FACTORS INFLUENCING IMMUNIZATION COVERAGE AMONG CHILDREN AGED 12-23 MONTHS IN KILINDI DISTRICT, TANGA-TANZANIA.

By

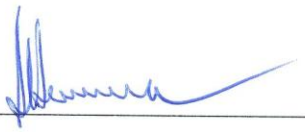
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"A Dissertation Submitted in Partial Fulfilment of the Requirements for the awards of Master of Public Health degree of the Muhimbili University of Health and Allied Sciences".

November, 2009.

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: **"Factors influencing immunization coverage among children aged 12-23 months in Kilindi District, Tanga-Tanzania,"** in partial fulfilment of the requirements for the degree of Master of Public Health of Muhimbili University of Health and Allied Sciences.



Innocent A.J Semali (MD, DPH, MSc, PhD).

(Supervisor)

Date 10/11/2009

DECLARATION

AND

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I, Bakari H. Mbwana hereby declare that this dissertation is my original work and that it has not been presented and will not be presented for any diploma or degree in any other university.

Candidates Signature _____ Date 11/11/2009

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AKNOWLEDGEMENTS

Let me thank God for bringing me safely through the academic year 2008/ 2009.This has been a busy and challenging year. Let me again gratefully acknowledge the tireless efforts and commitment provided by my supervisor Dr. Innocent A.J. Semali, the Head of the Department of Epidemiology and Biostatistics (MUHAS) for his technical assistance, comments, advice towards the production of this work.

I wish to extend my sincere appreciation to Dr.C.Sanga from the Reproductive and Child Health Section (MoH&SW), Dr. Mary Kitambi, Dr. Manyanga. Mr. Msilikale and Mrs.Fimbo both from EPI Tanzania for their necessary assistance,guidance and support during the entire period of this work.I would also like to thank staff from the National Bureau of Statistics particularly Mrs Komba for her assistance..

Special thanks should reach all the Staff of the School of Public Health and Social Sciences (SPHSS)-MUHAS for their constructive criticism, capacity building on the entire course in particular Dr. Kakoko D.V.C and Dr. Method Kazaura for their encouragement. Mr. Philip Bambino the Administrator and MUHAS ethical committee for their supportive administrative context.

I am most gratefully to all the Administrators from the Regional Administrative Secretary office (RAS) Tanga, Farida A. Mushi, District Administrative Secretary Kilindi,Tumaini Stephen for their kind assistance.I would as well not forget the Kilindi District Hospital administration particularly hospital Secretary for his Support and encouragement. Again I won't forget the Kilindi District Cold Chain Officer Mr.Moris Lukanga and his staff for their warm welcome.

Thanks should also go to our Drivers Mr. Salum and collegues from the office of the District Executive Director- Kilindi who drove us together with my research assistants (Mwaheri

Ibrahim and Somoe) along dusty, non-tarmac roads and hard to reach villages and mothers who accepted to be interviewed.

I wish to record here with appreciation the Ministry of Health and Social Welfare officials for ensuring fund release (sponsorship) for me, in particular the former Permanent Secretary Mr. Wilson Mkama and Chief Medical Officer, Dr.Deo Mtasiwa.

The kind help of Mr.Paphael Sangeda, a PhD student University of Lueven (Belgium) is appreciated for his direction on data analysis.

Last but not least, my extra ordinary thanks should go to my Wife Kissah for her technical support, tolerance, devotion, players and commitment together with my children Mariam and Maureen who missed me and lacked my support when I was away from home.

DEDICATION

This work is dedicated to my parents, wife and my children

ABSTRACT

This study was intended to assess the immunization status and its determinants among 12-23 months old children in Kilindi district, particularly community and household factors that are associated with low Immunization, including the role of sources of information on low immunization. It was a Community based cross sectional study and a total of 400 mothers/care takers with eligible children were interviewed, however 68(20.5%) were excluded for further analysis due to unrecorded sex and mothers who didn't know their age, thus 332(79.5%) were analyzed.

The study was conducted in July 2009, which included the use of interviewer-administered questionnaires. The child was said to be completely immunized if he or she received all of the following vaccines; BCG, four doses of polio vaccine, three doses of DPT-HB and one dose of measles, and incompletely if missed one or more vaccines. Data analysis was done by using the software SPSS 16.0 for Windows, with completion of immunization as dependent variable and determinants of immunization as independent variables.

204 children (61.4%) were fully immunized while 38.6% were incompletely immunized. No any child found unimmunized .Most antigens had higher coverage(90%) while Polio at birth had least coverage of less than 50.0% Most of the mothers, more than (90%) had positive attitude towards immunization. Child age was significantly associated with completion of immunization (p=0.0001) being highest (81.1%) among 20-23 months old and least (28.7%) in 12-15 months. Health facility was the major source of information on immunization status (87.3%). The most common reasons for incomplete immunization particularly Polio at Birth were mothers being sick after delivery (69.5%) and long distance from the health facilities (19.5%). Immunization status in Kilindi district has improved, as most of the antigens have coverage of more than 90% except polio 0 which is administered at birth having coverage of less than 50%. Strategies and more studies should be done to understand the reasons for the low coverage of Polio 0 antigen.

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ABBREVIATIONS

AMOs	Assistant Medical Officers
BCG	Bacillus Calmette-Guerin.
COs	Clinical Officers
DPT-HB	Diphtheria, Tetanus, Pertussis and Hepatitis B
EPI	Expanded Programme on Immunization
GAVI	Global Alliance for Vaccine Initiatives
IMR	Infant Mortality Rate.
MCH	Maternal Child Health
MDGs	Millennium Development Goals.
MMR	Measles-Mumps-Rubella
MOH&SW	Ministry of Health and Social Welfare
MPH	Master of Public Health
MUHAS	Muhimbili University of Health and Allied Sciences
NGOs	Non Governmental Organizations
NIDs	National Immunization Days
OPV	Oral Polio Vaccine.
P1MV	Proportion of 1 year child immunized against Measles Vaccine.
RED	Reach Every District
SES	Social Economic Status

SPHSS	School of Public Health and Social Sciences
SPSS	Statistical Package for Social Sciences.
TB	Tuberculosis
TDHS	Tanzania Demographic and Health Surveys
TV	Television
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
URT	United Republic of Tanzania
VHWs	Village Health Workers
VPDs	Vaccine Preventable Diseases
WHO	World Health Organization

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Immunization is among the most important intervention strategies towards achieving the Millenium Development Goals (MDGs) on child survival. Millenium Development Goal number four (MGD-4) aims at reducing child mortality by two thirds (2/3) between 1990-2010. Many countries in Africa have made little to no progress towards meeting the MDG-4. However Tanzania is on track/target to meet this goal, thanks are being given to several interventions including immunization (Honorati, 2008).The MDG-4 on child mortality is clearly within reach and child and infant mortality are on the decrease in Tanzania (Annika, 2007). Among the indicators for MDG-4 are infant mortality rate (IMR) and proportion of 1-year children immunized against measles. (PIMV)

A child is fully immunized and protected from immunization preventable causes of deaths if a child has received the seven vaccines by the age of nine months.

The seven vaccines include immunizations against Tuberculosis (TB) Measles, Diphtheria, Pertussis, Tetanus, Polio and Hepatitis B. At birth a child receives TB, BCG, Oral polio virus vaccine (OPV_0). At fourth week of life a child receives (OPV_1), Tetanus toxoid, Diphtheria, Pertussis and Hepatitis B ($DPT\text{-}HB_1$), **Table 1**. It is repeated at eight weeks and twelve weeks of life and at nine months of life the child receives measles vaccine. In the near future more

antigens would be added into the immunization schedule like HiB (Haemophilus influenza type B) (EPI, 2009)

Table 1 .Immunization and age of administration

Vaccine Type	Age of administration of Vaccines
BCG	At Birth
OPV	At Birth
DPT-HB1,OPV 1	Four weeks
DPT-HB 2,OPV 2	Eight weeks
DPT-HB 3,OPV3	Twelve weeks
MEASLES	Nine months

Source; URT-MOH &SW, 2003.

