasized among children and adults such as those done in Pakist and Kenya which brought tremendous improvement in hand washing practice among scho children (WHO, 2008c; AMREF, 2009). The World health Organization recommends that, f remarkable hand washing improvement to take place there has to be public-private partnersh during the implementation of hand washing promotion interventions (WHO, 2008a).

5.2 Hand washing awareness among primary school children

These findings indicated that more than half of the school children were more aware important aspects related to hand washing. Nevertheless, awareness status was not associat with hand washing practice. Similar results were obtained from a study done in Lusho (Lansdown et al, 2002) and Colombia (Lopez-Quintero et al, 2009). This indicated that lo awareness on hand washing is a problem in many parts of the world. As correctly reported Ebong (1994), this study has also shown that students in the upper class (Grade 7) are mo aware than the ones in the lower classes(Grade 5 and 6) since knowledge grows as childr progress from lower to higher classes. However, Ebony (1994) demonstrated that hi individuals' awareness does not necessarily guarantee the performance of the correspondi

behavior. For that reason, factors other than awareness should be looked at in hygien interventions to reinforce people's hand washing behavior (WHO, 2008c). There should be formation of a school hygiene education program that aims at enabling children to translate th knowledge they have acquired into practice (Mooijman et al, 2005). Furthermore, as correctl put by Early et al, (1998) hygiene education combined with accessible hand washing facilitie results to sustainable increase in hand washing frequency among school children.

5.3 Relationship between children's hand washing practice and social demographic factors

Studies which could be retrieved did not assess the relationship between grade and han washing practice This study indicated that children in the lower grades (grade 5 and 6) wer more likely to wash hands compared to those in the higher grade (grade 7). However, highe proportions were from the lower grades, this could be due to the fact that lower grade constitute younger individuals than those in higher grades. It appears that the young ones ar more obedient to wash their hands then the older ones. This study has also illustrated tha children in the upper class (grade 7) were more aware than the ones in the lower classes (grad 5 and 6). This shows that awareness does not guarantee the performance of the behavior. Th findings of this study demonstrated no sex differences on hand washing practice. Thougl previous studies have observed greater adherence with hand washing practice among childre who are females than males (Pete, 1987). Children from rural schools were more likely t wash hands than those in semi rural schools, although the differences were not statisticall significant. However, elsewhere rural–urban differences have been reported (Fenton et a 2010). As recommended by WHO (2009b) and on the basis of the findings of this study, bot rural and urban schools should be targeted for hand washing interventions with simila emphasis. It is also worth noting that this study used rural and semi rural school and therefor the contrast was not a true rural- urban comparison, implying that the children in bot categories were almost homogeneous.

5.4 School children's attitude towards hand washing practice

Individual attitudes reflect the degree to which performance of a behavior is positively o negatively valued which are shaped by beliefs and expected outcomes (Ajzen et al, 1980). I this study attitudes toward hand washing practice were not significantly associated with han washing practice. The majority of participants in this study had positive attitudes towards han washing practice but attitude was not a significant predictor of hand washing practic Contrary to this Lopez-Quintero (Lopez-Quintero et al, 2009) reported positive attitude bein related to hand washing intentions thus recommended further modification of individual attitudes and beliefs.

5.5 School children's self efficacy towards hand washing practice

Perceived self efficacy as defined by Bandura (1991) are people's beliefs about the capabilities to exercise control over their own level of functioning and over events that affe their lives. In this study self efficacy did not predict hand washing behavior. As correctly pu by Ajzen (2002), perceived self efficacy is the control over the hand washing behavior and no necessarily the actual performance of the behavior. Nonetheless, a study done in Colomb found that a high level of control over behavior strongly predicts proper hand washing practic (Lopez-Quintero et al, 2009). Therefore, health interventions for these schools have to targ raising self efficacy among school children.

5.6 Relationship between school children's hand washing and pressure from important referents

Important referents are regarded as role models and individuals normally learn from their ro models (Davis, 2010). In this study parents, health professionals and teachers were th important referents and strongly predicted children's hand washing practice. Similar referen were also mentioned by primary school children in Colombia and this factor increase children's likelihood to practice proper hand washing behavior (Lopez-Quintero et al, 2009 This was elaborated by Trunnell et al (2005) in the stage of change theory that a person ca

perform certain behaviors after seeing the behavior performed by someone else. Hence, It much easier for children to adhere to hand washing practice if their role models performing the behavior and providing consistent reminders (Davis, 2010; WHO, 2009a).

