

**INVESTIGATING UNDERLYING REASONS FOR EXCESS VACCINATION
COVERAGE IN PHALOMBE DISTRICT**

Master of Science in Environmental Health

(MSc EH)

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(BSc in Environmental Health)

**A thesis submitted to the Department of Environmental Health, Faculty of Applied Science
in partial fulfilment of the requirements for the degree of Master of Science in
Environmental Health (MSc EH)**

October, 2017

DECLARATION

I declare that this research entitled “**Investigating underlying reasons for excess vaccination coverage in Phalombe District**” is my own work. It is submitted in the partial fulfillment of the requirement for the Master of Science Degree in Environmental Health at the Polytechnic, University of Malawi. It has not been submitted for any other degree to any University before.

Signature

Date: December, 2017

CERTIFICATE OF APPROVAL

We, the undersigned, certify that we have read and hereby recommend for acceptance by the University of Malawi a thesis entitled **‘Investigating Underlying Reasons for Excess Vaccination Coverage in Phalombe District’**

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Dean – Postgraduate: _____

Signature : _____

Date : _____

Head of Department : _____

Signature : _____

Date : _____

DEDICATION

This Thesis is dedicated to my children Shazia and Shiraz. I am always encouraged to work hard when I see them. To Allah (Almighty God) I cherish their presence.

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ABSTRACT

Introduction: Immunization helps to prevent diseases known as vaccine preventable diseases to children. However, this is more effective when the immunization coverage is high (Coverage of above 90 %). Phalombe district is one of the districts with high vaccination coverage. Most of the health facilities have been registering an excess coverage of above 100 % and the reasons were being investigated for such excess coverage.

Objectives: The broad objective of the study was to investigate the underlying reasons for excess vaccination coverage in Phalombe district.

Methods: The study was conducted in 8 health facilities which were selected randomly across the district. The sample size of 134 of which 125 were clients from health facilities with both excess and normal vaccination coverage, 8 Health Surveillance Assistants and 1 Expanded Program on Immunization coordinator. Data was collected using survey questionnaires and self-administered questionnaires.

Discussions: There were disparities of data from the District and health facilities. The district reported higher coverage than health facilities. Most people (96.8 %) were able to access immunization services. However, there are more people accessing the services from outside Phalombe. Most of the clients recommended the way the health workers treat them during vaccination clinics. The good behaviour of the health workers contributed positively to the turn up of most of clients for vaccination services.

Results: The reasons for excess vaccination coverage were due to poor management of vaccination data, use of small target population (denominator) because some clients (48 %) were from outside the district. This denominator did not capture clients from outside the district. The district had also been providing quality vaccination services to the clients and these services attracted more clients even from outside the district.

Conclusions: The revision of district vaccination denominator (target population) and validation of district and health facilities vaccination data can address the problem of excess vaccination coverage in Phalombe. The coverage should be within acceptable margins of not more than 100%.

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ABBREVIATIONS AND ACRONYMS

AEFI	Adverse Events Following Immunization
BCG	Bacille Calmette-Guerin
DEHO	District Environmental Health Officer
DHO	District Health Office/r
EPI	Expanded Program on Immunization
FIC	Fully Immunized Child
GAVI	Global Alliance for Vaccines and Immunizations
H.S.A	Health Surveillance Assistant
JSI	John Snow Inc.
MCSP	Maternal and Child Survival Program
MSD	Measles Second Dose
MYP	Multi Year Plan
NSO	National Statistics Office
OPV	Oral Polio Vaccine
PCV	Pneumococcal Conjugate Vaccine
Penta	Pentavalent vaccine
Rota	Rota Virus vaccine
UNICEF	United Nations Children's Fund
VPD	Vaccine Preventable Disease
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background information

Immunization and vaccination services are very important issues in Malawi. The Expanded Program on Immunization (EPI) is responsible for such services in the country. Vaccination is given to children especially under one in order to prevent diseases known as Vaccine Preventable Diseases (VPD). These diseases include poliomyelitis, measles, pneumococcal, tuberculosis, diphtheria, and pertussis, diarrhea caused by rotavirus, haemophilus influenza B, hepatitis B virus infection and neonatal tetanus. Vaccination activities are the most powerful and cost-effective activities in the prevention of childhood morbidity and mortality (Ministry of Health, Expanded Program on Immunization, 2012). As suggested by World Health Organization, UNICEF and World Bank (2009), “vaccine, with the exception of safe water, no other modality, not even antibiotics has had such a major effect on mortality reduction”. This shows that Sustainable Development Goals formerly known as Millennium Development Goal 4, which talks about reduction in child mortality, can greatly be met if the status of immunization (vaccination) coverage is good, (high). The World Health Organization through Ministry of Health recommends the coverage of above 90% in all districts in Malawi. A child is said to be fully immunized when he/she gets vaccinated with all these antigens and has followed a proper schedule. This comprises at least 1 dose of Bacille Calmette Guerin (BCG), 4 doses of Oral Polio Vaccine (OPV), 3 doses of Hepatitis B- Haemophilus Influenza B vaccine (Pentavalent), 3 doses of Pneumococcal Conjugate Vaccine 13, 1 dose of Measles vaccine and 2 doses of Rotavirus vaccines. Monitoring of vaccination coverage is very important and crucial. Utilization of vaccine is measured by measuring the coverage rate. As a policy, vaccination coverage for all the countries needs to be above 80 %. Routine vaccination coverage in Malawi is above 85% since 2008 and most of the districts are now reporting the coverage of above 80 % in all antigens. This is a clear indication that vaccine utilization is good in the country (Ministry of Health, Expanded Program on Immunization, 2012).

Phalombe district is one of the districts with high vaccination coverage in the country. It has a coverage of above 100 % in most antigens. This has over the time been regarded as a major achievement. However, excess vaccination coverage of above 100% may not only be regarded as

a good achievement because it may bring its own problems hence needs to be monitored so that the reasons behind such excess coverage are established. In a normal situation, a coverage of 100% would be ideal and is supposed to be the highest vaccination coverage in the district which is doing well. The 100% coverage would explain that all the eligible children for vaccination are offered this service. This research was designed to find out the reasons behind such excess vaccination coverage of above 100% in Phalombe district.

1.2 Problem Statement

For the past ten years, Phalombe district has recorded excess vaccination coverage more than any other district in the South East Zone. The South East Zone comprises Mangochi, Machinga, Balaka, Zomba, Mulanje and Phalombe districts. Excess vaccination coverage of above 100% has been reported from many health facilities and this is becoming a normal trend for the district coverage.

Table 1: A snapshot of 2013 vaccination campaign in Phalombe

No	Vaccine	Target population	Population reached	Coverage in %
1	Measles	53, 293	63,460	119
2	Polio	60, 403	69, 919	116
3	Vitamin A	56, 850	65, 343	115
4	Albendazole	48, 322	60, 926	126

Source: (Ministry of Health, Phalombe Expanded Program on Immunization report, 2013)

Low vaccination coverage of below 80 % is regarded as a problem according to the WHO immunization coverage standards. This has prompted many researchers and scholars to conduct series of study on low coverage of vaccination in many districts in Malawi. However, excess vaccination coverage could also bring its own problem and the most notable ones include inadequate resource allocation to districts such as vaccination supplies and inadequate human resource for health workers. Unlike those studies on low coverage, this study has dwelled much on the reasons behind excess vaccination coverage of above 100% in Phalombe district. Excess

vaccination coverage has not been reported in Phalombe district alone. Some districts have also reported this and have contributed to excess coverage at national level for other reported antigens and periods. For example, EPI program reported an excess coverage of antigens of BCG, OPV and Pentavalent as shown below:

Table 2: Excess vaccination coverage at national level

Coverage of the year in %			
Antigen (vaccine)	2008	2009	2010
BCG	97	95	110
OPV	92	93	102
Pentavalent	91	93	102
Measles	88	92	99

Source: (Ministry of Health, Expanded Program on Immunization Multi Year Plan, 2012)

So, looking at the current vaccination status of Phalombe, it may not only just bring joy to the service providers but also consider what problems could arise due to such excess vaccination coverage and most importantly, the reasons behind such a trend.

1.3 Research objectives

1.3.1 Main objective

The main objective was to investigate underlying reasons for excess vaccination coverage of above 100 % in Phalombe district, Southern Malawi.

1.3.2 Specific Objectives

The specific objectives were to:

1. Assess the management of vaccine data in the district.
2. Determine the accessibility of immunization services in the district.
3. Assess the level of knowledge on vaccination among parents/ caregivers in the district.

4. Assess the quality of vaccination services offered in the district.

1.4 Research hypothesis

The following were the study hypothesis;

1. Management of vaccine data is a problem of health facilities in the district.
2. Some clients accessing the immunization services come from the catchment area outside Phalombe.
3. Caregivers have adequate knowledge on immunization services.
4. Health facilities in the district offer good immunization services.

1.5 Significance of the problem

The research explored the underlying reasons for such excess vaccination coverage in Phalombe district. This would assist the district service providers and other involved stakeholders to bring interventions that would also address the problem. Also, the findings would address some concerns raised by partners implementing immunization services on this excess vaccination coverage in the district.

CHAPTER TWO

LITERATURE REVIEW

2.1 Vaccines and its utilization in Malawi

Issues of vaccination coverage need to be addressed holistically when monitoring vaccines consumption and utilization in the country. Utilization of vaccines in Malawi is measured through the use of pentavalent vaccine and when this pentavalent vaccination coverage is above 85 %. This means vaccine utilization is good (Ministry of Health, Expanded Program on Immunization, 2015). Malawi as a country recommends that all vaccine antigens coverage should range from 85 % to 100 %. However, good vaccine utilization does not suggest that the coverage should go beyond 100%. Going beyond 100% simply means targeting non-existing clients of a particular catchment area. Malawi is currently providing seven childhood vaccines to all under-one children. These include BCG, OPV, HepB- Hib (Pentavalent), PCV13, Measles and Rotavirus vaccines. As a policy, every child is supposed to be vaccinated with all the mentioned vaccines before their first birthday. A vision of Malawi EPI is **“to keep Malawian children free from vaccine preventable diseases”**. This vision can only be achieved if the country has high vaccination coverage of above 90 %. The program’s mission is **“to reduce the infant morbidity and mortality rates due to vaccine preventable diseases by providing quality immunization services”** (Ministry of Health, Expanded Program on Immunization, 2012). Many countries including Malawi are a signatory of United Nations and are in the course of addressing and achieving Sustainable Development Goals formerly known as Millennium Development Goals. Reducing Child Mortality is MDG 4 and once a country prevents children’s death, it means the country is taking good direction in addressing Goal number 4.

