ACCURACY AND QUALITY OF ROUTINE IMMUNISATION DATA MONITORING SYSTEM IN OGBARU AND ONITSHA NORTH LOCAL GOVERNMENT AREAS, ANAMBRA STATE, NIGERIA

BY

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A DISSERTATION IN THE DEPARTMENT OF EPIDEMIOLOGY AND MEDICAL STATISTICS SUBMITTED TO THE FACULTY OF PUBLIC HEALTH IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PUBLIC HEALTH (FIELD EPIDEMIOLOGY) OF THE UNIVERSITY OF IBADAN

MARCH, 2013

CERTIFICATION

I certify that this research was carried out under my supervision by **AWOGU**, Nkiruka Cecilia, in the department of Epidemiology and Medical Statistics, Faculty of Public Health, University of Ibadan.

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DEDICATION

To the Almighty Father who made the beginning and completion of my postgraduate programme a reality.

ACKNOWLEDGEMENTS

Firstly, I would like to thank the Almighty Father who blessed my plan of coming to Ibadan, who saw me through my numerous trips from Onitsha to Ibadan and sustained me throughout the programme. He has always been and will always be the lifter of my head.

I would like to thank my supervisor, Dr. A.A Fatiregun, for his endless efforts, his never waning patience and encouragement. Without his help and support, this work would not have been possible to complete. My appreciation also goes to his lovely wife Mrs. Abosede Fatiregun who always welcomed me each time I walked in with this work.

I also want to appreciate the assistance of all the lecturers in the former department of Epidemiology, Medical Statistics and Environmental Health (EMSEH) especially the Head of Department Dr. Ikeoluwapo Ajayi, Dr. Olufunmilayo Fawole, Dr. Lola Adekunle, Dr. M.D Dairo and Mr. Akinyemi. In a special way, I will want to thank Dr. Babatunde Adedokun, for all his assistance and for improving my knowledge and skill in the use of SPSS.

My thanks also go to the Local Government Immunisation Officers of Onitsha North and Ogbaru Local Government Areas, Mrs Eunice Orjiakor and Mr. Sunday Okafor and all the Immunisation Focal Persons that I worked with.

I appreciate the help and support of my mum, Mrs Anne Awogu, my brother Mr. Francis Awogu and sister, Mrs Adaobi Okwuosa. You deprived yourselves to see me through this programme. I pray you all live to reap the fruit of your labour. I love you all. My thanks also go to my aunty Mrs. Dorothy Nwabueze. for her love and support.

This acknowledgement will be incomplete without saying thank you to my dearest aunty, Dr. Mrs. Edith Maduagwu, her husband Prof. Maduagwu, and children Chinedu and Chimere. You made my stay in Ibadan very enjoyable.

To my friends and colleagues: Ifeoma, Uzoma, Damilola (Iyawo tutun), Aunty Jane, Chizzy, Chika and Rita, thank you.

To my best and dearest friend, Fidel for all his encouragement, love and support. You have always been by my side through thick and thin. I love you.

ABSTRACT

Routine Immunisation (RI) is a cost-effective public health intervention to reduce child morbidity and mortality. Immunisation programme managers often depend on immunisation coverage obtained from RI data monitoring system to guide planning for intervention programmes. However, few studies have been carried out to determine the accuracy and quality of RI information system at the Health Facility (HF) and Local Government Area (LGA) levels in Nigeria. This study was therefore designed to assess the quality and accuracy of RI data monitoring system in Ogbaru and Onitsha North (ON) LGAs of Anambra State, Nigeria.

All the 48 HFs in the two LGAs (Ogbaru=28; ON= 20) and each of the LGAs Immunisation Units (IUs) were selected for the study. The World Health Organization standard methodology relating to immunisation data quality audit was used. This involved the review of the HF immunisation session tally sheets, monthly summary sheets and monthly LGA reports. A checklist containing 120-item Quality Score (QS) was used to assess the quality of the data monitoring system. A QS<90 indicated poor quality while a QS≥90 was taken as good quality. Records of the third dose of diphtheria-pertussis-tetanus vaccination at the HFs from January to December 2009 were recounted and compared with the data at the LGA IUs for the same period. An Accuracy Ratio (AR) which expresses the number of immunisation recounted at the HFs to that reported to the LGAs IUs was obtained. An AR within the range of 0.95 and 1.05 indicates data consistency. Immunisation Focal Persons (IFPs) in the HFs were interviewed using a questionnaire that contained a 70-point knowledge scale. Knowledge scores <50 indicated poor knowledge, while scores of ≥50 were taken as good knowledge. Data were analysed using descriptive statistics, t-test, Chi-square test, Spearman rho correlation and logistic regression.

The proportion of HFs with consistent data in Ogbaru and ON were 28.6% and 70.0% ($p<0.05$) respectively. The AR was 0.83 in Ogbaru and 0.99 in ON. The mean QS for HFs in Ogbaru and ON were 74.5±18.0 and 73.6±13.2 ($p>0.05$) respectively, implying low quality of the data monitoring system. There was a moderate correlation between the QS and AR obtained from the HFs in the two LGAs ($r=0.4$). Mean age of IFPs was 39.1±9.1 years in Ogbaru and 40.0±6.9 years in ON. Highest levels of education of IFPs were university degree (20.0%), Higher National Diploma (38.0%) and Community Health Officer's certificate (42.0%). The mean

knowledge score among IFPs was 44.0±8.0 in Ogbaru and 46.2±6.9 in ON with no significant difference. The proportion of IFPs with good knowledge in Ogbaru and ON were 54.5% and 45.5% respectively, with no significant difference. Data consistency was not associated with age of IFPs (OR=0.8, 95% CI=0.3-2.7), LGA location (OR=0.7, 95% CI=0.2-1.7), level of education (OR=0.6, 95% CI=0.2-2.2) and years of experience (OR=1.2, 95% CI=0.5-50).

There were inconsistent and low quality data reporting system in the two Local Government Areas. On-the-job training is needed to promote data accuracy and improve quality of data reporting system.

Keywords: Routine immunisation, Immunisation monitoring system, Data quality audit.

Word count: 495

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LIST OF ACRONYMS

AEFI	Adverse Events Following Immunisation
AR	Accuracy Ratio
DQA	Data Quality Audit
DQS	Data Quality Self Assessment
DTP3	Third Dose of Diphtheria- Tetanus Pertusis
EPI	Expanded Programme on Immunisation
GAVI	Global Alliance on Vaccines and Immunisation
HF	Health Facility
IFP	Immunisation Focal Person
LGA	Local Government Area
LIO	Local Government Immunisation Officer
NPI	National Programme on Immunisation
QS	Quality Score
RI	Routine Immunisation
TT	Tetanus Toxoid
UNICEF	United Nations Emergency Fund
VAERS	Vaccine Adverse Events Reporting System
VPD	Vaccine Preventable Diseases
WHO	World Health Organisation

CHAPTER ONE

INTRODUCTION

1.1 Background

Immunisation is a simple and effective way of protecting children against harmful infections that can be hazardous to their health. Immunisation against preventable childhood illnesses is an essential part of improving the health and well-being of children. Immunisation campaigns are among the most successful and cost-effective public health interventions which are believed to have saved about 20 million lives in the last two decades (UNICEF, 2010). It has led to the eradication of small pox, elimination of measles and poliomyelitis in regions of the world and substantial reduction in the morbidity and mortality attributed to diphtheria, tetanus and pertussis (WHO, 2003). It has been reported that "with the exception of safe water, no other modality, not even antibiotics, has had such a major effect on mortality reduction" (WHO, 2009). Immunisation coverage of infants for the six major Vaccine-Preventable Diseases (VPD) – diphtheria, measles, pertussis, polio, tetanus and tuberculosis - rose from less than five per cent in 1974 to more than 75 per cent in 2006. Over the last ten years, data consistently showed that over 70 per cent of children less than five years of age have been immunized against these illnesses. However, millions of children remain unprotected and at risk from these life-threatening and debilitating diseases despite the success of immunisation campaigns (Liverpool Associates in Tropical Health and Euro Health Group, 2006).

In most countries, immunisation is provided through the Expanded Programme on Immunisation (EPI) and as a part of the primary health care approach (Mavimbe et al, 2005). The EPI was initiated by the World Health Assembly in 1974, at the end stage of the global campaign to eradicate smallpox. Coverage for basic vaccines was an estimated 5% in developing countries at that time (Keja et al, 1988). The EPI goals were to ensure that every child received protection against childhood tuberculosis, polio, diphtheria, pertussis, tetanus, and measles by the time he or she was one year of age and to give tetanus toxoid vaccinations

to women to protect them and their newborns against tetanus infection. During the 1980s, national immunisation programmmes in developing countries made substantial progress in meeting the EPI goal, with the support of the World Health Organisation (WHO), United Nations Children's Fund (UNICEF), U.S. Agency for International Development (USAID), Italian government, and other partners. As immunisation coverage in developing countries soared, EPI was helping to lay the foundation for other primary health care services (Babalola and Aina, 2004). By 1990, average reported coverage for the six antigens was over 70%. As a result of the increase in coverage, the incidence of vaccine preventable diseases began to fall dramatically. The EPI programme was initially sponsored by the WHO alone but has now grown to be an operational programme of member states working with a broad-based coalition of United Nations agencies, multi and bilateral development agencies, private and voluntary groups, as well as concerned individuals.

An important agency in charge of immunisation programmes is the Global Alliance for Vaccines and Immunisations (GAVI), which was formed in 1999 with the aim of ensuring that every child in the world will be protected against VPD. GAVI exists as a mechanism for co-ordinating and revitalising immunisation programmes at international, regional and national levels. Having the vaccine fund, at its disposal GAVI provides support to countries with below $1,000 per capita GNP. By significantly expanding the reach and effectiveness of immunisation programmes the GAVI partners expect to help decrease the burden of disease globally (GAVI, 2004).

A cornerstone of the GAVI approach is performance-based programming whereby national EPI programmes are rewarded for actual increases in the number of children immunized (GAVI, 2002). The reported numbers of children receiving DTP3 has been selected as the best measurement of performance. DTP3 is chosen because, though not perfect, it is considered the most reliable measure of the number of fully immunized children (GAVI, 2004). However, the accuracy of reporting of the coverage of other antigens is also checked.

The GAVI has three reporting requirements. The first is that countries are expected to maintain a reporting system that includes the permanent recording of each vaccination given.

This can be done either by tallies or by daily records based on registers. The second is that countries are expected to keep all records and reports on immunisation data (vaccinations, vaccine stock, and disease surveillance) over the life of the share allocation system, at the respective administrative level. The third involves the timely completion of the (WHO/UNICEF) annual Joint Reporting Form by countries (GAVI, 2004).

In Nigeria, EPI was introduced in 1979 with the aim of providing routine immunisation to children less than two years (Sorungbe, 1989). The programme recorded initial but intermittent successes. The optimum level was recorded by early 1990 when the country achieved 81.5% coverage. After this period, Nigeria has witnessed gradual but consistent reduction in immunisation coverage. By 1996, the national coverage data showed less than 30% coverage for the entire antigens (Babalola & Aina, 2004). The Nigeria Demographic and Health Survey (NDHS) conducted by the National Population Commission (NPC) and the Nigeria Immunisation Coverage Survey (NICS), which was conducted by the National Programme on Immunisation (NPI) showed that the national coverage in Nigeria for full immunisation in 2003 was less than 13%, one of the lowest rates in the world. Some states in northern Nigeria had coverage rates below 1%, and the average for the whole North West Zone was just 4%. Nigeria's performance on routine immunisation has continued to decline since the high point achieved around 1990. However, the NDHS of 2008 showed that full immunisation coverage had increased to 19%.

Routine immunisation faces many challenges in Nigeria. Some of these include improving service delivery at the health facilities with high standard of practice and minimal risk, improving technical skills of health workers through continued training and capacity building, increased social mobilization and advocacy at all levels, improved monitoring and evaluation of immunisation services which include improved data management at all levels and efficiency of service delivery (GAVI, 2004).

The use of results-based financing mechanisms by major global donors has created further demand for timely and reliable data for decision-making (Chan et al, 2010). Decision makers need to decide on the best way to increase the number of people they immunized against

more diseases. They also need to introduce newly available vaccines and technologies, as well as the provision of other critical health investments during immunisation sessions in ways that will maximize effectiveness, reduce the VPD burden and ensure efficiency in resource allocation. These decisions can only be based on high quality data. Despite recognized efforts by programs and countries, the ability to respond to this demand is constrained by limited data availability, quality, and use. Many developing countries have limitations that hamper the production of data of sufficient quality and timeliness to permit regular tracking of progress made in scaling up and strengthening health systems (Chan et al, 2010).

Monitoring refers to the measurement of the level of achievement in vaccination coverage and other system indicators like vaccine safety and vaccine management (WHO, 2005). It involves a systematic and continuous process of examining data, procedures and practices linked to the programme activities (WHO, 2008). It is linked closely with reporting because it involves data collection and processing. Basic monitoring of national immunisation is essential to ensure that all children in all the wards have access to quality and sustainable immunisation services. The information derived is used to direct the programme in planning, measuring progress, identifying areas needing specific interventions and revision of plan based on identified gaps. The routine immunisation monitoring system helps to keep track of EPI coverage, dropout rate, vaccine utilization, vaccine coverage, adverse effects following immunisations and disease incidence.

Monitoring is an important tool for immunisation programme managers (WHO, 2003). It can help to improve the quality of the immunisation programme by ensuring that all infants and pregnant women are immunized, vaccines and safe injections are delivered in correct quantities and on time, staff are well trained and adequately supervised, information on disease incidence and Adverse Events Following Immunisation (AEFI) are collected and analysed and the community has confidence in the vaccines delivered and the immunisation service they receive.

Monitoring is an essential component of any planning step and management cycle (Frankel and Gage, 2007). Once areas that require strengthening have been identified, the issue of improving performance can be addressed. It is sometimes referred to as process evaluation because it focuses on implementation process and asks key questions such as: how well had the programme been implemented, how much did implementation vary from site to site, did the programme benefit the intended people and at what cost? For the purpose of monitoring, the routine immunisation data monitoring system is divided into six components which include: recording, reporting, archiving, demographic information, core output/ analysis and evidence of use of data.

Monitoring can be carried out through different methods. These include routine or administrative reports, supportive supervision and through surveys (Bos and Batson, 2000). Of all the different surveys conducted, the EPI cluster surveys are the most suitable for monitoring coverage in sub national. These surveys can be used to validate routine reports at the regional level. However, to validate immunisation coverage at the HFs, the lot quality coverage survey approach is sometimes used (Bos and Batson, 2000).

1.2 Statement of problem

There is a rapidly growing urgency to provide high quality data (Mate et al 2009). Reliable and timely health information is one of the foundations of effective health service management and public health action. Increases in national and international funding for health have been accompanied by greater demands for data and statistics to monitor programme implementation and performance, evaluate progress and ensure accountability. This has led to greater investments in health information, especially data collection. Many countries, however, still lack basic and effective health information systems. According to the Global Framework for Immunisation Monitoring and Surveillance (GFIMS), organizations which provide funding to immunisation programmes require comprehensive, high quality data on programme performance and surveillance to measure the impact of vaccines on the VPD burden and justify their public health investment (WHO, 2005). In most countries, inappropriate data have been said to be the common problems in information systems (Makombe et al, 2008). Reports have shown that official national reports of several

developing countries tend to overstate the number of children fully vaccinated against childhood diseases (Murray et al, 2003). A study in Nepal showed that the immunisation coverage was exaggerated by over- reporting from the primary health care service outlets as well as from the district health office (Onta et al, 1998). This finding indicates that, although such reports are generally the most widely available data for assessing vaccination coverage, their validity for measuring5 changes in coverage over time is highly questionable (WHO 2003).

1.3 Justification

The aim of any initiative to improve immunisation is to increase coverage up to a level where all children are protected against targeted diseases. Programme managers often depend on immunisation coverage obtained from routine data monitoring system to guide planning, review programmes and determine the areas which need intervention to improve coverage. Recent substantial increases in international attention to health have been accompanied by demands for statistics that accurately track health progress and performance, evaluate the impact of health programs and policies, and increase accountability at country and global levels (Chan et al, 2010).

