CHAPTER ONE

1.0 Introduction

This chapter gives a brief overview of immunization for childhood illnesses. It points out various perceptions on aims and effectiveness of the immunization programme. The major contributors to the Expanded Programme for Immunization (EPI) have been highlighted as well as the Reaching Every District/Child (RED/C) strategy introduced to improve the immunization coverage rate in developing countries. Statement of the problem with the problem analysis diagram and justification of the study have been included in this chapter.

1.1. Background information

Active immunization is an established value which is recommended for routine use in children to prevent diseases. The objective of immunization is to produce, without harm to the recipient, a degree of resistance as great as, or greater than, that which follows a clinical attack of the natural infection (Harper 1962). The production of a specific protecting antibody is the main requirement for effective immunization although it should be noted that immunity may persist long after such antibodies cease to be demonstrable as in whooping cough (Harper 1962).

The newborn baby may contain in his blood antibodies to the agents of certain toxic bacterial and viral infections according to corresponding antibodies present in the mother's blood. This passive immunity gives protection to the infant at a time when he is poorly equipped to produce specific antibodies, but it also interferes to a varying extent with infant's capacity to respond to the stimulus of certain toxoids or vaccines in the early months of life.

1.1.1. Aims and effectiveness of immunization programme

The aim of an immunization programme is the control of infection in the community apart from individual protection. A lower level of herd immunity than is necessary for solid individual protection can effectively control the incidence of communicable diseases if a high proportion of the susceptible community is immunized. An exception is tetanus since each individual at risk must be protected actively or passively.

Immunization occupies a critical role in achieving the Millennium Development Goal (MDG)

number 4 which aims at reducing the global under five mortality rate by two thirds between 1990 and 2015 (MOH 2005). It will also contribute significantly to the achievement of MDG number 5 which aims at improving maternal health and reduce maternal mortality, as well as MDG number 6, aiming at combating HIV/AIDS, malaria and tuberculosis

The world has the resources to drastically improve immunization programmes and save many young lives. The Global Alliance for Vaccines and Immunization (GAVI) is a coalition of organizations formed in 1999 in response to stagnating global immunization rates and widening disparities in vaccine access among Industrialized and Developing countries (WHO 2004). The GAVI partners include National Governments, the Children's Vaccine Programme at Programme for Appropriate Technology in Health (PATH), Research and Public Health Institutions, Foundations, Nongovernmental Organizations (NGOs), United Nations International Children's Emergency Fund (UNICEF), World Bank and World Health Organization (WHO).

Globally the immunization programme is facing big challenges with other competing health priorities. In 2002, the UN General Assembly Special Session on children set out targets that need to be achieved. These are:

- full immunization of children under one year of age at 90 percent nationally
- At least 80 percent coverage in every district (WHO 2004).

The WHO Africa Region Strategic Plan 2001-2005 and GAVI in 2000 set a goal of reaching ≥90% DTP3 coverage in every district in >80% of developing countries by 2005. This is being referred to as the "90/80 goal". To achieve a sustained and equitable access to good quality immunization services and accelerate progress towards the 90/80 goal, GAVI partners proposed in 2002 a new approach called Reaching Every Child/District (REC/D). REC strategy means reaching every child in every district with quality immunization services. Children are considered fully immunized when they have received a vaccination against tuberculosis (BCG), three doses each of diphtheria, pertussis, tetanus/hepatitis B/Haemophilus influenza type b (DPT-HepB-Hib), and polio vaccines, and a measles vaccination by the age of 12 months (MOH/CSO 2007).

Zambia has scored many successes such as introduction of vaccines to prevent hepatitis and heamophilus influenza type B (Hib). Sustainable immunization systems are those offering good physical access to services, acceptance and utilization of services by clients, good quality

vaccines, safe injections, secure funding, and effective record keeping (Kane et al. 2002). In Zambia, poliomyelitis eradication resulted from mass immunization campaigns during the National Immunization Days (NIDs) and sub national immunization days. Furthermore, Zambia was in 2007 awarded Maternal and Neonatal Tetanus elimination certification after a study was conducted by WHO (2007). However, strengthening routine immunization remains the key strategy for the control of vaccine preventable childhood illnesses.

MOH (2007) postulates that the elements of the measles control strategy recommended by WHO and UNICEF for global measles control are: vaccination (through routine services and periodic mass campaigns that provide a second opportunity for vaccination), surveillance and improved management of measles cases. Strategies for acceleration of measles control and elimination introduced in the country include: Strengthening routine immunization to achieve and sustain high coverages; providing a second opportunity for measles immunization through the implementation of high quality Supplemental Immunization Activities (SIAs); epidemiological surveillance with laboratory confirmation of cases and outbreaks; and improved case management (MOH 2007). Zambia held another measles immunization campaign in order to reduce morbidity due to measles in 2007. This followed campaigns conducted in 1999, 2000, 2002, and 2003 (MOH/CBOH 2003) that aimed at reaching the unreached during routine immunizations. However, whatever the degree of control of measles in a country, high measles vaccine coverage in every new birth cohort through routine services is necessary to control measles and sustain the achievement over time, supplemental immunization activities have therefore been recommended to be accompanied by simultaneous actions aimed at improving routine services. Improving routine services can be attained using the REC/D strategy.

1.1.2. Reaching Every Child/District (REC/D) strategy

The REC/D strategy was adopted in 2003 by Zambia and was implemented in the first ten priority districts namely: Chipata, Lundazi, Petauke, Kabwe, Chibombo, Nakonde, Kawambwa, Mazabuka, Kalabo and Ndola (MOH 2005). This is an effective approach to reach the un-reached and the missed opportunities in immunizations of children against preventable diseases through strengthening health provider capacity, engaging communities to participate in their children's health, intensifying technical support supervision, establishing community immunization posts for outreach, and management and utilization of data at all levels. The

approach was introduced as one of the recommendations at the 1997 EPI review (MOH 2005). Immunization coverage is one of the most important indicators of a successful immunization Programme.

Ndola district was one of the first ten districts to be introduced to REC/D strategy because of the observed increasing numbers of children that were not immunized. Ndola district is in the Copperbelt province of Zambia. It is an industrial town with a projected population of 449,883 for 2006. It shares borders with the Democratic Republic of Congo on the eastern side and northern part, Masaiti district on the southern part and Luanshya district on the western part. The Munkulungwe River separates Ndola from Masaiti district on the southern end. The district also shares boundaries with Kitwe in the north and Mufulira district in the northwest (Ndola DHMT 2006).

The district is serviced by 2 hospitals; Ndola Central and Arthur Davison, it has 20 clinics managed by the DHMT. The district is linked to other parts of the country and has reliable road network. It also lies along the line of rail. Accessibility is therefore not a problem. ZAMTEL, ZAMPOST, Telecel and Zamcel are the providers of communication in the district. It also has an airport which services both local and international flights. Ndola district has electric power supply from ZESCO and Copper belt Energy Corporation, the latter supplies power to mines and its residential areas, whilst ZESCO supplies power to the rest of the town. Despite implementing REC strategy since 2004, the District has seen an increase in the number of un-immunized children.

1.2. Statement of the problem

Even though Infant Mortality Rate (IMR) dropped from 95/1000 in 2002 to 70/1000 in 2007, while Under-five Mortality Rate also dropped from 168/1000 in 2002 to 119/1000 in 2007 (MOH/CSO 2007), these figures are still high.

The EPI in Zambia, like many other African regions, has been facing problems related to decline in immunization coverage in some districts while the national coverage has been increasing. Children have continued to suffer and die from potentially preventable and treatable diseases which are reflected in the high morbidity rates (MOH 2006). Zambia recorded an increase of measles IgM positive cases from 45 (7.1%) in 2005 to 189 (41%) in 2006 (MOH

2006). According to WHO recommendations, the target percent for measles detection rate should be less than or equal to 10% (MOH 2006). The rise in the proportion of IgM positive measles samples in the year 2006 was due to rising number of susceptible population to measles since some children vaccinated do not sero-convert, also some children miss the vaccination against measles (MOH 2006). This prompted the country to conduct a measles campaign in 2007, in order to cover the un-immunized children as well as those who were immunized but could not have acquired immunity.

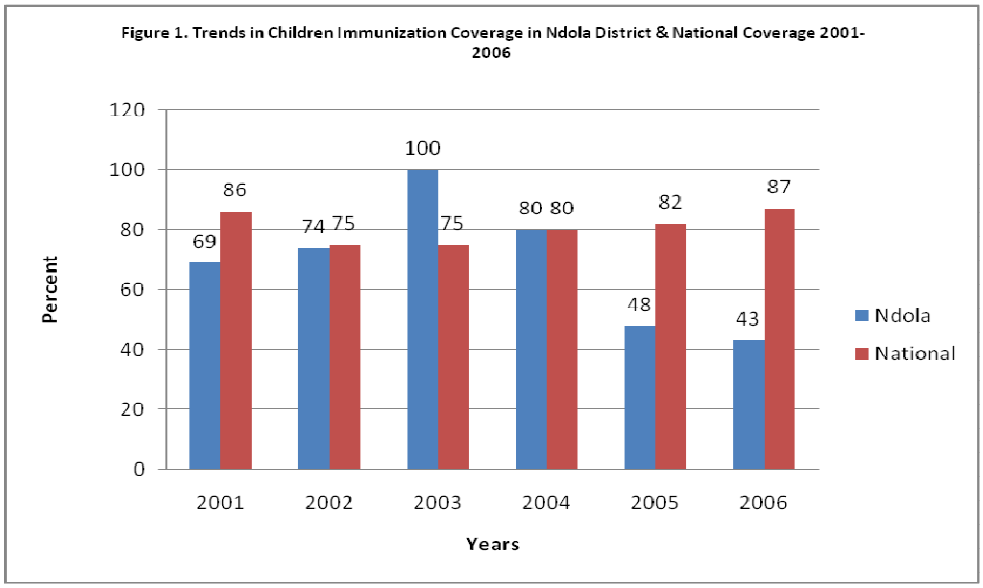
Ndola district contributed to the number of un-immunized children for measles. In 2006, only 62 per cent of children in Ndola were immunized against measles, while the country attained a national coverage rate of 84 per cent. There has been an observation that variations in the coverage rates between districts as well as between health facilities obtain. However, high and sustained routine vaccination coverage is needed to support the ongoing disease control initiatives and maintain their gains.

A 43 per cent lower than the national coverage of 87 per cent of fully immunized children (which is very low) in Ndola in 2006 could be associated to the observed mortality rate of three vaccine preventable diseases: pneumonia, meningitis and tuberculosis. These diseases can be prevented by using BCG and DPT-HepB-hip vaccines. Ndola district recorded mortality rates of tuberculosis at 18.9% in 2003; 15.2% in 2004; and 3.8% in 2005 (Ndola HMIS 2006). These diseases were among the top ten causes of deaths in children under five years of age.

The other noted cause of mortality in under-fives in Ndola include pneumonia which was recorded as number one cause of death from 2003 to 2005 with death rates of 14%, 13.4%, 7.6%, and 4.6% in 2006 where it was ranked as number two cause of death (MOH 2007).

The immunization coverage rate in Zambia at provincial levels has attained high levels in most provinces. However, Copperbelt province revealed a gradual decline of fully immunized children between 2003 and 2005 of 97%, 81% and 78% respectively (MOH 2005). Ndola district in particular, contributed to the decline in the number of fully immunized children in the province, as it experienced a reduction during this same period of 100%, 80% and 48%. This observed decline is of concern since the national coverage of fully immunized children has been increasing in the same period from 80% in 2004, 82% in 2005 and 87% in 2006 and

yet there are inconsistencies with the data from Ndola district that showed a sharp decline from 2003 to 2005 as highlighted in figure 1.



Source: MOH HMIS

The coverage rates in figure 1 show that there was an initial increase in Ndola from 69%- 2001 to 100%- 2003, thereafter; there was a decline to the lowest of 43 per cent in 2006. Ndola district also had relatively low coverage rates for all antigens in 2006 as BCG (69 %, compared to national rate of 94%); OPV3 (64% compared to national of 91%); Penta3 (65% compared to national of 91%); measles (62% compared to national of 84%); and TT2 (66%, compared to national of 79%) (MOH 2006). This decline deserves investigation whilst assumptions can be made about the possible causes.