2.2 Management of vaccination data and its quality in the districts

The vaccination data is supposed to be managed properly. This is important because the data is supposed to be used in decision-making. Another parameter that also needs to be given attention is the data quality. It is only quality data that can be useful when making decisions. EPI as a program has several priorities. However, it is emphasizing much on having sustainable high routine immunization coverage, improving documentation and data management and improving issues of monitoring, supervision and feedback on the facilities with lower immunization coverage. Much as I would like to agree with this, I also believe that it is not only low

vaccination coverage that needs monitoring, but also the issue of excess immunization coverage. There are several reasons for doing this. However, the following are most important; proper planning in terms of vaccination supplies, human resource deployment, and policy implication on such coverage because these are free services from government to its citizens, issues of cross boarder and ensuring that the data is correct. EPI has reported a number of weaknesses encountered by the program. One of them is the issue of poor documentation of vaccine doses used by health workers in some health facilities,(Expanded Program on Immunization, 2012). As reported by Brown, Burton, Dobo and Karimov (2014), “Population data are the central input in immunization coverage and therefore deserving of great attention”. This means that data management is very important as far as this program is concerned. Investigation of the quality of data is necessary to establish reality. It has been a challenge to come up with realistic immunization targets for most programme managers. This has contributed to the use of wrong denominator as a target population which at the end may give the excess immunization coverage of above 100%. One of the most known reasons for having a target population is to set boundaries for coverage. In situations where such boundaries are exceeding, an investigation on data management and other reasons should be conducted(Brown,et al., 2014). For example, some Health Surveillance Assistants submit EPI monthly reports late. This tendency may force them to present false data and obviously, if it is an immunization report, they may choose to document high coverage other than the lower coverage in order to avoid being queried or just to please their supervisors. Some health facilities have repeatedly reported excess vaccination coverage of above 100 % and this research question is centered on this in order to find out why the district is different from others in terms of vaccine coverage performance.

In 2008/9, the Republic of South Africa conducted a survey where they were looking at the immunization coverage from 52 districts. Out of these 52 districts, 22 had a coverage of 90% which was in line with a global target on immunization coverage. However, half of the districts had a coverage of above 100 % and this raised some questions. The questions which were raised had to do with data quality and the numerator and the denominator used when calculating the coverage (Ministry of Health, Republic of South Africa, 2007).This is a clear indication that immunization coverage for health facilities and districts is not supposed to go beyond 100% and when such a coverage is recorded, the reasons behind should be investigated. This is similar to

the coverage in Phalombe district where most of the health facilities have coverage of above 100%. This too demands for investigation.

It is also argued that one of the evidence of poor data accuracy is when the vaccination coverage goes beyond 100 %. According to World Health Organization (2015), low data accuracy includes excess coverage of above 100%, erratic fluctuation year in, year out and the occurrence of disease outbreaks in an area where the vaccination coverage is high. Phalombe as a district has not been spared with the occurrence of outbreaks despite registering the excess coverage of above 100%. This was the reason for conducting an investigation on district vaccination coverage.

2.3 Vaccination services accessibility in Phalombe

Despite the issue of data management, Phalombe as a district also needs to consider cross boarder issues. Phalombe marks the boundary between Mozambique to the eastern side, Mulanje to south-west and Zomba to north-west. Most places in Mozambique have no health facilities in the borders. This may force the Mozambicans to flock to Malawi health facility in order to seek for health services. Clients in Mozambique may also access health services in some neighbouring districts of Malawi due to factors like availability of outreach clinics within the boundaries, frequency of conducting such clinics, consistency and availability of vaccination supplies.

As it may be accepted and celebrated that the country is doing fine, such excess coverage can be due to the reasons mentioned above. Coverage of above 90 % would be the most appropriate because this depicts the ideal target population and has been the target for immunization coverage for countries by the year 2015 (World Health Organization, 2010). “Coverage levels in excess of 100% are occasionally reported. While these levels are theoretically possible, they are usually the result of systematic error in the numerator or denominator, a mid-year change in target age groups, or inclusion of children outside the target age group in the numerator. The highest coverage estimate is 99%” (Brown, et al., 2014).

2.4 Knowledge of mothers/ caregivers on vaccination services

High vaccination coverage can also be attributed to increased knowledge of the community. Vaccination services are offered to the community as a way of preventing disease occurrence (VPDs) and the uptake of such preventable services may depend on the mothers/ caregivers knowledge. Inadequate knowledge level may hinder the services to reach the majority while

adequate knowledge will promote the high vaccination uptake. Vaccination knowledge by mothers/ caregivers really plays an important role as far as their children vaccination status is concerned (Yu, 2015). People in the community need to have information on the importance of vaccination services and the benefits they get when their children are vaccinated. The benefits may include the diseases being prevented and the risk one may have if not vaccinated. Vaccination services have met several challenges in order to meet its desirable coverage. One of the challenges is lack of awareness. People lack information and have fears about the use of vaccines (Pang, 2011). For example, mothers with formal education are more likely to take their children for vaccination unlike those with no formal education (Bowie, Mathanga & Misiri, 2006). So, by looking at the excess coverage in the district, it could be possible that education has played a vital role in vaccination services for the district.

2.5 Quality of vaccination services offered by districts

Issues of quality on immunization services need full attention as far as health service delivery is concerned. People want health services which take care of their concerns. For example, when vaccinating children, AEFI needs to be minimized as much as possible. Some studies that looked at the quality of immunization services have reported that when vaccination providers were knowledgeable, friendly and gave technical support to clients, the rating of quality of services were good and vaccination coverage was high (Perry, Weierbach, El-Arifteen, & Hossain, 1998). Another concern is the unnecessary cancellation of outreach clinics. The community needs the system which is functional, uninterrupted and trusted. Outreach cancellation will reduce the vaccination coverage to reach the desired target as those clients missed during one session may choose not to come back during the next visit. If indeed the cancellations of clinics could be avoided in the district, they are rescheduled within 7 days when cancelled and the coverage would be high. Experience has shown that the vaccination sites which are cancelled now and again fail to vaccinate all their target population as the community is frustrated with the performances of clinics. Quality of vaccination services can also be measured based of the supply availability. Erratic vaccine supplies and related items have a big impact on vaccination coverage. The shortage negatively affect the coverage and the end result is low vaccination coverage (Assija, Singh, & Sharma, 2012).

Monitoring of defaulter tracing in the vaccination services is also important. If the district uses a good mechanism for tracing defaulters, the chances of excessive coverage is high. Defaulters are monitored using village health registers and reminder cards. So, every client is followed if he/she does not turn up for the next vaccination session (Ministry of Health, Expanded Program on Immunization, 2012).The districts which do this manage to vaccinate all its clients and may even go beyond their catchment area and end up registering excess or high vaccination coverage.

CHAPTER THREE
MATERIALS AND METHODS

3.1 Introduction

This is a study under Positivism philosophy as it finds reasons behind excessive vaccination coverage.

3.2 Study variables

The table below summarizes the study variables for this research.

Table 3: Study variables

No	Dependent variable	Independent variable
1	To assess vaccination data management	<ol style="list-style-type: none"> 1. Data archiving (storage and availability) 2. Vaccine coverage differences between health facilities and the district
2	To determine accessibility of vaccination services	<ol style="list-style-type: none"> 1. Distance to reach vaccination sites by clients. 2. Time taken to reach the vaccination sites by clients 3. Places where clients come from for vaccination services apart from those within the district?
3	Knowledge level of clients receiving vaccination	<ol style="list-style-type: none"> 1. Level of education of clients 2. Ability to explain the benefit of vaccines 3. Ability to mention names of vaccines
4	Quality of vaccination services	<ol style="list-style-type: none"> 1. Attitudes of health workers towards clients 2. Availability of vaccination supplies 3. Cancellation of outreach clinics

3.3 Study area

The study was conducted in Phalombe district. The district has a total population of 357, 387 people (National Statistics Office, 2015). It serves its population through 16 health facilities. Most people in Phalombe district are Christians (93.6%), 1.3% are Moslems and 5% belongs to other religions. The population growth rate of Phalombe is 3.1%. The major ethnic groups in Phalombe are Lomwe 80%, Mang'anja (Nyanja) 15% and Yao 3 %(National Statistics Office, 2011).

The district borders Zomba district to the north and north-west, Mulanje district to the south-west and Mozambique on the eastern side. It is believed that some health facilities in the district are overcrowded because of the people from the neighbouring districts and Mozambique. Most of the facilities close to the boundaries of Mozambique register excess vaccination coverage of above 100%. In the areas close to the boundaries of Mulanje and Zomba districts, the health facilities have also been registering the vaccination coverage of above 100% and this has raised questions on who the clients are and where they do come from despite the district having its own annual projected population. It is against this background that Phalombe was chosen for the study.

3.4 Study design

It was a cross section study because it was conducted in selected health facilities in the district.

The study was designed in such a way that useful data was collected from both the targeted respondents and the secondary data from vaccination report forms whose information was used to explain the situation on the ground.

3.5 Study population and sample size

The study comprised of the following groups;

1. Caregivers / clients receiving vaccines during the vaccination services at static and outreach clinics.
2. Health Surveillance Assistants or Disease Control Surveillance Assistants who are EPI focal persons at facility level.
3. District EPI Coordinator.

The study included these groups of people based on their involvement and experiences with vaccination services. Clients were very important and were included because all the information on accessibility, knowledge and quality of services had to come from them. Exit interviews were conducted with clients (caregivers) receiving vaccination services in both outreach and static clinics to establish where they came from, their knowledge on vaccination services and quality of services they received from the health workers in different clinics. These clients were able to mention the name of the village where they came from and HSAs who were present during the vaccination clinic assisted the research team to verify the information and identify the village as whether it was located in Phalombe, Zomba, Mulanje or Mozambique. This assisted in minimizing lying by clients in relation to their place of residence.

Health Surveillance Assistants/ Disease Control Surveillance Assistants provided the information on data management as they are the ones who compile the reports submitted to the district. They also provided the information on quality of services based on the performance of outreach clinics and the consistent availability of vaccination supplies.

The EPI district coordinator is the overseer of the immunization services and it was vital to include him in the study in order to provide information on data management at district level and the availability of vaccination supplies. He also acted as a pillar for this study because he is the custodian of the data reported at nation level.

Sample size had to be controlled during this study due to financial constraints and time limit for the study.

A research sample needs to be controlled as it is difficult to include everyone in the study. Sample sizes larger than 30 and less than 500 are appropriate for most research activities (Sillignakis, 2011).

$$\text{Sample Size: } n = Z^2 pq / d^2$$

Where z = Std normal deviation, p = national vaccine coverage, q = coefficient of national vaccine coverage and d = error margin

$$1.96^2 \times 0.9 \times (1 - 0.9) / 0.05^2$$

$$3.8416 \times 0.9 \times 0.1 / 0.0025$$

$$= 138$$

Based on the formula above, the eligible sample size which was supposed to be used was 138. Despite having three groups of respondents, the sample size included all the groups together because the study analysis did not separate the specific category of respondents. Also, the number of respondents on Health Surveillance Assistants and the Coordinator was already known. There were 8 Health Surveillance Assistants from 8 health facilities and 1 district coordinator. However, the total respondents were 134 due to non-response by other vaccination clients. This happened because they could leave the clinic earlier to accompany their friends who came together. These 134 respondents included 125 clients who received vaccination services during immunization clinics, 8 HSAs from all selected health facilities and 1 EPI Coordinator. The respondents came from 8 health facilities which represented 50 % of the total health facilities in the district. The health facilities comprised of both with excess coverage and normal coverage. Each health facility had a total of 15 vaccination clients as respondents except Chitekesa and Migowi which had 18 and 17 clients respectively because of their large facility population.