However, community based surveys have sometimes reported coverage rates that were different from administrative reports. Limited studies have verified the accuracy of reported data or determined the quality of routine immunisation monitoring system. In the South- East region of the country however, literature search showed that no studies had been carried out to verify the accuracy or quality of generated data. This study was therefore designed to assess the quality and accuracy of routine immunisation data monitoring system in a rural and an urban local government area of Anambra state.

1.4 Objectives

1.4.1 Broad objective

The general objective of this study was to assess the quality and accuracy of routine immunisation reporting system in Ogbaru and Onitsha North Local Government Area, Anambra State.

1.4.2 Specific objectives

The specific objectives were to:

1. Verify the consistency of immunization data generated at the health facilities and reported to Ogbaru and Onitsha North LGA.
2. Determine the quality of the immunisation data monitoring systems in the two LGAs.
3. Assess the knowledge of the health workers on the components of routine immunisation data monitoring system.

1.5 Research questions

The research questions were:

1. How much of the reported data generated from the health facilities can be verified in Ogbaru and Onitsha North LGAs?
2. What is the quality of the immunisation data monitoring systems in the two LGAs?
3. How knowledgeable are the health workers on the components of routine Immunisation data monitoring system?

CHAPTER TWO

LITERATURE REVIEW

2.1: Routine Immunisation Activities

Routine immunisation is well recognized as the foundation for all EPI activities. Through participation in the development of the health sector reform programme and strategy to revitalize Primary Health Care (PHC), the World Health Organisation (WHO) has continued to advocate for routine immunisation to be taken as the core component and arrowhead for revitalizing PHC in Nigeria (Babalola and Aina, 2004). Since the end of 2003, WHO has invigorated its support for routine immunisation, strategically at policy level with the Federal Ministry of Health and with the National Programme on Immunisation (NPI), and operationally at the field level in all states of the federation and Local Government Areas (LGAs). All the activities are deployed within the framework of the Inter- agency Co-ordination Committee (ICC), where government and partner agencies are represented as an avenue to move the programme forward (FBA Health Systems Analysts, 2005).

The WHO polio-funded structures that are in place at the national and state levels (human, financial and logistics) continue to support accelerated implementation of many health-related activities including routine immunisation, integrated disease surveillance and prevention and control of outbreaks in Nigeria. In December 2004, Nigeria adopted the 'Reaching Every Ward' approach during a national review and planning meeting to strengthen routine immunisation in every ward. Since then activities have included capacity building for strengthening static services, re-establishing outreach and mobile services supervision, linking services with communities, resource management and mobilization, monitoring and evaluation, including monitoring the impact of routine immunisation on vaccine preventable diseases.

Despite the various activities; data management, monitoring and evaluation were prioritized by WHO so that implemented activities could be evidence-based, allow regular performance analyses, and provide comparisons between States, Local Government Areas and wards, and

between Nigeria and other countries. Completeness of monthly reporting of routine immunisation data from LGAs improved from 18% in December 2004 to 72% in June 2005 (WHO, 2011).

2.2: Strategies for Provision of Routine Immunisation Services

Nigeria's routine immunization schedule stipulates that infants should be vaccinated with the following vaccines: a dose of Bacillus Calmette-Guerin (BCG) vaccine at birth; three doses of Diphtheria, Pertussis and Tetanus (DPT) vaccine at 6, 10 and 14 weeks of age; at least three doses of oral Polio vaccine (OPV) - at birth, and at 6, 10 and 14 weeks of age; and one dose of Measles vaccine at 9 months of age (Antai, 2009). Table 2.1 shows the immunisation schedule for Nigeria.

In order to ensure that all children are vaccinated, there are several strategies for the routine delivery of immunisation services in health facilities. One of such strategies is fixed facility, which refers to the regular delivery of vaccinations in a health facility on specified days of the week and hours of the day. Larger facilities may give vaccinations whenever eligible clients come. There is also the outreach strategy, which is the delivery of services to people who cannot get to health facilities or who can do so only with difficulty (WHO, 2006). Trips to outreach sites are usually completed within a day and are made by health facility staff on foot or using motorized vehicles, bicycles, or pack animals. Monthly visits provide a very timely protection for children, although less frequent visits may be necessary where distances are far, travel is difficult, or staff resources are limited. Rainy seasons or snowy winters may make it necessary to schedule a pre-season and a post-season outreach visit with a gap of several months in between. In some countries, such as India, outreach visits for primary vaccinations that are conducted once, twice, or three times a year are called "pulse immunisation." The last is the mobile strategy. This usually describes trips of more than one day by district or regional health workers for the purpose of delivering services to people living in remote areas. Mobile teams may spend several days travelling to reach the people. In some countries like Nepal, it can take up to ten days of walking from the district centre to reach some villages. Figure 2.1 shows a planning strategy for immunisation service delivery in a catchment area.

In general, the cost per vaccination is higher when services are provided through outreach and mobile strategies than through fixed services, because health workers spend more time to reach each child and because there are transportation and per diem costs involved. However, some people cannot be reached in any other way (WHO, 2005b).

Table 2.1: Routine immunization schedule in Nigeria

Type of vaccine	Minimum target age of child
BCG	At birth
OPV	At birth
Pentavalent 1 (DPT, HBV and Hib	6 weeks
Pentavalent 2 (DPT, HBV and Hib	10 weeks
Pentavalent 3 (DPT, HBV and Hib	14 weeks
Measles	9 months
Yellow fever	9 months

Source: NPHCDA, 2012

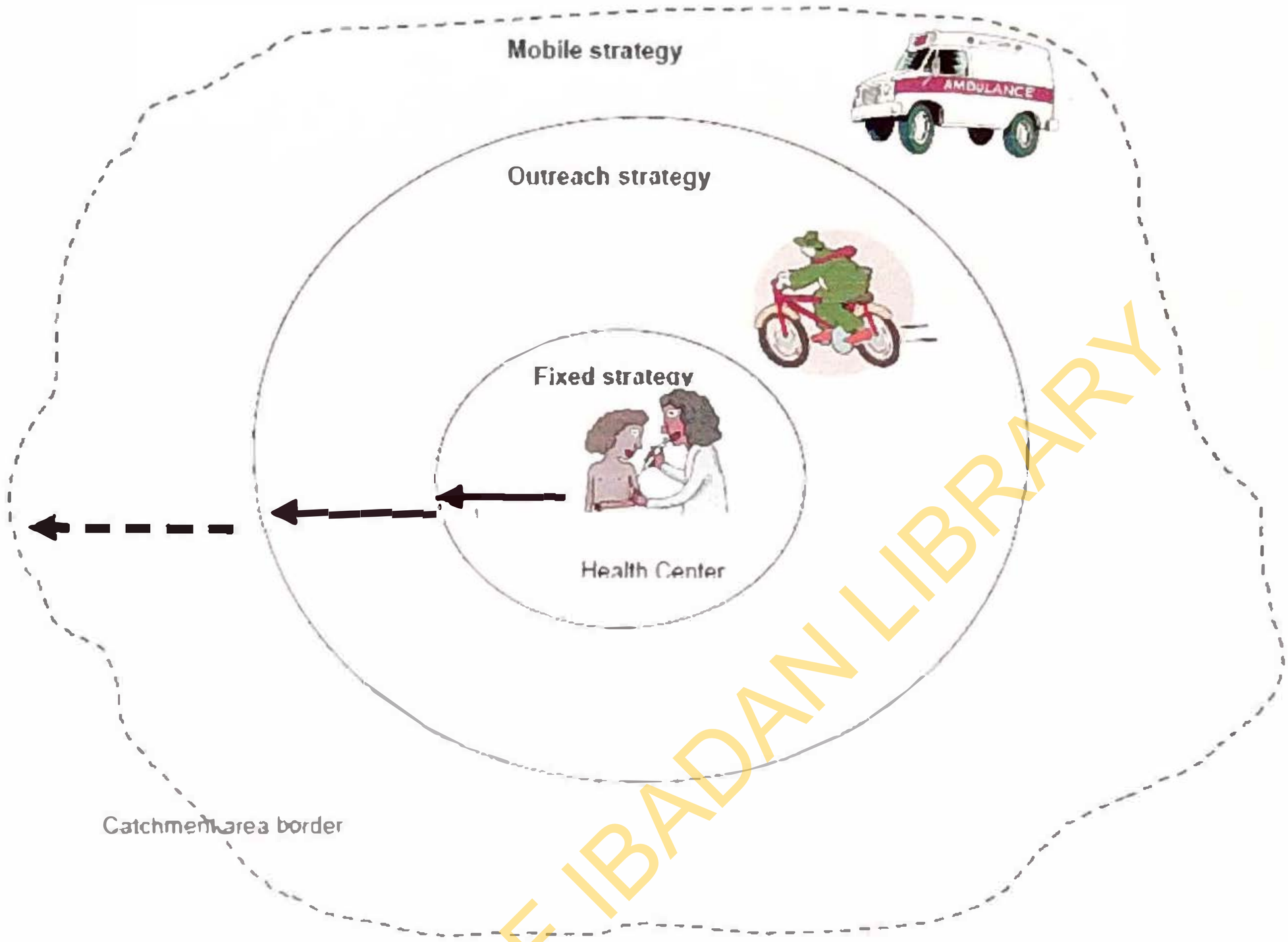

Fig. 2.1: Planning Strategy for Immunisation Service Delivery in a Catchment Area

Source: WHO, 2006

2.2: Reporting system of immunisation data

Most countries track the performance of their immunisation programmes through the hierarchical administrative monitoring systems (Ronveaux et al, 2005). In a typical system, staff at the local health facilities compile vaccination data from daily immunisation logs or tally sheets and report these to a local government health officer monthly. Staff at both the health facility and at the local government level, use these reports to evaluate the progress in achieving immunisation coverage goals.

The reporting system flow of immunisation data is shown in figure 2.2. The flow of information begins at the health facility level. A health facility is defined as the administrative level where the vaccinations are first recorded. It might include private health facilities, facilities of Non-Governmental Organizations (NGOs), hospitals, or a simple health post. Typically, when a health worker administers a dose of vaccine, the date of vaccination is immediately recorded on the child's vaccination card and on the immunisation register and the dose is tallied on an appropriate sheet allowing for the easy re-counting of all doses provided. The individual vaccination card is either kept in the health facility or stays with the child's caretaker while the register and the tally sheets are archived in the health facility. Health facilities usually report to a district health office on a regular basis (monthly or quarterly) and the number of doses of every antigen given during the reporting period are stated in the report. To prepare the report, the health facility officer obtains the number of doses administered from the tally sheets. A copy of all reports sent to the district is kept in the health facility where the cumulative number of doses administered is displayed in a graph to monitor the progress towards coverage targets. At the local government level, administrative personnel receive the reports, log the date they are received and follow up on late reports. They then aggregate the information from all the health facilities they oversee and send a periodic district report to the state level which forwards reports to the national level. At the national level (national headquarters of the national immunisation services/ programme), tabulations collating the district report information are made. Subsequently, the country sends the national data to the international community as an official report to WHO and UNICEF. It is worthy to note that the absence of data in any health information system fundamentally weakens the accuracy and reliability of the system (Mate et al, 2009).

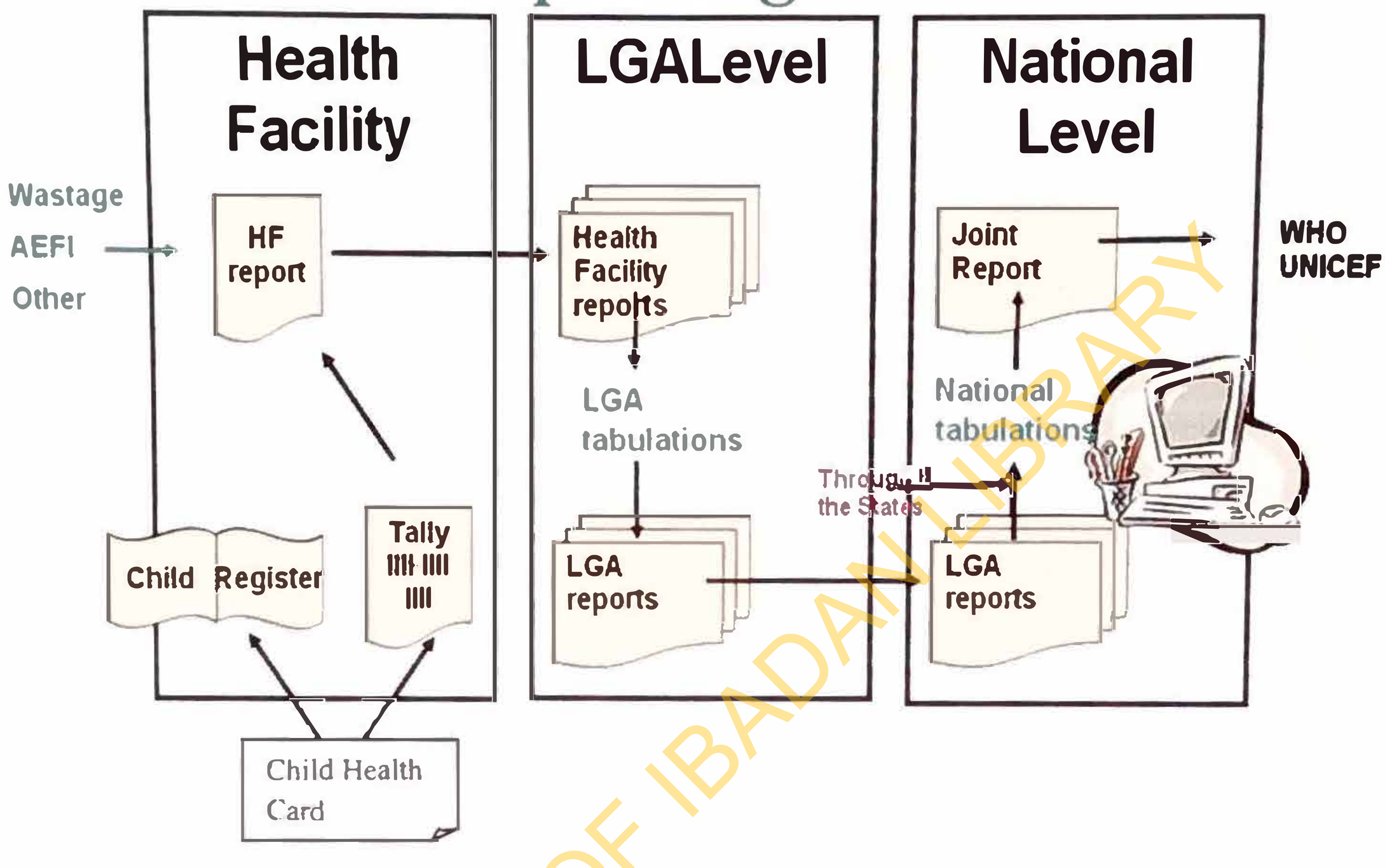

Fig.2.2: Reporting system flow of immunisation data

Source: WHO, 2005b.

2.4: Monitoring routine immunisation

Monitoring is the process of continuous observation and data gathering with the aim of comparing what has been achieved with your targets (Frankel and Gage, 2007). Monitoring also means keeping track of ongoing operational activities, milestones achieved, the use of budget, staff time and other resources. It facilitates reprogramming when necessary and eventual evaluation (WHO, 2008). Monitoring is carried out at all levels with the mechanisms designed at the planning stage of activities and is closely linked with reporting because it involves data collection and processing. It is an essential component of any programme, a step in the management cycle that is formed by planning, implementation of planned activities and evaluation. Good planning, both long and short terms are based on current data for prioritising and setting objectives. To ensure that the plans made yielded good progress, immunisation activities are monitored regularly. It has been reported that effective monitoring and supervision of health care programmes depend on complete, accurate and timely flow of data between primary health care facilities, hospitals and a central information hub (Mate et al, 2009).

Immunisation program managers and service providers need a continuous flow of information that tells them the following:

i. whether immunisation services are accessible to the target population,
ii. how many individuals in the target population are being vaccinated, who is not being vaccinated and why;
iii. if the quality of services meets program standards
iv. whether resources are used efficiently,
v. whether service strategies are meeting objectives,
vi. whether mortality and morbidity from vaccine-preventable diseases are being reduced.

Policy makers, political leaders, health planners, donors, providers of technical assistance, and members of the general public also need information (WHO, 2009). Immunisation systems rely on information to guide policies, strategies and to plan activities.