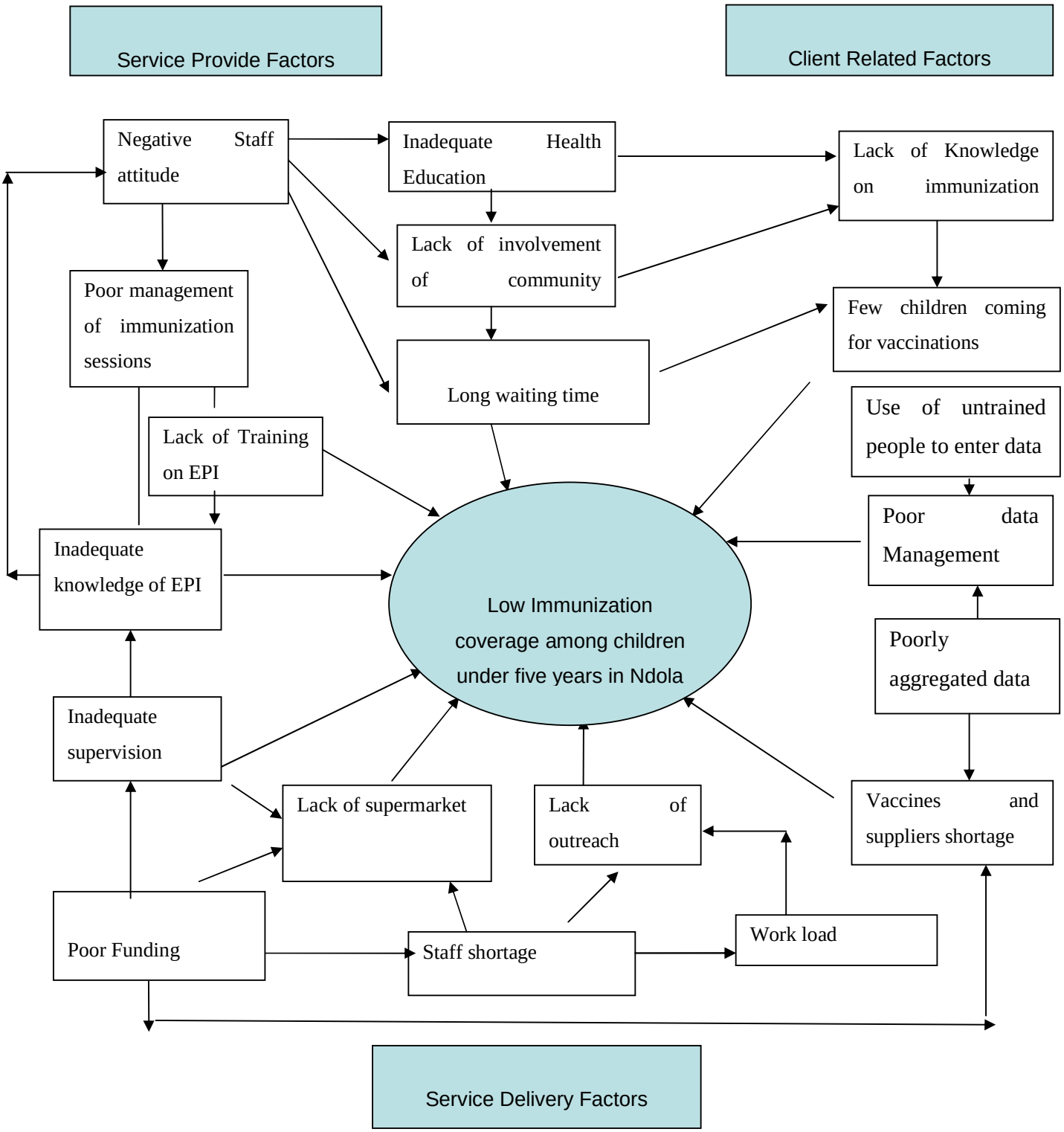
During the year 2006, Ndola recorded vaccine preventable diseases such as pneumonia and meningitis (both could be preventable with DPT-HepB-hip vaccines) among the top ten causes of death. This observation can be attributed to the low coverage rates highlighted above. The fully immunized coverage in 2005 was only 48% an indication that probably the uncovered 52% contributed to the mortality rate of the indicated vaccine preventable diseases in the district. King and others (1979) postulate that a community needs to immunize at least 80% of its children to provide herd immunity and hence prevent diseases. However, Ndola

did not achieve 80% for any of the antigens given during the period under review. The possible contributing factors to this observed low immunization coverage in Ndola could be attributed to:

- Lack of knowledge of immunization
- Low turn up for vaccination clinics
- Stock out for vaccines and other logistics
- Lack of outreach services and inadequate static immunization services
- Inadequate supervision
- Inadequate funding for immunization
- Long waiting time for immunization
- Failure to trace defaulting children
- Poor management of data.
- negative staff attitude

The problem analysis diagram in figure 2 shows the relationships of these factors and how they could have led to low coverage of fully immunized children in Kawama compound of Ndola district.

Figure 2: Problem analysis of the factors influencing immunization coverage.



The problem analysis diagram in figure 2 above shows that though there are many factors which are possibly contributing to the low coverage of fully immunized children in Ndola, some of them are directly contributing. These include: inadequate knowledge of EPI by health workers; inadequate supermarket and outreach activities; long waiting time; failure to trace defaulting children; and inadequate knowledge of immunizations by care takers; and poor data management. Although there are so many other factors that affect immunization coverage, only knowledge of immunization, outreach immunization service delivery and community participation have been considered in the objectives.

1.3. Definition of terms

Supermarket immunization services: the provision of vaccinations to any child visiting the health facility on any day instead of having scheduled days for immunizations.

Outreach immunization services: is the service health workers provide for immunizations away from the health centers.

Denominator: the figure below the line of the fraction used in calculation of coverage rates. These figures are provided by central statistical Office.

Community volunteer: is a community member who has been trained to assist the health workers in child health activities such as growth promotion, health education and following up defaulting children.

DTP1 – **DTP3 drop-out rates** – the percent of children who do not receive doses of DTP3 after receiving the initial dose, compared to all children who receive the initial DTP dose.

Fully immunized children- are those who receive all the necessary doses of vaccines (OPV, BCG, DPT-HepB-Hib, and measles) before one year of age.

Care taker - is the person looking after a child under the age of five years. It can be the mother or any one responsible for the child.

Child tracer – is a community member who is responsible to follow up on children and ensure that they have received the doses according to schedule. He or she will handle the community register for children.

Immunoglobulin (IgM) - is a class of antibodies found in circulating body fluids, they are the first antibodies to appear in response to an initial exposure to an antigen.

1.4. Justification of the study

Immunization programmes have been going on since 1974 in Zambia. So far only a few evaluative studies on the practices of immunization have been done in few districts. Since the introduction of the REC strategy in 2004 in the ten pilot districts, no major evaluation has been undertaken to determine the impact of the strategy on immunization coverage. The strategy has however, scaled up, and is currently being implemented in all 72 districts of Zambia. This strategy was aimed at improving routine immunization services which is cheaper than immunization through campaigns. However, in Ndola the expected improvement had not been realized. It was for this disparity observed that the researcher wished to find out the factors that influenced its implementation in Ndola.

Conducting an evaluation in a systematic manner helps to determine the extent to which a strategy being implemented is successful in achieving the predetermined objectives. This should involve assessment of its relevance, the way it brings about the desired results; its effectiveness; efficiency and acceptability. It should also review strengths as well as weaknesses. Evaluation should be a continuing process aimed at rendering health activities more relevant and more effective.

CHAPTER TWO

2.0. Literature Review

2.1. Immunization Theory

The science of immunization arose from the study of man's resistance to infection, through antigen stimulation and antibody production. One effective way of controlling the spread of infection is to strengthen the host defenses. This may be achieved by active immunization, which is one of the most powerful and cost-effective weapons of modern medicine. The use of toxoids for active immunization was begun by the British forces in 1939 and the United States forces in 1941 (Park 2005).

Immunity is acquired passively or actively. Passive immunity is the natural immunity which a fetus gets from its mother through the placenta, while active immunity is acquired by either suffering from a disease such as measles or being given a vaccine.

There are many factors which influence the effectiveness of different immunizing procedures such as potency of antigen, age of child and completeness of immunization, the presence of blocking factors and the variable antibody response of different individuals (Harper 1962). Furthermore, Harper (1962) contends that the proportion of the community that must be actively immunized to provide some herd immunity and prevent or slow an epidemic is dependent on each disease and local situation. Measles for instance, which is highly communicable requires a very high percent of population immunized naturally or artificially.

2.1.1. Importance of Immunization

Childhood immunization is cardinal because the passive immunity a child receives whilst in utero will diminish in the first year of life. There are some diseases where the mother does not pass immunity to her baby hence active immunity should be built through vaccination which starts soon after birth as for BCG and polio. The child will continue with DPT-HepB-hib and polio at six weeks for three doses given at four weeks intervals. The child must receive measles vaccine at nine months of age since the passively acquired measles antibodies protect the child only up to this age.

Immunization sessions should be conducted with care in order to prevent cross infection, adverse effects and destruction to the potency of the vaccines (King et al. 1979).

2.1.2. Types of Vaccines

Dead or weakened organisms (vaccines) are given which will not cause harm but help the child make antibodies against diseases. These vaccines are in two main forms:

- Live weakened/attenuated vaccines such as BCG, polio and measles. These are very delicate vaccines which must be freeze dried and must be reconstituted before use.
- Dead organisms or toxoids include whooping cough, diphtheria, tetanus and currently hepatitis B and heamophilus influenza. These vaccines should not be frozen but kept cool all the time. For these reasons, the cold chain must be maintained in order to sustain the potency of the vaccines (King et al. 1979).

2.2 Expanded Programme of Immunization

Benesh and others (2000) assessed the Expanded Programme of Immunization (EPI) in Bosnia and Herzegovina in order to determine the epidemiological situation of vaccine preventable diseases and review major EPI components and provide recommendations. The findings demonstrated no evidence on dramatic increase of disease incidence rate of major public health concern, with exception of stress related disorders and Tuberculosis (Benesh et al, 2000). The reported vaccination coverage in pre-war Bosnia and Herzegovina was high. Furthermore, Benesh and others (2000) state that in 1990, coverage rates of all EPI antigens were 91 per cent in Bosnia and Herzegovina. During the war, that followed thereafter, immunization was conducted mainly in centers while lack of security, vehicles, fuel and staff affected outreach services, resulting in an estimated drop of coverage to 30 per cent.

The study also revealed that the design of the monthly and annual reporting forms on immunization does not permit calculation of timely immunization consequently overall vaccination numbers are artificially boosted while, in reality, some children who are due for immunization are missed and others not planned for are included. In most facilities visited, staff did not maintain the vaccine cold chain during immunization, had incorrect or insufficient understanding of vaccine management. Among the recommendations was the establishment of a state-level EPI with common disease reduction/elimination targets, vaccination coverage objectives, vaccine and injection supplies management and cold chain

system serving all parts of the country.

Yadav and others (2006) conducted a survey on immunization coverage in urban slums of Jamnaga city in India. This was a cross sectional study focused on children between 1 and 2 years of age. Immunization cards were checked and presence of BCG scar assessed. They found out that fully immunized children were 73.3 per cent which was higher than the national level of 63 per cent. Partially immunized children were 23.8 per cent and un-immunized 2.8 per cent. The main reason for drop out or un-immunized was ignorance by mothers at 80 per cent and for the rest it was inconvenience. Some of the reasons for partial or no immunization were ignorance, inconvenience, short supply, schedule not planned and problem of relations between health worker and community.

Al-Sheikh and others (1999) conducted a cross sectional study to calculate coverage rate for children 0-2 years of age. The results showed that 60 per cent of children were fully immunized in the urban city of Tikrit (Irag) compared to 28 per cent in three villages which were rural. The results also indicated that most common causes of partial or completely un-immunized children in the urban city were ignorance or negligence of mother and unavailability of vaccines in the health facilities. However, in the rural areas ignorance, negligence of mothers and distance to health facilities were the most common causes. They concluded that a large gap still existed in immunization coverage between urban and rural areas and the main cause of incomplete immunization was lack of health education for mothers.

A pediatric clinic in Lagos (Nigeria) reorganized itself to reduce waiting time by setting up a separate vaccination station, and then vaccinated all sick children after they had received treatment for illness (Tembo 1993**).** The EPI in Mozambique re-classified its immunization schedules and reorganized clinics so that vaccinations were being given at the time a child registers, seriously sick children were vaccinated before leaving the clinic or soon after required hospitalization.

2.3. Immunization coverage approaches

WHO proposed introduction of Reaching Every District (RED) at country level and Reaching Every Child (REC) as a foundation for sustainable measles mortality reduction. This is

attainable by focusing on strengthening immunization services at district level. The elements of the RED strategy include:

- Re establishing outreach immunization services.
- Supportive supervision
- Community link with service delivery (community participation)
- Monitoring and use of data for action
- Planning and management of resources (CBOH 2004).

There has been observed challenges globally on the immunization services. These are optimizing use of existing resources, integrating other priority public health interventions with EPI, increasing capacity at district level; improving planning and logistics, increasing coverage and eliminating inequities. The major focus of the RED strategy should aim at identifying problems and causes of low immunization coverage and plan solutions to increase immunization coverage. This can be achieved at two level of reaching the un- reached children, hence improving utilization (WHO 2002).

A survey conducted by USAID (1992) in Bolivia found out that with increased immunization coverage, a reduction in disease burden was achieved. However, though mothers interviewed did not understand childhood immunization, many were motivated to have their children vaccinated as they felt immunization promoted good health in children. Results indicated that vaccinations against contagious diseases had a positive impact not only on the vaccinated individuals but on others who might have been contaminated. The benefits included permanent immunity acquired through vaccinations, and prevention of conditions such as brain damage and blindness as permanent impacts that are sustained by the beneficiary for the rest of his or her life (USAID 1992).

However, in the same study, some women actively resisted participation in the vaccination programme, at least until their children were older. They believed that infants should not be vaccinated because the immunization might cause a fever or pain. While other women associated immunizations with slowed child development, in that, their child who was beginning to walk would revert to crawling after an injection in the hip.

Other reasons brought out in the Bolivia study were that children did not complete immunizations because mothers were afraid of being scolded for losing the child's card, fear

of side effects to the first vaccinations (fever, pain), inconvenience and time limitations because the child got sick even after being immunized.

WHO (2002) published 15 studies on missed Opportunities for Immunization (MOIs) though they were not uniform in their methodology, including definition of MOIs, age groups surveyed, and analysis of causes. Ten of these studies explored the causes of MOIs in detail when vaccines were supposed to be available. These causes were:

- Either the health worker or parent incorrectly decided that common illnesses are contraindications to vaccination.
- The health worker neglected to screen or incorrectly screened the child's eligibility for vaccination.
- Sometimes a vaccination was given, but at the wrong time (for instance, measles vaccine at too early an age).
- The vaccine supplies were unavailable or damaged due to cold chain failure.
- The clinic was too crowded or disorganized to handle all those attending.
- Staff absence or lack of transport led to cancellation of sessions.
- Mothers were too busy to wait, were uninformed, or dissatisfied.
- A health worker feared wasting measles vaccine, so refused to open multi-dose vial when only a few children showed up.