Global partners in (developing and developed) countries established Expanded Programme on Immunization (EPI) since 1970s to ensure efficient and effective delivery of the vaccine to eligible children. Though some success has been reported, still vaccine preventable diseases contributes 20-35% of burden of ill health in children below age of five years and over 10 million children die before the age of five years (Behrman et al,1994;UN/MDGs, 2006)

In Tanzania vaccine coverage has been stagnant or declining and especially measles which declined from 91 % in 2005 to 89 % in 2007. As a result measles outbreaks among under five have been reported in almost all districts today (TDHS 2004/2005). Thus ensuring further improvement in immunization coverage is an important input in the strategies towards achieving MDGs. Hence identifying areas with low childhood immunization coverage

remains important as well as people with low coverage. It will help to direct resources to places where interventions are needed.

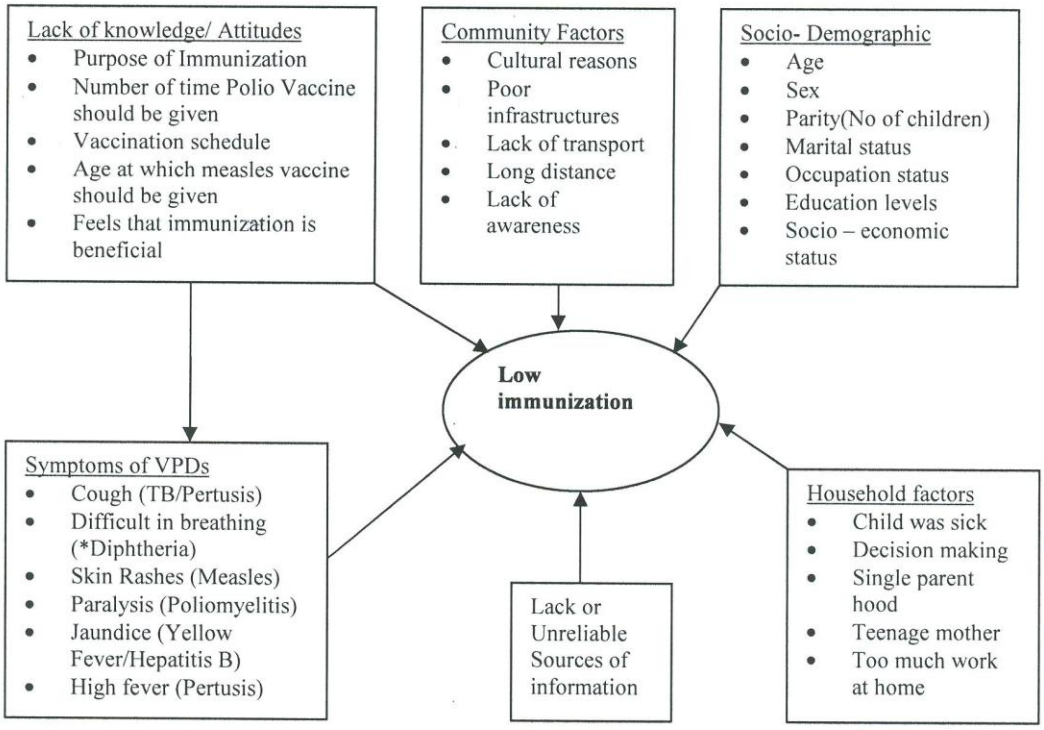
This study was proposed with the aim of determining the immunization status and related factors among poorly performing districts in Tanzania using Kilindi district as a case study.

1.2 Research Questions

- 1. What is the level of immunization coverage in Kilindi district?
- 2. What are the household factors responsible for influencing immunization coverage in Kilindi district?
- 3. What is the level of knowledge on communication and its influence on immunization among children care takers?
- 4. What are the mothers/ care givers perception towards lack of immunization?

1.3 Conceptual frame work

Figure 1: Conceptual frame work of low immunization coverage and related factors.



1.4 Problem Statement

Immunization coverage has remained stagnant while also declining in some areas. As a result number of deaths among children of under five years from vaccine preventable diseases remains high, estimated at 1.4 million annually (WHO, 2002). Most of deaths due to vaccine preventable diseases occur in developing countries accounting for close to one million deaths (Anand, et al, 2007). At the same time we lack careful quantification of low immunization and its determinants at sub-national levels.

Developing countries including Tanzania guided by the Millennium Development Goals (MDGs), has set national immunization coverage target in order to control burden of diseases associated with lack of immunization. Tanzania target was to achieve coverage of 90% or more among all districts by 2010 (EPI Comprehensive Multiyear plan 2006-2010; 2007). However despite the properly set national targets and the health system performance, the target has not been reached it remains low (83%) with very wide variation between districts ranging from 47% to more than 80% (EPI; 2007). In addition to this in some districts the coverage has been observed to drop or remain stagnant thus stalling the efforts to increase the coverage in order to achieve the MDGs on child mortality.

Several factors have been implicated for the lower coverage, these includes health systems related factors, community and household factors. Some of the health systems factors include lack of funds, lack of supportive supervisory visits, improper functioning cold chains

(as evident by temperature and humidity sensor/monitors) and transport (EPI; 2006, 2007). Community factors include lack of awareness, population mobility and poor infrastructure contributed to lower coverage. (Semali, et al, 2005). Household factors included social demographic characteristics, economy, transport and illness in the family (Mrisho, et al, 1998).

Efforts to reach the national targets included; implementing the Reaching Every District (RED) strategy, conducting National Immunization campaigns/Days, conducting periodic measles supplementation campaign after every three years (URT-MOH&SW: National Road Map Strategic Plan, 2008). Others include the Notification of Global commitment towards improving child survival in addition to committed donor support. Thus despite such efforts immunization coverage is still low hence, this study will determine the level of low Immunization and its determinants in low performing districts as a case study in Tanzania.

1.5 Rationale of the Study

- The findings of this study will provide recommendations necessary to improve immunization coverage. Thus it will help programs managers/policy makers to formulate appropriate strategies to raise immunization coverage.
- The study is expected to identify areas for improvement in service organization and to improve immunization coverage.

- This study is also for academic purpose in partial fulfillment of the requirements for the degree of Masters of Public Health in MUHAS and equip knowledge and skills in researches.

1.6 Objectives

1.6.1 Broad Objectives

To assess vaccination coverage and its determinants among 12- 23 months old children in Kilindi district, Tanga.

1.6.2 Specific Objectives

1. To determine the proportion of children aged 12-23 months fully immunized in Kilindi district.
2. To determine the relationship between Maternal / Guardian social- demographic characteristics with incomplete and complete vaccination among children aged 12-23 months in Kilindi district
3. To determine the proportion of mothers/Guardians of children aged 12-23 months having appropriate knowledge, an attitudes towards Immunization among 12-23 months old children in Kilindi district.
4. To assess the community reasons for not going to immunization for their children aged 12-23 months in Kilindi district.
5. To determine the leading sources of information on Immunization among mothers/Guardians of children aged 12-23 months in Kilindi district.

CHAPTER TWO

2.0 Literature review

Low immunization coverage is an important challenge to achieve the Millennium Development Goals (MGDs) on child health. Therefore scaling up of immunization coverage is pivotal to meeting MDGs in reducing child mortality

Immunization currently prevents more than 2.5 million deaths every year in all age groups from Diphtheria, Tetanus, Pertussis (whooping cough) and measles (Global Immunization Data, 2008). World Health Organization (WHO) estimates that in 2006, immunization saved 2-3 million lives.