Media adverts are sources of information to the community which might act as a behav change agent. Participants in this study cited television and radio adverts as the comm sources of hand washing information. This could be as a result of the "*Hands to be proud* campaign which aimed at increasing Tanzanians awareness on the importance of ha washing (Amelink et al, 2009). However, as radio coverage is much wider than televisi (Curtis et al, 2009) more adverts should be through radios. Introduction of these adverts h shown remarkable achievements in countries such as Ghana (WHO, 2008a) and Pakist (WHO, 2008c) which lead to full commitment among school children and other commun members. In Tanzania the campaign had slightly lower achievements as compared to Gha and Pakistan (Amelink et al, 2009). Therefore, lessons learnt from Pakistan and Ghana can adapted and modified to Tanzanian situations.

5.7 Hygiene facilities in primary schools

In this study running water was observed to be present in three out of the four schoc Though, there is inadequately provision of hygiene facilities in schools. Similarly, in India was projected that 17.3% of all schools are still without water supply (SSHE, 200 Availability of water is very potential since it has been proven to have crucial impact on t frequency of hand washing among school children (Lopez-Quintero et al, 2009). Enhanc access to hygiene facilities in schools has been recommended as a means of improving ha washing rates among children (Jewkes et al, 1990; Ebong, 1994; Lopez-Quintero et al, 20(Mooijman et al, 2005; WHO, 2009a). In Uganda, lack of reliable water supply was identifi as a hindering factor for improved school sanitation (Sidibe, 1999). Hence, as stated by WH (2009a) that provision of water for washing hands near the toilets saves as a visible remin to washing hands and acts as a social motivator.

In this study all schools visited had toilets. However, hand washing stations were provid only in one school and none of the schools provided soap for washing hands. Similar resu were found in India were visited schools had adequate hand washing points with soap (Maj et al, 2010). Hand washing stations i.e. sinks are stated as important determinants of ha washing compliance (Zomerplaag et al, 2005). Absence of soap for washing hands acts as barrier to hand washing practice since it breaks the dirt and grease that carries most of t germs which cannot be removed by water alone (WHO, 2008b). As correctly recommend by WHO, hand washing with soap is one of the most important hygiene behaviors whi should be promoted among school children (WHO), 2009a). As, unavailability of soap a hand washing stations were observed to be barriers to proper hand washing practices in t schools visited. Therefore, special concern should be taken into consideration in provision adequate water supply, hand washing stations and sanitation facilities in schools. The facilities should be part and parcel of school hygiene interventions so as to enable children effectively adapt the behavior (Early et al, 1998).

5.8 Study strengths

The response rate was 100% which enabled us to assume that the target population is reflect with a reasonable degree of accuracy. The English questionnaire was translated into Swah language and since similar questions were used in similar studies with reasonable validity a reliability therefore the questionnaire was not back translated. Design effect was consider due to 2 stages cluster sampling procedure whereby this was adjusted by doubling the samp size which allows for variation of characteristics among study participants. But, since t respondents were not drawn by probability sampling interpretation of the results should not generalized to the whole district. Moreover, this study used quantitative method which enabl us to identify factors that most likely to influenced school children's hand washing practice.

5.9 Study limitations

Dichotomization of variables during data processing might have reduced the power and better fitting of the data (Curtis et al, 2009). Therefore the cost of dichotomization should be ignored when interpreting the findings. Perception as a construct needs to be captured using several questions. Nevertheless, in this study due to time and money constrai children's attitudes and self efficacy were studied by using only 2 questions per construct th might have reduced the possibility of fully capturing the perceptions with regard to construct (Mpazi et al, 2005). This study relied on self reported information thus over or und reporting of "proper" practices could have occurred since direct observation on the act practice among participants was not done. However, children were well informed on preciseness of the information they provided.

