UPTAKE OF VACCINATION SERVICES AND ASSOCIATED FACTORS AMONG UNDER FIVES IN BARIADI DISTRICT, SHINYANGA REGION, TANZANIA

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UPTAKE OF VACCINATION SERVICES AND ASSOCIATED FACTORS AMONG UNDER FIVES IN BARIADI DISTRICT, SHINYANGA REGION, TANZANIA

By

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A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Applied Epidemiology of the Muhimbili University of Health and Allied Sciences

November 2010

CERTIFICATION

The undersigned certify that they have read and hereby recommend for examination of dissertation entitled ***Uptake of Vaccination Services and Associated Factors Among Under Fives in Bariadi District, Shinyanga Region, Tanzania*** in fulfillment of the requirements for the degree of Master of Applied Epidemiology of the Muhimbili University of Health and Allied Sciences.

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I, **Senga L. Sembuche**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

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Abbreviations

AFP	Acute flaccid paralysis
BCG	Bacille Calmette-Gue´rin vaccine
DTP	Diphtheria-tetanus-pertussis combination vaccine
DTP3	three doses of diphtheria-tetanus-pertussis combination vaccine
DTP-HB	Diphtheria-tetanus-pertussis (DTP)-hepatitis B (HB) combination vaccine
DTP-HB3	three doses of DTP-HB combination vaccine
EPI	Expanded Program on Immunization
HiB	*Haemophillus influenzae* type B vaccine
MoHSW	Ministry of Health and Social Welfare
NPEHI	National Package of Essential Health Interventions
OPV	oral polio vaccine
PHC	primary health care
RCH	Reproductive and Child Health
SD	Standard Deviation
UCI	Universal Child Immunization
UNICEF	United Nations Children's Fund
URT	United Republic of Tanzania
WHO	World Health Organization

Definition of terms

Coverage of vaccination

The extent to which program administrative figures capture the number of doses delivered to the target population for a particular antigen. In order to estimate percentage vaccination coverage, this number is divided by the total estimated number of people to be vaccinated in the target population.

Uptake of vaccination

The act of taking a child for vaccination showing the level of acceptance of vaccination services by a caretaker. The vaccination of the child must be documented by a valid date on a vaccination certificate (Road to Child Health card) to facilitate calculation of the rate of uptake of vaccination in a community.

Chapter One

1. Introduction

1.1 Background

The Expanded Program on Immunization (EPI) was launched by the World Health Organization (WHO) in 1974 when less than five percent of the world's children were immunized during their first year of life against the following six diseases — poliomyelitis, diphtheria, tuberculosis, pertussis (whooping cough), measles and tetanus(1). Within 30 years, the program has been able to increase immunization from five percent of all children globally to eighty percent (2). Vaccines avert suffering; disability, and death, immunization averted about two million deaths in 2002. However, till date, more than a quarter of the world's children – about 26 million infants – are not immunized against these six diseases (1).

WHO initiated the EPI to provide countries with guidance and support to improve vaccine delivery and to help make vaccines available to all children. A standard immunization schedule was established in 1984 on the basis of a review of immunological data for the original EPI vaccines: Bacille Calmette-Gue´rin (BCG), diphtheria-tetanus-pertussis (DTP), oral polio vaccine (OPV), and measles vaccines (2). Coverage has greatly increased since EPI began in 1974. In 2003, global DTP3 (three doses of the diphtheria-tetanus-pertussis combination vaccine) coverage was 78% — up from 20% in 1980. However, 27 million children worldwide were not reached by DTP3 in 2003; including 9.6 million in sub-Saharan Africa (3). Those who miss out on routine vaccination programs tend to be people living in remote locations, urban slums and border areas. They also include indigenous groups, displaced populations, those lacking access to vaccination because of various social barriers, those lacking awareness or motivation to be vaccinated and those who refuse (3). An estimated 2.1 million people around the world died in 2002 of diseases preventable by widely used vaccines. This toll included 1.4 million children under the age of five. Among these childhood deaths, over 500 000 were caused

by measles; nearly 400 000 by Hib; nearly 300 000 by pertussis; and 180 000 by neonatal tetanus (3).

Immunization is among the most cost-effective health investment. There is a well-defined target group; contact with the health system is only needed at the time of delivery; and vaccination does not require any major change in lifestyle. Immunization is a proven tool for controlling and even eradicating disease. An immunization campaign carried out by WHO from 1967 to 1977 eradicated the natural occurrence of smallpox. When the program began, the disease still threatened 60% of the world's population and killed every fourth victim. Eradication of poliomyelitis is within reach. Since the launch by WHO and its partners of the Global Polio Eradication Initiative in 1988, infections have fallen by 99%, and five million people have escaped paralysis. Between 1999 and 2003, measles deaths dropped worldwide by almost 40%, and some regions have set a target of eliminating the disease. Maternal and neonatal tetanus will soon be eliminated in 14 of 57 high-risk countries (3).

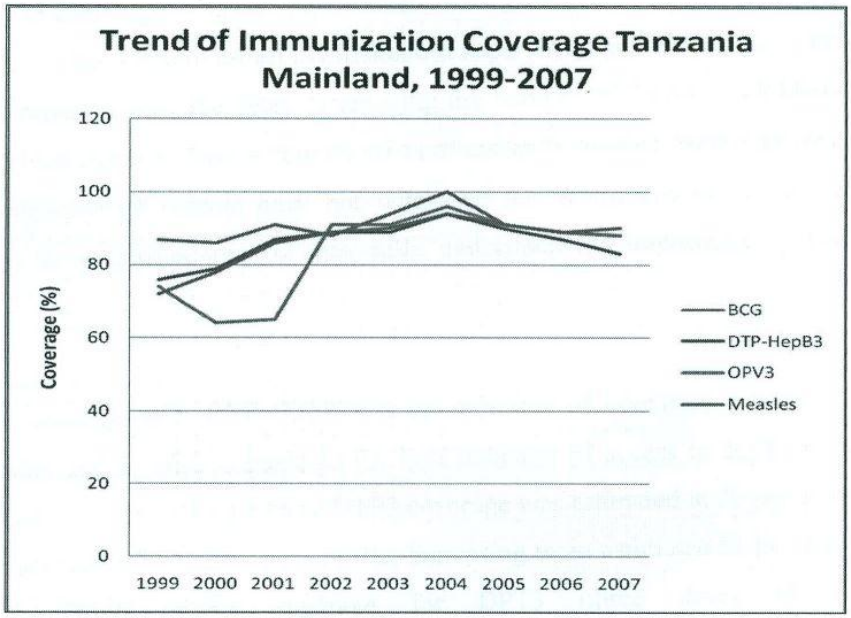
Today, national immunization programs in developing countries are responsible for improving access to the traditional EPI antigens and introducing new vaccines. In 2002, EPI focused on achieving 80 percent coverage rate of DTP3 in 80 percent of districts and using immunization contacts to deliver other high-priority child health interventions. In addition to delivering vaccinations, national immunization programs are concerned with the quality and safety of immunization through the adoption of safe injection technologies (auto disabled syringes, storage boxes, and incinerators) and proper cold chain and vaccine stock maintenance (4).

In most developing countries, immunizations are provided through a system of fixed facilities at different levels of the health system. Immunization campaigns are discrete, time-limited efforts at national or sub national levels that usually focus on specific antigens (for example, polio). Mobile strategies rely on the use of specialized vehicles to transport health professionals and vaccines to deliver services to remote or migrating populations. Outreach is a strategy by which staff members from a health facility travel to villages and surrounding areas to administer vaccines. Extended outreach refers to more targeted and intensive efforts (4).

In Tanzania, immunization is seen to be one of the important strategies of the Ministry of Health and Social Welfare (MOHSW) to improve the health of Tanzanians and therefore is one of the components of the National Package of Essential Health Interventions (NPEHI) of 2000. Since 1975, immunization services are overseen by the EPI which is under the Reproductive and Child Health Services, one of four sections of the directorate of Preventive Health Services in the MOHSW. Immunization services are provided free of charge countrywide. Immunization is offered as part of Primary Health Care (PHC) in all health facilities with Reproductive and Child Health (RCH) clinics. Out of a total of 5,681 health facilities, 4,320 (76%) were providing immunization services in 2006 (EPI/MoHSW, 2006). The immunization program has planned to increase the number of health facilities providing immunization services to 80% in 2010 (5, 6).