In 2003 of the 10.5 million deaths among under five children about 2.6 million were due to Vaccine to Vaccine Preventable Diseases (VPDs) (GAVI, 2005). While there has been reduction in childhood mortality since the 2nd half of the 20th century, over 10 million children still die before the age of five years from various diseases (UN/MDGs, 2006), of these deaths 1.4 million children are estimated to die from vaccine preventable diseases annually (WHO, 2006). It is reflection of the incomplete coverage with existing vaccines that persist in many parts of the world.

For example Measles alone presents a major global burden and number one killer among vaccine preventable diseases (VPDs) causing almost half a million deaths each year (Griffin,

et al, 2006; WHO, 2007).Therefore scaling up of immunization coverage to meet the MDGs among the low performing districts is important.

The high under five mortality rate is partly due to lack of access to effective interventions that would combat common and vaccine preventable diseases (Lee, 2003).The under five mortality rate decreased from 170 to 80 per 100 live births and infant mortality rate fell from 104 to 70 between 1995-2005. Though at this rate, the MDGs mortality targets seem within reach, mortality rates remains high in rural areas particularly in the most remote districts. In the same rural areas until 2007 the proportion of children immunized remained more or less constant at 69 %(UNDP update, 2009).

Therefore increasing immunization coverage is an important step towards reducing the under five mortality by 2/3 by 2015.

Several factors have been observed to contribute to low immunization coverage which include health systems, community and household determinants (Orenstein, et al, 1990; Taylor, 1997). House hold factors include increase in number of children, teenage mothers, single parenthood, ethnicity, sickness of the child and carelessness (Brown, et al, 1982). Other household factors include low social economic status and newly arriving families. Among the community factors are lack of awareness, poor community participation, immigrants, lack of transport, staying far from health center (Janis, et al, 2004).

Health system factors includes improved health facilities services, motivating health care providers by giving them incentives (Benedict, et al, 2000).

In a study done in London on factors affecting immunization uptake, it was found that many districts have difficulties in meeting the 90% coverage target for Measles-Mumps-Rubella (MMR) immunization because the families lived in remote areas and have adverse conditions with poor standard of living (Mauricea, 1993). Therefore it was advised that in order to increase the overall coverage the health services should target families with adverse conditions especially poor children, vulnerable groups, and those living in rural areas (Nguyen, et al, 2006)

It was also proposed that efforts were needed to identify areas with low immunization coverage so that resources can be directed to places where interventions are most needed (Rosenthal, at al, 2004)

A study done in Roma on routine immunization, the coverage was found to be low (below 90%) in marginalized groups in informal settlements (WHO, 2008). Among the factors contributed to low coverage included high levels of migration (33%), lack of registration of children in the health systems making it difficult to understand the extent of the problem. Other reasons given were many families had no jobs, lack of electricity, limited water supply and poor sanitation. In many parts of the world social economic in equalities contribute to low immunization and raises significant concerns in increasing coverage (Davidson, et al, 2001)

It is further emphasized that determinants of low immunization coverage or delay in immunization include low social economic status, low number of sources of information on

vaccination (Cui, et al, 2007). So improving coverage could be achieved by improving access to immunization for the poor and remote areas through outreach mobile services and other primary health care related interventions. A study done in Philippines to identify determinants of immunization, revealed that mothers who have less education and who have not attended antenatal visits were less likely to have fully immunized their children. Therefore in order to increase immunization coverage knowledge transfer to mothers must improve (Bondy, et al, 2008)

At the household level determinants of decision to use health services are perception of cost and benefits of the health interventions. It was revealed that very often this leads to different decisions made by house hold members than those imagined by health planners resulting in underutilization of public health services like immunization. For example the case of Lasbela district in South of Pakistan, only one out of ten children was immunized despite of free immunization offered by the government (Neil, et al, 2005)

A study done in India on determinants of Immunization found that only 44% of children were fully immunized and 24% not immunized at all, the rest were incomplete immunized (Bhola, et al, 2007). Among the reasons for incomplete immunization include un-availability of parents, lack of necessary information on immunization, sickness of the sibling and wrong perceptions on the effectiveness of the vaccines.

Adequate and appropriate information is important to promote and sustain immunization (Olumuyiwa, et al, 2008). This is supported by the findings in Ghana where it was found that

children were missed to be vaccinated in national immunization Days (NIDs) campaigns because the source of information to mothers/care takers was found to be inadequate (Akande, et al, 2005)

A similar situation was noted in a study on determinants of poor immunization done in a poorly performing district in Kenya which found out that low level of education, long distance from the health facilities, lack of knowledge on immunization and lack of staffs were associated with low immunization coverage (Omutanyi and Mwanthi, 2005). It was recommended to adopt strategies that will address those factors which hampered immunization coverage in order to reduce the higher child mortality rate.

Several efforts have been done by many developing countries to improve immunization coverage which include bringing immunization services close to communities; of extension and strategies to educate communities and enhancing community involvement (Tandon, et al, 1992). Other strategies used in South Africa and Bangladesh were home visits, and village heath workers use of cards to identify village visits.

In Ghana door to door visits were carried out and referred all under five children to immunization clinics (Brugha and Kevany, 1996)

Other strategies focused on increasing access to immunization services, in Kenya included use of school buildings as immunization centers with an educational components provided by the school children and mobile teams who circulated immunization information within

communities (Anony, 1977). In the district of Papua New Guinea, health post staffs were trained in administering vaccinations to permit vaccines to be given closer to rural communities. As a result measles coverage increased from 4% to 75% in the intervention district (Alto, et al, 1989)

In Nigeria, access to immunization services was improved by increasing the number of locations offering immunization and adding mobile clinics in the evenings (Oruamabo, et al, 1987). In conflict areas and hard to reach areas due to security concerns, like Mozambique involved use of Bush planes to gain access to people, providing incentives to attract people to come to immunization sites, going house to house to motivate parents to bring their children for immunization and working with communities to co-ordinate provision of services (Coninx, et al,1998;Cutts,1988,1990)

Another strategy adopted by various countries was using information dissemination to increase demand for vaccination, stressing benefits of immunization increased the demand of vaccination without changing service delivery (Zimicki, et al, 1990) For example in Philippines mass communication campaign (mass media) strategies were used to reach large number of people as a result increased measles coverage from 54% in 1989 to 69% in 1990. In Bangladesh increased coverage was attributed to the use of interpersonal communication among mothers participating in an NGO credit program that encouraged child immunization without providing additional immunization services. Increased coverage was highest among children of mothers who participated than those who didn't participate, for example in 1995

measles coverage rose to 68% among participants and 58% in non participants of the NGO (Amin and Li, 1997).

Changing practices in fixed sites by improving quality of heath facility can increase coverage through reducing drop out (children started vaccination series but did not complete the series) and missed opportunities (children that were available for vaccination, but that were not vaccinated). In Ethiopia the use of reminder stickers for parents resulted in decreasing drop out between DPT-1 and DPT-3 to 7% in the intervention district compared with 13% in the comparison district during 1992 (Berhane, et al,1993).

A study conducted in Sudan compared two methods to reduce missed opportunities for vaccination: moving the immunization services close to the consultation room in the health facility to provide immediate immunizations to children who had recently been seen in consultation, and having the physician write a prescription for immunization during curative visits. Each method resulted in an increase of 32% more children being vaccinated during the intervention week than prior to the intervention. (Loevinsohn andGareaballah, 1992).