Furthermore, given that the study was school based the finding could not be generalized to Arusha rural district council children since there are other children in the council who do attend school (Lopez-Quintero et al,2009). The quantitative method enabled us to ident factors that are most likely to influence hand washing practice which is what this study w assessing on. However, those results do not allow us to make causal relationships betwe hand washing and factors influencing the practice since it was a cross sectional study. T limitation of this method is that it does not provide more detailed in-depth explanation abo the behavior, as it is with qualitative studies (Scott et al, 2007; Curtis et al, 2009).

CHAPTER 6.0 CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

The findings of this study demonstrated that only a small proportion of school childre practiced "proper" hand washing behavior. About half of the children had awareness on issue related to hand washing practice. The important personal and social factors that wer significantly associated with hand washing were perceived pressure from important referent and children's grade. In primary schools visited, toilets were found present but only on school had hand washing stations and there was limited supply of water and soap within th schools.

6.2 RECOMMENDATIONS

On the bases of answers obtained from the research questions the following are recommended

1. Since proper hand washing is still practiced to a low extent, the Arusha rural distric should give a top priority to hygiene empowering interventions; this could be achieve by ensuring multi sectoral approach within public-private partnership framework t target both rural and urban settings.
2. Nearly half of the children were not aware of issues related to hand washing practice Therefore the National School health promotion program need to put more emphasi on importance of hand washing practice among primary school children
3. For hygiene interventions to succeed in this target group, Public health specialist should organize heath education programs which put special emphasis to children's important referents since they are role models and thus their opinion matters a lot ir influencing children to adapt the hand washing behavior.
4. The Ministry of Health and social welfare in collaboration with the Ministry o Education and vocational training should allocate more funding for construction and provision of accessible hygiene facilities in schools since the presence of these facilities facilitates adaptation of the behavior.

5. Active involvement of the community and their participation is important for th sustainability of hygiene and sanitation promotion.
6. Further research using qualitative approaches should be done in order to get richc information on how to improve the adaptation of hand washing behavior among schoo children.

REFERENCE

Ajzen, I., 2002. Perceived behavioral control, self-efficacy, locus of control, and the theory o planned behavior. *Journal of Applied Social Psychology. Vol 32. pg* 665-683.

Ajzen, I., and Fishbein, M., 1980. Understanding the Attitudes and Predicting Social Behavic Englewood Cliffs, NJ: Prentice-Hall.

African Medical and Research Foundation (AMREF), 2009. Personal Hygiene and Sanitatior Education. Available at: www.amref.org

African Medical and Research Foundation (AMREF), 2010. PHASE Kenya - School hygiene and sanitation project. Available at: http://www.amref.org/what-we-do/phase-kenya--school-hygiene-and-sanitation-project

Amelink, C., Kullmann, C., Pyne, H.H., Devine, J., Orsola, A., Florez, R., Nguyen, N., Nguyen, M., Diop, O., Koita, S., Badru, A., Coombes, Y., Molyneaux, J., and Perez, E.,2009. Global scaling up hand washing project second annual progress report Peru, Tanzania, Vietnam and Senegal. Available at: www.wsp.org/scalinguphandwashing

Arusha Rural District Council Education Department, Arusha Region, Tanzania. 2009.

Bandura, A., 1991. Social cognitive theory of self regulation. *Organizational Behavior and Human Decision Processes.* Vol 50, pg 248-287.

Bergqvist, S., 2008. Drivers and obstacles for hand washing: A case study in rural Malawi.

Berg, R., 1988. Day care for children in the APIC curriculum for infection control practice, Kendall Hunt, Iowa, pg. 1310-1324.

Case, C., 2008.Accesse excellent classic collection: Hand washing. Available at: http://www.accessexcellence.org [Accessed 28 December 2009]

Center for Disease Control and Prevention (CDC), 2009a. Department of Health and Human Services. [Accessed 2nd January 2010]

Center for Disease Control and Prevention (CDC), 2009b. Wash your hands. Available at: http://www.cdc.gov/Features/HandWashing/ [Accessed 2nd February 2010]

Curtis, V., and Biran, A., 2001. Dirt, disgust and disease: is hygiene in our genes? *Perspectives in Biology and Medicine*, Vol 44, pg 17 – 31.