Mukonka (2007) presented the current child health initiatives aimed at realizing the MDGs. One of the major initiative is to improve immunization coverage and hence reduce vaccine preventable diseases through routine immunizations, child health weeks (biannual) and special campaigns. The measles campaign conducted in 2007 achieved a coverage rate of 87 per cent for measles. During the second quarter of 2007, the RED strategy had been scaled up to the phase three where 25 remaining districts in Zambia were introduced to the strategy.

Ngoma and others (2007) presented a conference paper that looked at the effect of special campaigns and routine immunization on Zambia’s immunization coverage in their prospective and retrospective study. The results indicate that the health worker practice was professional but there were challenges of inaccurate Central Statistical Office (CSO) population and non- payment of outreach allowances. However, campaigns have benefits such as infrastructure improvement, refresher courses, strengthened partnerships and social

mobilization. Their conclusion was that complex health system challenges affected immunization coverage and some required immediate attention such as bridging the gap between clients and health providers through effective communication.

WHO (2005) reported on the country experiences in the implementation of the REC approach. They state that early planning and well co-coordinated integration of vitamin A supplementation, Insecticide Treated Mosquito Nets, and Mebendazole distribution with measles supplementary immunization activities demonstrated to be cost effective, efficient and time saving. Further, WHO (2005) indicates that integration of plans for logistics, advocacy, social mobilization, monitoring and evaluation resulted in an effective and efficient use of resources. Therefore integrating activities proved synergistic in improving child health.

King and others (1979) contend that we can stop measles, polio, and whooping cough spreading in a community by immunizing about 80 per cent of its children. These children give the whole community 'herd immunity'. This implies that the more children in a community that are fully immunized against certain diseases, the more everyone is safe from those diseases (Kane et al, 2002). However, tuberculosis and tetanus do not have the herd immunity and hence the target among children for these vaccines should be 100 per cent.

World Health Organization (WHO) and United Nations Children's Fund (UNICEF) have jointly sponsored ventures aimed at improving the immunization programmmes in Developing Countries. The WHO Expanded Programme on Immunization (EPI) assists health authorities to design, implement and evaluate their immunization programmes, also train their health personnel and acquire vaccines and other essential supplies (Adetokumbo et al. 2003). Furthermore, Adetokumbo and others (2003) contend that active immunization has evolved to become a powerful tool in public health. Vaccination is usually the preferred intervention in those diseases for which effective vaccines are available.

2.4. Effectiveness of immunization on child health status

Immunization has proved to be one of the most important and cost effective ways of ensuring that children survive their early years. Active immunization is of an established value and is recommended for routine use in children to prevent smallpox, diphtheria, whooping cough,

tetanus, poliomyelitis and measles. For infants under three months of age, an initial series of four, monthly doses of the antigens gives them the best antibody response, especially pertussis and poliomyelitis (Harper 1962). Immunization against vaccine preventable diseases saves the lives of approximately 3 million children yearly (WHO 2004). In a similar view, MOH (2007) contends that before the widespread availability of the measles vaccine, virtually all children contracted the disease and seven to eight million deaths occurred each year worldwide. Childhood immunization programmes have led to a dramatic decrease in measles morbidity and mortality.

Furthermore, immunization prevents many more from suffering debilitating diseases and lifelong disability. Widespread access to lifesaving vaccines is one of the greatest public health achievements of the time (Kane et al, 2002). In the past two decades, immunization has prevented an estimated 20 million deaths from vaccine preventable infections worldwide (UNICEF 2006). Information on immunization levels, trends and the distribution of vaccination services across districts is used to monitor immunization performance at the local, national and international levels and to guide efforts at polio eradication, measles control and neonatal tetanus elimination (UNICEF 2006). Reliable and timely monitoring and reporting of data at the district, provincial and national levels help public health managers to assess the effectiveness of immunization initiatives and make more informed policy choices.

Some of the notable successes of immunization include eradication of smallpox worldwide, as well as poliomyelitis eradication in many countries including Zambia (UNICEF 2004). Recently Zambia attained maternal and neonatal tetanus elimination certification. Despite the reported successes, much remains to be done. In 2004, an estimated 27 million infants did not receive three doses of DTP. This indicates that 1 in every 5 live births did not receive the vaccine dose. An estimated 1.4 million children under 5 years died from six major vaccine preventable diseases with a further 1.1 million deaths from pneumococcal and rotavirus diseases (UNICEF 2006).

However, while developing countries struggle to get vaccines to children who desperately want them, industrialized countries are facing different challenges. Many people in North America and Europe have become complacent about vaccines, assuming that since certain diseases rarely appear, they are no longer a threat (Kane at al. 2002). These misconceptions

have caused a resurgence of increases in contagious diseases such as measles, diphtheria, and pertussis. In the United States, the measles outbreak in 1989 led to 123 deaths, 90 per cent of those who died were not vaccinated (Kane et al. 2002). Controlling the outbreak requires expensive and difficult mass immunization campaigns until routine immunization can function again.

UNICEF (2006) highlights that 1 in every 6 infants is not immunized against tuberculosis, 1 in every 4 against measles, and only half of the world's infants are fully immunized against hepatitis B. Efforts to raise global immunization needs a strong focus on the countries where most of the un vaccinated children live, while also ensuring that the countries where children are most likely to miss out on immunization are not neglected in the search for greater global impact. In order to achieve this all governments must make difficult decisions about where to spend limited health care funds. The key is to determine which interventions provide the largest benefit for the lowest cost. Immunization is one of the rare interventions that, though attracts costs, has huge benefits for the health and well-being of the whole population. This is why it is often the cornerstone of public health programmes (UNICEF 2006). In order to attain vaccine independence, the Zambian government and Partners have been increasing allocation of resources for vaccine procurement from 10 per cent in 2005, 14 per cent in 2006 and 18 per cent in 2007 while the balance has been met by GAVI/VF (Mukonka 2007).

2.5. Factors affecting immunization coverage

Sikalumba (1999) looked at factors contributing to low immunization coverage in children less than one year in Isoka district. The methodology used in this study was not highlighted except for the study population. The findings revealed that there was low immunization coverage in those less than one year at 77 percent. Even though 82 percent of the health workers conducted static services for immunization weekly, 17 percent did not do so. The study did not indicate whether outreach services were provided.

However, knowledge about importance of immunization was high at 97 percent. The factors associated with low coverage were long distance to health facility, laziness by mothers, and minor ailments suffered by the children that hindered mothers from taking them for immunization. The study also revealed that poor attitude by staff and traditional beliefs and practices did not contribute to low coverage. Cold chain management was not understood by 60 percent of the health providers. Shortage of transport, logistics, and staff contributed to

poor coverage. Some of the recommendations were outreach services, supermarket at static services, capacity building in cold chain and vaccines, provision of transport and involvement of community members in following up under-five children (Sikalumba 1999).

Mubanga (1999) conducted a study in Nchelenge district on factors contributing to low utilization of child immunization services. The study methodology was cross sectional comparative study, using multistage sampling method. The findings were that there were poor quality immunization services being offered, services were inaccessible to many, and lack of follow up of defaulting children. Other possible causes identified were no children's' clinic conducted, long distances to health facility and inadequate knowledge on available immunization services. The study did not forward recommendations.

During RED/REC strategy training for health workers, some constraints were identified as contributing to high number of un-immunized children in the country. These are:

Planning and Management

Health workers identified problems with staff shortages, poor staff attitude; inadequate knowledge and skills; poor service delivery in form of quality of service, lack of honoring immunization appointments; lack of transport and logistical problems where there were some vaccine stock outs, high wastage rate and constant breakdown of cold chain equipment.

Revitalizing vaccination services

Lack of outreach services was identified as one of the major contributing factors to high number of un-immunized children. This was said to be as a result of high dropout rates, long distances and low turn outs for static immunization services.

Linking services to the community

Health workers agreed that when community members, especially volunteers were not fully involved in mobilizing mothers for immunization services, many children were not vaccinated leading to high drop-out rates. Community volunteers are also involved in following up defaulting children for immunization.

Monitoring and data management: Revealed poor data quality, due to incorrect tallying of doses, wrong data aggregates tallied which were not equal to cumulative figures.

Supervision

This was identified as the cornerstone to improved immunization coverage. Supervision at all levels of service delivery helps to identify deficiencies and immediately correct mistakes as

well as conduct technical support (Chivundu 2005).

The annual child health review reported factors influencing immunization coverage as geographical access, leadership and management styles, and technical know-how of the zonal supervisors, consistency in leadership and responsibility and health facility and regular supportive supervision, support to community leadership, defining roles of community leaders, integrating Expanded Program of Immunization (EPI) with other services, and waiting hours (Chivundu 2005).

The literature reviewed has shown various contributing factors to un immunized children in different countries including Zambia. These include service delivery factors such as inadequate supervision, vaccine and supplies shortages, inadequate funding, inaccurate CSO figures; service provider factors such as negative attitude of staff, poor data management, lack of involvement of community volunteers, and inadequate knowledge of EPI. Furthermore, some factors revealed concern care seekers which include lack of knowledge of immunization, busy schedule by caretakers, inconvenience, fear of being scolded by nurses, and long distance to the health facilities.

2.5. Research questions

- Do inadequate outreach services for immunization contribute to low coverage of fully immunized children in Kawama Compound of Ndola district?
- Are community volunteers involved in mobilizing mothers for vaccination of their children in Kawama Compound?
- Is lack of knowledge on immunization by mothers contributing to low coverage for fully immunized children in Kawama Compound of Ndola?

2.6. Objectives of the study

2 .6.1.General objective

To determine the factors contributing to low immunization coverage in relation to REC/D strategy in Kawama Compound of Ndola district.

2.6.2. Specific objectives

- To determine the proportion of children fully immunized before their first birthday in Kawama Compound of Ndola.
- To establish the frequency of outreach immunization services in Kawama Compound.
- To determine the participation of community volunteers in motivating caretakers/mothers to have their children complete vaccinations in Kawama compound.
- To establish the level of knowledge about immunization by mothers in Kawama compound of Ndola district.

CHAPTER THREE

3.0: Research methodology

Table 3.1. Variables, indicators and scale of measurement.

VARIABLE &DEFINITION	INDICATOR	SCALE OF MEASUREMENT
DEPENDENT VARIABLE		
Fully immunized children *The children who receive all required doses of vaccines before their first birthday.*	Proportion of children fully vaccinated before their first birthday over total population of children below one year.	Low=below 50 percent Moderate=between 50 & 79 percent High =At 80 percent or above
INDEPENDENT VARIABLES		
Community volunteer participation *Active follow up of children who default for immunization services children*	• Number of child tracers in the community • Number of times child tracers visit the mothers • Type of activities performed	Low= less than 5-7 High= 8-10 Low= less than one time per month High= one or more times per month
Outreach immunization services *Conducting vaccination services away from the heath facility*	Number of outreach visits conducted over planned visits.	Low=one visit per three months Moderate=one visit per two month high=one visit per month
Knowledge of immunization *Understanding the value and types of vaccines available*	Number of correct responses by mothers on immunization over total questions asked.	Low=below 50% Moderate=50-74% High = 75% and above

3.2 Research design

A descriptive cross sectional design was used in this study. Yadav and others (2006) conducted a cross sectional survey on immunization coverage in India where the researcher adapted the design from as this study also examined the process of immunization. Research design is the overall plan for addressing a research question including specifications for enhancing the integrity of the study (Polit and Hungler 2000). This study focused on evaluating the implementation process of the REC. Process evaluation is mostly carried out on services and programmes, as well as policy implementation (Ovretveit 1998). Document review was used to assess the service delivery by the health centre on immunization. In-depth interview and structured questionnaire were used to collect data.

3.3 Study setting

Kawama health center is located in one of the peri-urban areas of Ndola town on the Copperbelt province. The health center is located in the northern part of Ndola urban about 10 kilometers from town. It is a council gazette area with a population of 19,567 projected for the year 2009. The compound is predominantly a settlement area for retired people who constructed houses (brick with iron roofing sheets). The water source is from communal taps as well as shallow wells while sanitation is through pit latrines. The residents engage in subsistence farming that is done near and across the border into Democratic Republic of Congo. This is where the study was conducted.

Kawama compound was purposefully sampled by the researcher due to it being located within Ndola district revealing low coverage of full immunized children even after the introduction of the REC strategy in 2004. According to MOH reports, Ndola district in 2006 had full immunization coverage of 43 percent.

Kawama compound is highly populated but subdivided into zones which made the researcher collect data from all the zones. Within the zones were the community volunteers who assisted the researcher and data collectors enter the community without any problems.

3.4 Study population

The study population was children below five years of age found within the Kawama health center catchment area. The proxies were their mother or caretakers found at home at the time of data collection. The health workers at the health center and the Maternal and Child Health Coordinator for Ndola district were included in the study to verify the information collected

from the mothers/caretakers. Some community volunteers not involved in guiding the data collectors in the field were also included in the study as key informants.

3.5 Sampling and sample size

A sample is a selected subset of a population (Basavanthappa 2006). The researcher calculated the sample size by using the number of under fives in Ndola District. During data collection, the researcher conveniently sampled mothers/caretakers of children under five who were found at their homes in Kawama Compound. This was done in order to ascertain the views of the respondents about the process of immunization within the catchment area. The data collectors were assigned to the five different zones where they systematically moved from house to house until each interviewed 40 mothers/caretakers. The nurses and a clinical officer found at the health center during the time of data collection were included in the sample. Some community volunteers working with the health center staff were also included in the sample.