Nigerian experience revealed that health centers increased coverage of children fully vaccinated children aged one year of age by 18% in 1982 through reducing wait times i.e. by making sure that caretakers don't wait for a long time at the health facilities by creating quick immunization line (Ekunwe, 1984). In a Mexican children's hospital all missed opportunities for immunization were reduced by immunizing all hospitalized children who were not up-

to- date for their vaccines. This lead to the number of childhood immunizations delivered monthly increasing from 150 to 600 in 1991 (Avilla, et al, 1984)

Using innovative management practices; was another strategy adopted by some countries to improve coverage focusing at who should manage immunization systems and how systems might be improved to provide the highest quality services. In Cambodia increased coverage and equity were achieved by contracting immunization services to NGOs in selected districts (1991-2000). The immunization coverage increased as compared to immunization programs run by the Ministry of Health (MOH)/Government. However the cost of contracting was almost twice compared to MOH costs in those control districts (Schwartz, et al, 1992).

Coverage can also be increased through better use of data and community information; In Bolivia high risk populations in selected communities were visited bi-annually from 1992-1994 and members of these populations assisted in identifying their priority health problems. Among the study populations, 78% of children aged 12-23 months were fully vaccinated compared with only 8% in comparable populations in control communities. (Perry, et al, 1998). Similarly, in Papua New Guinea health staff were met to determine how best to improve services. They redefined health facility catchments areas and built a reporting system to collect accurate and meaningful data. These interventions were associated with an increased coverage of DPT-2 from 64% in 1980 to 89% in 1984(van Zwanenberg, et al 1988)

Other management methods have been used to improve service quality. In Indonesia, an intervention to improve quality of health care providers was implemented from 1993-1994. This intervention was of low cost and was associated with increases in coverage for all antigens, such as a increase of measles coverage by 25% in health centers participating in the program as compared to the health centers that did not participate (Robinson, et al, 2001)

In Madagascar the use of Auto-disposable syringes improved the availability of immunization. Health workers willingly worked more during the non immunization days, since no additional work load of syringe and needle sterilization this improved injection safety and hence more children were immunized (Drain, et al, 2003). In Nicaragua mobile outreach without food incentives had 63% coverage at baseline but when food incentives were added attendance increased to 102% and static clinics achieved 94% attendance with food incentives (Loevinsohn, et al, 1986).

Tanzania has been implementing the Reaching Every District (RED) strategy which includes outreach services, supportive supervision, community link with services delivery, monitoring and use of data for action and planning and management of resources to improve immunization coverage for all antigens and conducted measles supplementation campaigns after every three years (URT-MOHSW; National Road Map Strategic Plan, 2008). Other strategies were implementing national immunization days (NIDs), introduction of auto-disposable syringes and mass media communication (EPI report, 2007)

Despite of all these vast efforts the immunization coverage was 83% which was still below the expected target of 90% (WHO/UNICEF, 2008). Low immunization contributed significantly to delay in reduction of mortality in children under five years in Tanzania. In addition this has lead to measles outbreaks reported across the country due to low immunization coverage. (TDHS, 2004/2005).

In Tanzania most regions except four have immunization coverage of 80% or more (EPI Report 2006). The four regions include Dar es Salaam (75%), Kilimanjaro (71%), Coast (75%) and Kigoma (73%). Thus there is wide variations between regions and districts in immunization coverage. There are 35 districts which have coverage below 80% and some of the districts are Bariadi (47%), Kibondo (52%), Maswa (57%), Bukombe (56%), and Kilindi (77%) (EPI Report, 2007).

Several factors have been contributing to the low coverage and account for these differences. These include health system factors which among them are lack of supplies, outreach cancellations, lack of funds for training staff, limited funds to buy vaccines and poor functioning cold chain (EPI Annual repots, 2005,2006,2007). Others are lack of transport, poor vaccine forecasting, and shortage of reliable distribution systems from regions to the health facilities. There are also community factors which include improper perceptions, poor transport, cultural factors and inability to meet the required costs of travelling (EPI Annual reports, 2005, 2006 and 2007).

Studies from different sites in Tanzania also report similar types of determinants which include low levels of education among parents/care takers, sickness of the child and parenteral perception (Mrisho, et al, 1988). On the other hand a study on decentralizing EPI services and prospects for increasing coverage, it was found that community support was low and lack of awareness of the population they serve (Semali, et al, 2005)

It is possible that determinants of low immunization are context specific and hence it is important to determine factors related to low vaccination within the low performing districts. This study is thus determining reasons for incomplete immunization using Kilindi district as a case study in Tanzania.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Setting.

The study was conducted in Kilindi district in Tanga region.

It is among the 8 districts of Tanga region, it is bordered to the East by the Handeni district, to the North and west by Kilimanjaro region and to the south by the Morogoro region.

Kilindi district is a newly formed district and most of its inhabitants are peasants. It is administratively divided into 4 Divisions, 15 Wards, and 64 Villages. Its main ethnic groups are Pare, Wataita, Wambugu, Segeju, Wadigo, Wanago, Masai, Zigua and Wanguu.

According to 2002 census the district has total of 162, 491 population (United Republic of Tanzania census,2002). There is one hospital and other 23 health facilities, of these 3 are Health Centers and 20 dispensaries all offer immunization services. There is one district hospital at the moment that is newly opened and is expected to offer a range of services.

3.2 Study Population

The study included all children 12-23 months old within selected households and their mothers /guardians.

3.3 Study Design

The study was a Community based cross sectional design, exploring factors influencing low immunization coverage among children aged 12 -23 months in Kilindi district, Tanga.The

study was conducted in July 2009 as a requirement for the partial fulfillment of a Master of Public Health (MPH) program offered by Muhimbili University of Health and Allied Sciences(MUHAS).

3.4 Study Units Selection Criteria

3.4.1 .The inclusion criteria were as follows;

1. All children aged 12 – 23 months of age from the selected households were included in this study.
2. Care takers who were involved in caring of the under five children aged 12 -23 months.
3. Those who gave consent

3.4.2 Exclusion Criteria

1. Care takers who did not give consent.
2. Eligible children whose mothers age was not known.

3.5 Sample Size Determination

Sample size was calculated by using the following formula

$n= (Z^2)\ p\ (100 - p)/E^2$

Where n = the minimum number of the children 12-23 months required in this study

Z = standard normal deviate value (to correspond to the 95% confidence interval level, z was set at 1. 96)

E = the margin of error on P (rated at 6% and design effect of 2 in this study)

P = the estimated proportion of immunization coverage among under five children (77% from the previous study /survey in Kilindi district- EPI; 2007)

Therefore the minimum sample size was;

$n = \frac{1.96 \times 1.96 \times 77 \times 23}{36} = 189 \times 2 = 378.$

n = 378 - Approximated to 400.

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3.6 Sampling Technique/Procedure.

A multistage random sampling technique was used. At first stage at the district level two divisions were selected randomly among the four (4) divisions.

In the second stage two (2) wards were randomly selected from each of the selected division.

Third stage involved selection of two (2) villages in each selected ward.

Fourth stage involved selection of one hundred (100) households from the list of households with a child 12-23 months in each selected village.

3.7 Recruitment and Training of Research Assistants

Research assistants were Clinical Officers (COs) and Nurse Assistants and were trained on ethical issues, communication skills, how to fill questionnaires and get familiarization with research tool, study objectives and an overview of immunization. It was followed by pretesting the tools and finalization of the tools

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3.8 Data Collection

Data was collected using pretested questionnaires in Kiswahili language. Questionnaires consisted of mostly closed and with few open ended questions. A main data collector was the principal investigator assisted by two research Assistants who were recruited from health facilities in the district. Prior to the day of interview each household was visited to explain the aim of the study to the head and mothers/guardian and agreed a day of interview. On the interview day after obtaining consent the mother/ guardian was interviewed in privacy.

3.9 Data Management

The Principal investigator ensured completeness and correctness of data filled in the questionnaires at the end of each day. Correction of the missing and wrongly filled was done through onsite supervision and going back to responsive respondents whenever it was necessary.