Curtis, V., and Cairncross, S., 2003. Effect of washing hands with soap on diarrhea risk in the community: a systematic review. *The Lancet Infectious Diseases*, Vol 3, pg 275-281.

Curtis, V., Cairncross, S., and Yonli, R., 2000. Domestic hygiene and diarrhea; pinpointing the problem. *Tropical Medicine and International Health*, Vol 5(1), pg 22- 32.

Curtis, V., Danquah, L., and Aunger, R., 2009. Planned, motivated and habitual hygiene behavior: an eleven country. *Heath Education Research*, Vol 24(4), pg 655–673.

Curtis, V., Scott, B., and Cardosi, J., 2005. The hand washing hand book: A guide for developing a hygiene promotion program to increase hand washing with soap. Available at: http://www.who.org [Accessed 22nd December 2009].

Danquah, L., Curtis, V., and Aunger, R., 2007. What do we know about hand washing practices? A review of the results of the formative research studies from the Global Public-Private Partnership for hand washing with Soap and other sources. Available a http://www.hygienecentral.org.uk/pdf/FR%20Review%20Lifebuoy.pdf [Accessed 15 December 2009].

Davis, R., 2010. How to Be a Role Model to Children and Not Just a Disciplinarian. Availab at: http://www.ehow.com/how_4995068_model-children-not-just-disciplinarian.html#ixzz0sFR4TbRj [Accessed 29th June 2010]

Early, E., Battle, K., Cantwell, E., English, J., Lavin, J.E., and Larson, E.,1998. Effect of several interventions on the frequency of hand washing among elementary public school children. *American Journal of Infection Control*, Vol 26(3), pg 263-269

Ebong, R.D., 1994. Environmental health knowledge and practice survey among secondar school children in Zaire, Nigeria. *Environmental Health Perspectives,* Vol 102, pg 310-312.

Ejemot, R.I., Ehiri, J.E., Meremikwu, M.M., and Critchley, J.A., 2008. Hand washing for preventing diarrhea. *Cochrane Database of Systematic Reviews,* Issue 1. Art. No: CD004265.DOI.

Esrey, S., Potash, J., Roberts, L., and Shiff, C., 1991. Effects of improved water supply an sanitation on ascariasis, diarrhea, dracunculiasis, hookworm infection, schistosomi and trachoma. *Bulletin of World Health Organisation*, Vol 69, pg 609 – 621.

Fenton, G., Radhakrishna, R., Cutter, C.N., 2010. Participation in "Hand washing Univers Promotes Proper Hand washing Techniques for Youth. *Journal of Extension, Vol 48(1).* Available at: www.joe.org

Fewtrell, L., Kaufmann, R.B., Kay, D., Enanoria, W., Haller, L., and Colford, J.M., 2005. Water, sanitation, and hygiene interventions to reduce diarrhea in less developed countries: A systematic review and meta-analysis. *Lancet Infectious Diseases*, Vol 5(1), pg 42-52. [Abstract]

Gakuo, S., 2009. Daily Nations: Why the UN Made the Global Hand washing Day? [Acce 13th December 2009]

Huttly, S.R.A., Morris, S.S., and Pisani, V., 1997. Prevention of diarrhea in young childre developing countries. *Bulletin of World Health Organisation*, Vol 75, pg 163 -174

Jewkes, R.K., and O'Connor, B.H., 1990. Crisis in our schools: survey of sanitation facilitie in schools in Bloomsbury health district. *British Medical Journal,* Vol 301,pg 1085-1087.

Kirkwood, B.R., and Sterne, J.A.C., 2003.Essential Medical Statistics, Second Edition, Massachuetts: Blackwell Science.

Lansdown, R., Ledward, A., Hall, A., Issae, W., Yona, E., Matulu, J., Mweta, M., Kihamia, C., Nyandindi, U., and Bundy, D., 2002. Schistomiasis, helminth infection and healt education in Tanzania: Achieving behavior change in primary schools. *Health Education Research*, Vol 17(4), pg 425-433.