The national vaccination schedule for children less than five years in Tanzania includes one dose of Bacille Calmette-Gue´rin vaccine (BCG) given at birth, four doses of oral polio vaccine (OPV) given at birth, one, two and three months of age, three doses of diphtheria, tetanus, and pertussis (DTP) -hepatitis B vaccine (HB) -*Haemophillus influenzae* vaccine (HiB) given at one, two and three months of age, and measles vaccine given at nine months of age. Tetanus toxoid is offered to women of child bearing age (15 – 49 years) and to pregnant women (7).

Universal Child Immunization (UCI) launched by WHO and UNICEF globally, raised the immunization coverage in Tanzania from below 50% to more than 80% from 1985 through 1989. After the UCI campaigns, coverage started to fall from 80% in 1990 to 72% in 1998. The immunization coverage for DTP-HB3 increased from 76% in 1999 to 90 % in 2005 (Source: EPI/ MoHSW 1999 – 2007 Annual coverage reports). Between 2004 and 2007, the national coverage of all antigens offered dropped by various points ranging from 4 to 12. DTP-HB3 dropped from 94% in 2004 to 88% in 2007.



Source: EPI/ MoHSW 1999 – 2007 Annual coverage reports

The decline in coverage was attributed to several factors, such as shortages of kerosene, a shortage of staff as a result of retrenchment by government, deaths and attrition. As a result of Health Sector reforms, changes in the health systems affected the distribution of vaccine, equipment, vehicles and other supplies as well as the monitoring systems. Other factors contributing to poor performance were the lack of bicycles/motorcycles in some of the hard to reach areas, shortage of funds for supervision and lack of incentives to health workers (5, 6). Transmission of routine immunization data and low reporting rate of EPI target diseases are other challenges faced by the program (6). Tanzania is a vast country with poor infrastructure especially in the rural areas. Difficult terrain, special populations (i.e. nomads, most vulnerable children including orphans, refugee influx) are constraining factors impeding reaching every child for immunization. Special strategies are needed to reach these children (6).

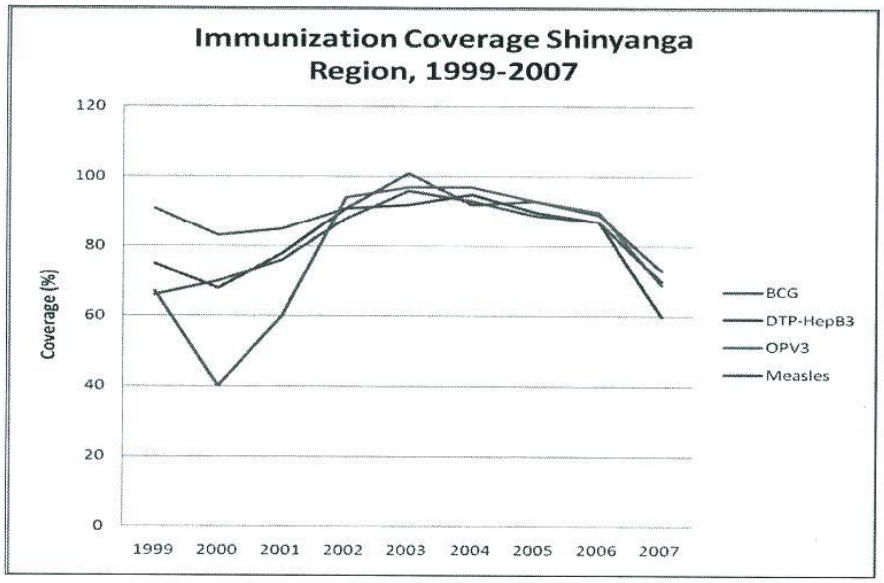
The other reasons for drop in coverage could be attributed to competing priorities of funding for immunizable diseases and other public health challenges such as malaria and HIV/AIDS. This

has raised the challenge of obtaining finances to continue to run the program and affecting the performance of the program especially in areas of supervision and outreach services. The success of the EPI program over the years in reducing the number of deaths of children from vaccine preventable diseases may have a counter effect of currently causing decline in coverage since the present generation of parents have not witnessed the devastating effect of not taking their children to be vaccinated nor do they fully understand the importance of vaccinating their children.

Complete coverage with DTP (DTP3) is an indicator of countries' performance of routine immunization and is often considered the best indicator of access to basic services, including health services (8). In 1980, globally DTP3 coverage was estimated at 20 per cent of the world's children vaccinated in the first year of life; increasing to an estimated 81 per cent by the end of 2007 (9). While global coverage for DPT3 (three doses of the combined diphtheria/pertussis/tetanus vaccine) has hovered between 70-81 per cent since 1990, significant variations exist between and within regions and countries (10). The number of developing countries estimated to have met the target of 80 per cent DPT3 coverage in every district has remained unchanged from 2004 to 2006 at 44 (9).

In 2007, out of 21 regions in Tanzania mainland, the number of regions that were able to attain coverage of 80% for each antigen was as follows; 16 for BCG, 15 for OPV3, 15 for DTP-HB1, 13 for DTP-HB2, 13 for DTP-HB3 and 16 regions for Measles vaccine. Shinyanga region was the poorest performer in coverage in the year under review, having the lowest coverage for every antigen offered except for BCG (Tanzania national annual coverage excel sheets EPI/ MoHSW). In Shinyanga Region, the immunization coverage for DTP-HB3 increased from 75% in 1999 to 90 % in 2005. Between 2004 and 2007, the coverage of all antigens offered dropped by various points ranging from 19 to 35; OPV 3 dropped by 28 points during the same period. DTP-HB3 dropped from 95% in 2004 to 60% in 2007. Shinyanga Region has been classified as being at high risk of importation of wild polio virus because OPV3 coverage is low (69%-2007), an

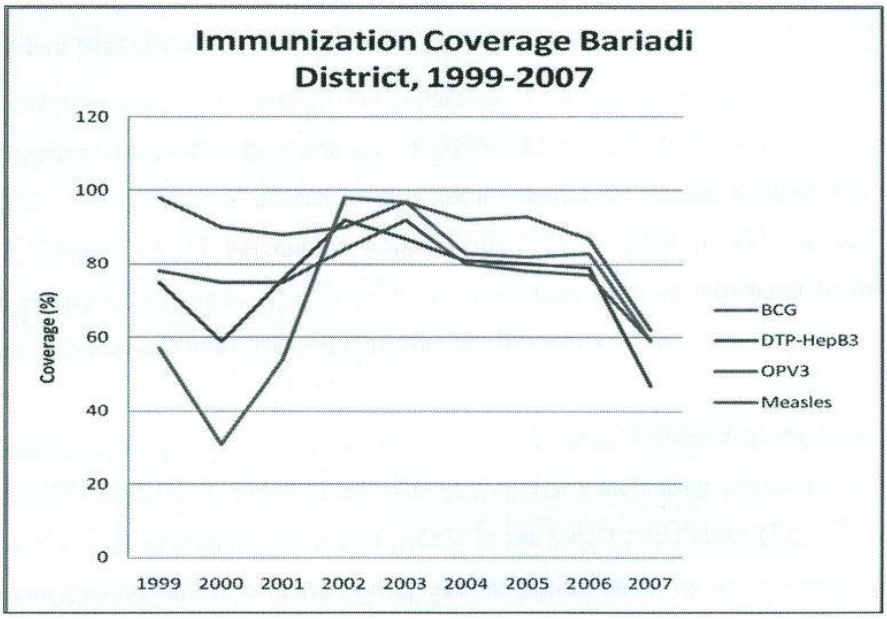
estimated 60,000 children are not completely vaccinated against poliomyelitis and there is a poorly performing acute flaccid paralysis (AFP) surveillance system (2007 surveillance index 0.9/100,000) (11).