3.10 Variables of the Study

3.10.1 Dependant variable: Completed immunization-Refers to a child who completed the immunization schedule in this study, who received vaccine or series of vaccines i.e. BCG, Polio-0, Polio-1, Polio-2, Polio-3, DPT-HB1, DPT-HB2, DPT-HB3 and measles. Mother/guardian was asked to show the card for validation.

-Completed immunization; If all vaccines recommended in the schedule had been given to a child.

3.10.2 Independent Variables - refer to the explanatory variables.

-Social demographic characteristic (Age in month / years) parity-number of children, marital status (single, married, divorced, widowed or separated) education levels (Nil, Quran, primary, secondary, college, university) social economic status [measured basing on occupation, education and employment status] (housewife, petty trader, teacher, peasant, health worker), physical address, Religion (Moslem, Christian, Others).

-Sources of information: Mothers/guardians were asked where they got information on immunization of their children (Radio, Newspapers, TV, Relatives, friends, Health Worker, Posters, and Nil)

-In terms of measuring mothers/caregivers Knowledge and Attitudes with regarding vaccination were asked on; Symptoms and Names of the VPDs covered by EPI, Purpose of Vaccines, immunization benefits and awareness, Age when measles vaccine is given, frequency of polio vaccine, Immunization Schedule, Reasons for not vaccinating and immunization status of their children.

-Community and Household Factors; (Fears of side effects of vaccines, cultural reasons, busy with work, Sick children, Long distance to health facilities, poor health services, and family conflicts, Lack of transport, lack of time , don't know and Others.

3.11 Pretesting of Questionnaires/ Piloting.

Prior to the main study the research instrument was translated to Swahili version for Data Collection and the pretesting was done at Amana hospital in Ilala Municipality. The sample size used for the pretest exercise was 40 which was about (10%) of 400. Questions which did not answer any of the study objectives i.e. irrelevant ones were removed and amendment was done. Any understatement was revisited following pretesting exercise.

3.12 Data Processing and Analysis

From the individual questionnaire /research tool data were coded and entered into computer software program using SPSS 16.0 for windows. Analysis of data, all necessary calculations of frequencies and cross tabulation were done. Statistical testing and significance level to examine the associations was performed using (Bivariate statistical analysis, Chi-square test, cross tabulation, Percentages, P-Value; the results were considered significant at P- value of less than 0.05

3.13 Limitations of the Study

This study;

- Only those respondents who were residing in the area from the last 6 months or more were included in this study.
- In the houses having twins only one of them was selected randomly

- In adequacies in the health care systems was not studied in this study as is also predictor for the low immunization coverage due to the paucity of resources.

These limitations were overcome by proper maternal history, help of village leader and using vaccination cards.

3.14 Ethical and Permission Considerations

Ethical approval was obtained from Muhimbili University of Health and Allied Sciences (MUHAS) ethical committee through MPH- coordinator and other appropriate authorities. The clearance with an introductory letter was submitted to the regional and district leaders. The district leaders were in turn introduced us to all other house holds to villages. In addition each respective village's authority was met. The aims of the project were explained and were asked to support it.

3.15 Consent

Consent form contained description of the study objectives, procedure, risks, confidentiality and contact details in case of any queries. It was stressing the benefits to community and children. They were assured of autonomous and right to withdrawal at any stage of the interview. They were then asked to give a written consent by signing.

CHAPTER FOUR

4: RESULTS:

Socio-demographic characteristics of subjects

A total of 400 hundred mothers/guardians of children 12-23 months were interviewed in this study. However 68(20.5%) were excluded for further analysis; 25 children due to unrecorded sex; and 43 mothers due to unknown age, however quality of data was not affected due to the homogeneity of the study population. Most respondents were females 330(99.4%) and majority 224(67.5%) were less than 30years old (**Table 1**). Furthermore majority 310(93.4%) were Moslems, 66.1% had only one child, 91.1% were females and 57.5% never schooled.

Table 1: Socio-demographic characteristics of Mothers/guardian interviewed. (N=332)

Characteristics	Frequency	Percentages
Care takers Age group (years)		
15-29	224	67.5
30+	108	32.5
Gender		
Female	330	99.4
Male	2	0.6
Marital Status		
Never married	26	7.8
Married	293	88.3
Divorced/separated/widow	13	3.9
Education level		
Never schooled	191	57.5
Incomplete primary	29	8.7
Completed primary +	112	33.8
Occupation		
Farmer	302	91.0
Housewives	20	6.0
Others	10	3.0
Alive under five children		
1	221	66.6
2	99	29.8
3+	12	3.6
Religion		
Christianity	22	6.6
Moslem	310	93.4

Table 2 presents distribution of children studied by age and sex. About half of the children 167(50.3%) were females while most 44.6% of the children were 20-23 months old and least 20.8% were aged 16-19 months.

Table 2: Age and sex wise distribution of the children aged 12-23 months.

Age Group(month)	Child Sex		Total
	Males	Females	
12-15	60(52.2%)	55(47.8%)	115(34.6%)
16-19	34(49.3%)	35(50.7%)	69(20.8%)
20-23	71(48.0%)	77(52.0%)	148(44.6%)
Total	165(49.7%)	167(50.3%)	332(100.0%)

Table 3 presents coverage of individual antigens in each age group. Polio-0 vaccine (Polio-0) given at birth was the least covered in each age group(less than 50%).The remaining antigens had coverage of more than 90% in all age groups. However there was no association of antigen coverage with age of the children ($p>0.05$).

Table 3: Percentage completion of each antigen by age group of children N=332.

Antigen/Vaccine	**Child Age Groups (months) [N/%)**				
	12-15	16-19	20-23	Total	P
BCG	109(94.8)	62(89.9)	138(93.2)	309(93.1)	0.602
Polio-0	55(47.8)	33(47.8)	59(39.9)	147(44.3)	0.452
Polio-1	109(94.8)	63(91.3)	139(94.0)	311(93.7)	0.674
Polio-2	109(94.8)	63(91.3)	140(94.6)	312(94.0)	0.576
Polio-3	109(94.8)	63(91.3)	139(93.9)	311(93.7)	0.674
DPT-HB-1	109(94.8)	63(91.3)	140(94.6)	312(94.0)	0.576
DPT-HB-2	109(94.8)	63(91.3)	140(94.6)	312(94.0)	0.576
DPT-HB-3	109(94.8)	63(91.3)	139(94.0)	311(93.7)	0.674
Measles	109(94.8)	63(91.3)	137(92.6)	309(93.1)	0.717

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Further analysis was done to determine the completion of immunization and its association with socio-demographic characteristics. A total of 204(61.4%) had received all antigens as scheduled and thus had completed immunization. Completion of immunization was highest (81.1%) among children aged 20-23 months and least (28.7%) among children aged 12-15 months, the difference was statistically significant (p=<0.0001) (**Table 5**).Though there was variation in completion of immunization with the other socio-demographic characteristics none of the difference was statistically significant (p>0.05).

Table 5:Percentage completion of immunization by socio-demographic characteristics of caretakers and children. N=332.

Characteristics	Number completed	% Completed	P-value
Maternal Age Group(years)			
15-29	130/224	58.0	
30+	74/108	68.5	0.182
Marital Status			
Not married	25/39	64.1	
Married	179/293	61.1	0.607
Education Level			
Never schooled	113/191	59.2	
Incomplete primary	21/29	72.4	0.378
Completed primary +	70/112	62.5	
Occupation			
Farmers	181/302	59.9	
Housewives+	23/30	76.7	0.173
Religion			
Christianity	11/22	50.0	
Moslem	193/310	62.3	0.386
No. of children			
1	135/221	61.1	
2+	67/109	61.5	0.808
Children age group(months)			
12-15	33/115	28.7	
16-19	51/69	73.9	0.000
20-23	120/148	81.1	

Table 6 presents completion of immunization by sex and age of the children Male children had a higher proportion (63.6%) completion of immunization as compared to female children with 59.3%.