Lerman, D., 2008. Hand washing for life: The 10 point history of poor hand washing. *Food Safety Magazine.* Available at: http://www.handwashingforlife.com/the_10_point_history_of_poor_handwashing [Accessed 4th February 2010]

Lopez-Quintero, C., Freeman, P., and Neumark, Y., 2009. Hand washing among school children in Bogotá, Colombia. *American Journal of Public Health*, Vol 99(1), pg 94-101.

Luby, S.P., Agboatwalla, M., Painter, J., Altaf, A., Billhimer, W. L., and Hoekstra, R.M., 2004. Effect of Intensive Hand washing Promotion on Childhood Diarrhea in High-Risk Communities in Pakistan: A randomized controlled trial. *JAMA*, Vol 291,pg 2547-2554.

Luong, T.V.,2003. De-worming school children and hygiene intervention. *International Journal of Environmental Health Research,* Vol 13: S153-S159.

Ministry of Health and Social Welfare (MOHSW), 2009. Meeting the Water, Hygiene and Sanitation Rights of Tanzanian Children. Available at: http://www.nimr.or.tz/Presentation/Sarah%20House_NIMR%20presentation.pdf

Mooijman, A., Berg,C., Jensen, L.O., and Bundy, D., 2005. Hygiene, Sanitation and Water schools. Available at: www.schoolsanitation,org

Mpazi, V.M., and Mnyika, K.S., 2005. Knowledge, Attitudes and Practices Regrading Chol Outbreaks in Ilala Municipality of Dar es Salaam Region, Tanzania. *East African Journal of Public Heath*, Vol. 2(2), pg 6-11.

Nandrup-Bus, I., 2009. Mandatory hand washing in elementary schools reduces absenteeisn due to infectious illness among pupils: a pilot intervention study. American Journal Infections Control, Vol 37(10), pg 820-826.

National School Health Program (NSHP), 2000.Ministry of Health: Health promotion in ou schools.

Onyango-Ouma, W., Aagaard-Hansen, J., and Jensen, B.B., 2004.Changing concepts of hea and illness among children of primary school age in western Kenya. *Health Educatic Research*, Vol 19(3), pg 326-339.

Paynter, N., 2008. Scaling up hand washing behavior in Tanzania. Available at: http://www.wsp.org/UserFiles/file/8232007123222_Scaling_Up_Handwashing_Beh ior__in_Tanzania.pdf [Accessed 22nd December 2009] [Abstract].

Pete, J.M., 1987. Hand washing practices among various school age students. *Health Education*, Vol 17(6), pg 37-39.

Rabie, T., and Curtis, V., 2006. Hand washing and risk of respiratory infections: a qualitativ systematic review. *Tropical Medicine and International Health,* Vol 11(3), pg 258-267.

Research and Education for Democracy in Tanzania (REDET), 2007. Available at: http://www.redet.udsm.ac.tz/pilot_districts/arusha.php [Accessed 20th February 2010

Rukunga, G., 2005.WELL FACTSHEET: Regional Annex for East Africa: Personal Hyg Behaviors. Available at: http://www.lboro.ac.uk/well/resources/fact-sheets/fact-sh htm/ [Accessed 22nd February 2010]

Rukunga, G., and Mutethia, D., 2006. WELL FACTSHEET: Regional Annex for East Af School Sanitation and Hygiene Education. Available at: http://www.lboro.ac.uk/well/resources/fact-sheets/fact-sheets-htm/[Accessed 22nd February 2010]

Scott, B., Curtis, V., Rabie, T., and Garbrah-Aidoo, N., 2007. Health in our hands, but not our heads: Understanding hygiene motivation in Ghana. *Oxford Journal: Health F and Planning.* Vol 22(4), pg 225-233.

Shackman, G., 2001. Sample size and Design effect. NYS DOH, Presented at Albany Cha of American Statistical Association. Available at: http://faculty.smu.edu/slstokes/stat6380/deff%20doc.pdf

Sidibe, M.A., 1999. School Sanitation and Hygiene in Uganda: The challenge.