Source: EPI/ MoHSW 1999 – 2007 Annual coverage reports

In 2007, out of eight districts in Shinyanga Region, the number of districts that were able to attain coverage of 80% for each antigen was as follows; two for BCG, two for OPV3, one for DTP-HB1, one for DTP-HB2, and DTP-HB3 and two districts for Measles vaccine. Bariadi District was the poorest performer in coverage in 2007, having the lowest coverage for every antigen offered(11).

In Bariadi District, the immunization coverage for DTP-HB3 increased from 75% in 1999 to 80 % in 2005. Between 2004 and 2007, the coverage of all antigens offered dropped by various points ranging from 21 to 34. DTP-HB3 dropped from 81% in 2004 to 47% in 2007(11).



Source: EPI/ MoHSW 1999 – 2007 Annual coverage reports

This study will investigate, at the community level, the factors that contribute to uptake of childhood vaccination. Factors affecting uptake of individual vaccines and completion of vaccination will be explored and relevant recommendations made for the improvement of the program.

1.3 Rationale

Mosley (14) has raised doubts about the effectiveness of vaccination campaigns in terms of their ability to reduce mortality in poor socioeconomic circumstances where uptake is known to be low. This is particularly relevant to Tanzania where a wide range of socioeconomic conditions exist, where 87% of the poor are living in rural areas (15). If uptake is low in poor socioeconomic circumstances, the vaccination program may be missing individuals who are under increased mortality risk from all causes of death. This may hamper the effectiveness of vaccination programs to reduce mortality in these settings.

Although vaccination coverage figures are generally available, there is no information about uptake of vaccination services. In order to define priorities and plan and implement interventions that aim to improve uptake of vaccination services, community-based information about the determinants of uptake of vaccination services in the district population is needed. When high risk groups and high risk areas are defined, limited resources can be used more effectively in order to improve vaccination uptake.

Studies have shown that individual beliefs about health are important in determining uptake of vaccination. In a study done on influenza vaccination among health care workers, it was found that beliefs about health plays an important role in uptake (16-19); other studies found that the principal reasons for declining vaccination in North America were the avoidance of medications and the fear of adverse reactions (20). Few studies have considered the impact of communication on uptake of vaccination services (16).

This study will generate knowledge about factors that associated with uptake of vaccination services. This will assist program managers to prepare comprehensive plans for more effective delivery vaccination services.

1.4 Research Questions

1. What is the uptake of vaccination services among children under fives in Bariadi?
2. What are the factors which influence vaccination uptake?
    a. What is the effect of caretakers' knowledge about vaccination and of EPI vaccines on vaccination uptake?
    b. Does geographical accessibility to health care services have impact on uptake of EPI vaccines?
    c. Does the education level of the caretaker have an impact on uptake of EPI vaccines?
    d. How does the relationship of the caretaker to the child affect uptake of EPI vaccines?

1.5 Objectives

Broad objective

To assess uptake of vaccination services and factors associated with uptake of vaccination services among children under five years in Bariadi District, Tanzania.

Specific objectives

1. To assess magnitude of uptake of routine vaccinations for childhood diseases among under five children
2. To assess the uptake of all DTP-HB doses among children under fives
3. To assess the validity of caretakers history on vaccination
4. To determine factors associated with uptake of routine vaccination services

Chapter Two

2 Literature Review

Immunization is a cornerstone of public health and is the process whereby a person is made immune or resistant to an infection, typically by the administration of a vaccine. Vaccines stimulate the body's own immune system to protect the person against subsequent infection.

Immunization is a proven tool for controlling and eliminating life-threatening infectious diseases. It is one of the most cost-effective health investments, with proven strategies that make it accessible to even the most hard-to-reach and vulnerable populations. It has clearly defined target groups; it can be delivered effectively through outreach activities; and vaccination does not require any major lifestyle change (21).

The goal of EPI is to ensure that by 2010 routine vaccination of children less than one year of age reaches 90 per cent nationally and at least 80 per cent coverage in every district or equivalent administrative unit, to extend the benefits of new and improved vaccines to countries in need and provide twice-annual vitamin A supplementation or food fortification where necessary (9). In 2007, of the 157 WHO member states defined as "developing", only 44 (28%) had three doses of diptheria -tetanus-pertussis (DTP) coverage greater than 80% in all districts (22).

When EPI was launched in 1974, less than five per cent of the world's children were vaccinated during their first year of life against six killer diseases — polio, diphtheria, tuberculosis, pertussis (whooping cough), measles and tetanus (1). Immunization has saved over 20 million lives in the last two decades. More than 100 million infants are vaccinated each year worldwide, saving more than 3 million lives annually. Today, nearly 79 percent of children receive these life-saving vaccinations and increasing numbers are also protected by new and under-used

vaccines, like Hepatitis B. However, a quarter of the world's children – about 26 million infants – are still not vaccinated against these diseases (1).

WHO estimates that in 2003, immunizations saved more than two million lives and an estimated 27 million infants were not vaccinated in 2003 (23). Nonetheless, in that same year 1.4 million children were estimated to have died from vaccine preventable diseases (measles, Haemophillus influenzae type B [HiB], pertussis, tetanus, yellow fever, and poliomyelitis), a reflection of the incomplete coverage with existing vaccines that persists in many parts of the world (23). The impact of vaccination depends heavily on the ability of vaccination programs to reach every targeted individual therefore without clear local delivery strategies, countries will not be in a position to take full advantage of the potential for reduction of disease (24).

Information on uptake and reasons for non-vaccination is vital to enhance overall vaccination activities (25). Inadequate levels of vaccination against childhood diseases remain a significant public health problem in resource-poor areas of the globe (26). The effectiveness of vaccination programs in resource poor settings can be influenced by factors such as the coverage of the health network, the existence and quality of outreach services, the quality of the cold chain, the liaison of communities with health services, the existence of population movements, and several other factors that are related to the vaccines in use, to health services or to communities. The relative effect of each one of the above factors may significantly vary according to geographical areas (27).

The philosophy behind intensive vaccination campaigns has been that once the public have been introduced to the benefits of medical technology and have experienced lower rates of illness and suffering as a result of vaccination programs, uptake for such technology will follow(28). Those who plan and conduct public health programs seldom give the same thoughtful consideration to the human relations aspects of their projects as they give to the physical technical and

organizational aspects. Program organizers and administrators need to recognize that their undertakings operate in social and cultural as well as physical and biological environments (29).

For vaccination to be effective as a long-term global childhood disease control strategy, it is essential for parents to continue to present their children for vaccination (30). Vaccination demand is the situation where people desire and seek vaccination for their children. As a basis for vaccination uptake, demand is distinguished from passive acceptance or compliance. Passive acceptance or compliance is acceptance of vaccinations by a public which yields to the recommendations and social pressure, if not prodding, of health workers and community leaders (28). Vaccination non-uptake can take a variety of forms, reflecting non acceptance – refusal to go or resistance grounded in a questioning of the need for vaccination – or a willingness but inability to go for vaccination (31).

Studies have investigated individual behavior and dispositions including parental knowledge, attitudes and beliefs, mothers' education level, perception and knowledge of vaccinations in relation to vaccination uptake and non uptake (32, 33). In Nigeria, maternal factor that was most strongly associated with non-completion of vaccination was lack of awareness of the need for vaccination (34). Maternal education and retention of immunization card have been confirmed by other researchers to be significant predictors of completeness of immunization (34, 35). The role of maternal knowledge as an important determinant of vaccination coverage has been shown by several researchers (34, 36-38) even in communities with a high level of illiteracy (39).