Table 6: Proportion completing of immunization by sex and age of the children N=204.

Age in months	Immunization status		Total
	Males	Females	
12-15	15(25.0%)	18(32.7%)	33(28.7%)
16-19	27(79.4%)	24(68.6%)	51(74.0%)
20-23	63(88.7%)	57(74.0%)	120(81.1%)
Total	105(63.6%)	99(59.3%)	204(61.4%)

Another aim of the study was to determine attitudes and knowledge associated with immunization among the study population. Thus attitudes were good as evidenced by a high proportion (91.0%) of the respondents agreeing that immunization was beneficial (**Table 7**).Similarly a high proportion (92.2%) would advice mothers to go for immunization. At least 78.9% understood meaning of vaccination whilst 84.0% knew schedule for measles vaccine.

Commonest symptoms known for vaccine preventable diseases were fever (63.3%), followed by cough (46.7%) and measles rashes (45%). Measles was the most known disease (78.0%) followed by pertussis (41.9%).

Table 7: Knowledge and Attitude on immunization of mothers/guardians

		Number(**N=332**)	Frequency (%)
1.Attitude			
	.Feels that immunization is beneficial	302	91
	.Advising other mothers to immunize	306	92.2
2.Knowledge on:	. Meaning of immunization	262	78.9
	.Age at which measles vaccine given	279	84.0
	Symptoms:		
	.Knew cough as symptom	155	46.7
	.Mentioned difficult in breathing	20	6.0
	.Knew measles rashes	150	45.2
	.Mentioned paralysis	57	17.2
	.Knew yellowish eyes	57	17.2
	.Mentioned higher fever	210	63.3
	.Mentioned convulsions	4	1.2
	.Diseases:		
	Knew TB disease	71	21.3
	.Mentioned Pertusis	139	41.9
	.Mentioned Tetanus	104	31.3
	.Mentioned Jaundice	16	4.8
	.Mentioned measles	259	78.0
	.Knew Diphtheria	82	24.7
	.Knew poliomyelitis	96	28.9
	.Mentioned others/didn't know	19	5.7

It was anticipated that individuals with appropriate knowledge and attitude will enhance completion of vaccination. Table 8 presents relationships of different knowledge and attitude elements with completion of immunization. Those who correctly mentioned cough as a symptom a higher percentage (67.1%) completed immunization compared to 56.5% among those who didn't. The difference was statistically significant ($p<0.05$).

Similarly a significantly higher proportion (95.0%) of those who mentioned difficulty in breathing completed immunization compared to (59.3%) amongst those who did not complete ($p<0.0001$). Knowledge of vaccine preventable diseases were also determined as well as its relationship with completion of immunization. Those who knew pertussis was a vaccine preventable disease had a higher proportion (68.8%) completing immunization compared to (55.8%) among those who did not ($p=0.041$). Similarly those who mentioned Tetanus a higher proportion (73.1%) completed immunization compared to (56.1%) among those who did not ($p<0.024$).

Table 8: Knowledge and Attitudes of Caretakers and completion of immunization having N=332.

	Variable	Response	N	%(Vaccinated)	P
1.Attitude	1.Feels that immunization is beneficial	**Yes**	302	62.3	
		No	8	62.5	0.521
		Don't know	22	50.0	
	2.Would you advice others to immunize	**Yes**	310	61.9	0.703
		No	12	50.0	
		Don't know	10	60.0	
2.Knowledge	3. Knowing correct purpose of vaccines	**Yes**	262	61.5	0.997
		No	70	61.4	
	4.Number of times polio vaccine given	**Yes**	34	68.6	0.368
		No	298	60.0	
	5.Correct months measles vaccine given	**Yes**	284	62.3	0.424
		No	48	27	
	6.Mentioning cough	**Yes**	155	67.1	0.048
		No	177	56.5	
	7.Knowing difficult in breathing	**Yes**	20	95.0	0.001
		No	312	59.3	
	8.Knowing measles rashes	**Yes**	150	66.0	0.122
		No	182	57.7	
	9.Knew paralysis for polio	**Yes**	57	64.9	0.555
		No	275	60.7	
	10.Mentioned high fever	**Yes**	210	61.0	0.809
		No	122	63.2	
	11.Knew convulsions	**Yes**	4	50.0	0.636
		No	328	50.0	
	12.Yellowish eyes for Jaundice	**Yes**	57	37.0	0.555
		No	275	60.7	
	13.Knew TB disease	**Yes**	71	66.2	0.354
		No	261	60.2	
	14.Mentioned Pertusis	**Yes**	141	68.8	0.041
		No	191	55.8	
	15.Mentioned Tetanus	**Yes**	104	73.1	0.003
		No	228	56.1	
	16.Mentioned Jaundice/yellow eyes	**Yes**	16	75.0	0.254
		No	316	60.8	
	17.Mentioned measles	**Yes**	259	60.2	0.239
		No	73	65.3	
	18.Mentioned diphtheria	**Yes**	82	72.0	0.024
		No	250	58.0	
	19.Knew Poliomyelitis	**Yes**	96	67.7	0.135
		No	236	58.9	
	20.Mentioned others or Don't know	**Yes**	19	63.2	0.401
		No	30	50,0	
		Don't	283	62.5	

Reasons for non-use of immunization services in Kilindi district, 2009.

Those mothers/guardians of children who did not complete immunization were asked to report reasons for non completion. Commonest (69.5%) reason was mother's illness immediately after delivery followed by long distance to health facility 19.5% (see Table 9).

Table 9: Household and community reasons for not completing immunization N=128.

Reason(s)	Number(N)	Percentage
Mother was sick	89	69.5
Long distance from H/facilities	25	19.5
Child was sick	6	4.7
Others	8	6.3

Sources of Information on immunization among mothers in Kilindi district

All respondents were asked to mention source of information on immunization. The commonest source of information mentioned was health facility (87.3%) followed by neighbors (43.4%) other sources including Radio (10.8%) **see Table 10** below.

Table 10: Sources of information on vaccination in Kilindi district N=332.

Source(s)	Number (N)	%
Health worker/ clinic	290	87.3
Friends	144	43.4
Radio	36	10.8
Television	31	9.3
Others	5	1.5

CHAPTER FIVE

5.0 DISCUSSION

5.1: Vaccination status of the children.

This study reveals a moderate coverage (61.4%) of immunization. Completion of immunization was high for older children (20-23 months) as compared to those aged 12-15 months. None of the demographic factors had any significant relationship with completion of immunization. However while all antigens had coverage above 90%, Polio-0 coverage was below 50%. A higher proportion had positive attitudes towards immunization, despite that knowledge on specific immunizable diseases was comparatively low.

In addition knowledge aspects associated with higher completion of immunization were knowing cough (67.1%) as a symptom, difficulty breathing (95%), pertusis (68.8%) and tetanus (73.1%).

Completion of immunization (61.4%) was lower than previously reported (77%) in 2007 in the district (EPI Annual report, 2007). Whilst most antigens had a completion rate above 90% Polio-0 had coverage rate below 50%. Hence a higher proportion of non-completion of immunization could be due to lack of Polio-0 of which is administered at birth.

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In this study completion of immunization was equal comparing male and female children. Other studies have shown that girls are less likely to complete immunization due to various reasons. For example, in Bangladesh immunization coverage rates for girls was less than that

of boys by 5% throughout the in 1990s (Chowdhury, 2002). Similar findings are reported in Malawi (Alister, 2007) in which high proportion (84%) of male children completed immunization compared to 66% among female.

Furthermore this study was found that the immunization coverage was significantly associated with age of the child, where by the coverage was higher among the oldest children in age group 20-23 months. Tanzania children are supposed to complete immunization by nine months; low completion of immunization among younger but eligible children could be due to health systems or community reasons which were not studied. It could also be due to emerging priorities in the study area limiting children access to immunization centers. Hence there is a need to study community and health system factors and its relation to completion of immunization.