3.6 Sampling procedure

Health facilities were randomly sampled and the procedure was based on the coverage data of 2013 - 2015. The district health facilities were categorized into 2 being those with normal and excess coverage. All those facilities with normal coverage were listed and so as those with excess coverage. After mixing the papers per category, 4 papers were picked from each making a total of 8 health facilities. The health facilities with normal coverage were those with 2 or 3 antigens whose vaccination coverage was below 100%. It was difficult to find a facility with all antigens below 100%. The 8 selected health facilities represented 50 % of the total district health facilities and these were Chiringa, Chitekesa, Migowi, MlunguAlinafe, Mwanga, Nambazo, Sukasanje and Waruma. The 50 % selection of health facilities was a good sample because it is big enough for generalization of the results.

Health Surveillance Assistants were picked based on the degree of their involvement on vaccination services. Therefore, only 8 Health Surveillance Assistants who were directly responsible for reporting from the 8 health facility responded to the study questionnaires.

The EPI coordinator had also to respond to a Self-Administered Questionnaire. He is the overall person on all the vaccination services at district level. The questionnaire was given to him in hard copy format to simplify the accessibility. The coordinator was given at least one week to complete the questionnaire because it involved looking at some information from reports and registers for the past 3 years.

The vaccination clients (mothers / caregivers) were reached by conducting an exit interview after receiving the vaccination services. They were sampled at an outreach clinic through consecutive method and after asking for a verbal consent. This therefore addressed the problem of bias.

3.7 Study period

The study started in July, 2016 with literature review and ended up with report writing in April, 2017.

3.8 Data collection

Both primary and secondary data were collected through 3 trained data collectors.

In this regard, the three targeted groups for this study were caregivers/ mothers, HSAs and the EPI coordinator. They were administered using different data collection tools. A total of 5 data collection tools were used as described below.

For the caregivers/ mothers, face to face interviews were conducted using questionnaires as shown in Appendix 1. The EPI coordinator was administered using a Self-Administered Survey Questionnaire which he managed to fill it in by himself. This is also shown in the appendix 2. There was another additional verification form for the coverage of antigens from 2013 to 2015 and this was administered to the coordinator by the researcher and the information came from the EPI reports. This tool is on the appendix 3. Health Surveillance Assistants were administered with a Self-Administered Survey Questionnaires. However, the enumerators were available at every health facility when the HSAs were answering the Questionnaires in order to give clarification where necessary. This is indicated in Appendix 4. A separate form was used to evaluate secondary data from the registers and reporting forms at health facility level for validation purposes with district data. This form is in Appendix 5.

3.9 Data analysis

The quantitative data was entered and analyzed using IBM SPSS Version and Microsoft Excel. All the statistical measurements were done by using IBM SPSS Version. However, the qualitative data was analyzed using triangulation and thematic procedure whereby the researcher provided detailed explanations based on the findings. Bivariate analysis was run to assess the associations of the reasons and excess vaccination coverage. Multiple logistic regression analysis was also run especially for those reasons that showed that they were statistically significant. The significance of the tests was based on the p-value of 0.05. For the study to rule out chance and confounding, confidence interval of 95% was used (Legesse, 2015).

3.10 Dissemination of study findings

The report will be presented to Phalombe District Health Office, EPI South-East Zone Office, EPI unit in the Ministry of Health, WHO, MCSP/JSI and UNICEF so that all stakeholders responsible for vaccines and immunization are aware of the study findings.

3.11 Ethical considerations

The study commenced after obtaining a consent from the Ministry of Health through Phalombe DHO. According to Saunders, Lewis, and Thornhill (2009) one of the reasons people get access to information or organization is when that organization sees the possible benefit of the research. Phalombe DHO officials were very cooperative and verbal consent was granted by DEHO on behalf of the DHO. The university ethical committee also gave a verbal approve to the research proposal after it was presented to the panel. All the respondents were assured of the anonymity and confidentiality for providing the information towards the study. All respondents took part only after they were asked for consent by the researcher and they were told to be free to withdraw from taking part in responding to the questionnaires at any time they felt so.

3.12 Pretesting

After the completion of the formulation of the questionnaires for this study, a pretesting exercise was organized at Phalombe Health Centre static clinic to test if the questionnaires were able to address the study objectives. This happened one week before the actual data collection exercise. The participants who responded to the questionnaire during the pre-test were not part of research respondents. Corrections were based on what was observed during the pre- test from the field.

Final copies of questionnaires were printed out and sent to the field for the data collection exercise.

3.13 Limitations of the study

The study was for only health facilities within Phalombe district. It is worth noting that it was not a comparative study between the health facilities with excess vaccination coverage and those with low vaccination coverage. The findings were generalized to Phalombe district only and the main interest of the researcher was to establish underlying reasons for excess vaccination coverage in the district. The response rate was at 97 % instead of 100% due to some factors mentioned on sample size topic above.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents results of the study which investigated reasons for excess immunisation coverage in Phalombe District, Southern Malawi.

4.2 Demographic characteristics of respondents

The study had a total of 134 respondents who were in three categories. These were 125 vaccination clients from 8 visited vaccination clinics, 8 Health Surveillance Assistants who are EPI focal persons from the sampled health facilities and 1 EPI district Coordinator. The study sample was designed to have 138 respondents but managed to capture 134, representing the response rate of 97.1%. The 4 missing responses were due to non-responses by the vaccination clients themselves. This happened because they left the clinic to accompany their friends who came together but not sampled. The reduction of the sample size has not affected the results of the study because all the sampled health facilities had a good representation of the vaccination clients.

4.2.1 Age

Most of the clients who came for the vaccination services were the age range of between 20 -24 years, representing 33.6 % and this was followed by clients of the age range between 15 – 19, and between 25 -29 representing 22.4 % each. While 3.2 % of the respondents did not know their age hence missing. Figure 1 shows age distribution of the respondents.

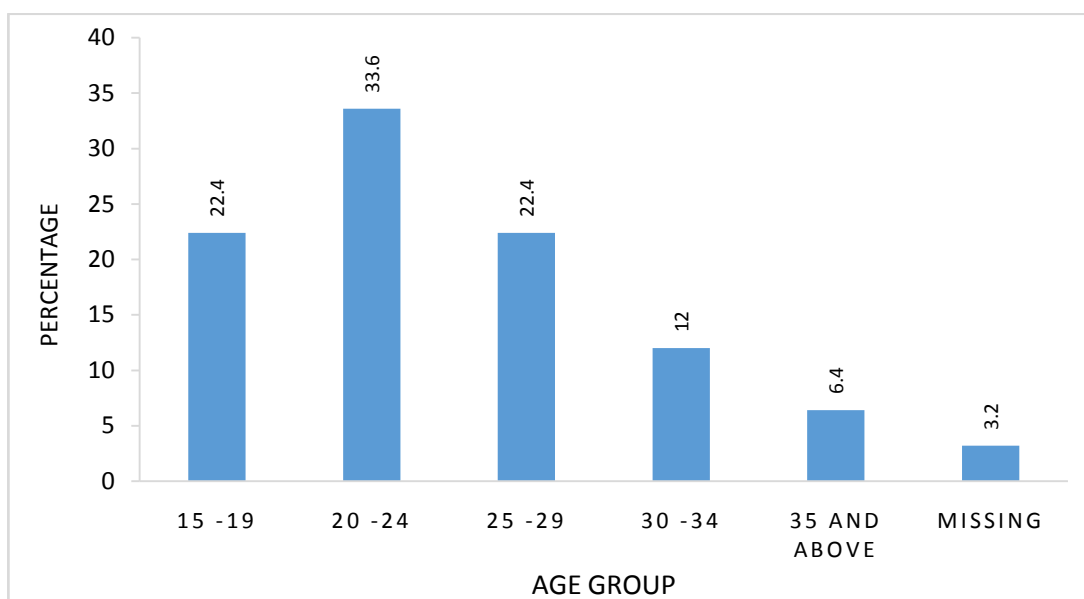


Figure 1: Age group for the clients' respondents

4.2.2 Education status of the respondents

Clients who came to receive the vaccination services were also asked about the level of their education. This was done in order to relate education status and their knowledge on the vaccination issues.

Table 4: Respondents education status

No	Education level	Frequency	Percentage
1	Non	6	4.8
2	Primary	100	80
3	Secondary	17	13.6
4	Missing	2	1.6
	Total	125	100

Clients with primary school education constituted 80 % while those with no education represented 4.8 %. However, 1.6 % did not respond to the question on education.

4.2.3 Marital status of respondents

Most of the respondents (immunization clients) were married representing 91.2 % and the least were those divorced and widowed both of whom represented 0.8 %.

Table 5: Respondents marital status

No	Marital status	Frequency	Percentage
1	Single	7	5.6
2	Married	114	91.2
3	Divorced	1	0.8
4	Widowed	1	0.8
5	Separated	2	1.6
6	Total	125	100

4.2.4 Religion of respondents

The mothers / caregivers who came to the vaccination clinics were asked about their religion. It was noted that most of them were Christians representing 93.6 % while Moslems represented 5.6 %. Those who did not respond in regard to religion represented 0.8 %.

Table 6: Respondents by religion

No	Religion	Frequency	Percentage
1	Muslim	7	5.6
2	Christian	117	93.6
3	Missing	1	0.8
4	Total	125	100

4.3 Management of vaccination data

The district was assessed on the management of vaccination data both at health facility level and at district level. The EPI district coordinator and the HSAs who are the EPI focal persons gave information on data quality and data archiving. The main issue was to compare the data of vaccination coverage between the health facility and the district level. The data collectors also conducted physical counting on the availability of reports and how they were kept.

Table 7: Trends of coverage of antigens for health facilities as reported by Health Surveillance Assistants

Health facility	BCG %			OPV 3 %			PCV 3 %			PENTA 3%			ROTA 2 %		
	2013	2014	2015	2013	2014	2015	2013	2014	2015	2013	2014	2015	2013	2014	2015
Chiringa	Not found	147	198	Not found	83	121	Not found	80	117	Not found	80	117	N/ A	79	109
Chitekesa	67.8	62.3	74	60	47	90	76	60	79	61	60	73	N/ A	576	74
Migowi	171.3	215.5	169	111.8	110.3	108	102.9	103.4	98.4	111.8	106.7	111	N/ A	99	119
MlunguAlinafe	Not found	Not found	106	Not found	Not found	185	Not found	Not found	184	Not found	Not found	180	N/ A	Not found	187
Mwanga	112	111	109	123	110	114	101	105	111	90	112	108	N/ A	97	110
Nambazo	13	124	128	67	64	92	72	105	93	85	100	91	N/ A	80	105
Sukasanje	162	201	162	81	96	138	126	162	123	138	169	141	N/ A	171	151
Waruma	119	121	117	722	685	769	Not found	Not found	Not found	722	683	766	N/ A	481	572

2013 Rota virus 2 vaccines data is completely missing as the vaccine was introduced mid-year 2013.

As per data reported by HSAs, most of the sampled facilities reported excess vaccination coverage of above 100%.

Chiringa had no data for all antigens in 2013 at facility level while MlunguAlinafe managed only to present 2015 vaccination data. Waruma did not have data for PCV 13 for all the years. This indicated that the facilities have a problem of proper archiving.

Chitekesa is the only facility which reported a vaccination coverage of below 100% in all antigens and in all the years. Waruma Health facility reported the highest excess coverage of around 700 % in OPV 3 and of around 500% in Rota 2 in all the years under review.