Other studies found that those with low uptake of vaccination differed from those with high uptake in their attitudes towards, and knowledge of, infant immunization based on a wide range of personal experiences (40). This study found that it is a mistake to label parental decision-making as "irrational' when one takes into account the interaction between personal experience, differing levels of advice and the impact of constraints, notably gender role constraints, as they

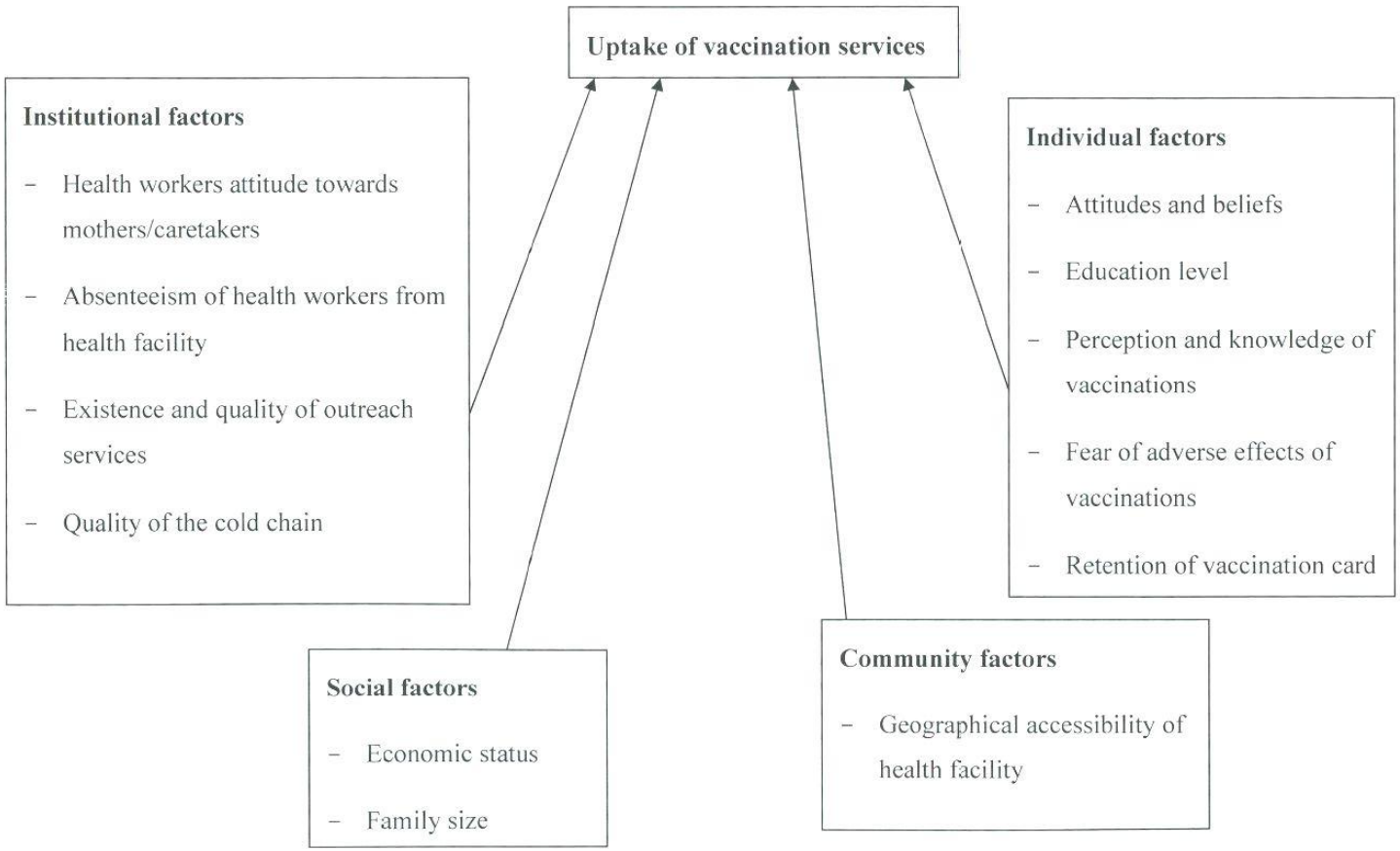
affect women with young children (40). Another study identified parental concerns about exposing children to potential risk and moral and religious objections to vaccinations as important factors affecting uptake of vaccination services (41).

Social characteristics such as income, family size, ethnicity, social isolation and migrant status have also been linked to vaccination uptake (42-44). The effect of socioeconomic variables on vaccination uptake has also been explored. These variables are those which have established relationships to infant mortality. These include maternal education, place of residence, and familial wealth as measured through the proxy of father's occupation (45-48). Other studies that sought to identify determinants of uptake of vaccination have also supported the view that maternal education (49, 50), basic health education for mothers (51) and area of residence (50) are important factors.

The child's sex and maternal age may also influence the likelihood of vaccination (Pillai and Conaway, 1992). The effect of a child's age on vaccination status is likely to depend on whether the child came into contact with health services early in its life, and secondly on the temporal effect of mass vaccination campaigns which may have been more effective in particular years (52).

The understanding of local social and cultural as well as physical and biological environments is crucial to develop and implement appropriate solutions for effective vaccination programs.

Figure 1: Conceptual framework of factors affecting uptake of vaccination services



Chapter Three

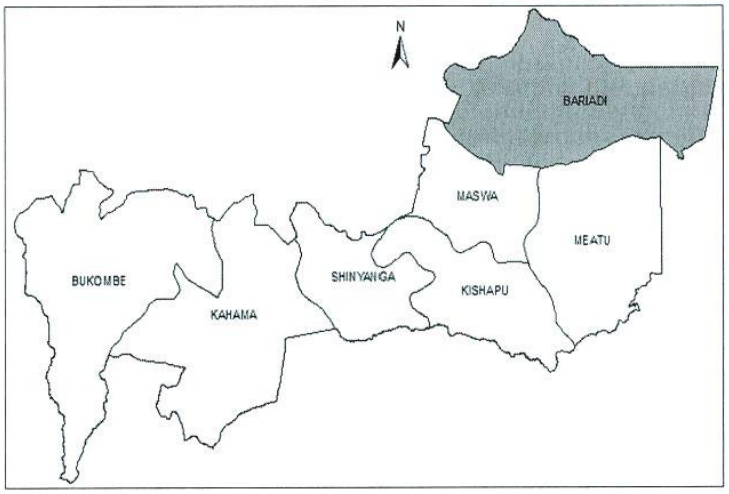
3 Methodology

3.1 Study Area

Shinyanga region was selected because it was the worst performer in coverage in 2007, having the lowest coverage for every antigen offered except for BCG. DTP-HB3 dropped from 95% in 2004 to 60% in 2007 in Shinyanga Region (Source: EPI/ MoHSW 1999-2007 Annual coverage reports).

Shinyanga Region is administratively divided into 8 districts: Bariadi, Bukombe, Kahama, Kishapu, Maswa, Meatu, Shinyanga Rural and Shinyanga Urban (53). In 2007, one (13%) out of eight districts in Shinyanga Region was able to attain coverage of 80% for DTP-HB3. The study was done in Bariadi District. Bariadi District was selected because it was the worst performer in coverage in 2007, having the lowest coverage for every antigen offered. DTP-HB3 dropped from 81% in 2004 to 47% in 2007 in Bariadi District (Source: EPI/ MoHSW 1999-2007 Annual coverage reports). Bariadi District is administratively divided into four divisions and 26 wards. The 2009 projected population of the district is 790,812. There are 60 health facilities which include one government hospital, five government health centers, 42 government dispensaries and 12 privately owned dispensaries.

Figure 2: Map of administrative boundaries of Shinyanga region



3.2 Study Design

The study design was a cross sectional survey.

3.3 Study Population

Study population was mothers/fathers/guardians or caretakers with children aged 12 - 23 months in Bariadi District. The 12-month period (the difference in the age group selected) was chosen to represent the births in a 12-month or a one-year period (an annual birth cohort) which would represent the most recent performance of the vaccination system (54).

3.4 Sample Size

The formula used to determine the sample size was:

$$n = \frac{z^2 p(1-p)}{d^2}$$

Whereby n is the minimum sample size, z is the value of the standard normal deviate corresponding to 95% confidence level, p is the uptake estimate for completely vaccinated child, which was not known for Bariadi District and was estimated to be 50% and d is the absolute precision, 0.07 to give a minimum sample size of 196 children. A 20% non-response rate was allowed and a sample size of 240 questionnaires was established.