To calculate the sample size, the following formula was used as follows:

$n=Z^2PQ/e^2$

n=Sample size

p=prevalence (43)

Q=100-p (100-43=57)

e=margin of error ±5% (2e=14, then e=7)

Z= 1.96 from normal distribution

Therefore:

n= Z*Z*P*Q/e*e

n= 213 rounded to 220

3.6.1 Inclusion criteria

Mothers and caretakers with children under five years at the time of data collection were included. All health workers involved in immunizations at Kawama health centre and some community volunteers in the compound were also included. The health center in charge and the district maternal and child health coordinator gave key information about immunization services in Kawama.

3.6.2 Exclusion criteria

Mothers/caretakers with children above five years and those mothers without children in the compound. Doctors and other health workers not involved in immunization services were also excluded.

3.7 Data collection tools and techniques

The researcher entered the study area through the local health centre (Kawama). The health centre has community volunteers in each of the four zones of the catchment area, who were requested to guide the study team into the community. Whilst at the local health centre, health workers involved in immunization programme were identified and requested to complete a self administered structured questionnaire. After entry into the community, the study team identified caretakers/mothers with under-five children, who were requested to participate in in-depth interview that were conducted by the data collectors.

Community volunteers involved in child health activities were identified in each zone and requested to be interviewed. Data collection tools used were: structured questionnaire for health workers which provided quantitative data, interview guide for caretakers/mothers and community volunteers that elicited qualitative data. A focus group discussion guide was used for the community volunteers to validate information collected. The data collection tools have been attached as appendix 2, 3 and 4.

Data collection was done within the month of May 2009 for two weeks. This was after approval to proceed with the study from The Research Ethics Committee and obtaining permission from the Ministry of Health.

3.8 Data collection/field activities

The researcher collected data from the field within one month after approval to proceed by UNZA Ethics Committee. Five research assistants were engaged, trained and collected data. A statistician was consulted during data entry and analysis.

3.9 Data quality control

The researcher trained the research assistants on the research tools and how to collect the required data. The instruments were pre-tested before they were used in the field. Data

collected was cleaned whilst in Ndola to determine completeness and identify if there was need to counter check the information obtained. This was achieved by going through all the questionnaires whilst in the field with the data collectors.

3.10. Data processing and analysis

The data was screened to ensure consistency and completeness whilst in the field and thereafter was entered into computer. Data processing and analysis was conducted in two folds: quantitative data processing and analysis and qualitative data processing and analysis.

a) Quantitative Data processing and analysis

The data were assigned a number to each response item that helped in data entry. The data was then arranged into tables and bar graphs for easy understanding. Cross tabulation would have been ideal to study relationships between normal or ordinal variables; however, further statistical analysis was not practical as the number of respondents utilizing the quantitative data collection tool were less than 30.

b) Qualitative Data processing and analysis

Purposive rather than random sampling was utilized in the field in order to include all cases, even deviant ones that could have been missed in random sampling, for observation in order to uncover the full array of multiple realities relevant to the inquiry. Inductive data analysis was used in order to reveal unanticipated outcomes and develop understanding of the process of immunization programme in the community, as the tool used for data collection was semi structured. The data were segmented, coded into themes that were later utilized to multiple regression analysis including statistical techniques to examine the relationship between the independent variables and the dependent variable. However, the exact meaning were protected as data were entered using the respondents' words.

The data were entered into computer SPSS software and analyzed. Chi-square statistic was used in order to determine the statistical significance of difference between the observed frequencies with would be expected frequencies. The intent was not to generalize findings, but to form a unique interpretation of the events in Kawama compound pertaining to immunization.

The data has been presented using frequency tables, pie charts and bar graphs, which are the most effective and simple way of communicating research results.

3.11 Ethical considerations

The proposal and the associated forms contained in Appendices were reviewed and approved by the University of Zambia Research Ethics Committee (REC) with respect to scientific content and compliance with applicable research and human subjects' regulations. The researcher sought permission from the Ministry of Health as well as at the Provincial Health Office and the District Health Office in Ndola. The Health centre in charge at Kawama clinic gave permission to proceed with data collection. Evaluation research on performance of immunization in Ndola was important because information collected from the health facility needed to be cleared by the supervisors. The nature and purpose of the study was explained to all participants, this included the benefits to the respondents about the information they provided, while confidentiality and anonymity was assured. When participants were satisfied with the explanation, they were asked to sign a written informed consent. Only those willing and offering to be interviewed were interviewed. An information sheet and a consent form have been attached as appendix 1.

3.12. Limitations and outcome of study

Cross sectional studies capture information at one time and hence cannot provide a kind of a trend analysis to determine contributing factors to the phenomenon. However, cross-sectional studies measure prevalence by depending on incidence and duration. In this way they do not demonstrate temporal link. They do not measure time trend analysis. Therefore this study only analyzed performance of immunization programme at the time of data collection. However, even with such limitations, evaluation studies are important in that the information obtained about the effects of an intervention is used to compare its value to the alternatives.

3.13. Project management

The researcher prepared to conduct the study by preparing a research proposal that was presented to Graduate Forum at the UNZA School of Medicine. After the suggested corrections were attended to, the proposal was submitted for ethical approval with the UNZA research ethics committee (approval letter is attached at the back). After ethical approval, the researcher proceeded to collect data for the study in Ndola during the month of May 2009. Three student midwives at Ndola School of Midwifery and two University of Zambia second year students were hired, trained and assisted with data collection. Whilst in the study district, the researcher obtained permission from both the provincial and district health offices to conduct research (authority letter is attached at the back). The data collectors engaged were

trained for one day in order for them to understand the tools for data collection as well as the process of data collection to be employed.

The data were collected within fourteen days in Kawama compound, at Kawama Health centre and at the Ndola Health Office. Furthermore, during field activities, five community volunteers were employed to guide the data collectors in the compound. These were the volunteers working with the health facility in health related programmes.

After the data were collected and quality control assured, the researcher engaged a statistician who helped with data processing and analysis. A draft research report was then written and submitted to the supervisors. The researcher utilized a budget of Zambian Kwacha (**K11,071,000.00) eleven million and seventy one thousand kwacha** (detailed budget is attached as appendix 8.8) that was used for purchasing of stationary; payment of data collectors and statistician; transportation to study site; accommodation and meals for the researcher as well as for report writing, printing and binding of documents.

CHAPTER FOUR

4.0 Findings

4.1 Introduction

The data presented in this study was obtained from 15 health workers, 203 mothers/caretaker, and 5 community volunteers in Ndola district of the Copperbelt province. The data has been presented as: Section A-qualitative data obtained from mothers/caretakers in kawama compound Section B-quantitative data obtained from health workers at kawama health center; and Section C-qualitative data obtained from key informants (District MCH coordinator, Kawama health center in charge and Community Volunteers). The breakdown of the respondents is shown in table 4.1.1.

Table 4.1.1 Description of sample

Category	**Sample**	**Actual**	**Remarks**
Mothers/caretakers	220	203	Rest of respondents were health workers
Health workers	14	13	One could not participate as she had just started work at the center
Key informants	7	7	For verification of data
Total	**241**	**223**	Three extra respondents were community volunteers for validation of information

Table 4.1.1 shows the breakdown of the sample used. The study focused on children under five years of age but the mothers/caretakers were the proxies. Health workers and key informants were interviewed to verify the information collected from the mothers/caretakers. There was 100 percent response rate from the sample. Extra 3 respondents were community volunteers for verification of data.

4.2 SECTION A: QUALITATIVE FINDINGS OF MOTHERS/CARETAKERS

4.2.1 Knowledge of immunization among mothers/caretakers

The mothers/caretakers were asked to state where they took their children for immunization services, the majority (93%) of the respondents indicated that they took their children for immunization to Kawama Clinic Zone 2, followed by Zone 1 and 3. Only 2(1%) mothers took children to centers outside

their catchment area. The mothers/caretakers further stated that they took their children monthly for immunization and other children's clinic services. 10(5%) reported that they only went there when there was need and 5(2%) did not know when they should take their children for their vaccinations.

When asked about the immunization schedule for children under five, slightly above half (63%) of the mothers/caretakers understood that children should start getting vaccinations one week after birth. Only 12% gave the ideal (soon after birth) time for starting vaccination**.** However, the majority (99%) of respondents said it was necessary for a baby to receive vaccination while 2(1%) said it wasn't. Those who said it was necessary gave various reasons as: 134(66%) for protection from diseases, 67(33%) for having a healthy baby, while 2(1%) specifically indicated protection from Tuberculosis.

Knowledge of ideal time to give measles vaccine was found to be high as 172 (86%) of women gave the correct age at which measles vaccine is given (at 9 months). However, 14 (7%) did not know when a child should receive a measles vaccine. While 15 (7%) gave wrong ages at which measles vaccine should be given, an indication of inadequate information given to mothers.

Knowledge of ideal age for completion of vaccinations by children under five was mothers/caretakers gave various ages as tabulated in table 4.2.1.1.

Table 4.2.1.1 Immunization status of children* Knowledge of correct for triple vaccine Cross tabulation

	Immunization status					
Knowledge of correct interval for triple vaccine	Fully immunized Frequency	%	Not fully immunized Frequency	%	**Chi-square**	**p-Value**
One month	143	91	0	0	134.44	<0.001
Wrong interval	14	9	41	100		
Total	**157**	**100**	**41**	**100**		

Table 4.2.1.1 above shows that knowledge of interval for triple vaccine has significant relationship to immunization status of children (Chi-square 134.44 and And P-value=< 0.001).

Table 4.2.1.2 Immunization status of children* Knowledge of correct age to finish vaccination Cross tabulation

	Immunization status					
Knowledge of correct age to finish vaccination	Fully immunized Frequency	%	Not fully immunized Frequency	%	**Chi-square**	**p-Value**
Correct age	157	100	9	25	136.90	<0.001
Wrong age	0	0	27	75		
Total	**157**	**100**	**36**	**100**		

Table 4.2.1.2 above show that knowledge of correct age for a child to complete vaccination has an association with the immunization status of children (Chi-square 136.90; P-value=<0.001).

Majority (98%) of respondents stated that it was necessary to take their child for vaccination even when they are not feeling well, while 2% said it was not necessary.

4.2.2 Immunization status of under-five children in Kawama compound

Mothers/caretakers with children under the age of five years provided under-five cards which were assessed for their children's immunization status as tabulated in table 4.2.2.1.

Table 4.2.2.1 Immunization status of children

Category	**Frequency**	**Percent**
Fully immunized	103	51
On schedule	40	20
Defaulted	38	19
Delayed getting some vaccines	17	8
No under five clinic card	05	2
Total	**203**	**100**

Table 4.2.2.1 shows that of the children whose under five cards were screened, 51% were fully immunized, 20% were on schedule for immunization, 19% defaulted, 8% delayed receiving some vaccines, and 2% had no evidence of immunization status due to lost cards or having a new card without transferring immunization data from the old card.

4.2.3 Activities of community volunteers in kawama compound

Mothers/caretakers were asked whether they were aware of active community volunteers in their compound, the majority (88%) of respondents indicated that they were aware of the active community volunteers in their community while 12% were not aware.

Activities conducted by the community volunteers in Kawama according to mothers/caretakers were: advising mothers on how to look after children (14%); conduct growth monitoring and checking the under five card (33%); TB treatment support-DOTs (14%), visiting the sick (12%); giving medication (4%); health campaigns (6%); another 6% of respondents did not know what community volunteers do and the rest said conducting deliveries; environmental health; door to door sensitization; educating mothers on family planning.

The type of support the community given to volunteers, mothers/caretakers gave various means of support as shown in figure 4.2.3.1**.**

Figure 4.2.3.1

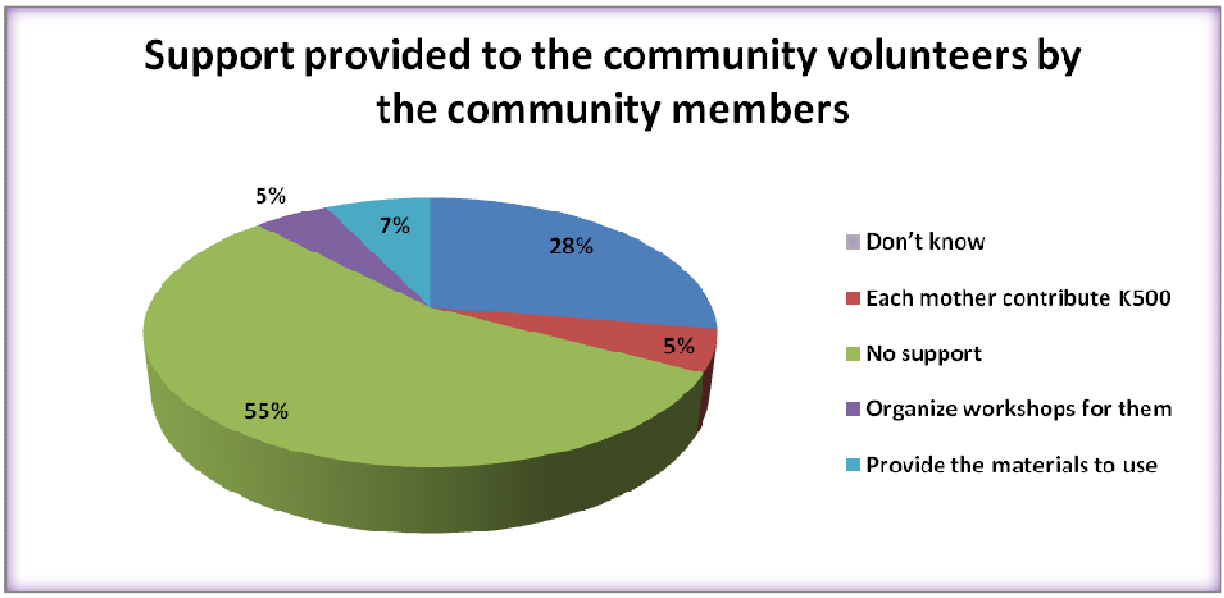


Figure 4.2.3.1 indicate that 55% of respondents stated that community volunteers were not given any support, 28% said that they were given materials for use, 7% said that they benefitted through attending workshops organized for them, and 5% said that each mother pays K500 during child health activities while another 5% did not know of any support rendered to them.