Monitoring of immunisation systems is based on the regular collection and analysis of well defined indicators (GAVI, 2002). An indicator is a variable that measures an aspect of a programme that is directly related to the programme's objectives. It can either be qualitative or quantitative. Quantitative indicators are numeric and are presented as numbers or percentages while qualitative indicators are descriptive observations which supplement the numbers and percentages provided by quantitative indicators. Indicators are very important in immunisation programmes because they measure the specific resources that go into carrying out the programme, the immediate results obtained by the programme and whether the outcome changed in the desired direction (Frankel and Gage, 2007). The information provided by indicators help in identifying and analysing problems as well as monitoring progress towards the stated target. Some of the indicators used in monitoring immunisation programmes include:

a) Frequency of service delivery.
b) Timeliness and Completeness of Reporting
c) No of Sessions conducted.
d) Monthly vaccinations given.
e) Percentage of planned supervisory visits conducted
f) Immunisation coverage using DPT3.
g) Drop Out Rates and Gaps.
h) Vaccine wastage rate.
i) Cumulative vaccination.
j) Denominators – Catchment Area Population

Governments, organizations that provide technical assistance, donors, and community leaders use indicators such as those listed in the table to measure whether they were achieving their objectives and to make strategic decisions on resource allocation. For example, some community-based health committees use DTP3 coverage as an indicator of the performance of all public health services in their communities. GAVI uses DTP3 coverage by district as an indicator of progress toward its goals. Indicators can also be used by programme managers to assess quality, efficiency, effort, and impact (WHO, 2008).

2.5 Reporting Adverse Events Following Immunisation (AEFI)

Vaccines used in national immunisation programmes are safe and effective, however, no vaccine is perfectly safe and adverse events can occur following immunisation. In addition to the vaccines themselves, the process of immunisation is a potential source of adverse events (WHO, 2009). An adverse event following immunisation is any adverse event that follows immunisation, believed to be caused by the immunisation. Reported adverse events can either be true adverse events, that is really a result of the vaccine or immunisation process, or coincidental events that are not due to the vaccine or immunisation process but are temporarily associated with immunisation. Immunisation can cause adverse events from the inherent properties of the vaccine (vaccine reaction), or some error in the immunisation process (programme error). The event may be unrelated to the immunisation, but have a temporal association (coincidental event). Anxiety- related reactions can arise from the fear or pain of the injection rather than the vaccine. In some cases, the cause of the AEFI remains unknown (Cutts et al., 1993).

Reportable AEFIs must include any death or serious events believed by the public or health workers to be caused by immunisation. Some events like abscess, toxic shock syndrome, sepsis, and BCG lymphadenitis, are indicators of programme errors. They can be markers for programme errors or for problems with specific vaccine lots (WHO, 2009). Reports of AEFIs are made on a standard AEFI report form which includes description of the event, timing of the event in relation to immunisation, vaccine(s) given and patient's identifying details. Additional items such as patient information (age, gender, ethnicity); vaccine information (manufacturer, lot number) and administration information (site and route of injection, outcome) may also be recorded.

Several barriers to reporting of AEFIs have been identified and peripheral health workers may not report AEFI due to the following reasons:

i. Not considering the event as related to immunisation
ii. Lack of awareness about the reporting system and process
iii. Lethargy- procrastination, lack of interest or time, inability to find the report form
iv. Fear that the report will lead to personal consequences

v. Guilt about having caused harm and being responsible for the event

vi. Reluctance about reporting an event when not confident about the diagnosis.

These barriers to reporting can be overcome by increasing awareness of the importance of reporting and the system for reporting and making it easy to report especially in situations of uncertainty (WHO, 2009). Another means is by emphasizing that investigation is about finding problems with the system and not to blame individuals. Lastly, is by giving positive feedback for reporting (WHO, 2008).

2.6: Components of routine immunisation data monitoring system

2.6.1: Demographic information component

In order to estimate the proportion of the targeted group reached with vaccination, population data by age and geographic area or catchment, are very important. The different population groups targeted for routine immunisation services are usually infants 0–11 months of age for primary vaccinations, and pregnant women for Tetanus Toxoid (TT) vaccination (WHO, 2004). Apart from the target population, health facilities and local government areas should also have displayed maps which will show all the areas they are expected to cover and their population (WHO, 2005b).

Reports have shown that in Nigeria, demographic information on HFs catchment areas are not handled systematically, there is no disaggregation of population data by strategy (fixed, outreach and mobile), population data are not consistent in HF and LGA data, there is no system for new born registration and tracking in many places, although TBAs are used in some areas (NPHCDA, 2010).

2.6.2: Core output/analysis component

This component involves the analysis of collected data. The scope of analysis and interpretation of the data generated by the monitoring differs depending on the level of the health system. Health workers are expected to use the data generated or collected to monitor the performance in general and, specifically, to monitor immunisation coverage and the drop-out rate. This will allow them to examine priority locations that performed poorly or areas

that experienced an unexpected change in the quality of performance. Some of the tools used by health workers to analyse and display monitoring data include: drop out monitoring chart, bar charts and maps. Every health facility that offers immunisation services needs to monitor progress toward coverage objectives. Providing tools such as monitoring charts and ensuring that health workers have the skills to use them can motivate health workers, enhance performance, and improve the quality of data. Immunisation monitoring charts should be posted in every health facility for inspection by health facility staff, clients, and supervisors. The charts can be shared with political and community leaders (WHO, 2008). It is important to know that data collection is only useful if the data are regularly analysed and the result of the analysis is used to improve service delivery. Data analysis is the responsibility not only of supervisory levels, but also that of health workers (WHO, 2002).

Reports have shown that many LGAs and HFs had the most challenge with this component (GAVI, 2005). The reports for Nigeria have shown that monitoring charts were seen in many places but format use was not standard. There was weak understanding of preparation and use of tools. Analysis and use of data have also been shown to be mainly verbal with no documentation of actions. Monthly LGA meetings are not regular and standardized and there are no documented feedbacks to HFs and LGAs. Community involvement is also very weak (NPHCDA, 2010).

2.6.3: Reporting component

At the end of the month, the immunisation data collected are compiled in summary forms, either manually or electronically, and sent to the LGAs. These summary reports are expected at the local government on or before the 5th of every month. Any report that is properly prepared must have the signature and date of the immunisation focal person at the health facilities According to WHO, The format of the summary report should be defined at district/national level and should be the standard for all health facilities. A copy of the report with date and signatures is sent to the local government level while a copy of the report is kept for use in the health facility. A good report has been said to be complete, timely and accurate ((WHO, 2005b).

Although some Data Quality Assessments (DQAs) had shown problems on the reporting components from some countries (Allotey and Reidpath, 2000; NPHCDA, 2010) others reported that the reporting components had improved considerably with records properly filled and filed (GAVI 2005; GAVI 2006). In health facilities in Zimbabwe, vaccine stock ledgers were reported to be available and up-to-date at the time of audit. However, despite introducing proper vaccine wastage monitoring tools, the tools were not being used to their maximum potential to inform the country regarding the actual wastage rates. It was also reported that the process for handling late reports was not adhered to which had led to laxity amongst those managing information (GAVI, 2006). In Nigeria however, it was reported that the recording situation was still the same as it was in DQS 2008. There was still the lack of use of official reporting forms at LGAs and HF levels, no evidence of delivery of reports (delivery note), signature and dating of reports were not in all reports, late reports were included in new months rather than months of the data and no AEFI reporting forms, kits AEFI committees in many places (NPHCDA, 2010).

Expected content of summary reports from health facilities

For reports from the health facilities to be complete, they must include:

a) Reports of all vaccinations given to infants and women.

b) Reports of vaccine-preventable diseases in the area, with the number of cases and immunisation status of each case, clearly stated. These can be displayed in each facility on a simple chart. A 'zero' report should be provided if there were no cases for the month.

c) Reports of adverse reactions following immunisation (AEFI). If there had been any adverse reactions during the month, details may be provided to the next level according to the AEFI system in the country. As a result of this, each health facility should have an AEFI form and kit to take care of AEFI.

d) Reporting vaccine usage and wastage patterns: the usage and wastage of vaccine will vary greatly from one session to another. However it is useful to monitor wastage and usage patterns regularly at all immunisation points to improve supply and avoid stock outs. This can be done by recording vaccine vial start and end balances, and vials received.

e) Any specific problems encountered during the reporting period (e.g. stock-outs, transportation problems, cold chain failure etc.) This is an opportunity to report supply problems and record supervisory visits (WHO, 2004).

2.6.4: Archiving component

For purposes of verification and also retrieval whenever needed, data must be stored at all the different levels. Storage of data can be done in hard copies or electronically. At the health facility, tally sheets, registers and reports should be stored for a specific period of at least three years. Higher administrative levels may use computers; however it is important that back-ups (hard copies and/or electronic copies) be available to avoid the loss of data in the case of system failure. Stored records are useful for supervisory visits and immunisation service reviews.

Reports have shown that there are issues regarding storage of data in many African countries (GAVI, 2005). In Nigeria however, it had been shown that this component is fairly satisfactory in many LGAs and HFs. However, copies of reports were not easily available in private hospitals and clinics, many previous data were missing in LGAs and HFs and computerisation of data is not in existence at the LGA level even when a computer system is available (NPHCDA, 2010).

The following types of data should be stored at each health facility for a period of three years.

i. Immunisation registers
ii. Tally sheets
iii. Reminder files or another system of tracking defaulters
iv. Copies of monthly reports
v. Target population data
vi. Immunisation monitoring charts
vii. Case/outbreak charts and reports
viii. Supervisory visit reports
ix. Stock card
x. Cold chain maintenance records (WHO, 2004).

2.7: Sources of immunisation data

Data may be defined as a representation of facts or concepts or instructions in a formalized manner, suitable for communication, interruption or processing by manual or electronic means (Abdelhak et al., 1996). Whether we collect data on paper or in a computer, the data should be organized in such a way that we can understand and retrieve them when needed (Davis and LaCour, 2002). National information systems vary from country to country. A country may have a separate monitoring system for immunisation or have an integrated one within the primary health care. Whatever the system, the national EPI manager is responsible for putting together the programme monitoring needs so that information on necessary variables are collected and available in a timely manner to facilitate assessment of progress, identification of problems and direction of management decisions at different levels. Sources of immunisation information are many (Bos and Batson, 2000). Information sources at facility levels include:

i. Population census data to calculate the size of the target population
ii. Child health card and immunisation tally sheets
iii. Monthly immunisation summary sheets
iv. Immunisation register
v. Tracking system to monitor defaulters
vi. Cold chain temperature monitoring chart
vii. Vaccine order forms and vaccine register/ stock cards
viii. Inventory list of immunisation and cold chain equipment
ix. Outpatient and inpatient registers
x. Target diseases routine reports, etc

At the provincial or national level, some of the common sources of immunisation information include:

i. Monthly reports on the number of immunisations performed and the occurrence of target diseases
ii. Immunisation coverage survey reports
iii. Supervisory reports

iv. Cold chain inventory register

v. Cold chain review reports

vi. Programme assessment/review reports

vii. ICC meeting minutes (WHO, 2004).

At the health facilities level, the sources of immunisation information include immunisation register and health facility's tally sheets.

Two main sources of data have been used to assess coverage of immunisation programmes worldwide. These are the administrative method which uses reported routine immunisation data and immunisation coverage survey which uses survey methods recommended by WHO (WHO,2012). In most countries, administrative coverage data are the number of doses administered to the target population. In order to estimate percentage immunisation coverage, this number is divided by the total estimated number of people in the target population. The target population groups vary from country to country and are dependent on the national immunisation schedule in place (Bos and Batson, 2000).

Countries are requested to report their vaccination coverage estimates every year to WHO and the United Nations Children's Fund (UNICEF) using the WHO/UNICEF joint reporting form on vaccine preventable diseases. These data are often referred to as officially reported data. Methods and strategies for collection and reporting of these data are specific to each country. The source of data for official reports can include service registries, surveys, or a combination of both. The target population in which vaccination coverage is assessed can also vary between countries, taking into account either yearly number of births, number of infants that survive their first year of life, or the number of children within a specific age range. Furthermore, a country might change its methods for obtaining estimates from year to year. The absence of standardisation in data sources and methods of collection decreases the comparability of officially reported data between countries and over time. Officially reported data tend to be the primary source of information for assessment of vaccination coverage and thus, it is essential to analyse their validity (Boerma et a.,1994).

Bos and Batson (2000), however, stated that three main instruments exist for assessing immunisation coverage in low and middle income countries. The first is the nationally generated programme statistics (or routine reports or administrative coverage).It is based on data collected by the health facilities and other providers on the number of children immunized with specific vaccines. The data are usually aggregated at the district level thus, providing detailed geographical information. National level estimates may be aggregated in sophisticated electronic health information systems or immunisation registries or more commonly, aggregated from district and regionally tabulated information.

The second is immunisation coverage surveys. These surveys in many cases use a simplified sampling design for relatively rapid and inexpensive collection of coverage. The EPI cluster surveys are particularly suitable for monitoring coverage in sub national areas although alternative sampling strategies may be used to obtain nationally representative estimate.EPI cluster surveys which have been carried out in many low and middle income come countries can be used to validate routine reports at the regional level. For validating immunisation coverage at individual health facility unit, the lot quality coverage survey approach is sometimes used (Bicaba et al., 2009).

The third instrument is household survey which includes USAID's Demographic and Health Surveys (DHS), UNICEF's Multiple Indicators Surveys (MICS), CDC's Reproductive Health Surveys etc. These surveys may use more complex stratified sampling designs as in the case of DHS or basic cluster survey methodology, as in the case of MICS. They provide information on a number of indicators, making them suitable for further analyses of variables affecting immunisation coverage (Boerma and Bicego, 1994; Bos and Batson, 2000).

2.8: Basic Recording Tools

Every health facility needs a system of recording immunisation data. Making records systematically and regularly after each session will help in the follow up on defaulters and solve other problems. It has been reported that many of the basic monitoring tools that could benefit health workers, their supervisors, and managers throughout the system are neglected because many health workers do not know how to use them (WHO, 2009). The basic

immunisation recording tools in health facilities are immunisation register, vaccination card, tally sheets and reminder files or another system for tracking defaulters.

2.8.1: Immunisation register

This helps the health workers keep track of the immunisation services they offer to each infant and to pregnant women. Health facilities can either have two separate registers, one for recording infant immunisations and another for recording Tetanus Toxoid vaccinations (TT) given to women, or one register to record both infant immunisations and TT given to women. The registration is done once the infants and pregnant women arrive at the health facility or outreach site. The register generally include the following information: an identification number, registration date, name, sex and birth date of infant, name and address of parent, vaccinations provided and vitamin A supplementation. The immunisation register can also be used like a birth register. As soon as an infant is delivered in the community, its name can be entered in the register even before the infant has received any vaccines. This will help to follow up on all members in the community (WHO, 2004).

2.8.2: The immunisation card

These are small booklets, usually given to mothers or guardians at the time of delivery or during the first vaccination visit, in which health workers record receipt of various antigens recommended through the WHO's Expanded Program on Immunisation. The infant immunisation card contains the immunisation history and status. It is an important card because it serves as a reminder for parents to return to the clinic for the next dose. It also helps the health worker determine an infant's immunisation and vitamin A status and is also useful when health workers conduct coverage surveys (WHO, 2005b). The card may be the only record of immunisation history and status available for health workers if immunisation registers are not well maintained or if clients move from one health facility to another (USAID, 2003). Each infant should have a card with immunisations marked correctly. Similarly, a separate card should be made for each woman having received TT vaccine. Even when a mother's TT doses are marked on the infant's card, there is still a need to issue a separate card for the mother. Vaccination cards are generally kept by the parents of the infants.