3.5 Sampling Technique

A multistage random sampling technique was used to obtained study participants. A sampling frame of all 26 wards in the four divisions in the district was developed. The first stage involved the stratification of the wards according to their 2007 performance; the best performing wards in one stratum and the worst performing wards in another. Best performing wards were those that had attained coverage of 80% and above while worst performing wards were those that had coverage below 80%. Four wards were selected from each stratum (best performing and worst performing) by simple random sampling technique. The four wards randomly selected from among the best performing were Luguru (DTP-HB3 coverage 115%), Mhango (DTP-HB3 coverage 98%), Nyakabindi (DTP-HB3 coverage 86%), and Bumera (DTP-HB3 coverage 81%), the four wards randomly selected from the worst performing wards were Zagayu (DTP-HB3 coverage 71%), Nkololo (DTP-HB3 coverage 68%), Somanda (DTP-HB3 coverage 64%), and Kasoli (DTP-HB3 coverage 43%).

In the second stage, one village was randomly selected from each ward. The selected villages were as follows: Luguru ward– Ikungulipu village, Mhango ward-Mbiti village, Nyakabindi

ward-Nyakabindi village, Bumera ward-Bulolambeshi village, Zagayu ward-Zanzui village, Nkololo ward-Nkololo village, Somanda ward-Matale village, Kasoli ward-Kilalo village.

A list of the households from each of the selected villages could not be obtained from village leaders to create a sampling frame for selection of households by systematic random sampling. Hence once at the village, the research assistants went to the center of the village and spun a bottle (34) to determine which direction to move. After obtaining the first household with an eligible child, the assistant then subsequently visited the third household in the same direction. An under five child aged between 12-23 months was selected from each sampled household. If a household had more than one eligible child then only one child will be randomly selected by ballot method. To determine the earliest acceptable birth date, exactly 24 months were subtracted from the date of the interview. To determine the latest acceptable birth date, exactly 12 months were subtracted from the date of the interview.

After all households were exhausted in this direction the assistant returned to the centre to determine another direction to follow. Approximately 30 interviews were made for each village and giving a total of 243 children interviewed.

3.6 Data Collection Procedures

Data was collected using a structured questionnaire administered by the researcher and three trained research assistants who were trained by the researcher. To be eligible for recruitment into the study, caretakers were required to sign an informed consent form, and have a child aged between 12 and 23 months. Questions included a wide range of demographic, behavioral and socioeconomic variables. The questionnaire had a mix of closed ended and open ended questions.

The uptake of vaccines was determined by asking the caretaker about the history of vaccination of their child as well as reviewing the Road to Child Health (RCH) card for each child. If there was conflicting information between the RCH card and the caretaker, the information on the RCH card was taken to be the true record. If the card was not available, only the history of vaccination from the caretaker was recorded. The uptake was classified as follows;

- Uptake of all routine vaccines: proportion of children who had received all doses of the "standard six" antigens – BCG (1 dose), diphtheria-tetanus-pertussis (DTP)-hepatitis B (HB) (3 doses), polio (3 doses), and measles vaccines (1dose).
- Uptake of DTP-HB: proportion of children who had received any of three doses diphtheria-tetanus-pertussis (DTP)-hepatitis B (HB).
- Completion of DTP-HB: proportion of children who had received all three doses of diphtheria-tetanus-pertussis (DTP)-hepatitis B (HB).

The WHO manual on EPI coverage surveys describes two alternatives for estimating uptake, the first is by "card only", in which vaccinations must be documented by a valid date on a vaccination certificate to be included in the numerator and the second alternative is by "card plus history", which includes in the numerator all reported vaccinations even those with no documentation other than mother's report (54). Uptake of vaccination in this study was estimated by "card only" method in which vaccinations were documented by a date on the RCH card. History of vaccination was taken only for DTP-HB vaccine hence could not be used to estimate full vaccination of children.

3.7 Pretesting of questionnaires

The questionnaire was translated to Swahili for data collection and pretesting was done in Kilalo village whereby 10 questionnaires were tested. Questions that were not understood were rephrased following the pretesting exercise.

3.8 Data Analysis

Raw data on the questionnaires was examined to detect errors and omission and corrected as necessary. Data were entered into computer, coded and analyzed using the EPI Info version 3.5.1 software. Frequencies of continuous and categorical variables, means and standard deviation of ages were calculated and cross tabulations to determine statistical associations were done with crude odds ratios presented. Statistical associations were tested using Chi square test and p-value at 5% significance level (two tailed test). Factors that were found to be significant at $p<0.05$ from bivariate analysis were entered into a logistic regression model and the adjusted odds ratios presented. A child was regarded as fully vaccinated is s/he had received one dose of BCG, three doses of oral polio vaccine (OPV1, OPV2, OPV3) three doses of DTP-HB and one dose of measles vaccine regardless of the timing of the administration of each dose. The criterion validity (concurrent) of caretakers' history of vaccination of their child was assessed by comparing history given by the caretaker with that from the RCH card as a gold standard. DTP-HB was used as a proxy for other vaccines.

3.9 Ethical Considerations

Ethical approval was obtained from the Muhimbili University of Health and Allied Sciences Research Ethics Committee. Approval to conduct the research was obtained from the district and the approval letter presented at the ward and village levels to obtain oral consent from the ward and village government leaders. All questionnaires were administered with individual participant's written informed consent. Those households where the child was found to have not completed the immunization schedule or not vaccinated at all were counseled on the advantages of immunization and advised to visit the health facility for immunization services. Participant's names and identifiers were not included in the data collection tools in order to maintain confidentiality. Written informed consent was sought from the participants.

Chapter Four

4 Results

A total of 243 children were recruited into the study and their caretakers were interviewed fo information on vaccination uptake, knowledge and attitudes towards vaccination services. Th retention of Road to Child Health (RCH) cards was 95.9% (232 out of 243) while 219 (90.1% out of 232 caretakers were able to present these cards to the interviewer. Thirteen caretakers di not present their child's RCH card because they had misplaced the card at the time of study There were no refusals from caretakers to participate in this study. Table 1 shows the village with their corresponding wards and the number of children from the village.

Table 1: Distribution of children surveyed according to village and ward in Bariadi District

Name of Village (Wards)	Number of children	Percent
Bulolambeshi (Bumera)	38	15.6
Nkololo (Nkololo)	38	15.6
Mbiti (Mhango)	35	14.4
Zanzui (Zagayu)	35	14.4
Ikungulipu (Luguru)	27	11.1
Nyakabindi (Nyakabindi)	27	11.1
Kilalo (Kasoli)	23	9.5
Matale (Somanda)	20	8.2
Total	**243**	**100**

4.1 Socio-demographic and economic characteristics of study population

Characteristics of the children

The children included in the study were aged between 12-23 months. The male to female ratio of the surveyed children was 1:1, 176 (72.4%) out of 243 were aged between 12 and 19 months mean age of the children was 17 months (SD 3.48), 144 (59.3%) out of 243 were born at home. Table 2 shows the characteristics of the children.

Table 2: Characteristics of children

Characteristic	Frequency	Percent
Sex of Child		
Male	118	48.6
Female	125	51.4
Age Group (month)		
12-15	90	37.0
16-19	86	35.4
20-23	67	27.6
Relationship to caretaker		
Own child	219	90.1
Other child	24	9.9
Where child was born		
Health facility delivery	99	40.7
Home delivery	144	59.3

Characteristics of caretakers

A total of 243 caretakers, each representing one child, were included in the analysis. Of these, 194 (79.8%) were female, 221 (90.9%) were married, 133 (54.7%) were aged between 14-29

years, 212 (87.2%) were peasants and 168 (69.1%) could read and write while 116 (47.8%) either had no schooling experience or had incomplete primary school education. The mean age of the caretakers was 31 years (SD 9.5). Table 3 shows the socio-demographic characteristics of the caretakers.