5.2: Socio-demographic characteristics of the subjects.

The study also found out that the mothers education and other household characteristics was not a significant factor in completion of immunization. This finding is contrary to what was observed in Phillipness where they found out that mothers who have less education were less likely to have their children fully immunized and suggesting strategies to educate mothers (Bondy, et al,2008). Education enables one read various important health and scientific messages. A study done in a poorly performing district in Kenya (Omutanyi, et al, 2005) found out that low level of education was associated with low immunization coverage and proposed educational strategies to reduce child mortality due to vaccine preventable diseases.

Similar findings in a study done in Malawi which showed that vaccination coverage among children increased with education of mothers. (Alister , 2007).

Similarly the study did not find association of completion of immunization with marital status, number of children, age of the mother and occupation. It is in disagreement with a study done elsewhere which reported significant association of immunization and household demographic characteristics (Brown, et al, 1982).This difference could be due to the presence of outreach mobile clinics that involved bringing immunization services closer to the communities, thus increasing an access. It is then possible that household characteristics have minor role in completing immunization. There is thus a need of other study to understand any association with completion of immunization.

5.3: Knowledge and Attitudes on immunization

Very high proportion of respondents had good attitudes towards immunization. That not withstanding knowledge on immunization varied a lot. Those who had good knowledge had a higher proportion completing immunization. This suggests that education strategies focusing on immunization could contribute to further increasing completion of immunization.

Most of the respondents in this study had very good attitude on immunization aspects though it was not associated with completion of immunization ($p>0.05$). Findings in this study are not supported by a study in Niger where vaccination coverage against Polio (OPV) was higher among those with good attitudes (Kobayashi, et al, 2003).

5.4: Sources of information on vaccination

Regarding the source of information on vaccination; in this study the commonest source of information mentioned by respondents was health facility; this finding is similar to the study done in Nigeria (Adeiga, et al, 2005). Adequate and appropriate information is vital in promoting and sustaining immunization (Olumuyiwa, et al 2008). A study done in Ghana reported that children who missed to be vaccinated in National immunization days, was because the source of information to caretakers and clients was in adequate (Akande, et al 2005).

Health workers have important role to improve immunization through education to mothers and community. In Indonesia experienced nurses in well performing health centers peer trained nurses in poorly performing health centers which improved performance among those performing poorly. Another source of information is mass media which includes radio, newspapers and television. Use of mass media facilitated reaching large number of people consequently increasing coverage from 54% in 1989 to 65% in 1990 (Zimicki, et al 1994).

Source of information is context specific, depending on which are the socio- demographic profiles of that particular population. Communities would rely on health facility as source of information if other sources of information do not exist. As the case of this study, the commonest sources of information were health worker/clinic (87.3%) followed by friends/neighbours (43.4%).

The strength of this study is stemmed on the cross-sectional design where participants were randomly selected from the population from the wards and villages of the district to assess the immunization coverage at the household level. This is contrary to the client's records reviews which were conducted in the past in the same study area for statistic and Census data. As such the findings can not be relied because of incompleteness and inaccuracy of data available in the health facilities. In the report (EPI,2005) pointed out that some health workers could not calculate well coverage rates sometimes exceeded more than 100%.That means findings from this study will form a base for future reference of immunization coverage as well as situation and barriers in Tanzania.

The weakness of this study is recalling bias, as it employed two methods (Card and maternal verbal history) to interview mothers, however this was minimized by proper and carefully enquire, but as with any other study this could not be avoided 100%. The study could also not investigate inadequacies related to the health care systems which have also been found to be responsible for the low immunization coverage.

CHAPTER SIX

6.1 CONCLUSION

In conclusion, generally the immunization status in the study area has improved, being more than 90% for most vaccines as compared to the 77% coverage in 2007 EPI report and thus reaching the national target except for Polio-0 vaccine with coverage of less than 50%.

6.2 RECOMMENDATIONS

1. Strategies to increase levels of knowledge on immunization among guardians of under fives children as well as communities should be adopted.
2. More studies [Qualitative] should be done to explore roles of community and health system factors on completion of immunization.
3. There is a need of increasing sources of information to the communities on immunization because there were only two commonly sources known, health worker/clinics (87.3%) and friend/neighbors (43.4%).
4. Literacy level should be increased for the caretakers so that they can understand the context and be able to read important health messages. In the study area 57.5% of caretakers had never went to school.

7.0 REFERENCES

Adeiga A, Omilabu SA,Sani FA, Lakehinde GF,Balogun O,Olagbaju O (2005). Infant immunization coverage in difficult- to- reach area of Lagos metropolis.*African Journal of Clinical and Experimental Microbiology* Vol 6 (3) 2005:227-231.

Akande T.M, Eshatu M ,.Bonsu G (2005). Rapid Assessment tool in Ghana. *Annals of African Medicine*, Vol 4, number 4, pp 172-176.

Alister C. Munthai (2007). Determinants of Vaccination Coverage in Malawi: Evidence From the Demographic and Health Surveys. *Malawi Medical Journal*; 19(2):79-82.

Alto WA, Alk S, Pinau D, Polume H (1989). Improving immunization coverage a comparison between traditional MCH teams and MCH teams plus Aid Post Orderlies; *PNG Med J* 32(2):97-100.

Amin R, Li YP (1997) NGO-promoted women's credit program,immunization coverage, and child mortality in rural Bangladesh. *Women's and Health*, 25(1):71-87.

Anand S, Batnighausen T (2007). Health workers and vaccination in Developing countries: An Econometric Analysis. *The Lancet* ; 369 (9569): 1277-85.

Annika Janson(2007). Shed some light on darkness: Will Tanzania reach Millennium Development Goals. *Acta Paediatri* ; 96(6) 781-786.

Anony (1977). Expanded Programme on Immunization: Study of feasibility, coverage and cost of maintenance immunization for children by district mobile teams in Kenya. *Weekly Epidemiological Record* 52(24):197-204.

Avilla- Figueroa C,Navarrete-Navarro S, Ramires-Galvan L, Baltazar-Lopez A, Lopez-Serrano M, Santos-Preciado JI (1992) Inmmunzaciones en oportunidades perdidas de vaccinacion. *Bol Med Hospital Infant Mex*;49(5):271-274.

Behrman RE, Klieg man RM, Arvin AM (1994). *Nelson Textbook of Pediatrics 15th Edition*, Philadelphia: W.B Saunders, page 1020.

Berhane Y, Pickering J(1993). Are reminders effective in reducing immunization drop out rates in Addis Ababa, Ethiopia*? J Trop Hyg* 96(3):139-145.

Bhola N, Sigh JV, Shally A, Vidya B, Vishwajet K, SK Sigh (2007). A study on determinants of immunization coverage among 12-23 months old children in urban slums of Luknow, India. *Indian Journal of Medical Sciences, vol*:16 (11):598-606.

Bondy J, Amardeep T, John J, Kathy N (2008) Identifying determinants of childhood immunization in Phillipness.*The Lancet* ;27(1):169-75.Epub 2008 number 12.

Brown J, Djoddom P, Murpphy K, Kesseng.(1982). Study to identify reasons for low immunization coverage in Cameroon as a SubSaharan country. Available from http://www.popline/docs/0746/037985.html.

Brugha RF, Kevany JP(1996) Maximizing immunization coverage through home visits: a controlled trial in an urban area of Ghana. *Bulletin of the World Health Organization* 74 (5):517-524.

Chowdhury,A.M.R (2007): Who gets vaccinated in Bagladesh?. The immunization divide.Dhaka: Bangladesh Health Equity Watch.Malawi Medical Journal; 19(2):81-85.