2.8.3: Immunisation Monitoring Charts

Every health facility that offers immunisation services needs to monitor progress toward coverage objectives. Providing tools such as monitoring charts and ensuring that health workers have the skills to use them can motivate health workers, enhance performance, and improve the quality of data (USAID, 2003). Immunisation monitoring chart is one of the best monitoring tools for immunisation coverage because it shows the monthly progress health workers are making in raising immunisation coverage in the health centre catchment area. It is expected to be posted in every health facility for inspection by health facility staff, clients, and supervisors. The charts can be shared with political and community leaders. (WHO, 2008). This chart enables health workers to compare the number of people actually immunized each month with the coverage targets. Each vaccine, even each dose of the same vaccine can have a monitoring chart. In order to be viewer – friendly, a chart is not used for more than two vaccine component. This will facilitate following progress simultaneously for two components as well as to calculate dropout rates between them. The health facility is the typical location to use the chart, but it can also be used at higher levels (LGA, state and national). At the higher levels like the LGA, it should be regularly updated when new data are received from health facilities to identify facilities with problems, give more support to those health facilities that do not perform well and acknowledge and commend good performance (WHO, 2005b).

2.8.4: Tally sheets

Tally sheets are the forms that health workers use to document an immunisation session, by making a record for every dose of vaccine given (WHO, 2004). They are used for all sessions whether fixed, outreach or conducted by mobile teams. It is advised that a new tally sheet be used for a new session. It is always worthwhile for a supervisor to spend time reviewing tally sheets with staff to improve the quality of reporting (WHO, 2005b). Appendix I show some common mistakes and corrective practices which supervisors can use as examples. Although errors can be identified and practices corrected, tally sheets should not be edited retrospectively (WHO, 2008).

2.9: Registration of Routine Immunisations

Immunisation record sheets and tally sheets are used to register immunisations given at health facilities. The record and tally sheets are completed immediately upon vaccination. These forms enable vaccinators to separately count children and Women of Child Bearing Age (WCBA), who belong to a given facility's catchment area, another facility's catchment area in the same district, or other districts. These data can be analyzed to determine patterns in vaccine-seeking behaviour and compute coverage rates specific for a given catchment area or district (WHO, 2008).

The health worker is expected to record the following information accurately on the forms:

i. The name and age of the vaccinated person
ii. The date of vaccination
iii. The accurate and complete address (district, subdistrict, and village or zone) of the vaccinated person and whether he/she is from the same catchment area of the facility, from another catchment area within the same district, or from another district.

In every health facility that provides vaccination services, the health worker in the vaccination post of the health facility is responsible to give the vaccine and to fill these registration forms (WHO, 2005b). Immunisation registers are kept at the immunisation post in the health facility.

2.10: Routine Vaccination Rates and its usefulness

Routine vaccination coverage rates are generally used to describe the proportion of the targeted population that has been vaccinated. This information provides a rough estimate of the proportion of the population that remains susceptible to the disease targeted by the vaccine (WHO, 2007). Analysis of coverage data helps in the development of plans to reach individuals who have been missed or those who did not complete a vaccination series (i.e. drop outs). At the health facility level, coverage data can be a powerful motivator to health workers and a valuable tool in the feedback to communities. At the district level, it can be used to target outreach and fixed facility immunisation sessions. An assessment of

immunisation coverage can help in the identification of programme weaknesses that should be addressed. Monitoring vaccination coverage is a critical component of monitoring programme performance. It should be a key function of surveillance staff, together with improving the quality and use of data at peripheral levels and synergy with other programme monitoring. In using service statistics to estimate coverage, it is essential to have reliable and consistent estimates of the catchment populations, based on population census projections (WHO, 2007). The estimation of childhood immunisation coverage is essential for monitoring immunisation programmes and it is a general measure of utilization of health services (Brown et al, 2002).

Immunisation coverage is a health output with the reduction in disease incidence as the ultimate outcome (Bos and Batson, 2000). Achieving high levels of coverage is, by itself, not a sufficient indication of the effectiveness of a health care system, as deficiencies in other areas could be widespread. However, lack of progress in moving towards high levels of coverage is a strong indication of failure to provide essential services to protect the health of the most vulnerable in a population. For diphtheria, pertussis, tetanus (DPT), a minimal coverage goal of 80 percent receiving three doses by 2005 has been proposed by the Global Alliance for Vaccines and Immunisation (GAVI), to be achieved in all districts in all countries (GAVI, 2002).

2.11: Source of errors in immunisation coverage data

Errors in routine immunisation reports may lead to the over- reporting or under reporting of immunisation coverage data (Bos and Batson, 2000). Many researchers have identified different types of data errors. Van der putten et al., (1987) divided data errors into interpretation errors, documentation errors and coding errors. Other authors like Sorensen et al 1996, divided data errors into systematic (type I) errors and random (type II) errors. Knatterud et al., (1998), also emphasised on bias as a category of data errors which can cause random as well as systematic errors.

Immunisation programmes are often handicapped by inexact population data (Zwanenberg and Hull, 1988). Routine reports or administrative coverage have a number of weaknesses

that may result in invalid or unreliable estimates of immunisation coverage. These weaknesses affect both the numerator and the denominator. In most countries, administrative coverage data are the number of doses administered to the target population. In order to estimate percentage immunisation coverage, this number is divided by the total estimated number of people in the target population. The coverage estimates calculated using administrative data can be biased as a result of inaccurate numerators (which is the number of children immunized by health personnel) and denominators.(WHO, 2005b) According to WHO, numerators may be under estimated due to incomplete reporting from reporting units or non inclusion of other vaccinating sources like private sectors and NGOs. Numerators may also be overestimated due to over- reporting from reporting units by the inclusion of other target population groups. The inaccuracy of denominators may also be due to problems of population movements, inaccurate census estimations or projections and numerators sources of ~~denominator~~ data. Some studies had suggested probable reasons for most of the difference.

Murray et al (2003) reported that the difference between the reported vaccination rates and household surveys could be because the information collected through service providers often records all vaccinations and not just those that had been delivered in accordance with the recommended schedule.

According to the author, service providers tend to report on crude coverage rather than total valid coverage, despite total valid coverage being the more relevant variable for policymakers. However, there is a substantial difference even between crude coverage and the officially reported data. Their second reason was that officially reported vaccination coverage data in most countries only incorporated vaccinations delivered by public sector providers. Vaccinations given by nongovernmental organisations or other private providers are not included. This should, in principle, bias official reports to report low rather than high rates. Thirdly, weak information systems can lead to the transmission of inaccurate information from the periphery to the centre in many health systems. Fourth, where vaccination coverage is related to financial or non-monetary incentives for health workers or supervisors, figures might, in some cases, be intentionally inflated. Also, several studies have shown that numerators or denominators can be inflated or deflated because of errors in

recording, storing or reporting information (Freund& Kalumba 1985, Kumar 1993, Onta et al 1998, Mavimbe et al, 2006).

According to Bos and Batson (2000), at the facility and district level, pressures to achieve the set target could lead to an upward bias in reporting while a lack of interest in record keeping and reporting could lead to underestimation of the coverage rates. Routine reports keep track of the number of children that have been immunized and the size of the target population or denominator (which is the cohort of zero and one year olds) is also estimated. The vital registration which is the most reliable source for such data does not exist in most low and middle income countries leading to estimates of the denominators of the target population being based on counts by local health workers or projections from the latest census data which introduces considerable uncertainty (Bos and Batson 2000).

The WHO, grouped the factors that affect accuracy and quality of data into four. The first is demographic and administrative factors which include imprecise census data, overlap of catchment areas as a result of changes in administrative set up, influx of refugee population from neighbouring areas or countries and the non inclusion of private sector and NGO data in the immunisation reports.

The second is the human factor which includes: insufficient motivation, temptation to adjust data so as to show a higher coverage. The third factor is insufficient knowledge or skills and includes inaccuracy in data entries and misunderstanding of the reporting forms and procedures (WHO, 2004).

2.12: Data quality and its components

Data quality has become increasingly important over the past years, not just because of its importance in promoting high standards of patient care but because of its impact on government budgets for the maintenance of health services (WHO, 2003a). According to the International Standard Organization (ISO), quality is the totality of features and characteristics of an entity that bears on its ability to satisfy stated and implied needs. Similarly, in the context of a medical registry, data quality can be defined as the totality of

features and characteristics of a data set , that bear on its ability to satisfy the needs that result from the intended use of the data (Danielle et al, 2002). To be useful, data in a medical registry must be of good quality (Danielle et al., 2002). In general terms, quality, as defined by Donabedian (1988), consists of the ability to achieve desirable objectives using legitimate means. Quality data represent what was intended or defined by their official source, are objective, unbiased and comply with known standards (Abdelhak et al., 1996).Many researchers have pointed out that data quality is an issue that should be assessed from the data user's perspective. For example, Abate et al (1998) stated that data are of the required quality if they satisfy the requirements stated in a particular specification and the specification reflects the implied need of the user. Data quality determines the usefulness of the generated results and can be ensured by: developing clear indicators, planning for data collection and analysis, training staff in monitoring and evaluation, data collection, incorporating data quality checks at all stages, taking steps to address identified errors and creating ownership and belief in data collection among responsible staff.

WHO, 2003 listed out the components of data quality to include firstly, accuracy and validity of the original data source. The original data must be accurate in order to be useful. If data are not accurate, then wrong impressions and information are being conveyed to the user (Davis and LaCour. 2002). Documentation should reflect the event as it actually happened. Recording data is subject to human error and steps must be taken to ensure that errors do not occur or, if they do occur, are detected immediately.

Secondly is reliability, which involves consistency of data and understanding of the information generated. Another is completeness which requires that all data are present. Also is legibility which involves that data are readable. Again is currency and timeliness which ensures that data are recorded at the time of observation. The sixth is accessibility of data which stipulates that data are available to authorized persons when and where needed. Finally, is the usefulness of the information.

In recent years, data quality has become an important issue, not only because of its importance in promoting high standards of patient care, but also because of its impact on

government budgets for the maintenance of health services. Authorities at all levels of health care including hospitals, community health centres, outlying clinics and aid posts, as well as ministries or departments of health, should be concerned about poor data quality and the impact it has on the quality of health care. In many countries, administrators are faced with poor medical or health records documentation, access to and utilization of accurate and accessible morbidity data (WHO, 2003).

These concerns not only relate to the quality of medical record documentation but also to the collection of health care statistics at all levels. At the health facility level, statistics are used to assess how much services are being used to enable the facility make appropriate financial and administrative plans and to conduct vital research. At the state, province or national levels, governments use health statistics for planning health care services and allocating resources where they are needed most. The accuracy and reliability of the information processed thus, are vital to the smooth running of the facilities and also in assisting governments with decisions on the provision of health care services locally and nationally (WHO,2003). Despite recognized efforts by programs and countries, the ability to respond to this demand is constrained by limited data availability, quality, and use. Many developing countries have limitations that hinder the generation of data of sufficient quality and timeliness to permit the regular tracking of progress made in scaling up and strengthening health systems. Many health facilities offer immunisation programme services and are expected to maintain accurate and reliable data. This is important because the key to the success of national immunisation programmes is the ability to collect and analyze both coverage and surveillance data to guided programme performance.

The issues of immunisation data quality are complex and multifaceted. The collection, reporting, and use of the immunisation data include multiple-layer stakeholders, e.g., health care workers, national and sub-national health officials, laboratory personnel, and data managers. In resource-limited countries, the data providers and users at each level are faced with different issues and challenges. Most national programs have immunisation coverage monitoring system, acute flaccid paralysis/polio surveillance system, and measles surveillance system. For the regional and global monitoring purposes, each of these systems

poses its own challenges on data standardization and accurate, timely, and complete data reporting. Common factors associated with data quality include: poor record keeping practices, disconnect between the laboratory and epidemiology units, irregular data entry and reporting, and inadequate training or skill level on data management. Studies have shown that an important way to improve immunisation data quality is by immunisation data entry at the point of service (Adams et al, 2000).

2.13 Accuracy of reported immunisation coverage data

Accuracy of data refers to the degree to which the data or statistics measures what was intended to be measured when the data collection system was designed (Shahid and Muhammad, 2010). The effort to obtain valid and reliable information on vaccination coverage to support programme implementation and monitoring has been one of the most comprehensive and wide reaching in public health. However, despite impressive investment in these efforts, changes in coverage, which is based largely on data collected from public sector service providers, is not correlated with changes in coverage detected in household surveys (Murray et al. 2003).

It is important to keep in mind that the primary function of a health information system is to provide data that enhance decision making in the provision of health services as well as the generation of evidence for the improvement of health of the individuals and the community. However, research has identified some limitations in the information systems to include low timeliness and completeness of reporting, inconsistent computer filing procedures, dual reporting systems, absence of written policies, poor data storage, insufficient analysis and feedback, and poor understanding in the use of denominator (WHO, 2008).

The process of tracking down information has changed dramatically in recent years. Introduction of computer technology and construction of World Wide Web, though allows easy access to data that previously was found in reports of limited circulation, however, due to paucity of resources in developing countries, these still rely on hand written forms and reports. In most countries inappropriate data recording and inadequate data analysis are common problems in information systems. A study carried out in Nigeria showed that there

were deficiencies in record keeping and data collection (Ogunbekun, 1999), while another study conducted in South Africa also showed that there were deficiencies in both the completeness and accuracy of the collection and reporting of data that tracks PMTCT service delivery (Mate et al,2009). The authors reported that there was a wide variation in the completeness of data reporting and available reported data was highly inaccurate, with data elements classifiable as ''accurate'' only 5.3% to 19.8% of the time. They also reported that the DHIS value deviated on average by75.2% from the corresponding values found in the clinics' registers, across all data elements. It was later established in this study that the primary site of breakdown for accurate transfer of data is during the tallying and collation of data in the clinics before the data is sent to the DHIS. Also, Makombe et al, (2008) in evaluating the quality of data aggregated by anti-retroviral clinics in Malawi reported that most sites did not document valid data for several critical data fields. During the 2008 data quality assessment, the reported coverage was 70% while the corrected coverage was approximately 50% Appendix ii, iii and iv show some discrepancies that were reported in 2008 data quality audit reports for Nigeria.

2.14 Effect of health workers' knowledge on data quality

The collection and use of data as an interrelated process requires sufficient knowledge of the health workers at different levels (Ekwueme et al., 2008). As a result of the effect of knowledge on the various components of the HMIS, several studies have confirmed the usefulness of trainings and supportive supervision in increasing the knowledge of health workers (Shrestha and Bodart, 2000). The quality of the generated data had also been shown to be affected by the knowledge of the health workers on various components of a Health Management Information System (HMIS) (Daudi and Mwangu, 2006).

Most of the health workers in developing countries lack the knowledge and skills needed for data interpretation and analyses. This has therefore resulted in the problem of poor data quality (Daudi and Mwangu, 2006). Finau, 1994, however raised some fundamental questions from his study with regards to the effectiveness of HMIS training as well as the quality of supervision conducted at health facilities. According to him, for trainings to improve knowledge and affect the quality of the HMIS, they must be offered according to

actual needs. He therefore, called for the need to revise approaches so as to make training on HMIS part and parcel of continuing education at the workplace and incorporated in career development of the respective staff. The study also suggested that mechanisms should be introduced for monitoring effectiveness of supervision using performance indicators instead of number of supervision visits (Finau, 1994).

2.15 Usefulness of immunisation coverage data

Immunisation coverage levels and trends are used to monitor the performance of immunisation services locally, nationally and internationally. They guide strategies for the eradication, elimination and control of vaccine-preventable diseases (WHO,2000), identify areas of immunisation systems that may require additional resources and focused attention and help in assessing the need to introduce new vaccines into national and local immunisation systems (WHO, 2005).

Bos and Batson (2000) however grouped the usage of immunisation coverage data into three. The first was using coverage data to set targets. According to them, monitoring trends in immunisation coverage can be done to evaluate past and current health systems performance. To evaluate future performance, immunisation coverage rates can be set as targets or milestones to be achieved in future years. Such targets, when set realistically and agreed to by those implementing the activities, can serve to provide direction for a program and can help motivate staff. While target setting needs to be done in specific country contexts, the experience of other countries at similar levels of coverage can provide guidance on targets that can reasonably be achieved. To the extent that the future will resemble the recent past, predicted levels of improvements provide some guidance for making reasonable assumptions for future improvements. But levels in immunisation coverage frequently vary a great deal from year to year in a given country. Unlike indicators such as child mortality that respond to a number of determinants and change slowly, immunisation coverage is much more subject to inputs and efforts within the health system (Frankel and Gage, 2007).

CHAPTER THREE

METHODOLOGY

3.1 Description of study area

The study was conducted in Onitsha North and Ogbaru Local Government Areas of Anambra state.