Mothers/caretakers indicated that majority of them (75%) were visited by community volunteers to check if their children received necessary vaccines while few (25%) said they were not visited.

The mothers/caretakers gave various suggestions for improvement of children's clinics including outreach services in Kawama compound. These were: health workers to open the clinic early and attend to clients on time; permanent structures to be built in outreach posts; to increase number of vaccination posts; to increase the number of visits per month at the posts; health workers to provide more weighing scales; the government to employ more health workers who should attend to clients; and to engage more volunteers. Some suggestions relate to the community as: community to clean the weighing posts; community volunteers to have good attitude towards children; community to renovate vaccination posts; and engaging the

community in decision making by the health center staff.

4.2.4 Outreach vaccination service activities

According to 112(56%) mother/caretakers, health workers last conducted outreach services for immunization during the last month prior to interview; while 53(26%) said more than a month ago, and 34(17%) said they don't know when health workers last conducted outreach services in Kawama compound. However, 1% of respondents said that they had never seen health workers conducting outreach vaccination services.

Majority (95%) of mothers/caretakers indicated that they went to the outreach posts for their children's health services while 10(5%) did not. Those that did not go were discouraged by the K500 payment, while others were ignorant of the service, lazy to take their children, too busy, or saw no benefit in taking their children for vaccinations.

Mothers/caretakers were asked to highlight reasons why some mothers did not take their children for vaccination services, reasons given have been tabulated in table 4.2.4.1.

Table 4.2.4.1 Reasons preventing mothers from having their children vaccinated

Reason	Frequency	Percent
Some mothers are lazy	100	49
Ignorance	34	18
Don't know	17	9
Some mothers think that the vaccine contains HIV	18	9
Congestions and payments	10	5
Some mothers are busy	7	3
Don't have time	4	2
Lack of seriousness	4	2
Don't care about their children	3	1
Lack of interest	3	1
Attitude of health workers	2	1
Total	**203**	**100**

Table 4.2.4.1 indicates that the major reason preventing mothers from enabling their children receive all the vaccine is due to laziness (49%). 18% of respondents said some mothers were ignorant about the service available. However some mothers (9%) thought that the vaccine contains the HIV virus and others could not give a reason.

4.3 SECTION B: QUANTITATIVE FINDINGS OF HEALTH WORKERS

4.3.1 Demographic data of health workers

Health workers interviewed were aged between 20 and 35 and above as tabulated in figure 4.3.1.1.

Figure 4.3.1.1 Age group of the respondents

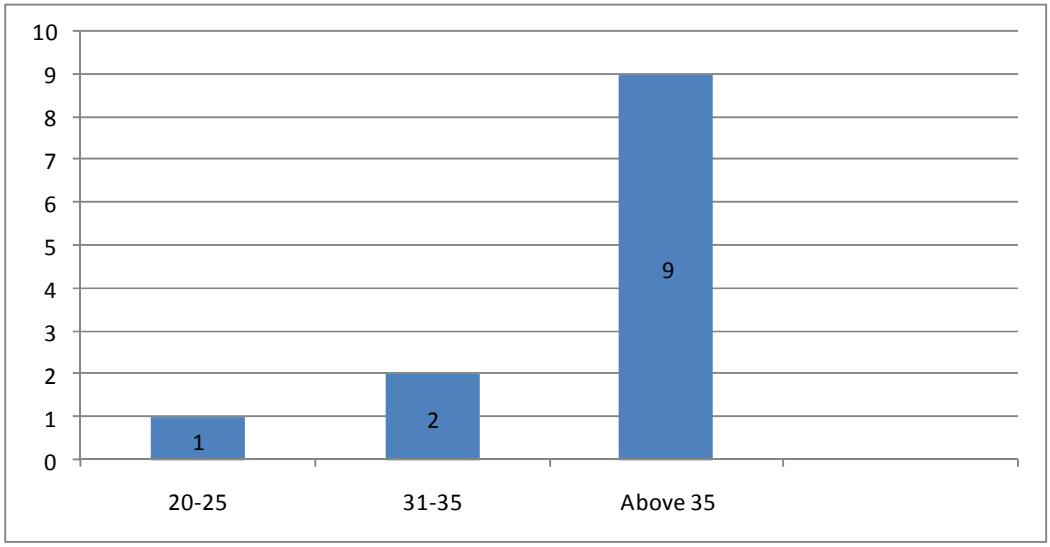


Figure 4.3.1.1 shows more health workers in the age category of 35 and above. There were fewer health workers in the lowest category of 20 to 30 years of age.

The sex of health workers interviewed is categorized below.

Table 4.3.1.2 Sex of the respondents

Sex	**Frequency**
Male	1
Female	12
Total	**13**

Table 4.3.1.2 shows more female health workers than males.

Professional qualification of health workers interviewed was tabulated as:

Table 4.3.1.3 Professional qualification of respondents

Profession	**Frequency**
Nurse	12
Clinical officer	1
Environmental Health Technician	0
Other (specify)	0
Total	**13**

Table 4.3.1.3 shows more nurses than clinical officers. There was no environmental health technician found at the health centre at the time of the survey.

The length of stay at the health facility by interviewed health workers was tabulated in table 4.3.1.4

Table 4.3.1.4 Duration of working at health centre

Duration	**Frequency**
Less than six months	0
Six months to one year	2
One to two years	1
More than two years	10
Total	**13**

Table 4.3.1.4 shows that there were more health workers who had worked for more than two years at the health centre (10). No health worker interviewed had worked for less than six months.

4.3.2 Knowledge of EPI among health workers

Health workers were asked the ideal age at which a baby should start receiving vaccinations and the responses were tabulated in table 4.3.2.1

Table 4.3.2.1 Age at which baby should start getting vaccinations

Age	Frequency
Soon after birth	12
At six weeks	1
At nine months	0
At any time the mother wishes to bring baby	0
Total	**13**

Table 4.3.2.1 shows that more health workers understood the ideal age at which the baby should start receiving vaccinations. Only 1 health worker indicated that baby should start at 6 weeks.

Health workers were asked the correct immunization schedule in Zambia and responses were tabulated as:

Table 4.3.2.2 Correct immunization schedule in Zambia

Immunization schedule	Frequency
BCG and OPV; OPV and DPT-HepB-Hib; OPV and DPT-HepB-Hib; OPV and DPT-HepB-Hib; Measles	4
OPV0 and BCG;OPV1 and DPT-HepB-Hib1;OPV2 and DPT-HepB-Hip2; OPV3 and DPT-HebB-Hib3; Measles	9
Total	**13**

Table 4.3.2.2 shows that more respondents knew the correct immunization schedule used in Zambia. However 4 respondents did not know.

Knowledge of the time measles should be given to children was tabulated in table 4.3.2.3.

Table 4.3.2.3 Age for measles vaccine

Age	Frequency
At six months	0
At seven months	0
At nine months	13
At one year	0
Total	**13**

Table 4.3.2.3 shows that all the health workers knew when a child should receive the measles vaccine which is at 9 months.

Knowledge of type of vaccines polio and measles were assessed and the responses were identified as tabulated below.

Table 4.3.2.4 Type of vaccine polio and measles are

Type	**Frequency**
Attenuated live organisms	11
Killed organisms	0
Toxins	0
Combination of the above three	2
Total	**13**

Table 4.3.2.4 shows that the majority of respondents knew what type of vaccines measles and polio are. However, 2 respondents did not understand what type of vaccines polio and measles were.

The recommended vaccine storage temperature was assessed and the responses were tabulated in table 4.3.2.5.

Table 4.3.2.5 Correct temperature for vaccine storage

Temperature	**Frequency**
0 to +8 degrees Celsius	4
+2 to +8 degrees Celsius	7
+4 to +10 degrees Celsius	0
-2 to -8 degrees Celsius	2
Total	**13**

Table 4.3.2.5 shows that only 7 respondents knew the correct fridge temperature for vaccine storage. The rest of the respondents (6) gave wrong temperatures.

Management of reconstituted measles vaccine was assessed as tabulated in table 4.3.2.6.

Table 4.3.2.6 Management of reconstituted vaccines

Action	Frequency
Put back into fridge for use later	0
Kept until next immunization session	0
Thrown away	10
Kept cool and used within 6 hours of reconstitution	3
Total	**13**

Table 4.3.2.6 shows that only 3 respondents understood how to manage reconstituted vaccines, while 10 respondents did not understand.

4. 3.3 Immunization service delivery by health workers

When asked how often the health workers conducted vaccination services at the health centre, the majority (12) respondents indicated that they did not conduct immunization services at the clinic every week day. Only 1 respondent stated that they did so. Further, 7 respondents indicated that they conducted immunization sessions once per week; while 5 respondents said twice per week and 1 respondent indicated three times a week.

Participation in outreach immunization services was identified as being done by the health workers as tabulated in table 4.3.2.7.

Table 4.3.2.7 Frequency of outreach immunization services

Number of times	Frequency
Once a month	9
Only during child health week	2
None	2
Total	**13**

Table 4.3.2.7 shows that majority (9) of respondents conducted outreach once per month while 2 respondents said they only did so during child health week and 2 other respondents stated that they never went for outreach services.

Outreach immunization posts introduced in the community were said to be more than three according to the majority (12) of respondents. However, 1 respondent said there was no functioning outreach post in the community.

More than 10 community volunteers worked with the health centre according to 11 respondents. The other 2 respondents stated that only five were working. Furthermore, all the health personnel said that these volunteers helped to weigh children monthly at their posts.
At each weighing post more than thirty (30) children were weighed and immunized per session, according to 11 respondents. The other 2 respondents indicated that between twenty and thirty children were weighed and immunized.

Health workers gave average waiting time during immunization sessions as tabulated below.

Figure 4.3.2.3 Average waiting time at a vaccination session

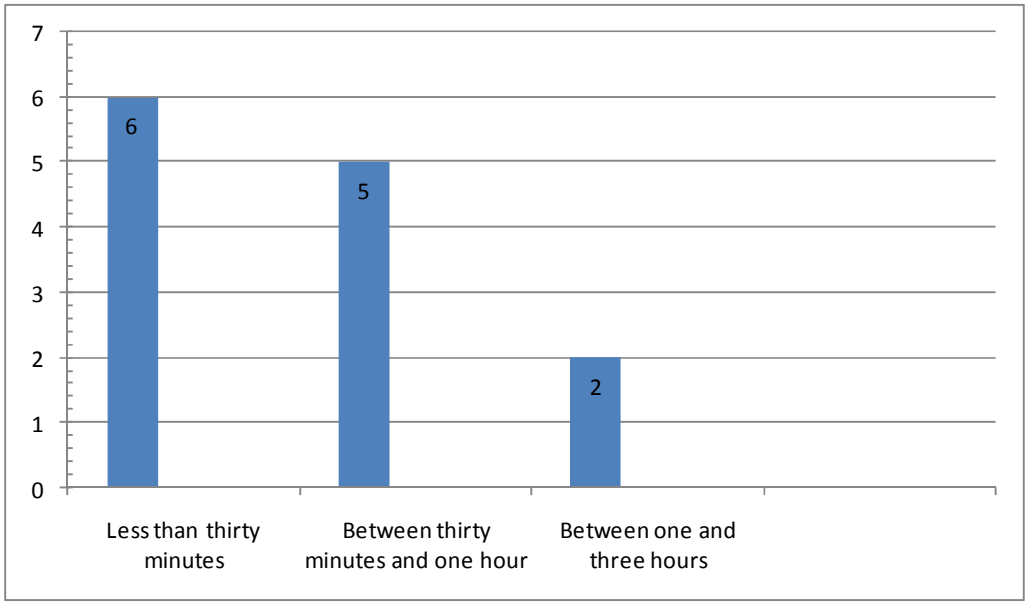


Figure 4.3.2.3 shows that (6) respondents stated that mothers wait for less than thirty minutes. Majority (7) indicated that they wait for more than thirty minutes.

The number of health workers attending to mothers during the immunization sessions was said by the majority (11) of respondents to be only one. Two health workers did attend to mothers according to 1 respondent and another respondent said three health workers attended to mothers at each session. There was no vaccine stock out during the past year prior to the survey according to 8 respondents while 4 respondents indicated that there was stock out only once. However, all the health workers stated that they never had a shortage of syringes and needles at any point during the previous year prior to the survey.

Health workers brought out the way health talks were planned and delivered during immunization sessions as highlighted in figure 4.3.2.4.