Table 3: Socio-demographic characteristics of caretakers

Characteristics	Frequency	Percent
Gender		
Male	49	20.2
Female	194	79.8
Marital Status		
Married	221	90.9
Single/Divorced/Widowed	22	9.1
Age (years)		
14-29	133	54.7
30 and above	106	43.6
Age unknown	4	1.6
Education level		
Never schooled	75	30.9
Incomplete primary	41	16.9
Completed primary up to form 2	112	46.1
Above form 2	15	6.2
Occupation		
Peasant	212	87.2
Others	31	12.8

Economic characteristics

The type of toilet and type of construction material of a house were used as a proxy for economic status. Table 4 shows the distribution of toilet facilities among the study population. Those with high economic status were those with ventilation improved latrine, pit latrine with cement slab, toilet that flushes to septic tank and toilet that flushes to pit latrine while those with low economic status were those without a toilet facility and those with pit latrine that did not have a cement slab. A total of 186 (76.5%) households had a pit latrine that did not have a cement slab while 45 (18.5%) households did not have any toilet facility.

Table 4: Type of Toilet Facility in Study Population

Type of Toilet Facility	Frequency	Percent
Pit latrine without cement slab	186	76.5
No facility	45	18.5
Flush to pit latrine	5	2.1
Flush to septic tank	3	1.2
Ventilation improved latrine	3	1.2
Pit latrine with slab	1	0.4
Total	**243**	**100**

Table 5 shows the construction materials used for roofs, walls and floors for the houses of the study population. Those with high economic status were those whose roofs were constructed with corrugated iron sheets or brick and cement; those whose house walls were constructed with brick and cement or whose house floors were constructed with cement. Those with low economic status were those whose house roofs were constructed with thatch leaves; those whose house walls were constructed with mud, thatch, iron sheets or wood or whose house floors were constructed with mud. A total of 33(13.6%) households had their house roofs constructed with

thatch leaves, 214 (88.1%) households had their house walls constructed with mud while 206 (84.8%) households had their house floors constructed with mud.

Table 5: Construction Materials used for Roofs, Walls and Floors of House

Construction Materials	Frequency	Percent
Roofing		
Corrugated iron sheets	209	86.0
Thatch leaves	33	13.6
Brick and cement	1	0.4
Total	243	100
Wall		
Mud	214	88.1
Brick and cement	26	10.7
Iron sheets or wood	2	0.8
Thatch leaves	1	0.4
Total	243	100
Floor		
Mud	206	84.8
Cement	37	15.2
Total	243	100

4.2 Uptake of routine vaccinations

Uptake of routine vaccinations for immunizable diseases was obtained from RCH cards and expressed as percentages. Uptake of DTP-HB was obtained by history of vaccination as given by the caretakers of the surveyed children and by review of RCH cards of those children who presented their RCH card. Table 6 shows the uptake of DTP-HB antigen according to history

given by the caretakers. A total of 100 children (41.2%) had received three doses of DTP-HB as reported by their caretakers while only 4 (1.6%) children had not received any dose of DTP-HB.

Table 6: Uptake of DTP-HB according to history

Uptake status	Number vaccinated	Percent vaccinated
1 dose	38	15.6
2 doses	67	27.6
3 doses	100	41.2
Don't know	34	14.0
Not administered	4	1.6
Total	**243**	**100**

Out of 243, 170 (70.0%) children had been fully vaccinated. The vaccination status of 24 (9.9%) children could not be verified due to absence of RCH card. The proportion of fully vaccinated children among those who presented their RCH card was 77.6% (170/219). Table 7 shows the uptake of each individual routinely administered vaccine among children with RCH cards.

Table 7: Uptake of routine vaccination by RCH card

Uptake vaccine	Number vaccinated	Percent vaccinated
BCG only	213	97.2
Oral polio at birth only	77	35.2
OPV1 only	216	98.6
OPV2 only	211	96.3
OPV3 only	199	90.9
DTP-HB1 only	215	98.2
DTP-HB2 only	211	96.3
DTP-HB3 only	204	93.2
Measles only	180	82.2

Of the 219 children with RCH cards, administration of OPV0 was done in 77 (35.2%) children while DTP-HB3 and measles antigens were administered in 204 (93.2%) and 180 (82.2%) children respectively.

The criterion validity (concurrent) of caretakers' history of vaccination of their child was assessed by comparing history given by the caretaker with that from the RCH card as a gold standard. DTP-HB was used as a proxy for other vaccines. Table 8 compares the two sources of information on administration of 3 doses of DTP-HB.

Table 8: Validity of caretakers' history on vaccination

Caretakers' History	DTP-HB3 RCH vaccination card	
	Administered	Not administered
DTP-HB 3doses administered	90	1
DTP-HB less than 3 doses administered or not administered at all	114	14
Total	**204**	**15**

The sensitivity of caretakers' history of vaccination with 3 doses of DPT-HB was 44.1%, the specificity was 93.3%, and the positive predictive value was 98.9%, while the negative predictive value was 10.9%. Also the percentage of children correctly classified as being vaccinated with 3 doses of DTP-HB or not vaccinated with 3 doses of DTP-HB was 47.5%.

The proportion of fully vaccinated children by village of residence was calculated. Table 9 shows the distribution of fully vaccinated children according to village of residence.

Table 9: Distribution of fully vaccinated children according to village of residence

Village of residence	Number of children presented RCH card	Number fully vaccinated	Percent fully vaccinated
Bulolambeshi	37	35	94.6
Zanzui	31	28	90.3
Nkololo	36	30	83.3
Ikungulipu	25	20	80.0
Mbiti	28	20	71.4
Nyakabindi	24	16	66.7
Matale	18	11	61.1
Kilalo	20	10	50.0
Total	**219**	**170**	**77.6**

The proportion of fully vaccinated children was highest for Bulolambeshi village (94.6%) and lowest in Kilalo village (50.0%).

4.3 Knowledge and attitudes of caretakers towards vaccination

Of 243 caretakers, 174 (71.6%) caretakers knew the purpose of vaccinations in children while 143 (58.8%) knew at least one of the immunizable diseases in Tanzania. For example 131 (91.6%) out of 143 caretakers mentioned measles as one of the immunizable diseases. The least mentioned disease was pertussis which was mentioned by 13 (9.1%) out of 143 caretakers. Although malaria is not one of the immunizable diseases in Tanzania, it was mentioned by 22 (15.4%) out of 143 caretakers while fever or other symptoms were mentioned by 19 (13.3%) out of 143 caretakers. The complete vaccination schedule was however known by only 13 (5.3%) caretakers. Table 10 summarizes the knowledge of caretakers on vaccination.

Table 10: Knowledge of caretakers on vaccination

	Number with knowledge	Percent with knowledge
Knows purpose of vaccination	174	71.6
Knows which vaccine child should receive	179	73.7
Knows correct vaccination schedule	13	5.3
Knows any of the immunizable diseases	143	58.8
Knows following vaccines (n=179)		
Measles	132	73.7
Polio/OPV	94	52.5
Tetanus	77	43.0
Tuberculosis/BCG	67	37.4
Diptheria	31	17.3
Pertussis	13	7.3
DTP	8	4.5
Knows following immunizable diseases (n=143)		
Measles	131	91.6
Polio	87	60.8
Tetanus	69	48.3
Tuberculosis	55	38.5
Diptheria	27	18.9
Pertussis	13	9.1

Out of 243 caretakers, 179 (73.7%) knew which vaccine the child should receive; 132 (73.7%) out of 179 mentioned measles vaccine and 15 (8.4%) out of 179 caretakers mentioned that a child receives vaccines for malaria or fever. Thirty two caretakers (13.2%) were able to mention the sites of administration of the vaccines i.e. shoulder, mouth, and thighs for BCG, polio, DTP-HB and measles respectively. Out of 243 caretakers, 238 (97.9%) felt that vaccination was

beneficial for their children while 178 (73.3%) said they had advised their friends to vaccinate their children.

4.4 Factors associated with uptake of vaccination

The relationship between various factors and uptake of vaccination among the children was examined. Factors such as sex of the child, age of the child, caretaker's knowledge of purpose of vaccination and other selected factors were studied to determine their possible influence on the uptake of vaccination among the children. Table 11 shows various factors influencing uptake of vaccination among the children.