Table 8: Trends of coverage of antigens for health facilities as reported by EPI Coordinator

Health facility	BCG %			OPV 3 %			PCV 3 %			PENTA 3%			ROTA 2 %		
	2013	2014	2015	2013	2014	2015	2013	2014	2015	2013	2014	2015	2013	2014	2015
Chiringa	235	177	217	106	120	147	120	107	138	118	110	139	N/A	88	129
Chitekesa	99	113	93	104	72	127	119	91	106	99	93	102	N/A	88	102
Migowi	178	208	184	123	131	127	127	117	128	126	119	133	N/A	116	141
MlunguAlinafe	180	1140	171	192	153	191	220	162	190	215	164	185	N/A	170	193
Mwanga	160	114	134	166	136	149	165	147	147	154	144	141	N/A	136	141
Nambazo	137	165	156	90	99	121	256	149	123	105	145	125	N/A	109	129
Sukasanje	181	210	177	109	113	163	160	187	162	177	162	165	N/A	198	171
Waruma	38	17	18	128	121	101	139	118	97	132	97	105	N/A	106	160

The district data did not report any missing data of all antigens in the years under review. Chitekesa and Waruma reported lower coverage of at least less than 100% in some antigens and years while the rest of the facilities reported the coverage of above 100%. However, a simple comparison of BCG was deliberately made to check the authenticity of the data by using simple logic. For example, Waruma BCG coverage reported by EPI coordinator was very low (about 20%) compared to similar data reported by HSAs which registered the coverage of above 100%. However, this is a health post where deliveries do not take place and expect the coverage to be low. MlunguAlinafe also registered a coverage of 1,140 % of BCG in 2014 which appeared as an outlier as shown graphically below.

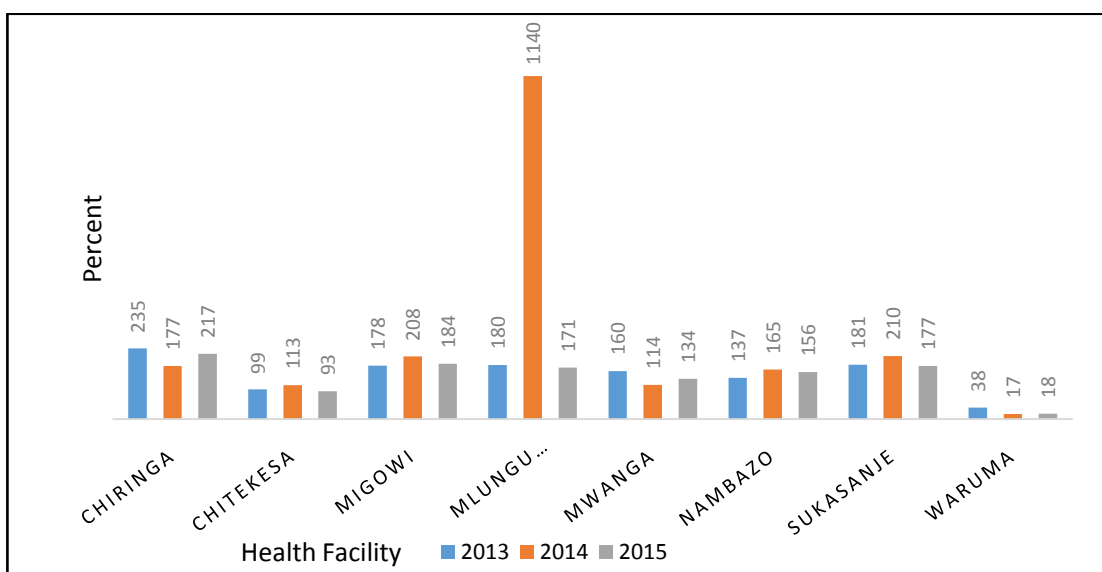


Figure 2: BCG coverage by facility at district level (Trend from 2013- 2015)

Table 9: Differences in the coverage of antigens between HSAs data and EPI Coordinator data

Health facility	BCG %			OPV 3 %			PCV 3 %			PENTA 3%			ROTA 2 %		
	2013	2014	2015	2013	2014	2015	2013	2014	2015	2013	2014	2015	2013	2014	2015
Chiringa	No data	-30	-19	No data	-37	-26	No data	-27	-21	No data	-30	-22	N/A	-9	-20
Chitekesa	-31.2	-50.7	-19	-44	-25	-37	-43	-31	-27	-38	-33	-29	N/A	488	-28
Migowi	-6.7	7.5	-15	-11.2	-20.7	-19	-24.1	-13.6	-29.6	-14.2	-12.3	-22	N/A	-17	-22
MlunguAlinafe	No data	No data	-65	No data	No data	-6	No data	No data	-6	No data	No data	-5	N/A	No data	-6
Mwanga	-48	-3	-25	-43	-26	-35	-64	-42	-36	-64	-32	-33	N/A	-39	-31
Nambazo	-124	-41	-28	-23	-35	-29	-184	-44	-30	-20	-45	-34	N/A	-29	-24
Sukasanje	-19	-9	-15	-28	-17	-25	-34	-25	-39	-39	7	-24	N/A	-27	-20
Waruma	81	104	99	594	564	668	No data	No data	No data	590	586	661	N/A	375	412

The comparison of the health facility and district data showed an abnormality because almost all the antigens in all the years under review were different. In some antigens, the differences were huge and could raise suspicion on what source was worth trusting.

4.4 Access to vaccination services in the district

The aim was to establish how vaccination services were accessible to the vaccination clients. This variable looked into three main issues. This included distance covered to reach health facility, time taken to reach the nearest health facility where they were accessing vaccination services and establishing whether some of the clients were coming from outside Phalombe district.

4.4.1 Accessibility of the vaccination services measured by distance

The vaccination services for the district were well accessible to majority. Most of the clients lived in an area within 3 kilometers or less where they could access the vaccination services. A total of 96.8% of the clients who said they were accessing the services easily were from the range of within 3 kilometers.

Only 3.2% had contrary views as they felt that the access was not good and were accessing the services at a radius of more than 8 kilometers.

A test by Chi-square showed a statistical relationship between distance and access to vaccination services as the H_0 was 0.000 which is less than H_1 0.005. This clearly showed that short walking distances to vaccination clinics contributed positively to accessibility of vaccination services in the district.

4.4.2 Accessibility of the vaccination services measured by time

Most of the clients also indicated that they were able to access the vaccination services based on time taken to reach the vaccination clinics as shown by the pie chart below. About 70% of the clients accessed the services within 30 minutes and the least were those spending more than an hour to access the services which contributed to 6.5% of the total number of clients.

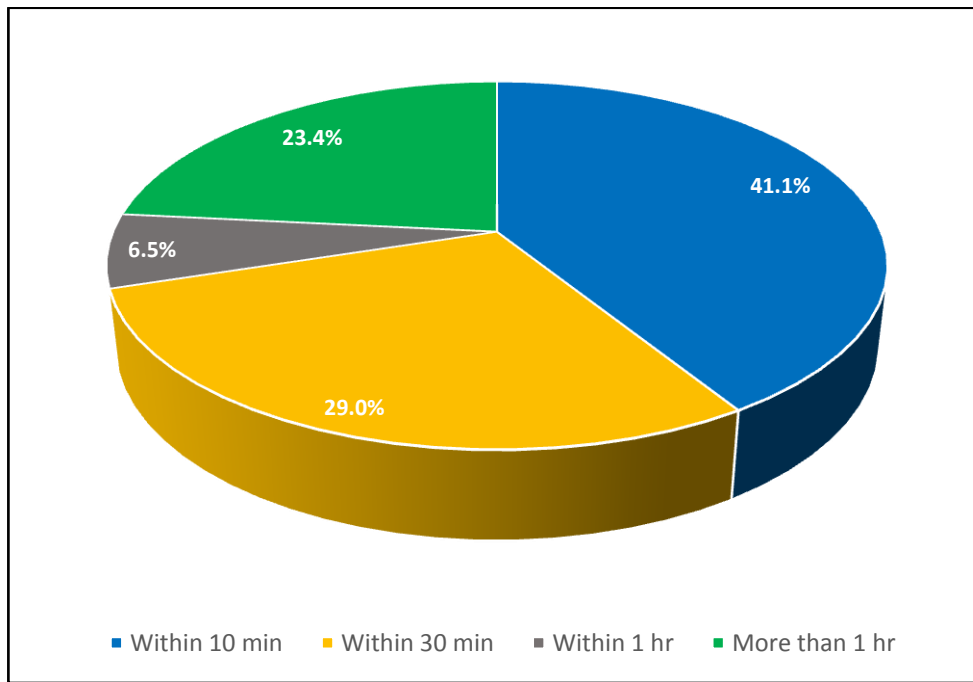


Figure 3: Pie chart showing time taken to access the vaccination services

Time of walking was emphasized on this study because the majority of the clients went to these vaccination sites on foot (97 %) and only 3 % could use bicycles and those were the people living more than 3 km radius to the vaccination site.

4.4.3 Accessibility of vaccination services by place (location) of origin

The clients were asked where they stay in order to differentiate from between people from Phalombe district and those coming from outside Phalombe. Some clients reported that they were from places like Mulanje, Zomba and Mozambique. Health facilities which registered more clients coming from places outside Phalombe, registered excess vaccination coverage of above 100% while those with less clients coming from other places other than Phalombe had a normal coverage of not more than 100%. It was found that 60 % of the facilities with excess coverage had most of the clients from outside Phalombe while 40 % of the facilities with normal coverage had most of the clients from within the district as shown in the table below.

Table 10: Vaccination level and where the clients came from

Number of people and where they came from						
	Phalombe	Mozambique	Mulanje	Zomba	Total	Percentage
Excess coverage	33	14	28	0	75	60%
Normal	32	4	0	14	50	40%
Total	65	18	28	14	125	
Percentage for each group (where clients came from)	52%	14.4%	22.4%	11.2%		100%

As the study combined both facilities with normal and excess coverage, a test was conducted to see if such a coverage had a relationship with the people come from. In this case, a test with Chi-square was run and found out that there was a statistical relationship between excess coverage of above 100% and the place where the clients came from.

The 52 % of the respondents were from Phalombe. Other clients came from outside the district that constituted to 14. 4%, 22.4 % and 11. 2 % from Mozambique, Mulanje and Zomba, respectively. All the clients were also asked if they knew someone who came from other places apart from Phalombe. The response was that 52 % of the respondents said they did not know anyone while 44 % said they knew some people from other places while 4 % did not respond to this. The 44 % of people who said they knew at least someone from outside Phalombe also mentioned Mozambique as the main place where most clients came from. Besides, they said that few clients were from Mulanje and Zomba districts.

4.5 Knowledge level of caregivers on vaccination services

Clients (caregivers) were assessed on their knowledge in relation to the vaccination services. They had to explain the importance of vaccination services and mentioned the vaccines their

children received. The criteria to say a caregiver had knowledge or not depended on their response by mentioning the names of the vaccine(s) the child was being given, its importance in terms of protection to the child and if they knew other vaccines other than the one being given to the child and if they knew the date of next visit. Clients were regarded as knowledgeable when they mentioned at least 2 or more vaccines, its importance and date of next visit. 56 % had knowledge while 44 % had no knowledge on vaccination services.