Figure 4.3.2.4 Kind of health talks given during immunization sessions

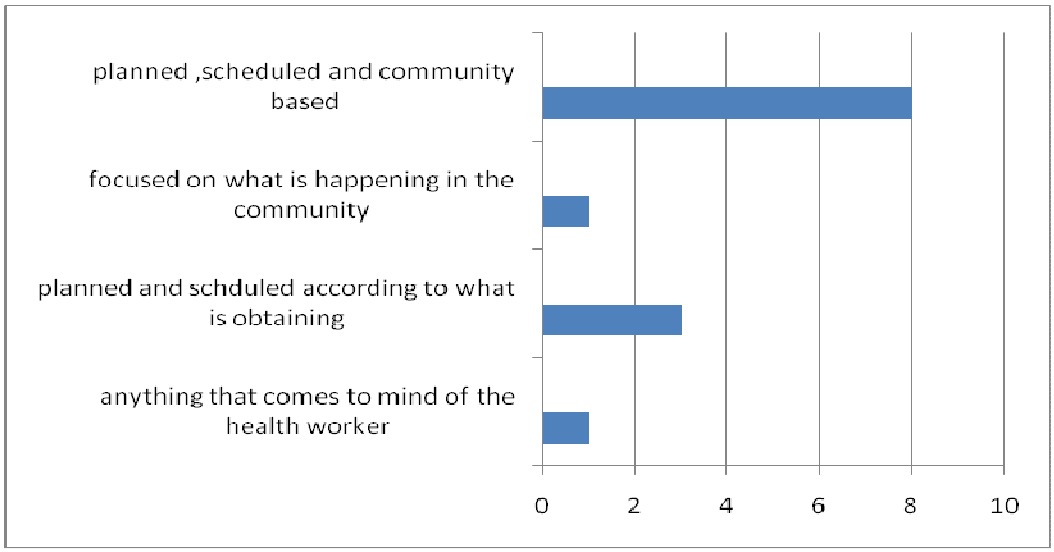


Figure 4.3.2.4 shows that majority of respondents (11) indicated that health talks were planned and scheduled according to what is obtaining as well as focusing on what is happening in the community. Only 1 respondent stated that they would teach anything that came to their mind.

However, the majority (11) of respondents stated that health talks were given immediately there were enough mothers waiting for the service (beginning of session). The rest (2) respondents said they gave to individual mothers whenever they came for service.

All the respondents stated that they kept Immunization charts, Immunization Registers, Tally sheets, Vaccine stock control cards and data aggregation forms. They also indicated that their

clinic had community registers for children under the age of five years at their immunization posts.

Only 2 respondents indicated that community volunteers updated the clinic registers once per week. The registers were updated once per month according to 11 respondents.
Most of the respondents (8) stated that they used Central Statistical Office (CSO) figures for calculation of expected number of children for immunization each year. Head count data by the community volunteers was indicated that used by 3 respondents while 2 stated that they used both SCO and head count data.

Majority (11) respondents stated that nurses/clinical officers or environmental health technicians tallied children due for vaccination. However, 2 respondents said that community volunteers did the tallying.

Technical support supervision by the district was said to be once per quarter by 9 of the respondents, 3 respondents said that it was done once per month and 1 said only when there was a problem. According to 10 respondents, the MCH coordinator at the district came for supervision and 3 respondents said that the entire DHMT came for supervision. During supervisory visits, issues discussed according to 11 respondents included: vaccine and syringe stock out; management of immunization data; and quality of immunization sessions. However, only 2 respondents said that only management of immunization data was discussed during the visits.

After the support supervision, 10 respondents said that issues raised during supervision were addressed as soon as possible. While 2 respondents said that they had to follow up to the DHMT for solutions. Only 1 respondent indicated that they had to wait for the next visit to talk about the same issues.

Respondents (7) said that they held community meetings once per quarter, 4 respondents said they did so once per month and 2 said only when there was a problem in the community.

4.4 SECTION C: QUALITATIVE FINDINGS OF KEY INFORMANTS

4.4.1 Introduction

The information collected from the three categories of key informants has been summarized and tabulated in table 4.4.1.1.

Table 4.4.1.1 Community views of key informants

Issue	**MCH Coordinator**	**Health Centre in Charge**	**Community volunteers**
Frequency of outreach services and reasons for reducing	Only once per month per post. Initially was done weekly to different posts. Lack of funding and inadequate qualified health workers led to reduced number of times to once per month.	Initially done every week at each post but currently only once per month per post due to staff shortage.	Only once per month per post. This has created overcrowding at posts discouraging mothers/caretakers.
Community volunteer participation and reasons for inadequate participation	Not very good due to lack of motivation. Only given an allowance twice per year (during child health week)	Reasonably good, weigh children and refer to health centre when necessary.	Good though need motivation as they have to earn a living also.
Reasons for not conducting supermarket immunization services	Not done due to staff shortage	Not done due to staff shortage	Not done. We don't know why?
Health education performance	Given to mothers by community volunteers. Trained 9 years ago as growth	Given to mothers by community volunteers. Helping nurses very much as	Given to mothers by community volunteers. Need more trainings and

	promoters	there is usually only one nurse at outreach.	orientations.
Quality of outreach immunization sessions	Has not been able to follow up to monitor as supervision done jointly as DHMT	Too many mothers/caretakers at each session, waiting time too long	Too many mothers/caretakers at each session, waiting time too long. Sessions disrupted during rainy season as no permanent structures available
Possible solutions/suggestions	Adequate funding to child health services to support outreach sessions. More qualified health workers to be posted to centers	More qualified health workers to enable both outreach and supermarket immunization services.	Incentives to motivate continued community volunteer activities by the volunteers.

Table 4.4.1.1. Shows convergent views of health workers and community volunteers about frequency of outreach services, community volunteer participation, supermarket immunization services and quality of outreach immunization sessions. It has also shown some possible solutions/suggestions by the respondents.

The respondents agreed on reduced frequency of outreach immunization services provided in Kawama compound. While the health centre in charge and community volunteers indicated that community participation was good, the MCH coordinator stated that it was not very good because there was no motivation to the community volunteers. Supermarket immunization service provision was said to be lacking by the MCH coordinator and health centre in charge due to staff shortage while the community volunteers said that they did not know why.

While the three key informants agreed that health education was given to the mothers/caretakers by volunteers, these cadres were not trained to educate others on health

issues as seen by the views of the volunteers who intimated that they needed more training/orientation.

Supervision on immunization in the outreach sites was not done by the MCH coordinator as there were no resources to enable such activities. The health centre in charge and community volunteers indicated that the service was of poor quality due to overcrowding and lack of permanent structures.

Suggestions/possible solutions for improved immunization service delivery included:

- Adequate funding;
- More qualified health workers;
- Introduction of supermarket immunization service;
- Increased outreach immunization sessions; and
- Incentives for community volunteers.

CHAPTER FIVE

5.0 Discussion of findings

During the 1990s, the increase that had been observed in immunization coverage in the African Region in the previous decade dropped. Routine immunization coverage in the WHO African Region dropped to 54 per cent for DTP3 at one year of age (WHO 2008).

The RED strategy that has been implemented in Zambia has helped to increase immunization coverage in most districts while other districts still have not attained the minimum of 80 percent coverage for full immunization as per AFRO strategic plan. By the year 2008, Zambia attained only 72 percent districts reporting at least 80 percent coverage (MOH 2009).

5.1 Challenges and constraints to the study

The research was restricted to one health center catchment area in Ndola out of the twenty health facilities providing immunization services to children under-five years of age due to inadequate funding and time. This gave a restricted view of the service delivery obtaining in the entire district. It would have been better to study the whole district in order to identify salient factors obtaining in the district, pertaining to the immunization of children under the age of five years.

The focus of the study was to assess the process of implementation of RED/C strategy by Kawama Health Center. However, RED/C implementation involves five components whereby only three were looked at as the other two components of: monitoring and use of data for action and planning and management of resources are implemented sorely by the health workers. An attempt was made to assess outreach immunization services, supportive supervision and community link with service delivery (community participation), components that involves more of community involvement.

5.2 Knowledge of the EPI programme by health workers

The health workers' knowledge on EPI was assessed and the results show that the age of the respondents influenced knowing the immunization schedule in Zambia. Those above 35 years of age knew the correct schedule used for immunization than the younger respondents. Correct immunization schedule information must be provided to mothers/caretakers at any time of contact in order to promote demand for the vaccination services. Majority (12) of

respondents understood when a baby should begin vaccinations (soon after birth). However, 63 percent of mothers/caretakers understood that babies should start getting vaccinated one week after birth. This can be attributed to inadequate information given to mothers before delivery as they have linked the first week postnatal visit to starting vaccinations. Babies need to be given oral polio 0 and BCG vaccines as soon as possible after birth.

Knowledge of correct temperature for vaccine storage is one of the cornerstones of the immunization programme. Vaccines are very delicate and demand observation of the various recommended temperatures depending on the type. The recommended storage temperatures in the health facility are between +2 to +8 degrees centigrade (MOH 2004). The fact that 4 health workers (3 nurses and a clinical officer) interviewed gave wrong temperatures does not help to sustain the quality of immunization service. All health workers should know and understand the rationale for keeping certain vaccines cool while others are frozen. When health workers do not understand the right temperatures, they cannot help to monitor fridge temperatures which must be checked twice every day. In this way, significant variations in the fridge temperatures are likely not to be reported and rectified, and this could lead to vaccines losing their potency.

Majority (10) of the health workers believed that they should throw away reconstituted measles vaccine left after giving some children during an immunization session. However, recommendations by MOH (2004) state that once reconstituted, measles vaccine can be kept cool and given to subsequent children coming for the service within 6 hours and it should be thrown away at the end of the session (only those who had been working for more two years understood that they could keep it cool and use within 6 hours). Such a large number of respondents throwing away a vaccine which is costly would be an indication that orientation of health providers was not adequate in the health centers.

5.3 Immunization status of children under five years

The study revealed that children of mothers/caretakers interviewed were in various categories for immunization status. Only 51 percent (lower than the national coverage of 78%) of these children were fully immunized. However, 20 percent of the children had received the vaccines according to schedule for their age (on schedule). Children were defined as fully immunized if they received BCG and OPV, 3 doses of DPT-HepB-Hib and OPV at four weeks

intervals and measles dose before the age of one year. Those on schedule had received the required doses according to the immunization schedule for their age at the time of the interview.

In comparison with the immunization data obtained at the health facility, fully immunized children in this compound should have been on average 101 percent in 2008, this percentage does not tally with the field findings. A coverage above 100 percent has a variety of assumptions as it could indicate poor data management where tallying is done as guess work; immunizing children from outside coverage areas; and that the services is perfect hence there should not have been any children defaulting. Torun and bakirci (2006) postulate that routine data in local regions of Istanbul does not provide accurate information; hence vaccination coverage should be estimated through surveys. This was in agreement to the observations made by the researcher at the health facility's records for immunization coverage that were all above 100 percent in all quarters of 2008.

However, the study has shown that 19 percent of children in the compound had defaulted as shown in table 4.2.1.2. Defaulting children initially attended the children's clinic (an indication that there was access) where some vaccines were given and later no follow up doses were received. Failure to receive the recommended vaccines puts a child at risk of contracting vaccine preventable diseases such as poliomyelitis and measles. Furthermore, 8 percent of the children delayed receiving certain vaccines making these vaccines not useful to the recipients as the recommended intervals between first, second and third (polio and DTP-HepB-Hib) doses is four weeks apart (MOH 2004). Lack of observance of the interval for triple vaccines renders the vaccination efforts less useful.

Immunization of children under-one year in any community should strive to attain at least 90 percent coverage as targeted during the introduction of the RED strategy in Zambia. The UN General Assembly Special Session on children set targets of full immunization of children under one year of age at 90 percent nationally. This can be achieved when all communities strive to attain higher coverage rates. Attainment of at least 80 percent coverage in measles can promote herd immunity for the children below the age of five years. Harper (1962) postulates that though complete immunization of every susceptible individual is not practical in a free society, the number of immunized children in a community should at least be 80% in

order for the herd immunity to apply. This would drastically reduce the spread of infection in an outbreak situation. This target and the goals of the RED/C strategy have so far not been realized as some children still remain un- immunized in Kawama.

The study also revealed that Kawama Health Center has been recording dropout rates in the two indicator vaccines- DTP3 and Measles. In 2008, a significant drop out was observed for DTP3 in the months of May, July and August (21, 15 and 12 percent respectively), while Measles drop out was observed in the months of January, March and July 2008 (13, 20 and 36 percent respectively). WHO (2008) states that any drop out of more than 10% in each cohort is significant. Every health facility enrolls a cohort of DTP1 children monthly who should be the same number or close to the number when they receive DTP3 after three months. Low vaccination status in any country compromises the benefits of herd immunity and places under-immunized children at a higher risk of vaccine preventable diseases.

5.4 Knowledge of immunization among mothers/caretakers

Mother/caretakers interviewed in Kawama compound took their children to their local clinic or local outreach posts for vaccinations and other under five clinic services. Lack of health education about specific vaccines available and correct vaccination schedule for under five children was revealed as only 25 (12%) of mothers/caretakers responded that a baby should be given first doses of vaccines soon after birth. The fact that mothers were told to take their children for post natal review and vaccination at one week after birth, in order to encourage the '6 days' post natal visits made them believe that a baby should get first doses of vaccinations after one week after birth as seen from the 127 (63%) responses.

Inadequate information provision was linked to responses of mothers/caretakers (12%) who indicated that a child finishes vaccinations at 5 years of age. In India, according to Yadav and others (2006), fully immunized children were 63 percent while those partially immunized were 23.8 percent. Factors associated with this low coverage were cited as ignorance, inconvenience and poor health worker and client relationships. This agrees with the findings in table 4.2.4.1 where mothers/caretakers stated that some of the reasons why some children fail to complete immunizations include laziness by mothers; ignorance of value of vaccinations by mothers; congestion at immunization posts; and payment of K500 at each visit.

WHO (2004) recommends that the immunization schedule should be single doses of BCG and OPV at birth, OPV and DPT-HepB-Hib at 6, 10, and 14 weeks and measles at 9 months. This recommendation should be emphasized to the mother/caretakers in order for them to demand for the service as they would know exactly when their child needed to receive each vaccine. Inadequate knowledge about immunization schedule could lead to high dropouts and missed opportunities for vaccinations. De Quadros and other (1992) found out that the immunization schedule was marred by high dropout rates and missed opportunities for vaccinations due to lack of knowledge, difficulty getting to the health clinic, or inappropriate clinic hours. The health care worker may not have checked whether the child required any vaccination during a visit at the clinic for other reasons.