Table 11: Factors associated with uptake of vaccination in Bariadi District

Variable	Vaccination Status		Crude OR (95% CI)	P value
	Full	Partial		
Sex of child				
Male	86	20	1.48 (0.74-2.97)	0.22
Female	84	29		
Age of child in months				
12-13	44	13	0.97(0.45-2.12)	0.93
14-23	126	36		
Relationship to caretaker				
Son/daughter	155	42	1.72 (0.59-4.88)	0.26
Other	15	7		
Where child was born				
Health facility	72	17	1.38 (0.68-2.83)	0.34
Other (home, on the way)	98	32		
Village has own health facility				
Yes	85	24	1.04 (0.53-2.06)	0.90
No	85	25		
Education level of caretaker				
None or primary incomplete	86	24	1.07 (0.54-2.11)	0.84
Primary complete+	84	25		
Marital status of caretaker				
Married	154	43	1.34 (0.44-3.95)	0.56
Single	16	6		
Purpose of vaccination				
Caretaker knows	128	28	2.29 (1.12-4.68)	**0.01**
Caretaker does not know	42	21		
Vaccination schedule				
Caretaker knows	10	3	0.96 (0.23-4.60)	0.95
Caretaker does not know	160	46		
Vaccination coverage performance				
Best performing ward (>=80%)	91	23	1.30 (0.66-2.58)	0.42
Worst performing ward (<80%)	79	26		
Roofing material				
High economic status (iron sheets, brick and cement)	189	21	0.90 (0.20-3.46)	1.00
Low economic status (thatch leaves)	30	3		
Wall material				
High economic status (brick and cement)	23	3	0.82 (0.21-3.760	0.73
Low economic status (mud, thatch, iron sheets, wood)	196	21		
Floor material				
High economic status (cement)	32	5	0.65 (0.21-2.15)	0.38
Low economic status (mud)	187	19		

A child whose caretaker understood the purpose of vaccination was found to be twice more likely to be fully vaccinated than a child whose caretaker did not understand the purpose of vaccination. Other factors did not affect the likelihood of a child to be fully vaccinated.

Table 12 shows the results of multiple logistic regression of the association between various factors and uptake of vaccination to control for confounding.

Table 12: Multivariate analysis on factors associated with uptake of vaccination

Variable	Adjusted Odds Ratio	95% CI	P Value
Sex of child			
Male	1.31	(0.65-2.62)	0.45
Female			
Age of child in months			
12-13	0.82	(0.38-1.78)	0.62
14-23			
Relationship to caretaker			
Son/daughter	2.88	(0.94-8.79)	0.06
Other			
Where child was born			
Health facility	1.29	(0.63-2.64)	0.48
Other (home, on the way)			
Village has own health facility			
Yes	1.27	(0.51-3.15)	0.61
No			
Education level of caretaker			
None or primary incomplete	1.37	(0.67-2.78)	0.39
Primary complete+			
Marital status of caretaker			
Married	0.99	(0.30-3.28)	0.98
Single			
Purpose of vaccination			
Caretaker knows	2.80	(1.32-5.94)	**0.01**
Caretaker does not know			
Vaccination schedule			
Caretaker knows	0.87	(0.20-3.74)	0.85
Caretaker does not know			
Vaccination coverage performance			
Best performing ward (>=80%)	1.68	(0.68-4.12)	0.26
Worst performing ward (<80%)			
Roofing material			
High economic status (iron sheets, brick and cement)	0.47	(0.67-6.85)	0.20
Low economic status (thatch leaves)			
Wall material			
High economic status (brick and cement)	1.32	(0.23-7.45)	0.75
Low economic status (mud, thatch, iron sheets, wood)			
Floor material			
High economic status (cement)	1.32	(0.35-5.06)	0.68
Low economic status (mud)			
Constant			0.22

Table 12 shows that, after adjusting for other factors, the relationship between vaccination status and knowledge of caretakers on purpose of vaccination remains significant.

Chapter Five

5 Discussion

This study revealed that uptake of routinely administered vaccinations among children aged 12-23 months was high with geographical variation among villages. Despite low levels of education among caretakers; this study found a high proportion of caretakers who knew the purpose of vaccination. However for individual vaccines, the uptake of OPV0 was low. One factor was found to be a significant determinant of full vaccination status and this was related to caretakers' knowledge of the purpose of vaccination. Children whose caretakers knew the purpose of vaccination were three times more likely to be fully vaccinated than children whose parents did not know the purpose of vaccination.

5.1 Uptake of vaccinations among children

This study found that a higher proportion of children were fully vaccinated compared to 55% that was reported by the 2004-2005 Tanzania Demographic and Health Survey (TDHS) for Shinyanga region (55). This difference could be an actual increase since TDHS was conducted more than five years ago and the EPI program may have implemented strategies to improve coverage although this was not assessed by this study. One of the strategies that could have contributed to a higher uptake include an integrated approach to childhood preventive diseases whereby insecticide treated bed nets for preventing malaria are given out during routine immunization or mass vaccination campaigns and this could also be a reason for the increase in uptake as caretakers expect to receive discount vouchers for insecticide treated bed nets or actual insecticide treated bed nets during mass vaccination campaigns. Other explanations for this difference could be that with the TDHS coverage figure is a weighted result and geographic variations in coverage pulled down the figure. Also the TDHS was a larger study yielding results

that are closer to the population figure. The 2009-2010 TDHS found that overall 75% of children aged 12-23 months were fully vaccinated nationally while 79.8% of children aged 12-23 months were fully vaccinated in the Lake region where Shinyanga is located. These figures are similar to the findings of this study (56).

The proportion of fully vaccinated children found in this study was also slightly higher than 61.4% reported from a study done in Kilindi District, Tanzania in 2009 (57) but comparable to a Nigerian study which found that 72.4% of infants studied had completed the vaccination schedule (58). However, the higher proportion in the Nigerian study could be due to the fact that their study was based in the health facilities rather than in the community. In their study they evaluated children during their visit for only the last vaccine in the schedule which would have excluded children who did not return for subsequent vaccines at earlier ages hence the higher rate of completion of the vaccination schedule. Community based surveys provide a more accurate estimation of the uptake of vaccination while health facility based surveys may bias the estimation since it will exclude those who have not sought vaccination services.

With the exception of measles vaccine, this study found that the uptake of individual vaccines were higher than that provided by WHO-UNICEF 2008 estimates for Tanzania (59). Uptake of individual vaccines also showed a marked improvement compared to the 2007 District performance which showed that the coverage of all vaccines for the district were below 90% with BCG being highest at 62%. This study found uptake of vaccines other than OPV0 and measles to be above 90%. This observation might be due to the fact that most children in this study were delivered at home and as such OPV0 was not given and that not all children who began the vaccination schedule completed it.

The finding that uptake of earlier vaccines was higher in this study than for latter vaccines, is consistent with findings in other countries such as Nigeria, Mozambique and Guinea Conakry

(60, 61). The drop in uptake of vaccines from BCG to measles in this study indicates that children are lost to follow up in later months and some (who take the later antigens) skip some of the vaccines. The overall decline in uptake of vaccines (15%) between BCG and measles vaccine was lower than that reported from Nigeria (60).

An important finding of this study is the low sensitivity (the ability of the caretakers' history to correctly identify those children who had received three doses of DTP-HB) of the caretakers' history of administration of three doses of DTP-HB indicating that it may not be possible to rely on history given by caretakers to determine vaccination uptake in this community although the specificity (the ability of the caretakers' history to correctly identify those children who had not received three doses of DTP-HB) was high. This contrasts with findings from a Nigerian study that found the sensitivity of maternal recall of full vaccination status to be high (99.5%) and from a study conducted in India which reported a moderate sensitivity of 64.1% of the history of administration of DTP (34, 62).