3.1.1 Onitsha North Local Government Area

Onitsha north LGA is one of the 21 local government areas in Anambra state. Created in 1991, it has its headquarters located at the Government Residential Area, Onitsha. It is a metropolitan and inhabits people from all works of life and tribes (although predominantly Igbo). It is bounded to the East by Idemmili North Local Government Area; to the west by Oyi LGAs; to the north by the River Niger and to the south by Onitsha South LGA. The local government has a 2009 projected population of 139,534. It is made up of nine communities, namely; Umuase, Ogboli, Odoje, Isiokwe, Ogbembubo, Umudei, Ogbeotu, Umuaroli And Ogbeabor; and 10 health districts. It houses the largest market in the entire West African sub region. The major religion is Christianity with few migrant Muslim and few traditional religion worshippers. The local government has both public and private health facilities that offer routine immunisation services. It has the following target populations: 0-59 months (27,909); 0-11 months (465); pregnant women (6977); women of child bearing age (30,698). The map of the LGA is shown in appendix I. As at the time of this study, the LGA had twenty (20) Health Facilities (HFs) that offer routine immunisation services.

3.1.2 Ogbaru Local Government Area

Ogbaru LGA has a projected population of 247,793. It is one of the largest LGA in the state with numerous health facilities that carry out routine immunisation activities. The whole north west and south west end is the river Niger while the north, north east and south east areas are bounded by Onitsha South, Idemmili North, Ekwusigo and Ihiala LGAs respectively, and boundaries with Delta and Rivers states towards the south. The inhabitants

are predominantly farmers and fishermen. Generally, the LGA has a very bad terrain throughout the year but it is worse during the rainy season when the river Niger overflows its banks, blocking the only major link road that traverses the entire LGA. As of the time of this study, The LGA had twenty eight (28) functional HFs that render routine immunisation services. It has the following target population: 0-59 months (27,909), 0-11 months (465), pregnant women (12,389) and women of child bearing age (59,471).

3.2 Study design: This was a cross-sectional study but involved the WHO standard methodology of immunisation Data Quality Audit (DQA). It involved the review of the health facilities' immunisation session tally sheets and monthly summary sheets and monthly LGA reports.

3.3 Study population

All the focal persons in health facilities that offer routine immunisation services in Ogbaru and Onitsha North LGA were recruited into the study. Also included were the two LGA immunisation officers.

3.4 Sample size estimation

$$N = \frac{DZ\alpha^2 pq}{d^2}$$

Where N= minimum sample size

$Z\ \alpha^2$= standard normal deviate of α which corresponds to 95% confidence level

= 1.96

p = DPT3 coverage in 2008 (NPI, 2008)

q =1-p=100-38.0=62.0%

d = desired precision set at 0.06

D=design effect=2

$$N = \frac{1.96^2 \times 0.38 \times 0.620 \times 2}{0.06^2}$$

= 503

Since the Immunisation Focal Persons in the two LGAs were less than 503 in number, all the IFPs were recruited into the study.

A total of 28 facilities were visited in Ogbaru LGA while 20 were visited in Onitsha North LGA.

3.5 Sampling technique

All the IFPs and the local government immunization officers in the two LGAs were involved in the study.

3.6 Data collection procedure

Data was collected at the health facilities and LGAs using the WHO standard DQS questionnaire adapted for Nigeria and the WHO data verification tool (Appendix III). The knowledge of the IFPs was assessed using a semi- structured questionnaire with six sections: knowledge on recording, archiving, reporting, demographic information, core output/analyses and evidence of using data for action.

The DQS questionnaire which was used to determine the quality of the monitoring systems for the two LGAs had two sections of Quality Questions to be administered at the LGA and HF level. Each of these components for the first section (LGA level) had 7, 8, 6, 8, 10 and 8 questions respectively. The components for the second section (HF level) had 13, 4, 8, 4, 5 and 4 questions respectively. Each level consisted of six components which included recording, archiving, reporting, demographic information, core output/ analysis and evidence of use of data.

The data verification tool is a form on which the doses of immunisations recounted from the HFs tally sheets, summary sheets and LGA summary sheets were recorded. Each of these forms was used to record doses of DPT3 and measles vaccinations.

3.6.1 Process of Data Accuracy Verification at the Health Facility Level

i. All the HFs that provide routine immunisation services and report to either Ogbaru or Onitsha north local government areas, were visited.

ii. The HF tally sheets and monthly HF summary sheets for January to December 2009 were requested for.

iii. The tally sheets were recounted for DPT3 and measles doses, for the period between January and December, 2009. The recounted values were recorded in the HF data collection tool.

iv. The figures found in the duplicate of the monthly HF summary reporting register for DPT3 and measles for the periods between January and December 2009, were also recorded in the HF data collection tool.

v. The target population for the Health facilities was also obtained and entered into the HF data collection tool.

3.6.2 Process of Data Accuracy Verification at the LGA level

The LGA Level is where the HF is situated.

i. Copies of HF monthly summary reporting registers (Jan-Dec 2009) as submitted to the LGA by the health facilities and the LGA monthly summary reporting form were requested for and assessed.

ii. The DPT3 and measles reports as seen in the HF summary forms of the HFs at the LGA level for Jan-Dec 2008 were recorded in the LGA data collection tool.

iii. The figures for DPT3 and measles for the respective Health Facilities were checked and recorded in the LGA data collection tool as recorded in the LGA summary form.

iv. The Target population for the HFs and LGAs were obtained and recorded accordingly.

3.7 Data analysis

3.7.1 Determination of data accuracy:

The measure of data accuracy was the Accuracy Ratio, (AR). This was determined by the ratio of DPT3 or measles vaccines recounted at the health facilities to that reported. Based on the value of AR, data generated could be consistent or inconsistent. Health facilities with AR between 95% and 105% indicated data consistency.

$$\text{LG AR\%} = \frac{\text{Immunisation recounted at HF} \quad X\ 100\%}{\text{Immunisation reported at LGA}}$$

$$\text{HF AR\%} = \frac{\text{Immunisation recounted from tally sheet}}{\text{Immunisation reported in the monthly summary sheet}} \times 100\%$$

Inconsistent data was also categorised into over- reported and under- reported data. It was over- reported if AR was less than 95% and under- reported if AR was more than 105%. The ARs for the two LGAs were presented in pie charts. Comparison of AR% was made using column charts.

3.7.2 Assessment of the Quality of the Monitoring System

The quantitative measure of the quality of the immunisation reporting system at each level (HF and LGA level) was the Quality Index (QI). The QI score was based on a series of questions that were scored after interviews with health workers, observation checks and assessment of the records and reports at each HF (38 questions) and LGA (47 questions). These questions were grouped into six components: recording, archiving, reporting, demographic information, core output or analyses and evidence of using data for action components. The checklist contained total QI of 120. Each correctly answered question was given a score of 1. QS<90 indicated poor quality while a QS≥90 was considered as having a good quality. The QI was presented in a radar graph based on average values of each component by normalizing the values of each index to a scale from 0 to 10.

3.7.3 Assessment of knowledge of health workers on components of routine immunisation data monitoring system

All the Immunisation Focal Persons (IFPs) in the HFs were interviewed using a semi-structured questionnaire that contained a 70-point knowledge scale. A total of twenty IFPs were interviewed in Onitsha North while twenty eight were interviewed in Ogbaru LGA. A score of one point was given for every correct answer while a score of zero was given for a wrong answer. Knowledge scores <50 indicated poor knowledge, while scores of ≥50 were taken as good knowledge. Data were analysed using descriptive statistics, t-test, Chi-square test, Spearman rho correlation and logistic regression.

3.8 Data management

Prior to analysis each completed questionnaire was reviewed for completeness by the principal investigator. The data collected from the health facilities using the DQS

questionnaire and data verification tool was analysed using an excel tool developed for data quality audit. The quantitative data collected from the health workers using a questionnaire was analysed using the Statistical Package for Social Science (SPSS). Data were cleaned and consistency checks done severally to ensure accuracy and completeness. Both descriptive and inferential statistics were computed. Simple frequency tables of respondents' characteristics were made. The confidence level was set at 95%. Factors that were found to be significant at p less than 0.05 from bivariate analysis were entered into a correlation model.

3.9 Ethical consideration

Permission to carry out the study was sought from Ogbaru and Onitsha North local government areas. Approval for the study was granted by the ethical committee of Nnamdi Azikiwe Teaching Hospital, Nnewi (Appendix IV). The health workers were given assurance of confidentiality and the liberty to participate voluntarily in the study. Informed consent (Appendix V) was obtained from respondents after explaining the aim of the study.

3.10 Limitations of study

The limitations of this study include:

a. The inability of the immunization DQA to verify vaccinations at the point of delivery.
b. Social desirability bias. Since many of the health workers had an idea of the right thing to do, the tendency for them to say exactly what was expecte of them was high. This was minimized by using a structured questionnaire and confirmation through observation.
c. Recall bias was also a limitation of the study as participants might not be able to recall some of the information they were given during trainings. However, this challenge was greatly minimised as both observation and record review was employed in the study.
d. As a result of the small sample size, this study cannot be generalized to a large population; there is therefore need for large scale studies to be carried out with the same objectives given the crucial role of immunisation. This study however gives an insight into the challenges the routine immunisation data may face.

CHAPTER FOUR

RESULTS

4.1 Socio-demographic characteristics of the immunisation focal persons in Ogbaru and Onitsha North local government

A total of fifty (50) immunisation focal persons (IFPs) were interviewed at the HFs. Twenty eight (28) of the IFPs were from Ogbaru while twenty (20) were from Onitsha North local government areas. Majority (96%) of the IFPs were females. The mean age of IFPs was 39.1±9.1 years in Ogbaru and 40.0±6.9 years in Onitsha North LGAs. The highest levels of education of IFPs was Community Health Officer's certificate (42.0%). Majority (82%) of the IFPs had received training on immunisation data. Table 4.1 shows the demographic characteristics of the immunisation focal persons in Ogbaru and Onitsha North local government areas of Anambra state.

Table 4.1: Socio- demographic characteristics of the immunisation focal persons in Ogbaru and Onitsha North local government areas of Anambra state

Characteristics	Ogbaru N=28 (%)	Onitsha North N=20 (%)
Sex :		
Male	1 (3.6)	1 (5.0)
Female	27 (96.4)	19 (95.0)
Age group:		
20-29	5 (17.9)	1 (5.0)
30-39	9 (32.1)	9 (45.0)
40+	14 (50.0)	10 (50.0)
Marital status:		
Married	22 (78.6)	18 (90.0)
Single	6 (21.4)	2 (10.0)
Qualification:		
University degree	5 (17.9)	6 (30.0)
Higher National Diploma	8 (28.6)	9 (45.0)
Community Health Officer's certificate	15 (53.6)	5 (25.0)
Years of experience		
<1-3	5 (17.9)	5 (25.0)
4-6	7 (25.0)	2 (10.0)
7-9	8 (28.6)	11 (55.0)
10+	8 (28.6)	2 (10.0)
Had ever received training on immunisation data monitoring system		
Yes	25 (89.3)	14 (70.0)
No	3 (10.7)	6 (30.0)
Last time of training on immunisation data monitoring system		
2010	6 (21.4)	6 (30.0)
2009	13 (46.4)	6 (30.0)
2008	6 (21.4)	2 (10.0)
Never	3 (10.3)	6 (30.0)

4.2 Consistency of the data generated at the health facility and reported to the local government

4.2.1 Consistency of DPT3 reports of health facilities in Ogbaru and Onitsha North LG

Figure 4.1 shows the proportion of HFs in Ogbaru and Onitsha North LGs that had under-reported, over- reported and consistent DPT3 data. In Ogbaru LG, 7 HFs (25%) over-reported the number of DPT3 vaccines given, 12 HFs (46.4%) under- reported while 8 HFs (28.6%) had consistent DPT3 reports. The HF with the lowest AR had 39.1% while the highest AR recorded was 173.1%. In Onitsha North LG, 14 HFs (70%) generated DPT3 reports that were consistent. Three HFs (15%) over- reported the DPT3 vaccines given while 3 other HFs (15%) under- reported the vaccines given. Of the ten consistent reports at the LG, one HF had no report both in their HF and at the LG level. The range of the AR was between 43.7% and 239.42%

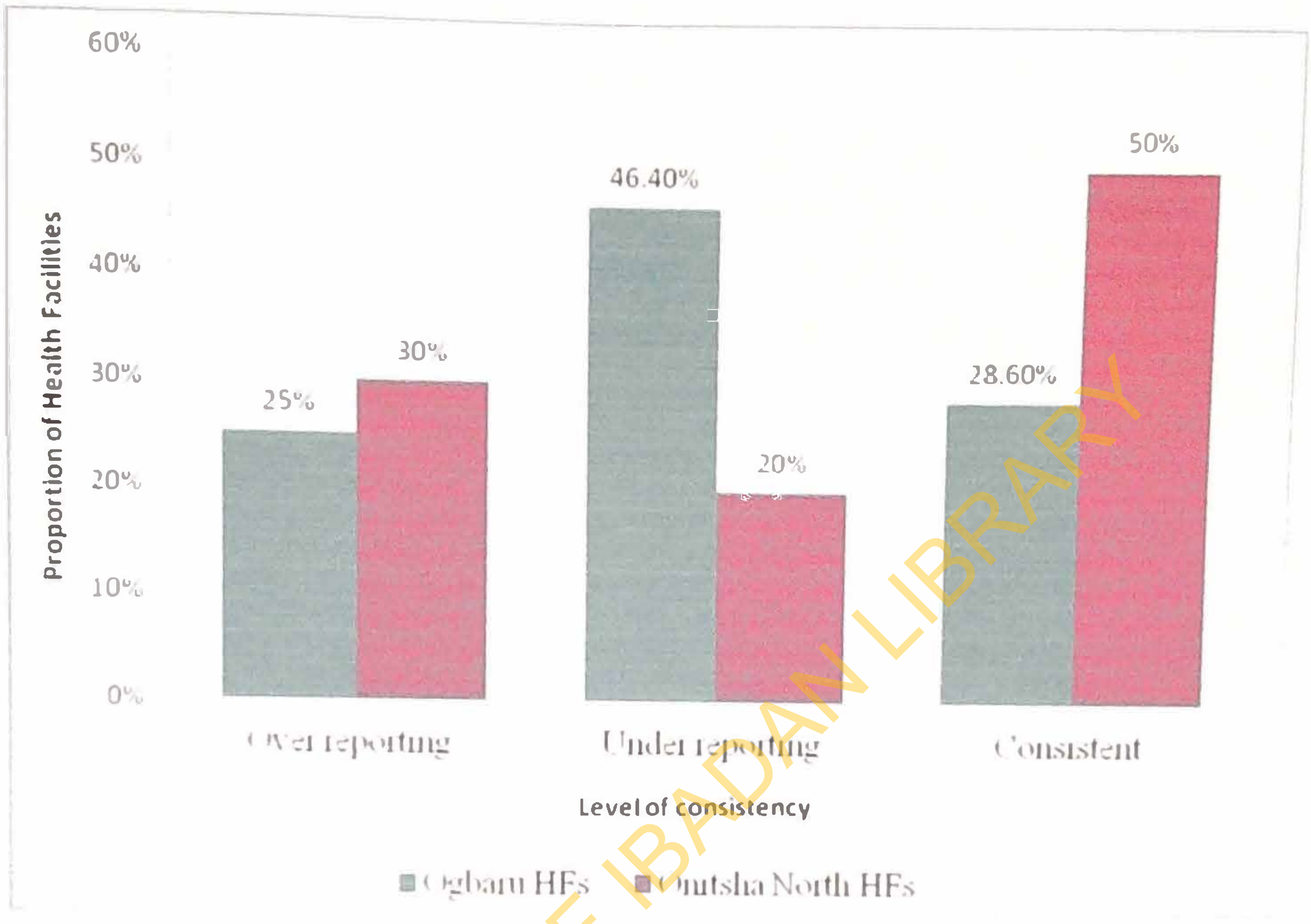

Figure 4.1: Comparison of the consistency of DPT3 reports of health facilities in Ogbaru and Onitsha North local government areas

4.2.2: Consistency of Measles reports of health facilities in Ogbaru and Onitsha North Local Government Area

In Ogbaru LG, 2HFs had no data both in their HFs and at the LGA. Seven HFs (25%) had consistent measles report, 12 HFs (42.9%) underreported while 9 HFs (32.1%) over- reported their reports. The AR of the HFs ranged between 23.8% and 225.7%. In Onitsha North LGA, 11(55%) HFs had consistent data, 4 HFs (20%) under- reported while 5 HFs (25%) over-reported. Of the consistent reports, one HF had no records both at the HF and at the LGA. The lowest AR was 46.2% while the highest AR was 272.9%. Figures 4.2 and 4.3 below show the proportion of health facilities reports for measles vaccines that were consistent, under- reported or over- reported.