However, majority of respondents (99%) understood that it was necessary for their children to receive vaccinations as they believe that vaccines protect children from various diseases. This indicated that the community members accepted and were willing to participate in immunization services as long as they were able to access the health center or health post.
However, the fact that the health centre reduced the number of visits to outreach immunization posts from once per week to once per month was reported by both mothers/caretakers and community volunteers to have affected access as there were always a large number of people seeking to be attended to while health workers were always very few. One of the recommendations of RED/C strategy implementation was to create extra immunization posts in order to reduce the number of children being attended to at each post. Kawama health centre did not create any extra posts according to the health centre in charge, responses from health workers and the MCH coordinator from the district. Access to the health post could be facilitated by increased frequency of visits, increased number of health workers and motivated community volunteers.

Measles vaccine, according to the vaccination schedule is the last vaccine a child should receive. The responses reveal that 23 percent of mothers/caretakers either did not know when their baby should finish receiving vaccines or gave wrong ages. This could account for those whose children defaulted or delayed in getting their doses.

5.5 Participation of community volunteers in immunization

With scarce human resources and overwork, optimal co-ordination of different activities at fixed health stations and in mobile or outreach teams may almost be impossible without the strong involvement of the community (Bardenheier et al. 2004). This study revealed that the community understood the value of community volunteers in health service delivery. However, 55 per cent of the mothers/caretakers indicated that the volunteers were not given any support by the members of the community as demonstrated in figure 4.2.3.1. Members of the community should be fully involved in their children's health as volunteers or supporters of the volunteers. Immunization services needed to be integrated better into community structures in an environment of consultation between the community and health managers (Sambo 2007).

Kawama community lacked better appreciation of the role of the community volunteer as they did not give them adequate support. Those mothers/caretakers, who indicated that there was support, linked it to what the health center was doing for the volunteers such as orientation meetings. While others said they contributed K500 towards the volunteers every time there was a children's clinic. Community volunteers were the major providers of health information in the compound, when little or no support was given to them this resulted into high number of them dropping out as they needed to earn a living. When volunteers dropped out in high numbers, continuity was disturbed as there would be need to train new members, an activity that was rarely done due to resource constraints. Un- informed volunteers did not give value to the work they did in the community as inadequate or completely wrong messages could be passed on.

Though 88 per cent of the mothers/caretakers knew that there were volunteers in the community, 25 per cent of them said that no volunteer had visited them to check if their baby had received the necessary vaccines and other services. This could have been the reason why 19 per cent of the children assessed had completely defaulted from the service. The implementation of the RED strategy relies on active participation of child tracers (community volunteers) who should follow up children in their homes to assess their immunization status after every session. However in Kawama community the community registers were not being fully utilized at the time of the study. The community volunteers who were still working with the health center were trained some 9 years back by Care International as growth promoters,

whose emphasis was to weigh children in the community and advice on child care and nutrition. No child tracers were identified in the community and there had been no refresher courses for the growth promoters to enable them effectively operate in the community as child tracers.

The community volunteers were entrusted to give health education to mothers/caretakers but with inadequate information about the changes in immunization services. This could be attributed to the inadequate knowledge about specific issues on immunization that the mother/caretakers displayed during the interviews. One of the volunteers interviewed did not even know the vaccines children should receive; therefore she could not be expected to teach others what she did not understand herself.

5.6 Outreach immunization service delivery

The implementation of the RED/C strategy focused on outreach service as an essential strategy to routine immunization in all areas where populations were underserved. To conduct effective immunization services for immunization there was need for adequate supplies, trained personnel, supervision, transport and funds for payment of allowances GAVI (2002). Kawama health center reported inadequate health workers for outreach services. Outreach posts should have been increased in order to reduce congestion and distance to the post by the community. At implementation of RED/C strategy, no new posts were added to the available five posts that were still being utilized. Initially health workers used to go to each post once per week, but due to inadequate funds and staff shortage, they were only attending to each post once per month. Mothers/caretakers complained that it is very difficult to access immunization services due to congestion.

Studies carried out in Mozambique, Ghana, and Brazil have reported low vaccination coverage associated with health system related factors such as the number of days vaccination was performed and distance to the nearest vaccination posts. This study has revealed that reducing the number of days for outreach, from one per week per post to once a month per post, and lack of supermarket at the health center has affected immunization coverage. Though this study was conducted in a peri-urban area where issues of long distances do not apply, waiting time at the vaccination posts discouraged mothers/caretakers as there were always too many people waiting for the service. It was however found that 96

percent of mother/caretakers had no problems with taking their children for immunization even when their child was not feeling well. This therefore could be interpreted to mean that children defaulted mostly due to health provider reasons such as long waiting time in accessing the service and not providing clear and adequate information to them on when they should take their children for the service.

Inadequate funding resulted into reduction of the stipulated allowance for outreach services from Zambian Kwacha ZK 50,000.00 to ZK 25,000.00 per health worker per day by the District Health Management Team. The government did not provide allowances for volunteers who worked with health workers during outreach service. However, the health center tried to provide at least sugar for the volunteers to have tea; mothers/caretakers also contributed ZK 500 each towards refreshments for volunteers. This money had been viewed as deterrent for some community members who felt that the government should have given something to the volunteers who did a lot of work for the health center. The community volunteers were only paid an allowance of ZK 30, 000, 00 per day during Child health Week activities that were conducted twice per year. Dropping out from active participation by community volunteers was high in the community due to lack of incentives from the health facility as well as the community.

Outreach immunization services were also affected by lack of permanent structures. During the rainy season, outreach immunization sessions were disrupted due to heavy rains. Though the health center requested for plots from the city council for construction of permanent structures as outreach posts, they had not been allocated any. The volunteers felt that child health in the community was neglected as most NGOs that operated there tended to focus on other areas such as Malaria, Tuberculosis and HIV and AIDS, where most resources were directed to.

Lack of supermarket immunization service at the clinic where all eligible children attending clinic on any week day could be vaccinated resulted into congestion at the outreach posts as mothers did not have alternative places to visit for immunization services.

CHAPTER SIX

6.0 Conclusion

The risk of disease due to delay in vaccine administration varies, and depends on the vaccine, disease circulating, transmissibility, likelihood of importation, and severity of the outcome. Vaccination timeliness is particularly important for diseases that have the potential to cause outbreaks, such as measles (Luman et al. 2005). Various strategies and incentives have been implemented in order to improve immunization coverage rates in Zambia. However, there are still barriers to the attainment of the set goals such as that set by GAVI in 2000 of reaching ≥90% DTP3 coverage in every district in >80% of developing countries by 2005.

The objectives of the study were to find out the number of children fully immunized by their first birthday; establish the frequency of outreach immunization services; determine community volunteer participation and establish the level of knowledge about immunization by mothers/caretakers in Kawama compound. The study design used was only able to capture information at one time without providing trend analysis. The study also was only able to assess three components of REC/D strategy implementation due to time and financial constraints. There were few health workers found at the time of data collection at the health centre and this made the date collected for quantitative information inadequate for statistical analysis.

This study has revealed that only 51 percent of the children screened were fully immunized and 20 percent were following the immunization schedule. However, this figure is below the target of at least 80 percent. It is also lower than the national achieved target of 78 percent for 2008. The health centre was reported to be conducting outreach only once per month per health post, though mothers/caretakers displayed knowledge of immunization, services provision hindered their full participation. Though community volunteers were available they were not supported or motivated to participate fully in community mobilization for child health activities.

The major focus of RED strategy aimed at identifying problems and causes of low immunization coverage and planning for solutions to increase immunization coverage. Efforts to increase vaccination coverage should take into account factors that contributed to

the incomplete vaccination status of children. Various factors were identified as affecting the immunization coverage for children in Kawama compound. These include: inadequate knowledge about the vaccination programme by some mothers and caretakers; inadequate outreach immunization posts; laziness by some mothers; busy schedule due to farming and other means of survival; overcrowding at the outreach posts; inadequate qualified health workers; lack of appreciation of the roles and value of community volunteers by the community; not motivating community volunteers; and lack of permanent outreach posts for immunization sessions. Though the community had volunteers, no child tracers had been trained to manage the children's community registers which should help them identify children that missed vaccines or dropped out of the service. Without following up the children after sessions, many will continue to drop out as seen from the 19 percent of children screened who had defaulted.

The health workers felt that the immunization services could be facilitated by regular technical support supervision, increase in number of health workers involved in immunizations, adequate funding for outreach services and frequent orientation especially on new recommendations for implementation of immunization services.

6.1 Recommendations

Mothers and caretakers need more information about the value of having their children immunized. There is need to strengthen Information Education and Communication at all levels (national, provincial, district, facility and community) in order to help them make informed decisions about their children's health. Since the community volunteers provide health education to mothers/caretakers, they should be well informed about changes in the immunization programme through regular orientation sessions.

The immunization service in Kawama compound was inaccessible to the mothers/caretakers due to overcrowding during outreach sessions. Kawama community has people who survive mostly on subsistence farming and working in nearby townships as house help. These mothers/caretakers need to be allowed to choose when to take their children for the service in the community instead of being forced to attend on one day in a month. Increased sessions per month could help them attend to their means of survival as well as look after their children's health.

The health system should have enough health workers who would be able to provide the services the community desire. Provision of more outreach sessions as well as supermarket service at the health centre could only be achieved when there are adequate qualified and motivated health workers.

Supervisory visits provide opportunities for on-the-job training. Integrated supervision should not compromise the quality of and time spent on supervision of immunization services. The DHMTs should identify non regular longer visits by the MCH coordinators to promote hands on learning and improve quality of data for immunization services.

Other health providers not directly involved in immunization for children should take interest to check the immunization status of children at every contact area in order to identify defaulters or those delaying in receiving their vaccination doses. These children could then be directed to the immunization service sites for vaccination.

Training and support to child tracers will help reduce the number of children defaulting or receiving the vaccines later. These are volunteers whose focus will be on keeping of an updated community register for under five children where the vaccines will be updated as they are given to the children.

Involvement of community members in promotion of children's health by the health facility could improve the support volunteers receive from their communities. Regular community meetings not only provide feedback about services provided quarterly, but also helped community members participate in the welfare of their children's health.

Funding to the districts must be given according to the needs of each district. The government should consider the gains that can be attained in supporting preventive health interventions such as immunization. Reduced funding has affected outreach services that require allowances, human resource and transport.

Finally there is need to conduct evaluation of RED/C implementation in districts in order to facilitate sharing of lessons learnt by health providers.

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8.0 APPENDIXES

8.1 Information sheet

Dear Participant,

My name is Rosemary Masilani, a student with the University of Zambia, School of Medicine. I am here in Kawama to conduct a study that focuses on immunization of children under five years of age. I am appealing to you to take part in this study by being interviewed by either myself or my assistants.

The purpose of this study is to determine the factors that have contributed to low coverage levels for fully immunized under one year children in Ndola district. Immunization is very important in prevention of vaccine preventable diseases such as measles, polio, tuberculosis, meningitis and diphtheria. Data is being sought from you on your knowledge of immunization and some practices that obtain in relation to the immunization programme at Kawama clinic.

Voluntary Participation

Your participation in the study is purely voluntary. You are free to withdraw from the study at any time you wish to do so. Your withdrawal or non participation will not affect your relationship with your supervisors and other health workers in the district. You have the right to ask or seek any clarification from the researcher whenever you wish to do so.

Risk and benefits

This is a questionnaire based research where questions will be asked regarding your knowledge and practices obtaining in the health facilities and the community. There is no physical risk involved in this research. There are no direct benefits or monetary gain to you by participating in this study. However, the knowledge and information you will give by your participation will help strengthen the delivery of immunization services to the community.

Confidentiality

All information gathered will be highly confidential and privacy will be maintained at all times. The research information will be disseminated to the relevant authorities but no such information released will lead directly to you as anonymity will be maintained.

8.2 Consent form

The purpose of this study has been explained to me. I further understand that: if I agree to take part in the study, I can withdraw at anytime without having to give an explanation and that taking part in this study is purely voluntary.

I…….consent to participate in the study that has been explained to me.

Signature …….... Date ……

Or thumb print…….....Date……..

Name of **witness**……signature……Date……

Name of **interviewer** ……

Signature ……..Date ……

If you wish to seek any clarification, please call at the following address:-

Ms. Rosemary Masilani

UNZA- Dept. of Community Medicine

Lusaka Or

Ministry of Health

Health Promotion Unit

Box 30205

Lusaka. Phone: 0977355385

For any ethical clarification please contact:-

The University of Zambia E-mail: unzarec@zamtel.zm

Research Ethics Committee Fax: +260-1-250753

P.O. Box 50110 Tel. no. 01 256067

Lusaka, Zambia

8.3 In-depth interview schedule for mothers/caretakers

DETERMINANTS OF IMMUNIZATION COVERAGE OF CHILDREN UNDER FIVE YEARS IN KAWAMA COMPOUND OF NDOLA URBAN DISTRICT

Instructions:

a. **Introduce yourself to the respondents**
b. **Explain the objective of the research and the benefits to the respondents**
c. **Obtain consent from the interviewee to proceed with the interview.**
d. **Check that the mother/caretaker has a child under five**

SECTION A: IMMUNIZATION KNOWLEDGE

1. Where do you usually take your child for children's clinic?.....
2. How often do you take your child to the clinic for vaccinations?.....
3. At what age should your child start getting their vaccinations?.....
4. Can you mention the names of the vaccines given to children soon after their birth?

.....