4.6 Source of information on vaccine services

The clients who were found to have enough information on vaccination services were asked about the source of information. They said that they got this information from Health Surveillance Assistants that contributed to 92.8% while mass media contributed only 0.8 %. Below is a summary of the findings in relation to the source of information on vaccination services in Phalombe.

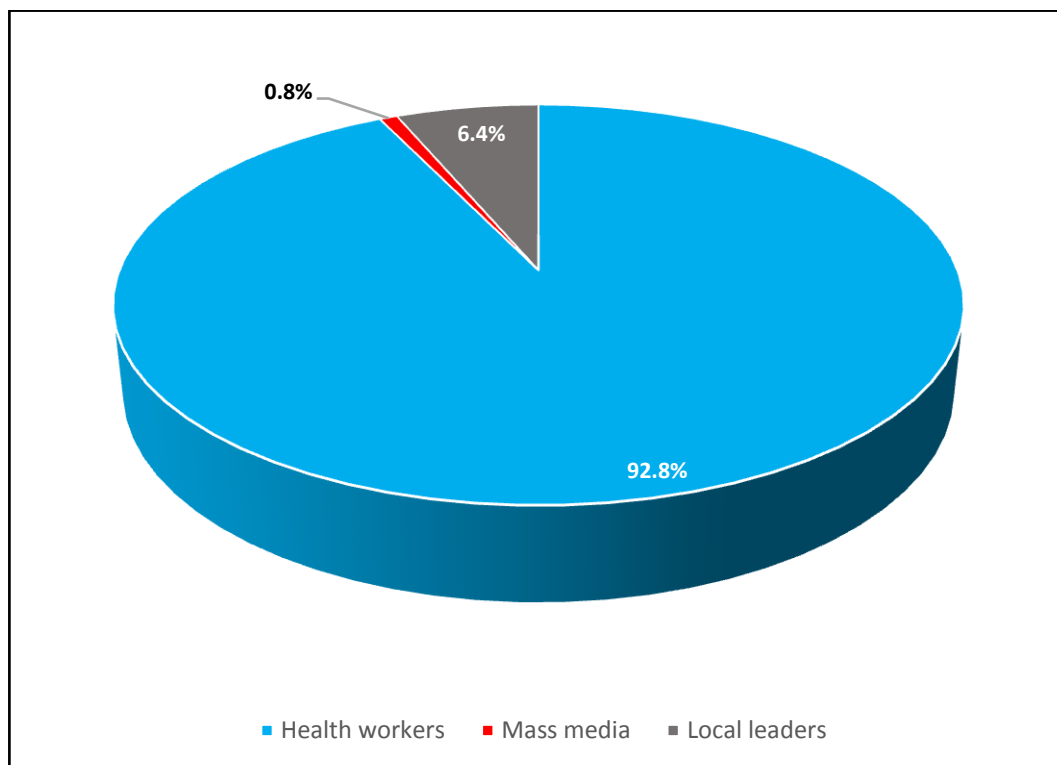


Figure 4: Pie chart showing source of information of vaccination

4.7 Clients education level and their knowledge on vaccination services

The clients' education level were compared to their knowledge to check if there was any significant relationship. It was found out that those with knowledge could even be clients who did not have any education background. Some clients with secondary school education did not have a knowledge on vaccination services. The table below shows the summary of the findings.

Table 11: Mother's knowledge on vaccination services and her education level

	None	Primary	Secondary	Total
Knowledgeable	2	56	11	69
Not knowledgeable	4	44	6	54
Total	6	100	17	123
Percentages	4.9	81.3	13.8	100

Most of the mothers/ caregivers had gone to school before. Those with primary education represented 81.3 % and those with secondary education represented 13.8 % while those without education represented only at 4.9 %.

A Chi square test was also run to measure an association between those with knowledge and education status. There was no association between the mother's knowledge on vaccination services and her education level as H_0 was found to be 0.226 greater than 0.005.

4.8 Quality of vaccination service

One of the tasks on this study was to appreciate the quality of the vaccination services in the district. The main issues to look for were the attitude of health workers, consistence availability of vaccine supplies, tracing defaulters and cancelation of vaccination clinics.

4.8.1 Quality of vaccination services based on Health Surveillance Assistants' behaviour

In this case, attitude of health workers was said to be good when the clients said that they were being handled in a professional manner, for example, they were never shouted at, being welcomed warmly and all the services were being executed in a friendly manner. Besides, there

were no adverse events following immunization which are frequently observed or reported due to poor vaccination techniques. The responses were summarized as below in a pie chart.

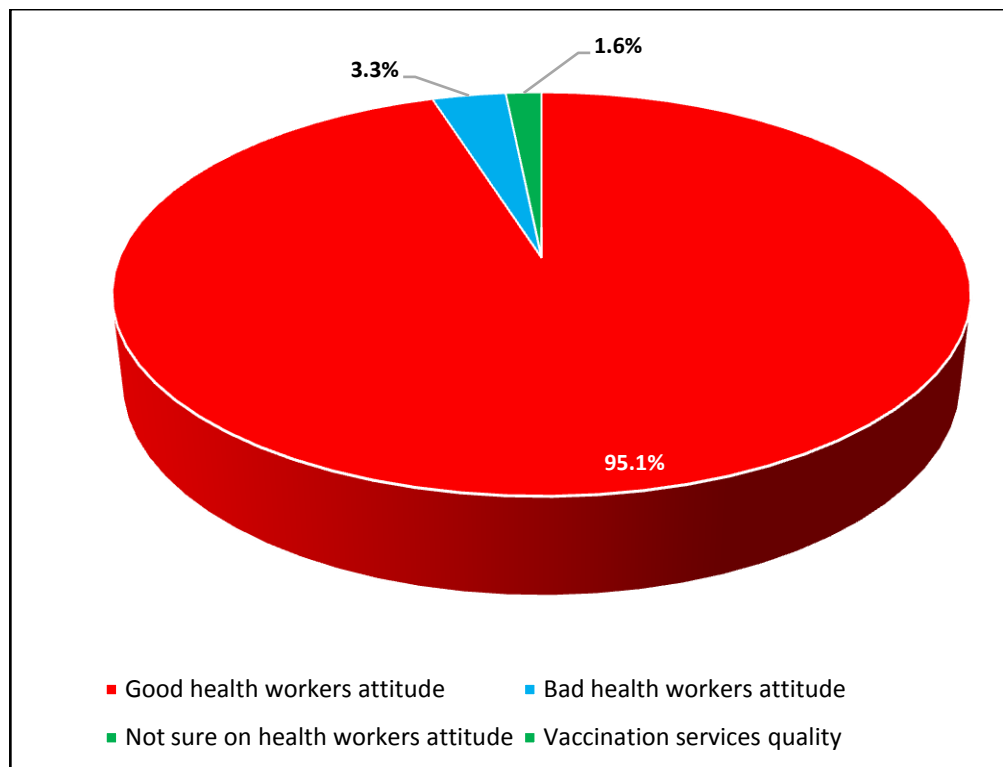


Figure 5: Pie chart showing percentage of health workers' attitude

Most of the mothers/ clients recommended the attitude of health workers (HSAs) during vaccination services. 95.1% of the mothers said the HSAs' behaviour was good while only 3.3% differed with their friends and said the health workers' attitude was bad and 1.6% were not sure of the health workers conduct. *"We enjoy coming here for growth monitoring and vaccination services. We are never shouted at like what we hear from other people from other health facilities". "We are treated in a friendly manner."* said one of the caregiver at Waruma health facility. Another caregiver from Chiringa said, *"We have good trained HSAs who are able to vaccinate our children without much pain and that is why my friends and I always come for vaccination services here"*.

4.8.2 Quality of vaccination services based on the availability of vaccine supplies

The district has not experienced a problem of vaccination supplies shortage like vaccines and injection materials. When the Health Surveillance Assistants were asked on the availability of vaccines supplies, all of them indicated that they had not experienced the shortage for the past 3 months prior to the study representing 100 % (where n=8).

4.8.3 Quality of vaccination services based on vaccination clinics' performance

The district also conducted most of the planned vaccination clinics without much cancellation. For example, out of the 1, 054 vaccination clinics that were planned for the year 2015, they managed to conduct 1,043 clinics with a cancellation rate of only 1 %. The cancellation of vaccination clinic planned for the past 3 months prior to the study was at 0. 2 % for the 8 health facilities visited.

CHAPTER FIVE

DISCUSSION

5.1 Demographic data

Married women of the age group between 15- 29 years were the main respondents, who represented 78.4 %. In terms of education status, most of the respondents attended primary school level which represented 80 %. None was found in the category of tertiary education level. In terms of their religion, there were more Christians (93.6 %) while 5.6 % were Muslims. These parameters had to be looked upon because most of the studies that were conducted in the past showed that immunization coverage was affected by many things and some of these include; social and environmental characteristics, parental knowledge, vaccine financing, access to medical care and many others (Ehresmann, 2008). This suggests that parents with good formal education and sound economic status are more likely to get their children for immunization and the vice versa. Religion do also affect in immunization services because of the beliefs.

5.2 Management of vaccination data

Management of vaccination data was found to be a big problem. It was discovered that most of the data at facility level and district level could not correspond although it was for the same period. Health facility generate vaccination data and feed the district. In this case, data for antigens like, BCG, OPV3, PCV3, Penta 3 and Rota 2 from health facility and district level were compared in the years 2013, 2014 and 2015. The aim was to check the validation of the data and establish its quality and reliability. The expectation was that the figures would be the same at all levels. It was discovered that most coverage at health facility level were lower than those at district level. However, all levels reported that the figures were from NSO to calculate such coverage. The only aspect which was common was that both health facilities and district level had most of the coverage above 100%. For example, the BCG coverage at Chiringa Health facility (reported at facility) in 2014 and 2015 were 147 % and 177 %, respectively while the same antigen and same year had the coverage of 198 % and 217 %, respectively. The differences in data at health facility level and district level would always raise questions on the accuracy and reliability of the district vaccination data. According to Chahed, Bellali, Alaya, Mrabet, and Mahmoudi (2013), data collected through routine immunization reporting system have been criticized for its accuracy. This data can also be questioned based on these findings. The

management of immunization data is a major challenge faced by the EPI program (Ministry of Health, Expanded Program on Immunization, 2012). The finding agrees with the challenge Phalombe is facing. Most immunization players would like to address this problem holistically so that the data presented on every forum is trusted by all partners. As reported by Brown, et al., (2014), "Population data is the central input in immunization coverage and therefore deserving great attention". The differences in vaccination coverage at district level could only be observed when people or institutions use different target population and from different sources. Phalombe, just like any other district in Malawi, projected populations by NSO at all levels. Health facilities receive such figures from the district coordinator and this was confirmed during interviews. The findings showed that the district had been reporting higher coverage than health facilities despite both reporting excess coverage of more than 100%. The question on the source of data to be trusted still stands. However, it is the health facility that generates this data and it is better to assume that this data is more reliable than the district level data. For example, a study on auditing the quality of immunization data was conducted in Tunisia and the study found out that the tendency of over-reporting on immunization data was more often than under-reporting at district level (Chahed, et al., 2013). This is a true picture of the reporting system of immunization data in Phalombe. So, when the district is reporting such high coverage, several possible reasons can be suggested. These may include;

1. The district is doing that just to impress the national level on high coverage but the performance on the ground is not like that.
2. Reporting of information that is not represented in the registers due to poor record keeping or information processing at facility level.
3. The difference between denominator used at national level and local level where by the one used at national level is relatively smaller than the one used at local level.