Tanzania Institute for Education (TIE), 2010. Value based water sanitation and hygiene education by the Tanzania institute of education. Available at: http://www.tie.go.tz/content/vbwshe.html

Trunnell, E.P., George, L., and White, J.R., 2005. Using behavior change theories to enha hand hygiene behavior. *Education for Health*, Vol. 18(1), pg 80 – 84

Tumwine, J., Thompson, J., Katua-Katua, M., Mujwajuzi, M., Johnstone, N., Wood, E., ar Porras, I., 2002. Diarrhoea and effects of different water sources, sanitation and hygiene behavior in East Africa. *Tropical Medicine and International Health*, Vol 7(9), pg 750–756.

United Republic of Tanzania (URT), 1988. Ministry of Health: School health services Guidelines, School health services unit.

United Republic of Tanzania (URT), 2000. Ministry of Health in collaboration with Ministry of Education and Culture: Policy/Guidelines on School Health Promotion in Tanzani Mainland.

United Republic of Tanzania (URT), 2008. Ministry of Health and Social Welfare; Tanzania Global School-based Student Health Survey Report.

Water Aid, 2010. Child to child hygiene education in Tanzania. Available at: http://www.wateraid.org/international/what_we_do/where_we_work/tanzania/2615.a [Accessed 24th September, 2010]

Water and Sanitation Program (WSP), 2007. The Report on the Formative and Baseline Survey on Hand washing with Soap in Uganda: Are Ugandans' hands clean enough pg 82-86.

World Health Organization (WHO), 2004. Water, sanitation and hygiene links to health. *Fac and figures*, WHO, Geneva. Available at: http://www.who.int/water_sanitation_health/facts2004/en/[Accessed 22nd February 2010]

World Health Organization (WHO), 2008a. Global Hand Washing Day, Public-private partnership to promote hand washing in Ghana. Available at: http://www.globalhandwashingday.org/ppph_in_ghana.asp [Accessed 15th February 2010]

World Health Organization (WHO), 2008b. Global Hand Washing Day, This Planner's Guic is designed to ensure that you have the materials you need to make the first-ever Global Hand washing Day a success. Available at: http://www.who.int/gpsc/events/2008/Global_Handwashing_Day_Planners_Guide.p [Accessed 15th February 2010]

World Health Organization (WHO), 2008c. Global Hand Washing Day, Safeguard Pakistan School Education: Program empowering children with hygiene education. Available at: http://www.globalhandwashingday.org/Safeguard_pakistan.asp [Accessed 15th February 2010]

World Health Organization (WHO), 2009a. Water, sanitation and hygiene standards for schools in low-cost settings. *Edited by Adams, J., Bartram, J., Chartier, Y., and Sim J.* Available at: http://www.unicef.org/wash/schools/files/rch_who_standards_2010. [Accessed 16th February 2010]

World Health Organization (WHO), 2009b. Global Hand washing Day, Children as agents change: Lessons from UNICEF. Available at: http://www.globalhandwashingday.org/Lessons_UNICEF.asp [Accessed 29th June 2010]

World Health Organization (WHO), 2009c. WHO Guidelines on hand hygiene in health ca a Summary; First global patient safety challenge clean care is safer care. Available a www.who.int/patientsafety/en/

World Health Organization (WHO), 2010. The global Public Private Partnership for Hand washing with soap. Second Annual Celebration of Global Hand washing Day. Available at: http://globalhandwashing.org/newletter-pdf/PPPHW_SoapBox_newsletter_March2010.pdf

WHO-UNICEF Joint Monitoring Programme, 2000. Global Water Supply and Sanitation Assessment Report, Geneva. Available at: http://www.who.int/water_sanitation_health/monitoring/globalassess/en/ [Accessed 22nd February 2010]

WHO-UNICEF Joint Monitoring Programme for water supply and sanitation Report, 2008.Available at: http://www.wssinfo.org/en/welcome.html [Accessed 22nd Februa 2010]

Wikipedia free encyclopedia, 2010.Hand washing with soap. Available at: http://en.wikipedia.org/wiki/Hand_washing [Accessed 22nd February 2010].

Zomerplaag, J., and Mooijman, A., 2005. Child-Friendly Hygiene and Sanitation Facilities in Schools: Indispensable to effective hygiene education. Delft, The Netherlands, IF International Water and Sanitation Centre, 48 pages.