5.2 Knowledge and attitudes on vaccination

This study found that more than two thirds of the caretakers knew the purpose of vaccination. High proportions have been found in a similar study done in Kenya where more than 90% of the caretakers could define and explain the purpose of immunization (63). However the Kenyan study found a relatively higher proportion than that observed in this study. This difference could be explained by a higher rate of literacy (93%) and a higher proportion of respondents (71%) who had completed primary school and above reported from Kenya. In this study, only two thirds of the caretakers were literate and half had completed primary school and above. A higher education level means that respondents are better able to understand concepts of immunization and would have come across the topic in school.

About 70% of caretakers said that they knew which vaccines their children were supposed to receive, most commonly mentioning measles and polio vaccines. This level of knowledge in this community is higher than the lower level (4%) of knowledge of polio vaccine reported from Niger (64). About 60% of the caretakers in this study could mention at least one immunizable disease. The level of knowledge about measles in this study was higher than that reported by Mbwana from Kilindi District, Tanga region, Tanzania where 78% of the mothers/guardians mentioned that measles was a vaccine preventable disease (57). The level of knowledge in this study is also is much higher than the 1% of caretakers in a Nigerian study who knew that measles was preventable by immunization (38). A higher proportion of caretakers in this study mentioned polio as a vaccine preventable disease than was reported (28.9%) from Kilindi District (57). However, in a study in Kenya, a higher proportion (70%) of respondents mentioned polio as a vaccine preventable disease (63).

Knowledge about vaccine preventable diseases reflects a good understanding of the immunization goals. Apart from measles and poliomyelitis, which were mentioned by more than half of the caretakers as vaccine preventable diseases, this study found other vaccine preventable diseases such as hepatitis B were not mentioned at all. Similar findings have been reported by other authors in Burkina Faso (65). A higher proportion was aware of these diseases because most people have seen or experienced cases of measles and polio but not hepatitis B. Also, this is probably because these diseases (measles and poliomyelitis) have been well addressed by several awareness campaigns such as the National Immunization Days for the past several years, while the relatively recently introduced Hepatitis B vaccine has not been given much attention. This shows that knowledge about vaccination and the vaccination program is proportionate to the effort the health system deploys for communication and promotion of awareness (65).

While people recognize that vaccination is for the health of their children, more detailed knowledge about vaccination and vaccination services provided in the country may be required. UNICEF states that "It is essential that all parents know why, when, where and how many times the child should be immunized. Parents also need to know that it is safe to immunize their child even if the child has an illness or a disability or is suffering from malnutrition" (66).

A number of caretakers wrongly named malaria as an EPI preventable disease , a finding similar to a study done in Burkina Faso (65). This confusion might be due to the fact that in Tanzania, discount vouchers for the purchase of insecticide treated bed nets are given when a child presents for routine vaccination or during mass supplementary immunization campaigns. A number of caretakers also mentioned other diseases and symptoms that are not in the mandate of EPI in Tanzania. These findings are important because if uptake of vaccination is dependent on the expectation that all diseases and symptoms will be controlled, the trust and confidence of those uninformed participants who suffer – after being vaccinated – from diseases with similar symptoms that were not part of the vaccination regimen will be lost.

In this study, the majority of caretakers had positive attitude towards vaccination, by saying that they had advised friends to get their children vaccinated and felt that vaccination was beneficial for their children. This attitude is consistent with that found in a study done in Kenya (63).

5.3 Factors associated with uptake of vaccination

This study found that a child whose caretaker knew the purpose of vaccination was three times more likely to be fully vaccinated than a child whose caretaker did not know the purpose of vaccination. The strength of the association between vaccination status and caretakers' knowledge of the purpose of vaccination increased and remained statistically significant in a

multivariate logistic regression model. However this study did not show an association between full vaccination and the caretaker's education level; a finding that mirrors those of other authors in Tanzania, Mali and Burkina Faso (57, 67, 68) but differs from a studies conducted in Mozambique, Malawi, Ethiopia and India which found that maternal education was an important determinant of childhood immunization (26, 69-71). The lack of association between the levels of education of caretakers in this study could be due to community level campaigns given by EPI, popularization of vaccination and the benefits of vaccination being more widely recognized as communities attribute decreased incidence of diseases such as measles and poliomyelitis to the vaccines that the children are receiving. This could also explain why despite lower literacy rates and lower level of education among the caretakers in this study, a child whose caretaker (parent/guardian) understood the purpose of vaccination in children than a child whose caretaker did not understand the purpose of vaccination in children was more likely to be fully vaccinated.

Factors like gender (sex of a child) were not statistically significant. This finding is similar to those of studies done in Mozambique and Nigeria (26, 34). Other researchers have shown that in some societies the male child has a greater chance to be vaccinated (72).

In this study, children born in a health facility were only slightly more likely to be fully vaccinated than children born at home although this association was not statistically significant. This study also found that close to 60% of the children were born at home, representing a significant public health concern. However the limited role of health facility births in determining the vaccination status of children could be attributed to outreach services in the district whereby vaccination services are taken to communities with poor access to health facilities. Outreach services involve village leaders and village health workers in sensitizing the community on the importance of vaccination and on attending the outreach clinic. However the effects of these factors were not investigated in this study and warrant further research to determine their role in vaccination uptake in communities that have poor access to health care services.

Marital status of the caretaker, the relationship of the child to the caretaker or whether the caretaker knew the vaccination schedule did not have a significant effect on the vaccination status of the children in this study. Other authors in Mozambique have also found that marital status did not have an impact on vaccination status of children (26).

5.4 Limitations

This study has several limitations. The use of caretakers' history for assessing uptake for those who lack RCH cards was omitted because the study found there was low sensitivity on uptake of DTP-HB when comparing history of caretakers and RCH card. Some vaccines like measles being well known by mothers could have given a higher sensitivity if assessment basing on history was done. However, a high card retention rate (90.1 %) in this community increases the accuracy of the estimation of uptake by card only method.

Another limitation lies with the sampling technique. The sampling procedure at the village level using a spinning bottle may have introduced bias into the study because those living in the same area that might have the same characteristics would be likely to be included in the study. These could result in an over or under estimation of uptake. However this effect was minimized by the inclusion of different villages rather than one in the study.

The third limitation lies with the small number of children obtained from some selected villages which lead to a low uptake and hence likely giving false conclusions.

Lastly, this study did not explore program factors that may have significant association with uptake of vaccinations.

Chapter Six

6 Conclusion and Recommendations

6.1 Conclusion

Uptake of routinely administered vaccinations among children aged 12-23 months was high compared to what was reported in 2007. The uptake of OPV 0 vaccine however was found to be low. The child whose caretaker understood the purpose of vaccination was found to be three times more likely to be fully vaccinated than a child whose caretaker did not understand the purpose of vaccination. An important finding of this study is the poor validity of the caretakers' history of administration of three doses of DTP-HB indicating that it may not be possible to rely on history given by caretakers to determine vaccination uptake in this community. While caretakers recognized that vaccination is for the health of their children, a large proportion of caretakers did not have detailed knowledge on vaccination and vaccination services. The uptake of vaccinations in this community could be increased further by providing more detailed knowledge about vaccination and vaccination services.

6.2 Recommendations

1. Repackage Health Education on Vaccination

   Health care providers in Bariadi should educate caretakers about the importance of vaccinations for their children, what vaccines their child is supposed to receive and at what age. The district should also collaborate with schools where information about vaccination could be provided to school children who could disseminate to the community at large.

2. Strengthen vaccination follow ups

   The EPI program should devise strategies to ensure that children delivered at home receive OPV0 before they reach one month and that children who do not return for subsequent vaccines are followed up. This will also ensure that children born at home begin the vaccination schedule early.

3. Community sensitization

   Continuous sensitization of the community regarding vaccination by involving community leaders may help in improving uptake in villages that do not have health facilities of their own but also in villages that do have health facilities of their own.

4. Further research

   Programmatic factors in Bariadi needs to be studied and operational research like the role of outreach services in increasing uptake of vaccinations in areas with limited access to health care services and investigations into the role of health facility based and program based factors in determining uptake of vaccination in Bariadi District should be planned.

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