The explanation was really difficult for one to find the main reason for having such high coverage at district level than at health facility level. The coordinator faulted the poor record keeping at health facility level and believed that the figures presented by the district were true and worth believing. He suggested that the post reports at some health facilities were generated after the true data was sent at district level. An example was the situation at Waruma which had

reported high coverage than the district level did and their data was really questionable. For example, the study reported the coverage of BCG in 2013, 2014, and 2015 at 119%, 121% and 117%, respectively. However, the coverage of the same BCG at district level at the same period of 2013, 2014 and 2015 was at 38%, 17% and 18%, respectively. Waruma is a health post which has no maternity wing. This means that most of the children who were vaccinated with BCG were born from other health centres and could only go there if they were not vaccinated at birth. BCG is given at birth and Waruma health centre is expected to have the lowest BCG vaccination coverage. In this regard, the coverage of less than 50% reported at district level could be true compared to the coverage of above 100% reported by the health facility. This showed that the report by health facility was just a guess-work and probably they were just following the trends of other antigens which were above 100%. However, another different situation was encountered in MlunguAlinafe, whereby the BCG coverage reported at district level was at 1,140 % in 2014 and no data to justify such performance at the facility level. When plotted on a graph, it appeared as an outlier because no antigen and facility reported coverage of above 1000% (one thousand percentage). This was supposed to be verified by the coordinator before sending the report to national level because there is no way a facility could register such a big coverage and yet the coverage of the same antigen in 2013 and 2015 was within the range of 100%. This could prompt one to suggest that 1,140 % came out as a typing error like 140 %. Unfortunately, it was aggregated to a district target without validating hence high vaccination coverage in the district resulted. The target population would always set boundaries in terms of knowing exactly how many of the eligible children have been reached or not reached with an intervention (Brown, et al., 2014). So, it is very surprising to have such big differences in coverage when the boundaries were already set. This means that the documentation is a serious problem in the district. In 2008/9, the Republic of South Africa conducted a survey where they were looking at immunization coverage of above 100 % in more than 50 districts and questioned quality of the data and the numerator and the denominator used when calculating the coverage (Barron & Monticelli, 2007). The survey revealed that the numerator used by such district was less than the projection figure of the target population. Since both health facility and district level report most of the antigens at above 100%, it might be concluded that the denominator used is being underestimated. There was also a mention of possible interchange of figures from the same survey. For example, instead of writing 70 %, another digit may be added making it 700 % and

this is identified as an outlier in most of the cases. An example could be the coverage of Rota 2 of Chitekesa health facility in 2014 where the facility reported 576 % but the district reported 88 %. The digit 5 at the beginning could be a result of an error. Another example is PCV 3 coverage of Nambazo health facility in 2013 where the district reported the coverage of 256% while the health facility reported 72%. Looking at the vaccination coverage trends for most health facilities, the conclusion can be made that one of the problems was typing errors which could be verified using the previous coverage trend by the district before reporting the figures to national level.

Another issue was the health facility archiving of vaccination data. Most of the facilities had no place where they could file all the reports after conducting a clinic. This was evidenced by some missing data from some health facilities as indicated in the tables. This could prompt the health workers to use only visible data available during the compilation of the reports leading to guess-work. For example, Waruma and MlunguAlinafe had many missing data at facility level yet reported high coverage at district level.

The conclusion on vaccination data management in the district is that the data is not managed well since there are big differences in terms of vaccination coverage from reports at health facility and district levels. It is therefore difficult to rely on such data. Such problems could be due to typing errors, deliberate attempt to make the coverage high at one level only like at district level or when compiling vaccination data, no records are used and instead, they just guess what could be the coverage for that particular month.

5.3 Access to vaccination services in the district

The findings revealed that vaccination services in the district were not a problem as many were able to be reached. The results showed that 96.8% of the people were able to access the vaccination services compared to only 3.2% who said they face some challenges in accessing these services. This trend could easily boost the vaccination coverage and this suggests that almost everyone accesses the services. The main emphasis was walking long distances to where the community would find the vaccination services. Most of the clients indicated that they spend just one hour to reach the centres where they would be offered the services. Those walking within 10 minutes, 30 minutes, 1 hour and more than 1 hour represented 29%, 41.1%, 23.4% and 6.5%, respectively. This means that the majority of the people walk within 30 minutes to the

vaccination clinic. As a policy by Ministry Health, good access to health interventions is supposed to be accessed within 30 minutes of walking and the waiting period should not be more than one hour. Vaccination services are preventive services where the beneficiaries are clients without medical problems.

The vaccination services are also supposed to be available within a short distance in order to be accessed by the majority. Any distance of more than a radius of 8km is regarded as a hard to reach area as per guidelines of Community Integrated Management of Childhood Illnesses' (C-IMCI). In all places regarded as hard to reach in the district, there are village clinics operating that are managed by HSAs to treat minor ailments to under-five children. These places are also the vaccination points for children hence reducing the barrier of long distances. (Ministry of Health, Phalombe Health Management Information System, 2015). The district has also many outreach clinics located in all places which are believed to be hard to reach and have no village clinic in operation in order to shorten the distance and make sure that all are reached. As a strategy to expand the services, EPI is using REC approach in the district. REC is an acronym which stands for Reach Every Child and its aim is to make sure that all eligible children are vaccinated within the scheduled time. One operational component of REC is the re-establishing of outreach clinic where all planned clinics are conducted (Ministry of Health, Expanded Program on Immunization, 2012). Phalombe tried to establish many outreach clinics and this increased a number of children who accesses vaccination services. A statistical test showed a positive relationship between access and distance. This shows that the closer the people to the vaccination centres, the higher the coverage registered.

Access was also linked to the place of origin of the clients. It was found out that a good number of people were from outside Phalombe. Phalombe is a district that borders Mozambique to the east, Zomba to north-west and Mulanje to the south-west. All these locations contributed to significant percentages. From those who got interviewed from the 8 health facilities, 52% were from Phalombe, 14.4% came from Mozambique, 22.4% were from Mulanje and those from Zomba were 11.2 %. Health facilities within the boundaries of the district have registered excess vaccination coverage in the past years. However, even those centres which were not in the boundaries could be accessed by other clients from outside Phalombe and their coverage had been more than 100% in most antigens. Migowi was a good example of such facilities. As

already mentioned, the facilities sampled were both with normal and excess coverage. The findings also revealed that facilities with normal coverage had only 36 % of the clients coming from outside Phalombe while those facilities with excess coverage had 56 % of the clients coming from outside Phalombe. The additional clients from outside Phalombe made the denominator used by the district to be small because it does not include the population of people from outside Phalombe. This is in line with what WHO suggested on the excess coverage. This excess coverage statement says, “Coverage levels in excess of 100% are occasionally reported”. While they are theoretically possible, they are usually the result of systematic error in the numerator or denominator, a mid-year change in target age groups, or inclusion of children outside the target age group in the numerator. The highest coverage estimate is 99%”(Burton et al., 2009). Assuming that 52% of the people from within the district represent 100% to its target, the remaining figure of 48% of the people from outside the district could also contribute close to another 100% in terms of coverage hence making the vaccination coverage go beyond 100%.

There are many districts which also assist people from other location apart from their people. However, 48% is just too high and no doubt the denominator is supposed to be looked into in order to fix the problem of excess coverage.

5.4 Mothers/ caregivers’ knowledge on vaccination services

The mother’s/caregiver’s knowledge level on vaccination services had to be assessed in order to relate it with such excess coverage in the district. The mothers / caregivers’ knowledge on vaccination may play an important role on the vaccination status of their children (Yu, 2015).The findings showed that 56% of the caregivers/mothers have knowledge on vaccination services in the district. These are the clients/caregivers who were able to explain the vaccines their children were receiving, its importance in terms of diseases targeted by such vaccines and also able to mention date for the next visit to the clinic. 56% of the mothers gave good explanations. This means that they really understood the benefit of such services. Having such people in the community could motivate others to go for the services as these might act as ambassadors who would influence their friends to access the services hence increased vaccination coverage. It is very clear that these vaccination services have encountered several challenges to meet its desirable coverage and one of such is lack of awareness. People lack information and have unknown fears about the use of vaccines (Pang, 2011). High knowledge level among the care-

givers/ mothers would help them access the services and increase the coverage probably to the excess. However, 44% had no knowledge on the issues of vaccines. These are the people who came for vaccination services despite the knowledge gap they have. As already explained, having knowledge meant that the clients were able to state all the details of vaccines received by their children including the diseases the vaccines are able to protect against. The 44% of the mothers without knowledge managed to come for the vaccinations services just as a monthly routine activity they had to do for their children. So the combination of the knowledge and behaviour could boost the district coverage. The finding also suggested that most of the people in the district got information on vaccination services from health workers (92.8 %), and few got it from local leaders and mass media in the proportions of 6.4% and 0.8%, respectively. This gives a clear picture that health workers are the main players in the provision of the services. These health workers were able to raise the awareness campaign on the importance of vaccination services and also disprove some myths and fears the community could have associate with the use of certain vaccines. The sensitization meetings held in the community are of face-to-face type unlike where mass media alone is used. When the education status and knowledge level were measured, it was found out that those who had no education represented 4.9% and had knowledge, those with primary education represented 81.8% and had knowledge and those with secondary education represented 13.8% and had knowledge. For example, mothers with formal education are more likely to take their children for vaccination unlike those with no formal education (Bowie et al., 2006). From the results, it was simple to conclude that education and knowledge levels of the mothers/ caregivers in the district could contribute positively to improving the coverage of the vaccination but it could not be a factor that was making this coverage to be more than 100%.

5.5 Quality of vaccination service in the district

This objective examined at the general attitude of health workers who administer vaccines by looking at the manner clients are handled, availability of vaccine supplies and how vaccination clinics schedules are honoured in terms of avoiding cancellation. Most of the clients recommended the way the health workers treat them during vaccination clinics because 95.1% said the behaviour of the health was good. They were praised highly and they even said that the way these health workers treated them contributed positively to the turn up of most of them in patronizing the district clinics. The manner in which the health workers handle clients matters

much as far as health services delivery are concerned. People have been shunning some health interventions when they observe that health workers lack respect towards them. Apart from the good manner health workers are supposed to show, there is also need for them to have confidence and expertise when executing their jobs. For example, some people said they come to health facilities because their children did not experience much pain when being vaccinated. This meant that such clients had confidence in the health workers hence promoting high patronization on vaccination services. When vaccinators have competence and their interaction with the clients happens to be friendly, the vaccination coverage is good (Perry et al., 1998). Attitude in the delivery of health services is very crucial and needs to be checked time and again. Bad behaviour of some health workers has resulted in driving away some clients from certain services. An example could be the pregnant mothers who sometimes seek medical assistance from unskilled midwives from the community during delivery as they are put off by the bad behaviour of some skilled midwives in the health facilities. As it has already been stated, these clients come from different localities, that is, within Phalombe and from Zomba, Mulanje and Mozambique. If the attitude of the health workers were known to be good as presented from the findings, it would attract more people from other locations. At the same time, this would help in retaining the entire target population from within the district. Most people would come to the district to access the services especially if the clinics around their areas are known to be offering unsatisfactory quality of services hence excess coverage in Phalombe. The other places might experience a reduction of coverage while Phalombe coverage could be higher. This might increase the numerator while the denominator remains the same hence have an excess coverage of above 100%.