5. What diseases do these vaccines protect the children from? (list according to response).....
   .....
6. Is it necessary for your children to receive vaccination, if so why?.....
   .....
7. At what age should a child receive the measles vaccine?.....
10. At what age should a child have finished receiving their Vaccinations?.....
11. Should you take your child to the vaccination clinic even when they are not feeling Well?
    YEs.....
    No.....

    If not why?.....

12. How many weeks should pass before you take a child for the next dose of DPT-HepB- Hib? (An injection given three times which protects your baby from five diseases) .....

SECTION B: IMMUNIZATION STATUS DATA

14. When was your child born? .....

15. How many vaccinations has the child received since birth?.....

(Please check under- five cards and record the vaccinations received)

BCG..... (**Tick vaccine received, also indicate dates**)

OPV0.....

OPV1.....

OPV2.....

OPV3.....

DPT-HepB-Hib1.....

DPT-HepB-Hib2.....

DPT-HepB-Hib3.....

Measles.....

SECTION C: COMMUNITY VOLUNTEER ACTIVITIES

17. Can you tell me the community activities conducted by the health workers from your local clinic?.....

18. Do you have community health volunteers in your community?

Yes.....

No .....

19. If you do, what activities do these volunteers do in the community?

.....

.....

20. Does the community volunteer near your home come to check if your child has received the necessary vaccines every month?

Yes.....

No.....

21. If not, how does the health workers identify which children have Not received vaccines.....

22. In your own view what other activities should community volunteers engage in for your children's health.....

.....

23. What kind of support is provided to the community volunteers by the community

members?.....

24. What suggestions do you have for the improvement of children's clinics including outreach services?

.....

.....

.....

SECTION D: OUTREACH VACINATIONS ACTIVITIES

25. When was the last time health workers from your local clinic came to conduct children's clinic in Kawama?.....

26. How many vaccination outreach posts are operating in Kawama? .....

27. What services are provided by the health workers at these outreach immunization posts?.....

.....

28. Do mothers and caretakers go to the outreach posts for health services of their children?

Yes.....

No.....

29. If they do not go, why do you think they don't?.....

.....

30. In your own view, what do you think prevents mothers from having their children get all the vaccinations they need?.....

.....

.....

Thank you for your time!

8. 4 Questionnaire for health workers

DETERMINANTS OF IMMUNIZATION COVERAGE OF CHILDREN UNDER FIVE YEARS IN KAWAMA COMPOUND OF NDOLA URBAN DISTRICT

Dear respondent,

This is a self administered questionnaire, however, the interviewer is available to provide clarifications where needed.

Identification no…….

Name of health centre…….

SECTION A: DEMOGRAPHIC DATA

question number	content	CODE
01	What is the age of respondent?	
	a. 20 to 25 years ( )	1
	b. 26 to 30 years ( )	2
	c. 31 to 35 years ( )	3
	d. Above 35 years ( )	4
02	What is the sex of the respondent?	
	a. Male ( )	1
	b. Female ( )	2
03	Professional qualification	
	a. Nurse ( )	1

	b.Clinical officer ( )	2
	c.Environmental health officer ( )	3
	d.Other (specify)……	4
04	How long have you worked at this clinic?	
	a. Less than six months ( )	1
	b.Six months to one year ( )	2
	c. One year to two years ( )	3
	d.More than two years ( )	4
SECTION B: Knowledge of expanded programme on immunization		
05	At what age should a newborn baby start receiving vaccinations?	
	a. Soon after birth ( )	1
	b.At six weeks ( )	2
	c.At nine months ( )	3
	d.At any time the mother wishes to bring the child ( )	4
06	Which is the correct immunization schedule in Zambia?	
	a.OPV1 and BCG; OPVand DPT-HepB-Hib1; OPV and DPT- HepB-Hib2; OPV and DPT-HepB-Hib3; Measles ( )	1
	b.BCG and OPV ; OPVand DPT-HepB-Hib; OPV and DPT-HepB- Hib; OPV and DPT-HepB-Hib; Measles ( )	2

	c.OPV0 and BCG; OPV1and DPT-HepB-Hib1; OPV2 and DPT-HepB-Hib2; OPV3 and DPT-HepB-Hib3; Measles ( )	3
	d.Measles; OPV0 and DPT-HepB-Hib1; OPV1; OPV2 and DPT- HepB-Hib2; OPV3 and DPT-HepB-Hib3. ( )	4
07	What is the ideal age for giving Measles vaccination?	
	a.At six months ( )	1
	b.At seven months ( )	2
	c.At nine months ( )	3
	d.At one year ( )	4
08	What type of vaccines are measles, and poliomyelitis?	
	a.Attenuated live organisms ( )	1
	b.Killed organisms ( )	2
	c.Toxins ( )	3
	d.Combination of the above three ( )	4
09	What is the recommended temperature for storage of vaccines?	
	a.0 to +8 degrees Celsius ( )	1
	b.+2 to +8 degrees Celsius ( )	2
	c.+4 to +10 degrees Celsius ( )	3
	d.-2 to -8 degrees Celsius ( )	4
10	What should be done to leftover reconstituted measles vaccine?	
	a.Put back in the fridge for use later ( )	1
	b.Kept until next immunization session ( )	2

	c.Thrown away ( ) d.Kept cool and used within 6 hours of reconstitution ( )	3 4
SECTION C: Immunization activities being conducted		
11	Do you provide vaccinations on daily basis at this centre? a.Yes ( ) b.No ( )	 1 2
12	If no to question number 11 above, how many days in a week do you vaccinate? a.One ( ) b.Two ( ) c.Three ( ) d.Four ( )	 1 2 3 4
13	What do you understand by the term supermarket for immunizations? a.Vaccinating all children who visit the centre ( ) b.Vaccinating eligible children when they visit centre ( ) c.Waiting for the scheduled days to provide vaccinations ( ) d.Sending children to the supermarket before immunization ( )	 1 2 3 4
14	How many times in a month do you go for outreach immunization services at each post?	

	a.Once a month ( ) b.Only during child health week ( ) c.Once per quarter ( ) d.None ( )	1 2 3 4
15	How many functioning outreach immunization posts has the clinic created since introduction of RED strategy? a.None ( ) b.Two ( ) c.Three ( ) d.More than three ( )	 1 2 3 4
16	How many community volunteers are working with the health centre for immunization? a.None ( ) b.Five ( ) c.Ten ( ) d.More than ten ( )	 1 2 3 4
17	What activities are being conducted by the community volunteers a.Weighing children monthly at their posts? ( ) a.Giving vaccinations ( ) b.Holding political meetings ( ) c.Nothing ( )	 1 2 3 4
18	How many children are immunized at each outreach session? a.Less than ten ( ) b.Between ten and twenty ( )	 1 2

	c.Between twenty and thirty ( )	3
	d.More than thirty ( )	4
19	On average how long do mothers have to wait at a vaccination session for their children to be vaccinated?	
	a.Less than thirty minutes ( )	1
	b.Between thirty minutes and one hour ( )	2
	c.Between one and three hours ( )	3
	d.More than four hours ( )	4
20	How many qualified health workers attend to mothers for immunization at each session?	
	a.One ( )	1
	b.Two ( )	2
	c.Three ( )	3
	d.More than three ( )	4
21	During the last year how many vaccines were out of stock in any quarter?	
	a.None ( )	1
	b.One ( )	2
	c.Two ( )	3
	d.More than two ( )	4
22	During the last one year how often did your clinic have a shortage of syringes and needles?	
	a.None ( )	1

	b.One month ( ) c.More than one month ( ) d.More than one quarter ( )	2 3 4
23	At what level during the immunization session do you give health talks? a.Immediately there is enough mothers waiting for service(beginning of session) ( ) b.Give to individual mothers whenever they come for service ( ) c.At the end of the sessions ( ) d.None at all ( )	 1 2 3 4
24	What kind of health talks do you give to mothers/caretakers? a.Anything that comes to the mind of the health worker ( ) b.Talks are planned and scheduled according to what is obtaining( ) c.Health talks focused on what is happening in the community ( ) d.Number b and c above ( )	 1 2 3 4
SECTION D: Immunization data management		
25	What kind of record is being kept at this clinic for immunization? a.Immunization charts, immunization registers, tally sheets, vaccine stock control cards, aggregation forms ( ) b.Hard cover books, clinic outpatient registers, children's under five card. ( ) c.None ( )	 1 2 3
26	Does the clinic have community registers for children under five at	

	the immunization posts? a.Yes ( ) b.No ( )	 1 2
27	If yes to question number 23, how often do the community volunteers update the Clinic register? a.Once per week ( ) b.Once per month ( ) c.Once per quarter ( ) d.None ( )	 1 2 3 4
28	If no to question 23 above, how are the defaulting children followed up? a.Not followed at all ( ) b.Wait for mothers to come to the clinic ( ) c.Do not know ( ) d.Use of exercise books ( )	 1 2 3 4
29	Which data is used by the clinic for calculation of expected children for Immunization each year? a.Central Statistical Office figures ( ) b.Head count by the community volunteers ( ) c.Both a and b ( ) d.None ( )	 1 2 3 4
30	Who is responsible for tallying of vaccines given to children? a. Nurse/Co/EHT ( )	 1

	b. Community volunteer ( )	2
	c. CDE(Clerk/Maid/Guard) ( )	3
	d. Data Entry Clerk ( )	4
SECTION E: Supervision		
31	How many times does the District Health Office come to conduct support supervision?	
	a.None ( )	1
	b.Once per month ( )	2
	c.Once per quarter ( )	3
	d.Only when there is a problem ( )	4
32	How many times do you go out to hold community meetings with volunteers?	
	a.None ( )	1
	b.Once per month ( )	2
	c.Once per quarter ( )	3
	d.Only when there is a problem ( )	4
33	During the past quarter, which officer(s) visited MCH department?	
	a.District Director of Health ( )	1
	b.District MCH Coordinator ( )	2
	c.Environmental Health Officer ( )	3
	d.All the above ( )	4
	e.None ( )	5

34	During the support supervision visits what issues are raised?	
	a.Vaccine and syringes stock out ( )	1
	b.Management of immunization data ( )	2
	c.Quality of immunization sessions ( )	3
	d.All the above ( )	4
35	From the raised issues during support supervision, what is the reaction of the district officers?	
	a.Address issues as soon as possible ( )	1
	b.Nothing is done ( )	2
	c.Have to follow up to DHMT for solutions ( )	3
	d.Wait for next visit to talk about same issues ( )	4

END OF QUESTIONNAIRE

THANK YOU FOR YOUR TIME

8. 5 Focus group discussion guide for community volunteers

DETRMINANTS OF IMMUNIZATION COVERAGE OF CHILDREN UNDER FIVE YEARS IN KAWAMA COMPOUND OF NDOLA URBAN DISTRICT

Instructions:

a. **Introduce yourself to the respondents**
b. **Explain the objective of the research and the benefits to the respondents**
c. **Obtain consent from respondents to proceed with the interview**

Guiding questions

1. For how long have you been working as a community volunteer?
2. When were you trained to be a child tracer apart from your usual growth promotion activities?
3. Mention all the vaccines that children should receive and at what age?
4. Explain the immunization schedule in Zambia.
5. What is the time interval between DTP-HepB-Hib1 and DTP-HepB-Hib2?
6. Discuss the community activities conducted by health workers from this clinic on immunization.
7. How do you conduct defaulter tracing activities?
8. Where is the child health community register kept and why?
9. List all the voluntary activities you conduct in the community?
10. How many outreach posts are in Kawama catchment area/
11. How frequently do you weigh children at these posts?
12. Who is involved tallying weighed children and those due for immunizations?
13. In your own views, what makes some mothers fail to take their children for vaccinations?
14. What suggestions do you have for improvement of immunization programme in your community?

8. 6: Work plan

1.0 Preparation and submission of proposal

2.0 Recruitment and training of research assistants

3.0 Data collection

4.0 Data entry and analysis

5.0 Report writing

6.0 Submit draft report

7.0 Submit final report

8.7 Gantt chart

No.	Activity	Dec	Jan	Feb	Mar	Ap.	May	June	Jul	Aug	Sept	Oct	Nov	Dec
1.0	Prep.& sub proposal	**	**	***	**	**								
2.0	Train Res. Ass.						*							
3.0	Data collection						**							
4.0	Data entry and analysis							****	****					
5.0	Report writing									***	****			
6.0	Submit draft report											***	***	
7.0	Submit final report													*

8.8 Study budget

No	Item	Quantity	Unit cost	Total cost	Remarks
1	Stationary		500,000	500,000	
2	Secretarial service		500,000	500,000	Payment for secretary
3	Transport		2,000,000	2,000,000	for researcher to study area
4	Perdiem for researcher	1x 14 days	290,000	4,060,000	For board and lodge for researcher in study area
5	Train research assistants	1 day	150,000	150,000	Refreshments & trans.
6	Payment for research assistants.	2x10 days	100,000	2,000,000	Trans. & lunch for research assistants
7	Data analysis	1	500,000	500,000	Payment of statistician
8	Report writing		1,000,000	1,000,000	For photocopying, printing and binding
9	Miscellaneous	10%	1,071,000	1,071,000	
	Total cost			**11,071,000**	

Justification for the budget:

A) Personnel and allowances

These are required for the pre testing of the research instruments in order to refine the instruments. They will also help in the collection of data. There will be need for a secretary who will type the work and a data analysis specialist will be required to enter data and analyze for report writing.

B) Supplies and equipment

These will be used during the typing, printing, photocopying and production of the proposals, the final report and its copies for distribution.

C) Transport

The researcher will need transport to the district as well as within the district for data collection. Research assistants will also require transport within the district as they assist with data collection.

D) Lodge and board

The researcher will need accommodation and food during the time of data collection in the district. The research assistants will be paid lunch and transport allowances.

E) Miscellaneous

10 per cent of the total budget is required for any shortcomings the researcher may encounter during the research.