Coninx R,Dupuy C, Hermann C Ribeiro GC, Margot M, Lucic K(1998). Vaccination of the civilian population in the country at war: it can be done; it can also be evaluated. *The ICRC experience in Mozambique Journal of Tropical Pediatrics* 44(3):186-188.

Cui F.G, Gotin R(2007) Immunization coverage and its determinants in children aged 12-23 months in Gansu, China. *Vaccine;* 24(4):664-71.

Davidson R, Gwatkin, Garima D. In equalities in immunization coverage: An overview of social-economic and Gender Differentials in developing countries. *Available from* web. world bank.org.

Drain PK, Ralaivao JS, Rakotonandrasana A, Carnell MA (2003). Introducing auto-disposable syringes to the national immunization programme in Madagascar. *Bulletin of the World Health Organization* 81(8):553-560.

Ekunwe EO (1984) Expanding immunization coverage through improved clinic procedures. *World Health Forum*; 5(4):361-363.

Expanded Programme on Immunization Tanzania (EPI) (2007). Annual Evaluation report, Dodoma Holy Cross Meeting report.

Expanded Programme on Immunization Tanzania (EPI) (2007). *Comprehensive Multiyear Plan* 2006-2010.

Expanded Programme on Immunization Tanzania (EPI) (2005). Annual Evaluation Meeting Report, Iringa Saint Augustine University (SAUT) Hall.

Expanded Programme on Immunization (EPI) (2006) Annual Evaluation Meeting Report, Songea Girls Secondary School Hall.

Global Alliances for Vaccines Initiatives (GAVI)-(2005). Scaling up of Immunization to meet Millennium Development Goals (MGDs).

Griffin D.E, Moss W.J (2006). Can we eradicate measles? *Microbe*; 1(9); 409-13.

Honorati Masanja (2008). Child survival gains in Tanzania. Analysis of data from demographic and health surveys. *The Lancet*; vol 371; issue 9620, pages 1276-83.

Janis Paterson, Tecila Percival, Sarnia Butle (2004). Maternal and Demographic factors associated with non immunization. *Journal of the News land Medical Association*, vol 117 number 1199.

Kobayashi M, Hirakawa K, Sawada M, Suzuki C, Saikawa S, Ando H, Nakame M, Nakano T.(2003). Vaccination coverage of poliomyelitis among less than 5-year old children in the markets of Niger. *Jpn J Infect Dis* 56:175-77.

Lee LW. Child survival (2003). A global health Challenge. *The Lancet*; 362:262.

Loevinsohn BP, Gereaballah E (1992). Missed opportunities for immunization during visits for curative care: a randomized cross over trial in Sudan. *Bulletin of World Health Organization*;70 3):335-339.

Loevinsohn BP, Loevinsohn ME (1986). Improvement in coverage in primary health care of developing country through use of food incentives. *The Lancet*, 1 (8493);1314-1316.

Mauricea L (1993). Factors affecting uptake of Measles-Mumps –Rubella immunization. *British Medical Journal* ; 307:168-171(17 July).

Ministry of Health and Social Welfare (MOH&SW)-(2008). The National Road Map Strategic Plan. To Accelerate Reduction of Maternal, Newborn and Child Deaths in Tanzania 2008-2015, page 8.

Mrisho F, Ussiri EV, Kwesigable G (1988). The immunization coverage and its determinants among under five children in Ironga village, Hai district-Tanzania. *Fourth year MD research Project*, MUHAS Research Bulletin, vol 2; no. 1.

National Bureau of Statistics (NBS) [Tanzania] and ORC Macro.2005(2004-2005).Tanzania Demographic and Health Survey, National Bureau of Statistics and ORC Macro.

Neil Andersson, Anne C, Noor A, Khalid O,Joel L Robert J and Beveley Shea (2005). House hold cost benefit equations and sustainable universal childhood immunization: a randomized cluster controlled trial in South Pakistan. *BMC Public Health*; 5:72.

Nguyen M. T (2007). Child immunization in Vietnam: Situation and Barriers to coverage *Journal of biomedical sciences*; 39 (1):41-58

Olumuyiwa O, Ewan F, Francois C, Vincent I (2008). Determinants of Vaccination coverage in rural Nigeria. BMC Public Health 8:381. *Available from*: http://www.biomedcentral.com/1471-2458/8/381.

Omutanyi RM, Mwanthi MA (2005). Determinants of immunization coverage in Butere-Mumias district in Kenya. *East African Medical Journal*; 82 (10);501-5.

Orenstein W.A, Alkinson W, Mason D (1990). Barriers to Vaccinating pre school children in Health care poor Underserved areas.1:315-330[*Medline]*.

Oruamabo RS.Okoji GO (1987). Immunization status of children in Port Harcourt before and after commencing the Expanded Programme on Immunization. *Public Health*;101 (6):447-452.

Perry H,Robison N, Chaves D, Taja O, Hilari C, Shanklin D, Wyon J (1998). The census-based, impact-oriented approach: its effectiveness in promoting child health in Bolivia. *Health policy and Planning*;13(2):140-151.

Robinson JS, Burkhalter BR,Rasmussen B, Sugiono R (2001). Low-cost on- the-job peer training improved immunization coverage in Indonesia. *Bulletin of the World Health Organization*;79 (2):150-158.

Rosenthal J.R, Dewald L, Mc Cauley,Berman S, Irgoyen M,Sauwyen M, (2004). Immunization coverage levels among 19 to 35 months old children in 4 diverse medically underserved areas of the United States. *Pediatrics*;113 (4): e 292-302.

Schwartz JB, Bhushan I (2004). Improving immunization equity through a public-private partnership in Cambodia. *Bulletin of the World Health Organization*; 82(9):661-667.

Semali I.A, Tanner M, de Savigny D. (2005). Decentralizing EPI services and prospects for increasing immunization coverage: the case of Tanzania. *Int J Health Plann Manage*, 20(1):21-39.

Tandon BN, Gandhi N (1992).The Integrated Chill Development Consultants: Immunization coverage in India for areas served by the Integrated Child Development Programme.*Bulletin of the World Health Organization*; 70(4); 461-465.

Taylor J.A, Danden P.M, Slora E (1997). The Influence of Provider behaviors, parenteral characteristics and a public policy initiative on immunization status of children followed by private pediatrician; A study from Pediatric research in office settings. Pediatrics; 99:209-215.

UNDP updates (2009); Reducing child mortality. *Available from* www.undp.ro/mdg/reduce-child mortality. Retrieved March, 2009.

United Nations: The Millennium Development Goals (MDGs) report (2006), New York; United Nations.

United Republic of Tanzania. Ministry of Health and Social Welfare (MOH&SW)-(2003): *National Immunization Program Financial Sustainability Plan.* page 27.

United Republic of Tanzania. National Bureau of Statistics, National census(2002). *Retrieved from* http://www.tanzania.go.tz/census/district/html[Retrieved.April, 2009].

Van Zwanenberg TD, Hull C(1988) Improving Immunization coverage in a province in Papua New Guinea. *Br Med J (Clin Res Ed)*; 296(6637):1654-1656.

World Health Organization (WHO) (2002): Estimates of Disease burden and cost effectiveness.
*Available from:*www.who.int/entity/immunizationmonitoring/burden/estimates-burden/en/index.html.(Retrieved March, 2009).

World Health Organization (WHO), Regional Office Europe. A study on routine immunization. *Available from* http://www.euro.who.int/vaccine/eiw/20001217-5.(accessed March 2009).

World Health Organization/ United Nations Children Funds (WHO)/UNICEF (2008). Global Immunization Data; *Available from* http://www.who.int/immunization monitoring/data/en.(Retrieved 21st March 2009)

Zimicki S, Hornik RC, Verzosa CC, Hernandez JR, de Guzman E (1994) Improving vaccination coverage in urban areas through a health communication campaign: the 1990 Philippine experience. *Bulletin of the World Health* Organization; 72(3):409-422.