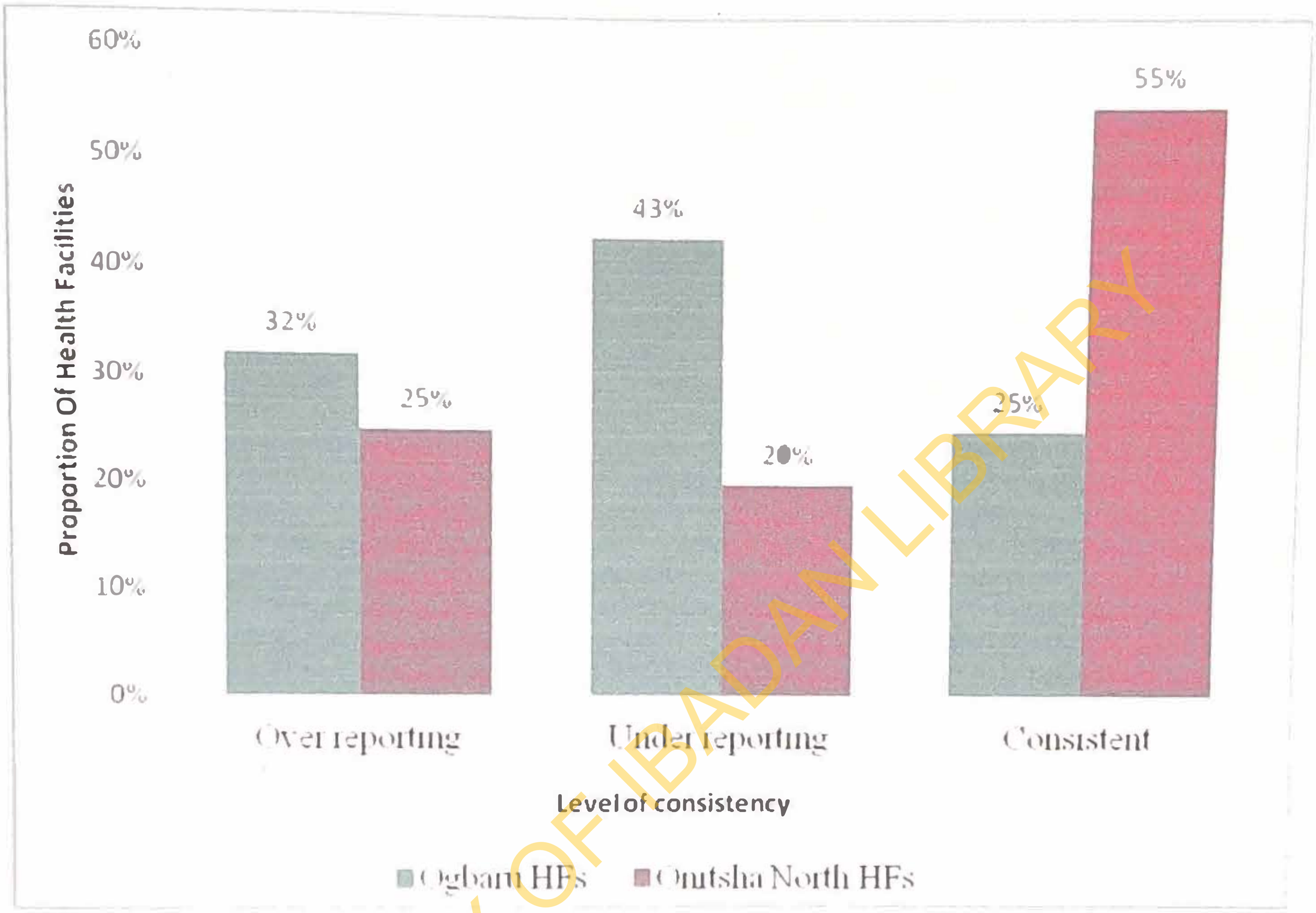

Figure 4.2: Comparison of the consistency of measles reports for health facilities in Ogbaru and Onitsha North LGAs

4.2.3 Consistency of DPT3 reports sent to the state by Ogbaru and Onitsha North LGA

The DPT3 reports submitted to the state by Ogbaru LG had reports of 9 HFs (32.1%) consistent with the data recounted at the HFs. The reports for 10 HFs (35.7%) were over-reported while those of the remaining 9 HFs (32.1%) were under- reported. The overall AR for DPT3 reports in Ogbaru LGA was 83.0%.

Onitsha North LGA had reports of 8 HFs (40%) consistent with the data recounted at the HFs. Reports of 6 HFs (30%) were under- reported while those of the remaining 6 HFs (30%) were over- reported. The overall AR for DPT3 in Onitsha North LGA was 96.3%. This is shown in figure 4.3.

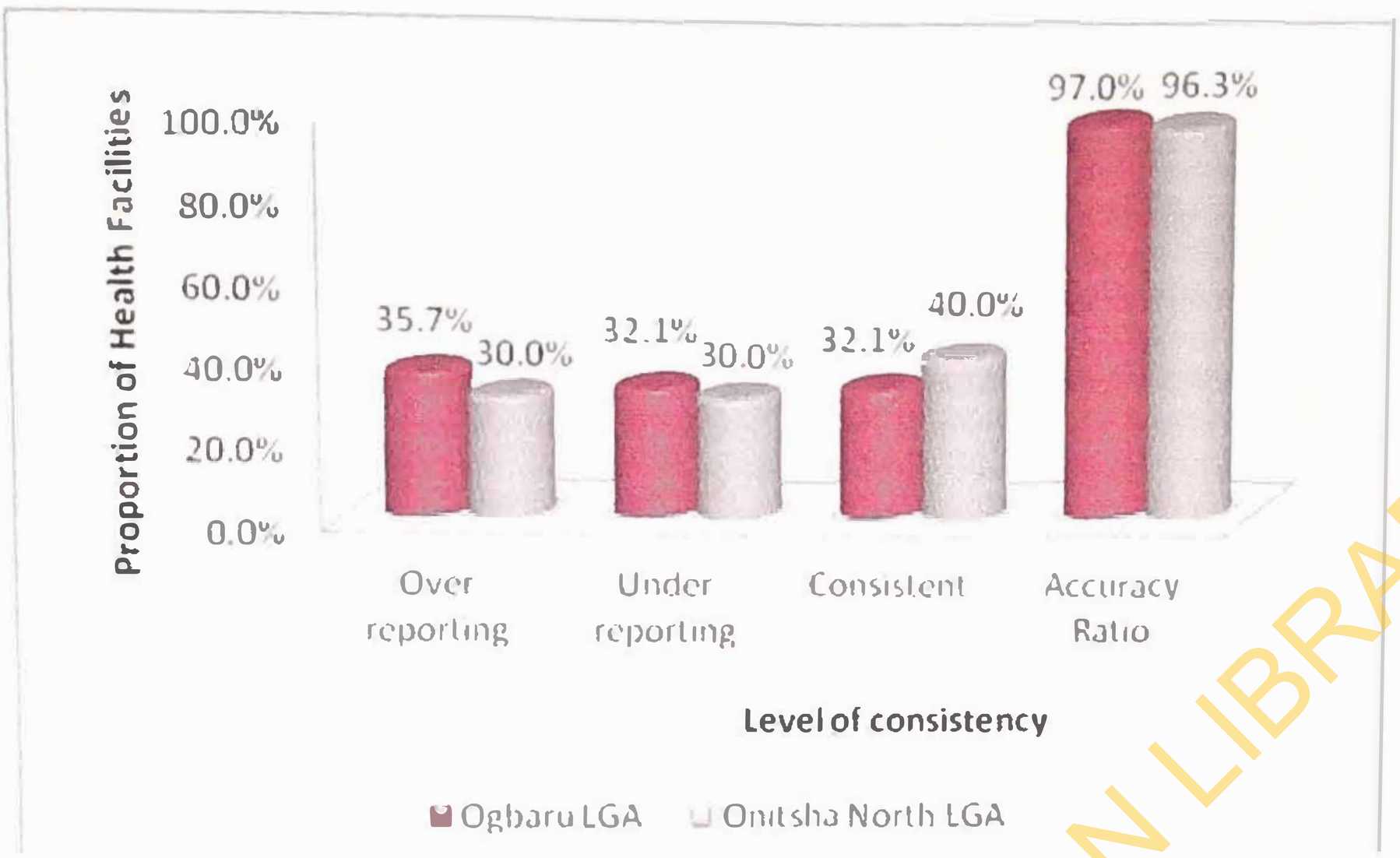

Figure 4.3: Overall consistency of DPT3 reports submitted to state by Ogbaru and Onitsha North LGAs

4.2.4 Consistency of measles reports sent to the state level by Ogbaru and Onitsha North local government area

Figure 4.4 below shows the measles reports that were sent to the state by ogbaru and Onitsha nortrh local government areas. The measles reports submitted by Ogbaru LGA to the state had 5 (17.9%) of the HFs reports consistent. Twelve (42.9%) of the HFs reports were under-reported while 11 (39.3%) were over- reported. The AR for measles in the LGA was 104.4%. In Onitsha North LGA, reports of 11 (55%) of the HFs was consistent with the data recounted at the HFs. The reports of 6 HFs (30%) were under- reported while those of 3 HFs were over- reported. The AR of measles data in the LGA was 104.4%.

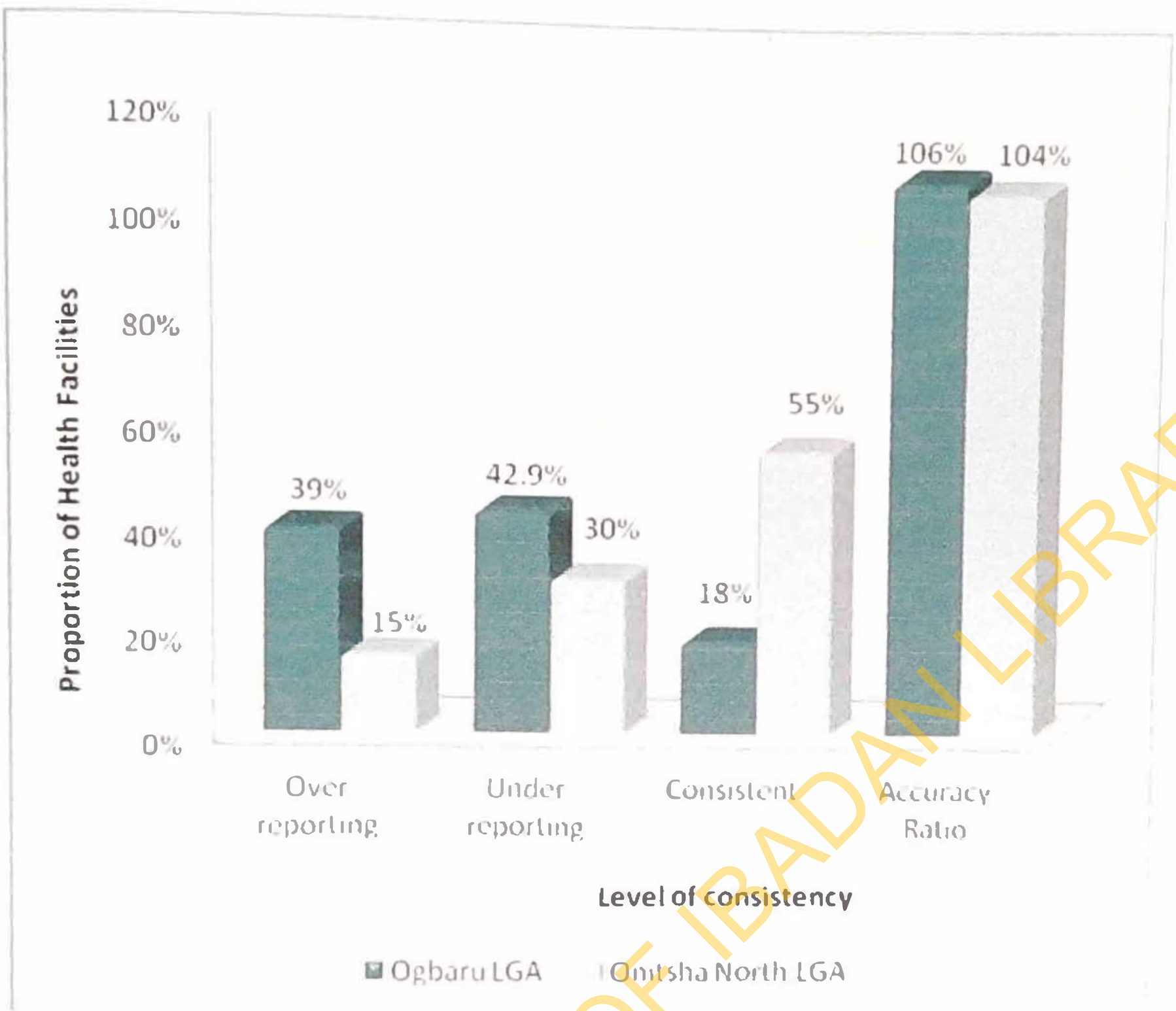

Figure 4.4: Consistency of measles reports submitted to the state by Ogbaru and Onitsha North LGAs

4.2.5 Comparison of the absolute number of doses for DPT3 in health facilities' tally sheets, summary sheets and the LG summary sheets in the two LGAs.

At the health facility level in Ogbaru LGA, the number of DPT3 doses recorded in the tally sheet were 5,357 while 4, 594 were reported to the LGA. The LGA however reported a total of 5,520 to the state. In Onitsha North however, although a total of 7,737 was recorded in the tally sheets, 8,155 doses was reported to the LGA while 8,211 was reported to the state. This is shown in fig.4.5.

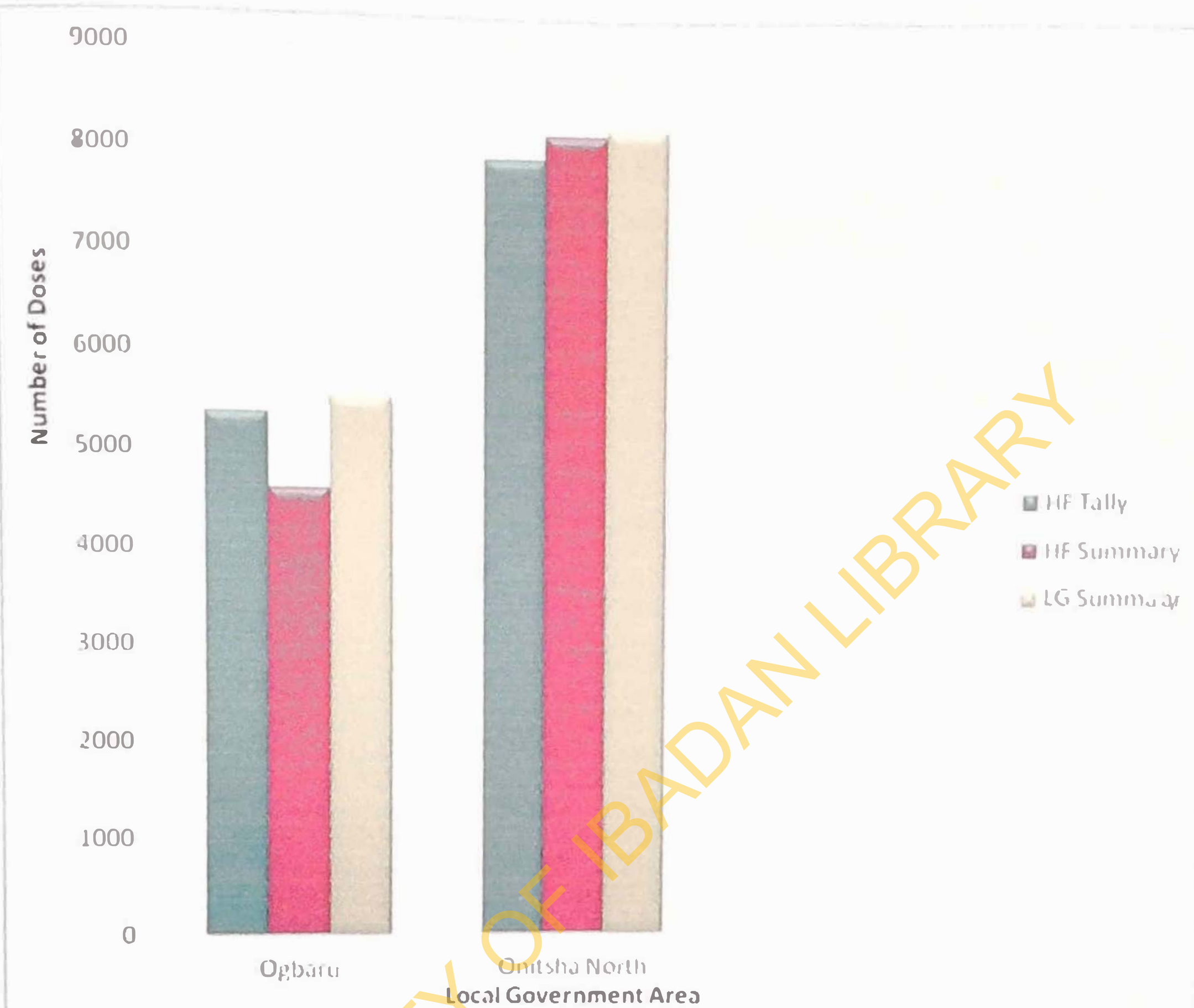

Fig.4.5: Comparison of the absolute number of doses for DPT3 in tally sheets, summary sheets and the LG summary sheets in the two LGAs.