Only 3.3% of the people were of the view that the health workers attitudes were bad while 1.6% were not sure on the conduct of the health workers. Those who said the health workers attitudes were bad gave an example of the waiting time. They said that sometimes they are made to wait for the vaccination services not because of congestion but the selfishness of some health workers. However, very few clients complained of this malpractice.

5.6 Performance of vaccination clinics, the tracing of defaulters and the availability of supplies

Vaccination clinics were also conducted as planned. This was evidenced by low cancellation which was found to be at 1% and they were also able to reschedule within one week after the cancellation. This again could give an opportunity to clients to access the services. Those within

the borders of the district might have taken an advantage accessing the services by flocking to these undisturbed clinics hence increasing the coverage to excess. The quality of vaccination services offered by the district is one of the four major obstacles of immunization coverage under the societal and cultural categories(Pang, 2011). When people are assured of the quality services, it is easy for them to adopt the intervention.

Drop out is another thing that has negatively affected the vaccination coverage. This becomes a problem when the defaulters are not followed. If the district uses a good mechanism of tracing defaulters, the chances of registering excessive coverage is high. Defaulters are monitored using village health register and reminder cards. So, every client is followed if he/she does not turn up for the vaccination session once it is due (Ministry of Health, Expanded Program on Immunization, 2012). Phalombe is able to follow its clients when register drops out within a certain month. Vaccination coverage might also be affected by the inconsistent availability of supplies. These include vaccines, its diluents and injection materials. Erratic vaccine supplies and related items have a big impact on the coverage of vaccination. The shortages negatively affect the coverage and the end result is low vaccination coverage (Assija, et al., 2012). The district did not experience any supply stock out within the three previous months prior to the study. The health workers reported that they had been doing both stock book audits and physical counts of supplies frequently in order to make sure that they were well stocked with supplies. This again played a role in making sure that the majority of the people were being reached. In situations where other districts were running short of supplies, people living close to the district could be flocking to Phalombe to access the uninterrupted vaccination services. This also made the district register excess coverage of above 100%.

CHAPTER SIX

CONCLUSSIONS AND RECOMMENDATIONS

6.1 Conclusions

The study has provided an insight of the reasons behind the district's excess vaccination coverage of above 100%. Data management was a big problem. Almost in all the 8 health facilities where the study was conducted, there was not even a single health facility whose coverage data corresponded with the district level data. It was also observed that the district reported higher coverage than the health facility in most of the antigens. If the health facility figures are to be trusted, then it is easy to conclude that the excess coverage reported by district level to national level were as a result of guessing the figures.

The vaccination access had been good. Most people were being reached with the vaccination services within a manageable walking distance and within a short time of less than an hour. About 40 % of the people accessing the vaccination services came from nearby locations other than from the district with most of them were from Mozambique, Mulanje and Zomba. This trend had an increased numerator which is divided by small denominator (projection by National Statistics Office) hence reflecting an excess coverage of above 100%.

The knowledge level of the mothers/caregivers is not significant to make the excess coverage of above 100%. There were 56% of mothers with knowledge and 44% mothers with no adequate knowledge on vaccination services. However, the knowledge had no major impact on the district vaccination coverage.

The district offers good quality vaccination services as evidenced by good attitude of the health workers, unnecessary cancellation of vaccination clinics and consistent availability of vaccination supplies. This attracted more clients from both within and outside the district hence contributing to excess coverage of above 100%.

6.2 Recommendations

To correct the excess coverage in Phalombe district, the following recommendations are being proposed;

1. The EPI Coordinator needs to do data validation and verification before compiling the report to national level so that the data should be trusted by all interested partners.
2. The calculation of district coverage should be based on both the NSO's projection and the head count to determine the performance as this will assist in planning.
3. A health workers' attitude should be sustained in order for the district to continue having good vaccination coverage.
4. Health facility management should be trained in record keeping and archiving in order to solve the problem of data loss.

REFERENCES

- Assija, V., Singh, A., & Sharma, V. (2012). *Coverage and quality of immunization services in rural Chandigarh*. Panjab University, India: PGIMER. Retrieved from: <http://www.indianpediatrics.net/july2012/565.pdf>.
- Barron, P., & Monticelli F. (2007). Key District Health Indicators in Primary Health Care. Health Systems Trust, Durban, South Africa. Retrieved from: <https://www.popline.org/node/195851>.
- Bowie, C., Mathanga, D. P., & Misiri, H. (2006). Poverty, access and immunisations in Malawi: An analytical study. College of Medicine, Blantyre, Malawi. *Malawi Medical journal*, 18 (1). Retrieved from: <https://www.ajol.info/index.php/mmj/article/view/10902>.
- Brown, D.W., Burton, A., Dobo, M.G., & Karimov, R. (2014). A comparison of National Immunization Programme Targets Population Estimates with data from other Independent Sources and differences in computing coverage levels for the 3rd dose of DPT containing vaccine. *World Journal of Vaccines*, 4, 18-23. Retrieved from: <http://www.scirp.org/journal/wjv>.
- Burton, A., Monasch, R., Lautenbach, B., Dobo, M. G., Neill, M., Karimov, R., Wolfson, L., Jones, G., & Birmingham, H. (2009). World Health Organization and UNICEF estimates of national infant immunization coverage: methods and Processes. *Bulletin of the World Health Organization*. Retrieved from <http://www.who.int/bulletin/volumes/87/7/08-053819/en/>.
- Chahed, M. K., Bellali, H., Alaya, N., Mrabet, A., & Mahmoudi, B. (2013). Auditing the quality of immunization data in Tunisia. *Asian Pacific Journal of Tropical Disease*, 3 (1), 1-6. Singapore. Retrieved from: <https://www.sciencedirect.com/science/article/pii/S2222180813600146?via%3Dihub>.
- Ehresmann, K. (2008). *Immunization and health disparities: Infectious disease epidemiology, prevention and control, immunization, tuberculosis & international health*. Minnesota,

Department of Health. United States of America. Retrieved from:
<http://www.health.state.mn.us/divs/idepc/immunize/stats/immreport.pdf>.

Legesse, E., & Dechasa, W. (2015). An assessment of child immunization coverage and its determinants in Sinai district, Southern Ethiopia. *BMC Pediatrics*, *15*(31). 1-114

Retrieved from:

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4438454/pdf/12887_2015_Article_345.pdf.

Ministry of Health, Expanded Program on Immunization (2012). *Comprehensive expanded program on immunization multi-year plan 2012-2016*. Lilongwe, Malawi.

Ministry of Health, Expanded Program on Immunization (2012). *Field manual for introduction of rotavirus vaccine*. Lilongwe, Malawi.

Ministry of Health, Expanded Program on Immunization (2012). *Field manual*. Lilongwe, Malawi:

Ministry of Health, Expanded Program on Immunization (2015). *Training manual for the introduction of measles second dose*. Lilongwe, Malawi.

Ministry of Health, Expanded Program on Immunization, Malawi (2015). *Training manual for the introduction of inactivated Polio Vaccine in Routine immunization*. Lilongwe, Malawi.

Ministry of Health, Phalombe Expanded Program on Immunization report (2013). *Supplementary immunization activities campaign*. Phalombe, Malawi.

Ministry of Health, Phalombe Health Management Information Systems (2015). *Health Annual Reports*. Phalombe, Malawi.

Ministry of Health, Republic of South Africa. (2007). *Output indicator: Indicator comparison by district*. Pretoria, South Africa.

National Statistics Office (2011). *Malawi Demographic and Health Survey 2010*. Zomba, Malawi.

National Statistics Office (2015). *Population Projection*. Zomba, Malawi.

- Pang, T. (2011). *Vaccination in Developing Countries: Problems, Challenges and Opportunities*. Global perspectives in Health Volume II. Geneva, Switzerland. Retrieved from: <http://www.eolss.net/Sample-Chapters/C03/E1-14-05-06.pdf>.
- Perry, H., Weierbach, R., El-Arifeen, S., Hossain, I. (1998). A comprehensive assessment of the quality of immunization services in one major area of Dakar City, Bangladesh. *Tropical Medicine and International Health*, 3 (12) p. 981- 992. Retrieved from: <http://onlinelibrary.wiley.com/doi/10.1046/j.1365-3156.1998.00333.x/references>.
- Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research Methods for Business Students* (5th ed.). London, England: Pearson Education Limited.
- Sillignakis, E. K (2011). *Sample of Research Proposal*. Lingnan University, South Africa. Retrieved from: http://www.ln.edu.hk/eng/genres/additional/P_ResearchProposal_Tourism_NoAbstract.pdf.
- World Health Organization (2010). Strategic Plan 2011- 2015. Department of immunization, vaccines and biological. Geneva, Switzerland. Retrieved from: http://www.who.int/immunization/documents/IVB_SP_2010-15_final_Ver.pdf.
- World Health Organization (2015). *Assessing and improving the accuracy of target population estimates for immunization coverage*. Working draft. Geneva, Switzerland. Retrieved from: http://www.who.int/immunization/monitoring_surveillance/data/Denominator_guide.pdf?ua=1.
- World Health Organization, UNICEF & World Bank (2009). *State of the world's vaccines and immunization* (3rd ed.). Geneva, Switzerland. Retrieved from: http://apps.who.int/iris/bitstream/10665/44169/1/9789241563864_eng.pdf.
- Yu, H. (2015). *Does an education seminar intervention improve the parent's knowledge on vaccination? Evidence from Yiwu, East China*. Zhejiang University, China. Retrieved from: <http://www.mdpi.com/journal/ijerph>.