4.2.6 Comparison of the absolute number of doses for measles in tally sheets, summary sheets and the LG summary sheets in the two LGAs.

Figure 4.6 below shows that in Ogbaru LGA, a total of 4,890 doses of measles vaccine was recorded in the tally sheets, 4,594 doses was reported to the LGA while 4,838 was reported to the state. In Onitsha North LGA, the doses recorded in the tally sheets and that reported to the LGA were 11,282 and 11,147 respectively. The difference between the doses reported to the state and that recorded in the tally sheets was 0.42%.

Fig.4.6: Comparison of the absolute number of doses for measles in tally sheets, summary sheets and the LG summary sheets in the two LGAs.

4.3 Quality of the routine immunisation data monitoring system

Tables 4.2a, 4.2b and 4.2c show the results of the observation, checklists and responses of immunisation focal persons on the quality of immunisation data monitoring system. Majority of the health facilities had the basic recording forms (Ogbaru HFs= 85.7%, Onitsha North HFs=90%). Immunisation cards were not available in 48% of all the HFs in both Ogbaru and Onitsha North local government areas. Reporting forms were not properly filled in 27% of all the HFs and majority (81%) of the immunisation focal persons were not aware of the standard operating procedures for recording Adverse Events Following Immunisation (AEFIs). All the HFs had a vaccination target which was set by the respective local government areas. Majority (98%) of the HFs do not monitor drop out rate or vaccine wastage.

Table 4.2a: Observations on the quality of immunisation data monitoring system

Variables	Ogbaru N=28 %		Onitsha North N=20 %	
Observation on recording component				
Presence of tally sheets	25	(89.3)	20	(100)
Use of immunisations registers	28	(100)	18	(90)
Use of immunisation cards	15	(53.6)	11	(55)
Recording of vaccine in vaccine ledger book	18	(64.3)	17	(85)
Updating of vaccine utilization tool	14	(50)	11	(55)
Recording of vaccine receipt in the VM1 tool	12	(42.9)	10	(50)
Presence of all recording forms	24	(85.7)	18	(90)
Observation on reporting component				
Signing of all reports by the officer- in- charge	21	(75)	14	(70)
Proper filling of reports	21	(75)	14	(70)
Awareness of SOP for AEFI recording	7	(25)	2	(10)

Table 4.2b: Observations on the quality of immunisation data monitoring system

Variables	Ogbaru N=28	%	Onitsha North N=20	%
Observation on archiving component				
Presence of all previous reports	21	(75)	16	(80)
Location for storing reports and recording forms	28	(100)	20	(100)
Availability of reports for the entire period	22	(78.6)	16	(80)
Presence of child registers for the previous year	27	(96.4)	18	(90)
Presence of tally sheets for the previous year	23	(82.1)	17	(85)
Availability of feedback from LGA	1	(3.6)	18	(90)
Observation on demographic component				
Record of the number of infants in the catchment area	28	(100)	20	(100)
Presence of a system for collection of information on new births	1	(3.6)	0	(0)
Setting of vaccination targets by the HF	28	(100)	20	(100)
Setting of targets by strategy (fixed/outreach/mobile)	26	(92.9)	17	(85)

Table 4.2c: Observations on the quality of immunisation data monitoring system

	Ogbaru N=28 %	Onitsha North N=20 %
Observation on core outputs/analysis component		
Splitting of coverage by strategy: fixed/outreach/mobile	0 (0)	0 (0)
Presence of an up-to-date chart on vaccinations for the year	5 (17.9)	1 (5)
Monitoring of drop-out rate for DPT1/DPT3	1 (3.6)	0 (0)
Monitoring of vaccine wastage	1 (3.6)	0 (0)
Observation on evidence of using data for action component		
Identification and actions taken on areas of low access	0 (0)	0 (0)
Actions taken on the last feedback from the LG	0 (0)	1 (5)
Interaction with the communities on immunisation	10 (35.7)	1 (5)

4.4 Quality score of routine immunisation data monitoring system in Ogbaru and Onitsha North LGA

At the LG level, Ogbaru had total QS of 62% while the average QS for all the health facilities was 68%. The strongest area of the quality of system index for Ogbaru LGA was the archiving component with a score of 8.50 while recording and demographic information component was the strongest in Onitsha South with a score of 10.0 points. The two LGAs had the weakest scores in core output/ analysis and use of data. The mean scores for recording, archiving, reporting, demographic information, core output/ analysis and use of data were: 8.24, 8.54, 7.63, 5.68, 3.35 and 4.09 respectively. The quality charts for the two LGAs are shown in figures 4.7a and 4.7b respectively.

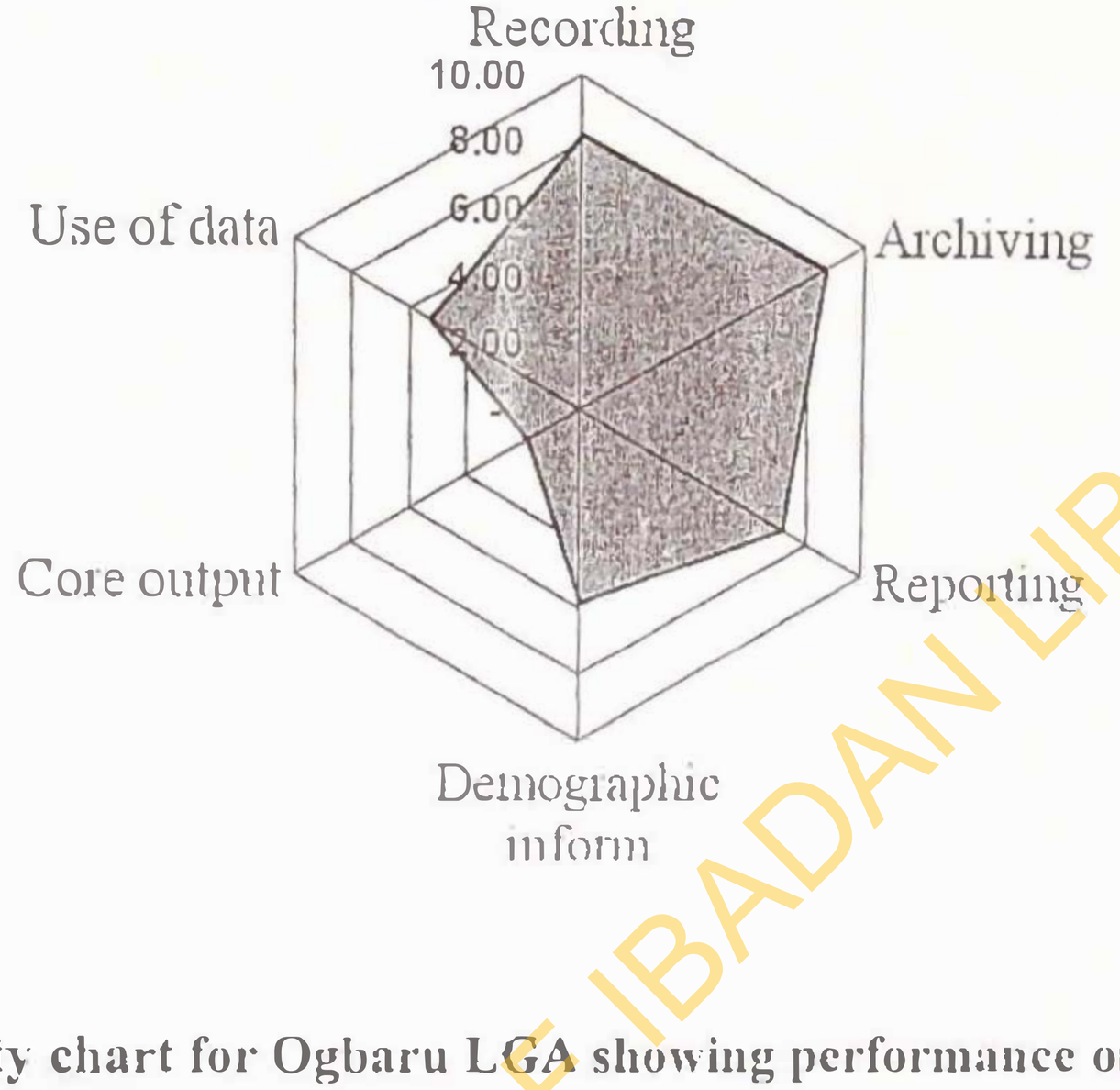

Figure 4.7a: Quality chart for Ogbaru LGA showing performance on the components of routine immunisation data monitoring system

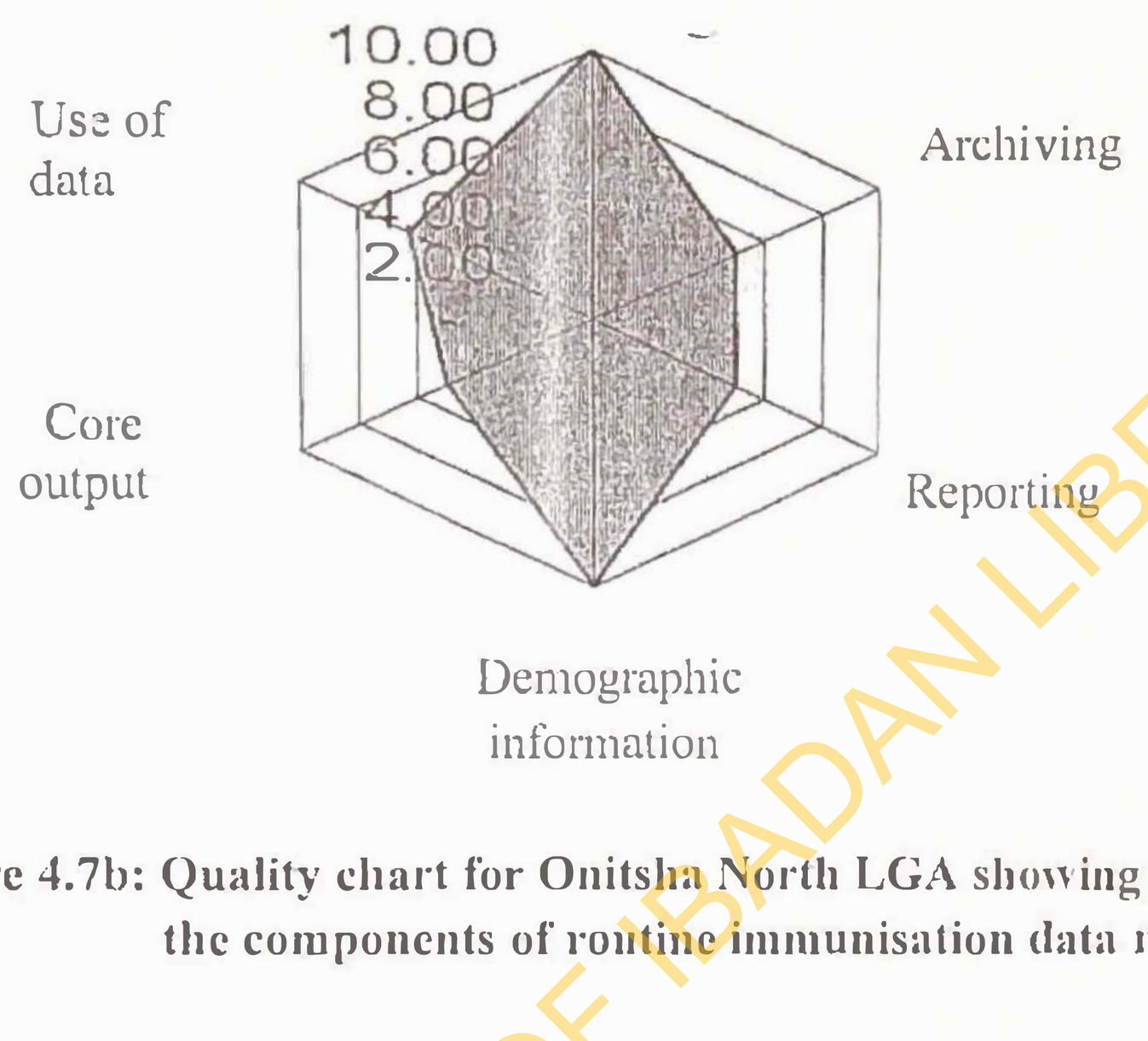

Figure 4.7b: Quality chart for Onitsha North LGA showing performance on the components of routine immunisation data monitoring system

4.4.1 Quality score of the health facilities in Ogbaru and Onitsha North LGAs

The QI of all the HFs in Ogbaru and Onitsha North LGAs were 68% and 64% respectively. Among the HFs in Ogbaru, archiving and core output analysis were both the strongest and weakest components, with a total of 8.69 and 1.85 points respectively. Among HFs in Onitsha North, however, the strongest component was recording with a total of 8.26 points, while the weakest was core output/ analysis with 1.17 points. The quality charts for the HFs in Ogbaru and Onitsha North LGAs are shown in figures 4.8a and 4.8b respectively.