APPENDIX ONE

Questionnaire targeting mothers/ caregivers at the outreach clinic for vaccinations

Instructions

1. Circle the letter corresponding with the response
2. Provide a clear explanation in the spaces provided
3. Check the completeness of the questionnaire before you leave the place of the interview

Identification

Questionnaires ID	/.../.../.../.../
Date of interview	/.../.../.../.../
	Start..... To
Name of health facility	
Name of outreach clinic	
Name of interviewer	
Is the respondent a mother or caregiver?	Mother.....1 Caregiver.....2

Section A: General information/Demographic data

<i>No.</i>	<i>Questions and Filters</i>	<i>Coding categories</i>
101	Marital status	Single <input type="checkbox"/> Married <input type="checkbox"/> Divorced <input type="checkbox"/> Widowed <input type="checkbox"/> Separated <input type="checkbox"/>
102	Mothers /Caregivers' age	
103	Religion	None <input type="checkbox"/> Muslim <input type="checkbox"/>

		Christian	Others
104	Tribe	Lomwe	Yao Chewa Mang'anja Sena Tumbuka Others
105	Education level	None	Primary Secondary Tertiary
106	Child's D.O.B Age	/...../...../...../ months	
Section B: Accessibility of Vaccination Services			
107	Name of nearest health facility		
108	Is this nearest health facility different from the one where you are now?	1. Yes	2. No If no, go to 110
109	If yes, why are you at this health facility then?		
110	Original village of the client / place of residence	Place of residence..... Original village.....	
111	Nationality	1. Malawian	2. Non Malawian
112	Do you experience any problem to access the vaccination services here?	1. Yes	2. No
113	How long do you walk to reach to vaccination clinic	1. Within 10 min	2. Within 30 min 2. Within 1 hr 4. More than 1 hr

114	How often do you come to this vaccination clinic	<ol style="list-style-type: none"> 1. Every month (clinic) 2. Not often
115	Do you know some people from other districts/ another country who also come here to seek for vaccination services?	<ol style="list-style-type: none"> 1. Yes 2. No <p>If no, go to 117</p>
116	If yes, where exactly do they come from	Name of the place(s).....
117	Look for the trends of previous visits at least for 3 months (to establish a picture of real coverage)	<ol style="list-style-type: none"> 1. Attended all the vaccination sessions 2. Was absent previous month(s) 3. The first time to come to clinic
118	What made you have such a record of visits(have such a number of visits)	
Section C : Knowledge of mothers / caregivers on vaccination		
119	How do you get information about vaccinations?	<ol style="list-style-type: none"> 1. Health workers 2. Mass media 3. Local leaders 4. Others (specify)
120	How do you know the date for the next visit?	<ol style="list-style-type: none"> 1. Told by health workers 2. Know by own 3. Written in health passport 4. Others (specify).....

121	Do you know the vaccine(s) that has been given to your child?	1. Yes 2. No Write them if mentioned
122	What are some of the diseases that a child can be protected from when he/she is vaccinated with this vaccine?	Write all the diseases mentioned:
123	Apart from the vaccine your child has received, what are other vaccines which you know for children?	
124	What are benefits for coming for vaccination services?	
125	When are you coming for the next visit?	1. Next month 2. Don't know 3. Will not come back
Section D: Quality of vaccination services		
126	Do you prefer coming here for every vaccination of your child	1. Yes 2. No If yes, go to 127 If no go to 128
127	Why do you like this particular vaccination clinic?	1. Is close 2. Good services 3. (Specify)..... .
128	Why don't you like this particular vaccination clinic?	
129	Have you ever been sent back from the vaccination clinic before	1. Yes 2. No

	getting the services?	If no, go to 131
130	What were the reasons?	<ol style="list-style-type: none"> 1. Outreach cancelation 2. Shortage of vaccination supplies 3. Others(specify)
131	How do you describe the attitude of health workers here?	<ol style="list-style-type: none"> 1. Good 2. Bad 3. Not sure

Thank you for time spent answering the questionnaire.

APPENDIX TWO

Questionnaire targeting the EPI Coordinator / Cold Chain Technician

Instructions

1. Circle the letter corresponding with the response
2. Provide a clear explanation in the spaces provided
3. Check the completeness of the questionnaire before you leave the place of the interview

Identification

Questionnaires ID	/.../.../.../.../.../
Date of interview	/.../.../.../.../.../
	Start..... To
Name of district	Phalombe
Position of respondent	
Name of interviewer	

Section A: General information/Demographic data

<i>No.</i>	<i>Questions and Filters</i>	<i>Coding categories</i>
101	Total district population	
102	Total under 1 population	
103	Source of demographic data	1. NSO 2. Head count
104	Why do you use data from this source?	
105	How reliable is this source?	

Section B: Accessibility of Vaccination Services																		
104	Does the District EPI Coordinator know the monthly vaccine requirements for the district?	1. Yes 2. No																
105	What are the vaccine supply levels in the district?	1. Enough 2. Not enough																
106	Any stock out of supplies within the last 3 months?	1. Yes 2. No																
107	How many clinics did you plan?	1. Static 2. Outreach																
108	% of clinic cancellations within the last 3 months																	
109	% of clinic rescheduled within the last 3 months																	
110	How far are the vaccination clinics?	1. Within 10 min walking distance 2. Far																
111	What criteria is followed to open up an outreach clinic to an area?	1. Distance 2. Population 3. Geographical barriers																
112	How is the district coverage for the past 3 years? (See the reports)	<table border="0"> <thead> <tr> <th></th> <th>Penta 3</th> <th>OPV3</th> <th>PCV3</th> </tr> </thead> <tbody> <tr> <td>2013.....</td> <td>.....</td> <td>.....</td> <td>.....</td> </tr> <tr> <td>2014.....</td> <td>.....</td> <td>.....</td> <td>.....</td> </tr> <tr> <td>2015</td> <td>.....</td> <td>.....</td> <td>.....</td> </tr> </tbody> </table>		Penta 3	OPV3	PCV3	2013.....	2014.....	2015
	Penta 3	OPV3	PCV3															
2013.....															
2014.....															
2015															
113	What % of health facilities have the coverage of vaccines above 100%																	

114	What % of health facilities have low coverage of vaccines below 80%?	
115	Where are those facilities located with excess coverage	<ol style="list-style-type: none"> 1. At borders with Mozambique 2. At borders with other districts 3. Within (inside)
116	What is so special about such health facilities having such excess coverage of above 100 %?	
117	Why do you think the district has excess vaccination coverage of above 100%?	
118	Do you see this excess coverage as something positive or negative?	<ol style="list-style-type: none"> 1. Positive 2. Negative 3. Not sure
119	Why do you think so?	
120	Do you experience problems of drop outs?	<ol style="list-style-type: none"> 1. Yes 2. No
121	If yes, how big is the problem?	<ol style="list-style-type: none"> 1. Big 2. Small <p>Key; $\geq 10\%$ is big</p>
Section C: Data Management/ Quality		
122	Who compiles the vaccination data at a health facility?	<ol style="list-style-type: none"> 1. HSAs 2. Statistic clerks
123	What special skills do such people have?	<ol style="list-style-type: none"> 1. Trained in data management 2. Not trained

124	How reliable are they when compiling the data?	<ol style="list-style-type: none"> 1. More reliable 2. Reliable 3. Not reliable
125	Are the Health Facility reports (that are sent to district) completely filled in?	<ol style="list-style-type: none"> 1. Yes 2. No (Check by sampling few)
126	Do you have health facilities that submit data late?	<ol style="list-style-type: none"> 1. Yes 2. No <p>If no, go to 128</p>
127	What are the names of these facilities	Write health facility names
128	Does late reporting affect the coverage?	<ol style="list-style-type: none"> 1. Yes 2. No
129	If yes, how?	

APPENDIX THREE

Section D: Trend of excess vaccination coverage from the study sampled H/ Facilities

Antigens coverage trend from 2013 -2015																
	BCG %			OPV3 %			PCV 3 %			Penta 3 %			Rota 2 %			
Facility	2013	2014	2015	2013	2014	2015	2013	2014	2015	2013	2014	2015	2013	2014	2015	Explanations
Chiringa																
Chitekesa																
Migowi																
Alinafe																
Mwanga																
Nambazo																
Sukasanje																
Waruma																

Note: To be filled in using data from 2013- 2015 at district level

Thank you for time spent answering the questionnaire.

APPENDIX FOUR

Questionnaire targeting Health Surveillance Assistants who are EPI focal persons

Instructions

1. Circle the letter corresponding with the response
2. Provide a clear explanation in the spaces provided
3. Check the completeness of the questionnaire before you leave the place of the interview

Identification

Questionnaires ID	/.../.../.../.../.../
Date of interview	/.../.../.../.../.../
	Start..... To
Name of health facility	
Health facility population	
Position of the respondent	
Name of interviewer	

Section B Data Management/ Quality

<i>No.</i>	<i>Questions and filters</i>	<i>Coding categories</i>
101	Does the HF have data on the vaccination target for the catchment area?	1. Yes 2. No
102	Does the HF have the vaccination target population displayed?	1. Yes 2. No
103	What is the facility target for the following vaccines?	1. BCG 2. Penta 3 3. OPV 3 4. Rota 2
104	What was the coverage of these	1. BCG

	vaccines for last the month?	2. Penta 3 3. OPV 3 4. Rota 2
105	What was the coverage of these vaccines for last the last 3 years (from 2013 to 2015)?	2013 2014 2015 1. BCG 2. Penta 3 3. OPV 3 4. Rota 2
106	Can a child's vaccination history be easily followed in the registers?	1. Yes 2. No By checking
107	Have reports for the previous 3 months (Jan to March) been signed and stamped by the health facility in charge before sending them to the district?	1. Yes 2. No
108	Was the report for the last month submitted to the district on time?	1. Yes 2. No <i>Date</i> <i>submitted.....</i>
109	Are the HF reports correctly filled in?	1. Yes 2. No
110	Is there one place where the previous vaccination reports are kept?	1. Yes 2. No
111	Are the reports organized in a file by dates?	1. Yes 2. No
Section C: Accessibility of vaccination services		
112	% of outreach clinic cancellations within the last 3 months	
113	% of outreach clinic rescheduled within the last 3 months	

114	Are there any outreach clinics within your catchment area which report about excess vaccination coverage? > 100%	1. Yes 2. No
115	If yes, what are some of the reasons?	
116	Where do most clients come from especially in outreach clinics where you have a high coverages	1. Within the district 2. Outside the district 3. Outside the country
117	Use the registers to check the data on what is in the registers and the reporting form. Check for Penta 3, PCV 3, OPV3 and Rota 2 (the data should be for 3 months from Jan, 2016)	
Section D: Quality of service		
118	What do you do in order to encourage more people to come for vaccination services?	
119	At what time do you start administering vaccines at your clinics	
120	How do you handle the issue of vaccination of defaulters?	
121	Have you ever experienced a problem of vaccine supplies stock out the past 3 months?	1. Yes 2. No
122	What strategies are put in place to monitor vaccines supply stock outs?	

123	From your experience, what is the major difference the way this facility administers vaccines compared to other facilities?	

Thank you for your time spent answering this questionnaire.

APPENDIX FIVE

Documentation verification form targeting the Health Surveillance Assistants who are EPI focal person

District: Phalombe *Name of health facility.....*

Name of enumerator.....

Date.....

<i>No</i>	<i>Vaccine</i>	<i>Registers (doses)</i>	<i>Reporting forms (Doses)</i>	<i>Difference</i>
1	BCG			
2	OPV 1			
	OPV 3			
3	Penta 1			
	Penta3			
4	PCV 1			
	PCV 3			
5	Rota 1			
	Rota 2			

End of questionnaire.

APPENDIX SIX

Request for permission to carry out a research study in health facilities from the district



Department of Environmental Health
Postgraduate Studies
Private Bag 303
Chichiri
Blantyre 3
1st September, 2016

The District Health Officer
Phalombe District Health Officer
P. O. Box 79
Phalombe

Dear Sir/Madam

Request for permission to carry out a Research study in Health facilities from the district

I am a student at the Malawi Polytechnic, University of Malawi, pursuing Master of Science Degree in Environmental Health. I intend to carry out a study on **“INVESTIGATING UNDERLYING REASONS FOR EXCESS VACCINATION COVERAGE IN PHALOMBE DISTRICT”**

This study is part of the requirement for the award of Master of Science in Environmental Health.

It is my hope that the result will assist the district and other stakeholders in improving the reporting system and other issues related to vaccination performance in the district.

I am looking forward for your continued support and positive response.

Yours faithfully,



Patrick Omar Nicks