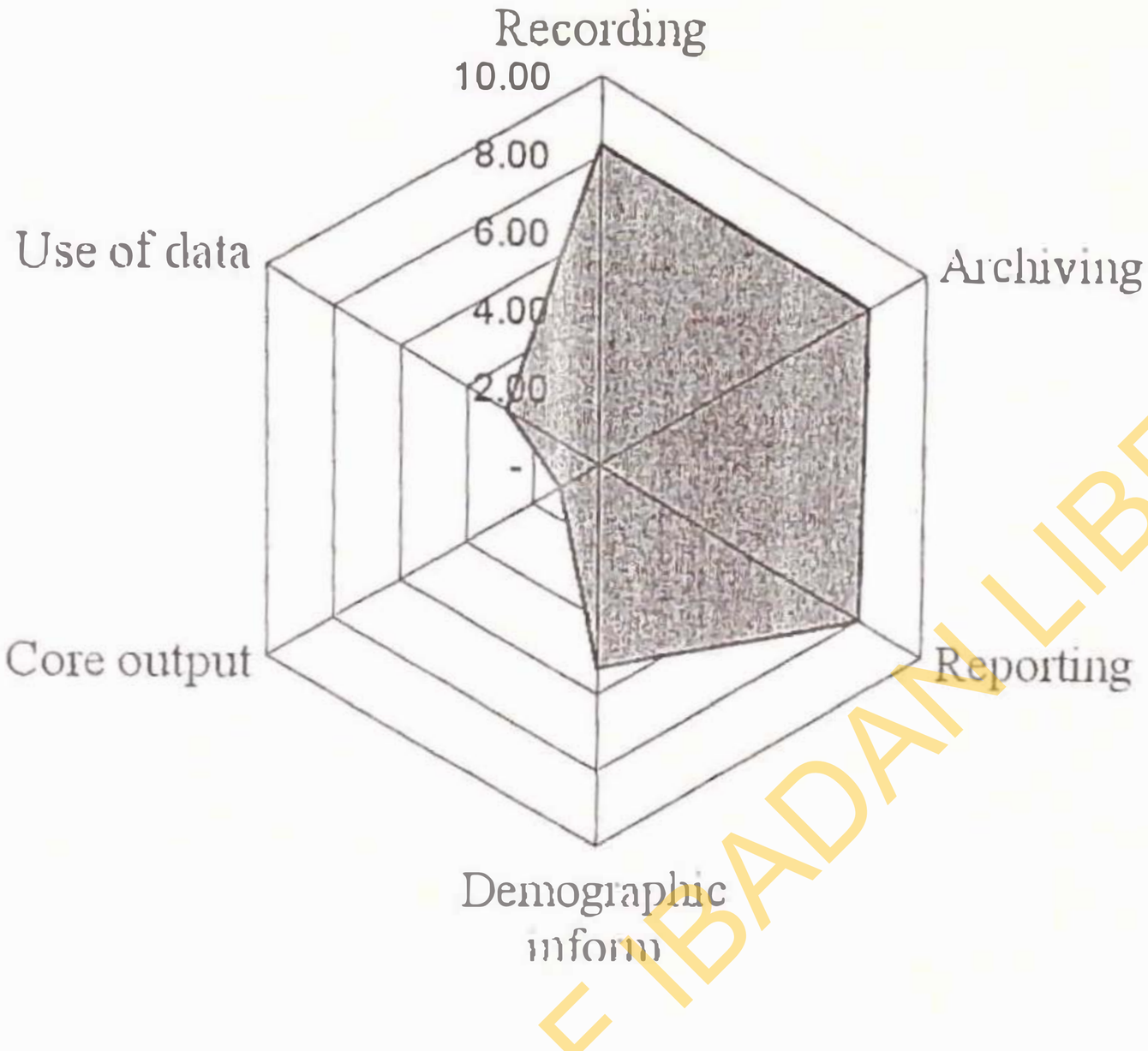

Figure 4.8a: Quality charts of health facilities in Ogbaru LGA showing performance on the components of routine immunisation data monitoring system

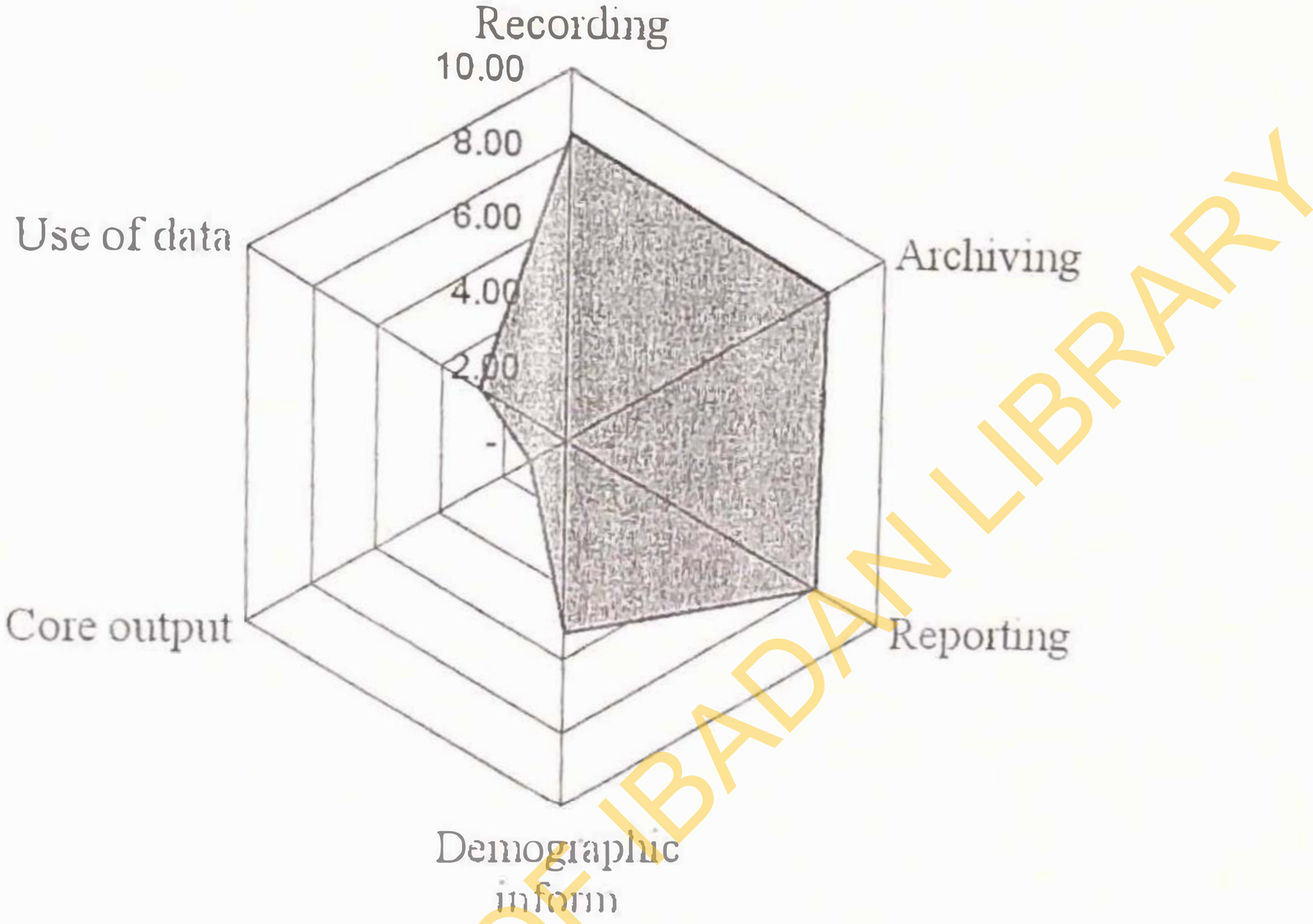

Figure 4.8b: Quality charts of health facilities in Onitsha North LGA showing performance on the components of routine immunisation data monitoring system

4.5 Responses of the immunisation focal persons on components of routine immunisation data monitoring system

All the respondents know that there should be a monthly sending of vaccination reports to the LGA however, very few of the respondents in Ogbaru (42.9%) and Onitsha North (45.0%) report obstacles encountered during immunisation sessions. Also, all the respondents in Ogbaru and Onitsha North know that data should be stored however, only 42.9% of respondents in Ogbaru and 50.0% of respondents in Onitsha North LGA know the minimum duration for storage of tally sheets. Table 4.3 below show the responses of the immunisation focal persons on components of the routine immunisation data monitoring system.

Table 4.3: Responses of the immunisation focal persons on components of the routine immunisation data monitoring system

Variable	●gbaru N=28 (%) Correct response	Onitsha North N=20 (%) Correct response
Knowledge of use of tally sheets	22 (78.6)	15 (75.0)
Knowledge of when to tally	22 (78.6)	15 (75.0)
Ability to produce an inununisation monitoring chart	17 (60.7)	15 (75.0)
Responses on archiving		
Data should be stored	28 (100)	20 (100)
Obstacles encountered during immunisation sessions are included in reports	12 (42.9)	9 (45.0)
Knowledge of the minimum duration for storage of tally sheet	12 (42.9)	10 (50.0)
Responses on reporting component		
Monthly sending of vaccination reports to the LG	28 (100)	20 (100)
Responses on core output/analysis component		
Knowledge of the importance of monitoring	19 (67.9)	12 (60.0)
Ability to produce a monitoring chart	17 (60.7)	15 (75.0)
Meaning of the difference between DPT1 and DPT3	15 (53.6)	18 (90.0)
Feedback is a valuable tool for improving coverage	19 (64.3)	18 (90.0)

4.6:

4.6 Responses of the immunisation focal persons on reasons for inconsistency in routine immunisation data

On the reasons for inconsistency in data generated, 44.8% of the respondents in both Ogbaru and Onitsha North LGA cited insufficient motivation as a reason while in Ogbaru LGA, very few of the respondents (37.9%) cited misunderstanding of the reporting forms as the reason for inconsistencies in data. However, in Ogbaru LGA, majority (55.2%) stated that inaccuracy in data entry was the major reason for inconsistency while the majority of the respondents in Onitsha North (52.4%) stated that lack of reporting forms was the major reason for inconsistency in data.

Table 4.4: Responses of the immunisation focal persons on reasons for inconsistency in routine immunisation data

Reasons	Ogbaru N=28 (%)	Onitsha North N=20 (%)
Insufficient motivation	13 (46.4)	13 (60.0)
Poor supervision	14 (50.0)	9 (45.0)
Inaccuracy in data entry	15 (53.6)	9 (45.0)
Misunderstanding of the reporting forms	10 (35.7)	9 (40.0)
Lack of reporting forms	13 (46.4)	10 (50.0)

4.7 Comparison of overall mean scores of Immunisation Focal Persons in Ogbaru and Onitsha North LGA on the components of immunisation data monitoring system

The overall mean scores of the IFPs in Ogbaru and Onitsha North LGA was 44.0±8.0 and 46.2±6.9 respectively. However, of all the components recording had the highest score with mean scores of 15.18±2.60 and 15.25±1.86 respectively. None of the components had a significant difference in mean scores ($p>0.05$) between the two LGAs.

Table 4.5: Comparison of overall mean scores of Immunisation Focal Persons in Ogbaru and Onitsha North LGA on the components of immunisation data monitoring system

Components	Total Score		Mean Score		t-Test	p-value
	OGB	ONN	OGB	ONN		
Reporting	103	80	3.68±1.03	4±1.07	0.04	0.84
Recording	425	305	15.18±2.60	15.25±1.86	1.46	0.23
Archiving	78	61	2.79±0.73	3.05±0.83	0.56	0.46
Use of data	191	149	6.82±2.83	7.45±2.84	0.51	0.82
Core output/ analysis	225	179	8.04±2.58	8.95±3.03	0.16	0.70
Demographic information	201	145	7.18±1.61	7.25±1.33	0.30	0.59
Overall	1223	919	44.0±8.0	46.2±6.9	0.32	0.35

4.8: Knowledge level of the immunisation focal persons in Ogbaru and Onitsha North local government areas on components of routine immunisation data monitoring system

All the respondents had a good knowledge of the archiving component. However, majority of the respondent had a poor level of knowledge on core output/ analysis (45.8%). Very few of the respondents had a good knowledge of all the components (18.8%) while 81.3% had poor knowledge of all the various components.

Table 4.6: Knowledge level of the immunisation focal persons in Ogbaru and Onitsha North local government areas on components of routine immunisation data monitoring system

Components	Good N=48 (%)	Poor N=48 (%)	X^2	p-value
Reporting	31 (64.6)	17 (35.4)	2.9	0.12
Recording	47 (97.9.0)	1 (2.1)	46.1	0.001
Archiving	48 (100.0)	0 (0)	-	-
Use of data	31 (64.6)	17 (35.4)	5.1	0.024
Core output/ analysis	26 (54.2)	22 (45.8)	0.7	0.48
Demographic information	29 (60.4)	19 (39.6)	2.9	0.12
Total knowledge	9 (18.8)	39 (81.3)	15.7	0.001

4.9 Association between total knowledge of immunisation focal persons and their socio demographic characteristics

There was no significant relationship between the total knowledge of the immunisation focal persons and their age, their years of experience, qualification, their local government area and having received training in the previous years. Table 4.7 show the result of a logistic regression between the total knowledge of the immunisation focal persons and their socio demographic characteristics.

Table 4.7: Association between total knowledge of immunisation focal persons in both LGAs and their socio demographic characteristics

Variable	Odds ratio	95% CI	p-value
Age	0.90	0.16 - 5.06	0.9
Years of experience	0.95	0.17 - 5.41	0.95
Qualification	0.77	0.23 - 2.58	0.67
Ever received training	1.30	0.25 – 6.62	0.76

4.10 Correlation between the accuracy ratio for DPT3, measles and quality index

The health facilities' accuracy ratio for DPT3 showed a significant, positive but mild correlation with the quality index (r= 0.38, p value =0.01). However, there was no correlation between the accuracy ratio for measles and quality index (r=0.137, p value=0.01). This is shown in Figures 4.9a and 4.9b below.

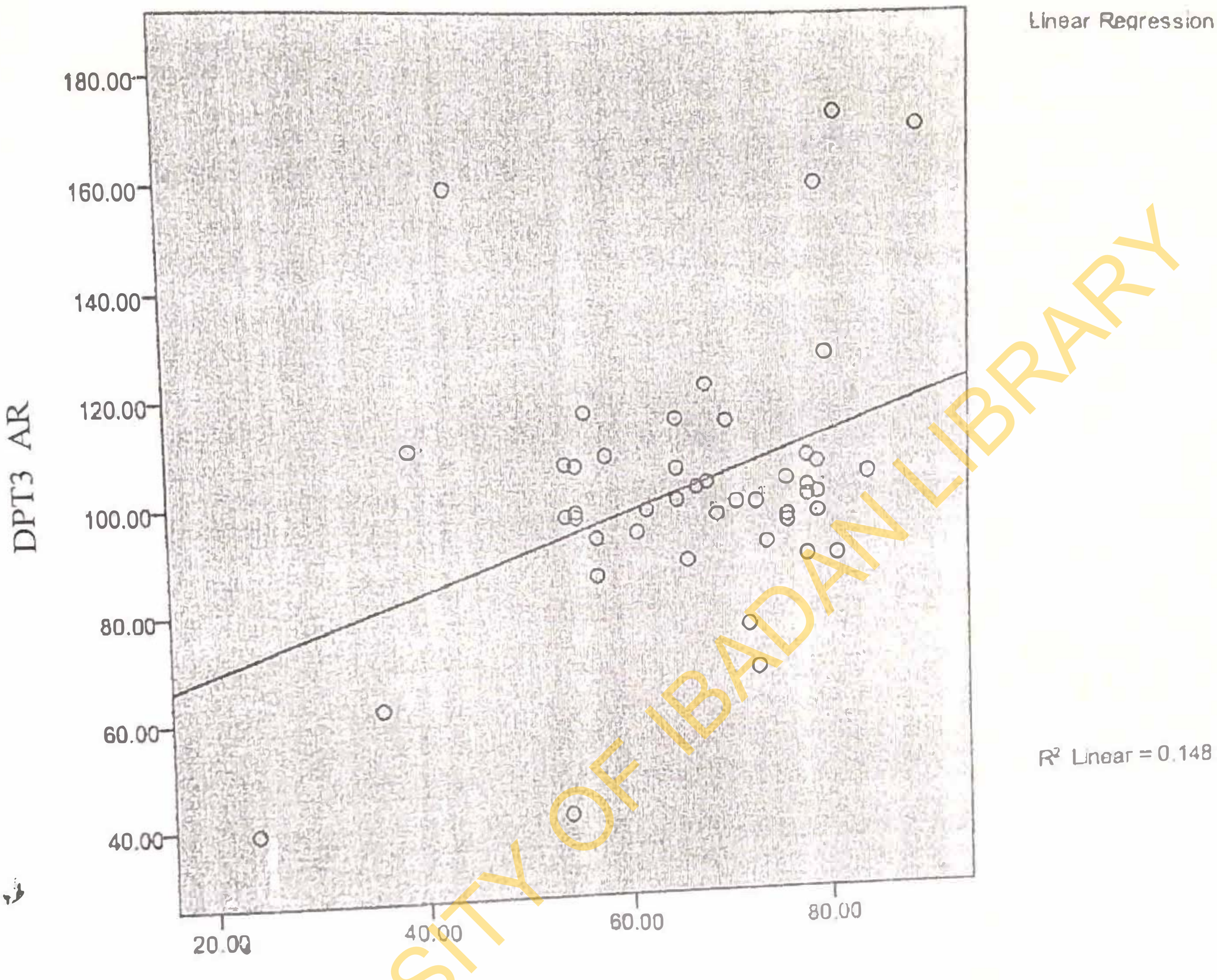

FIG. 4.9a: Correlation between the accuracy ratio for DPT3 quality index

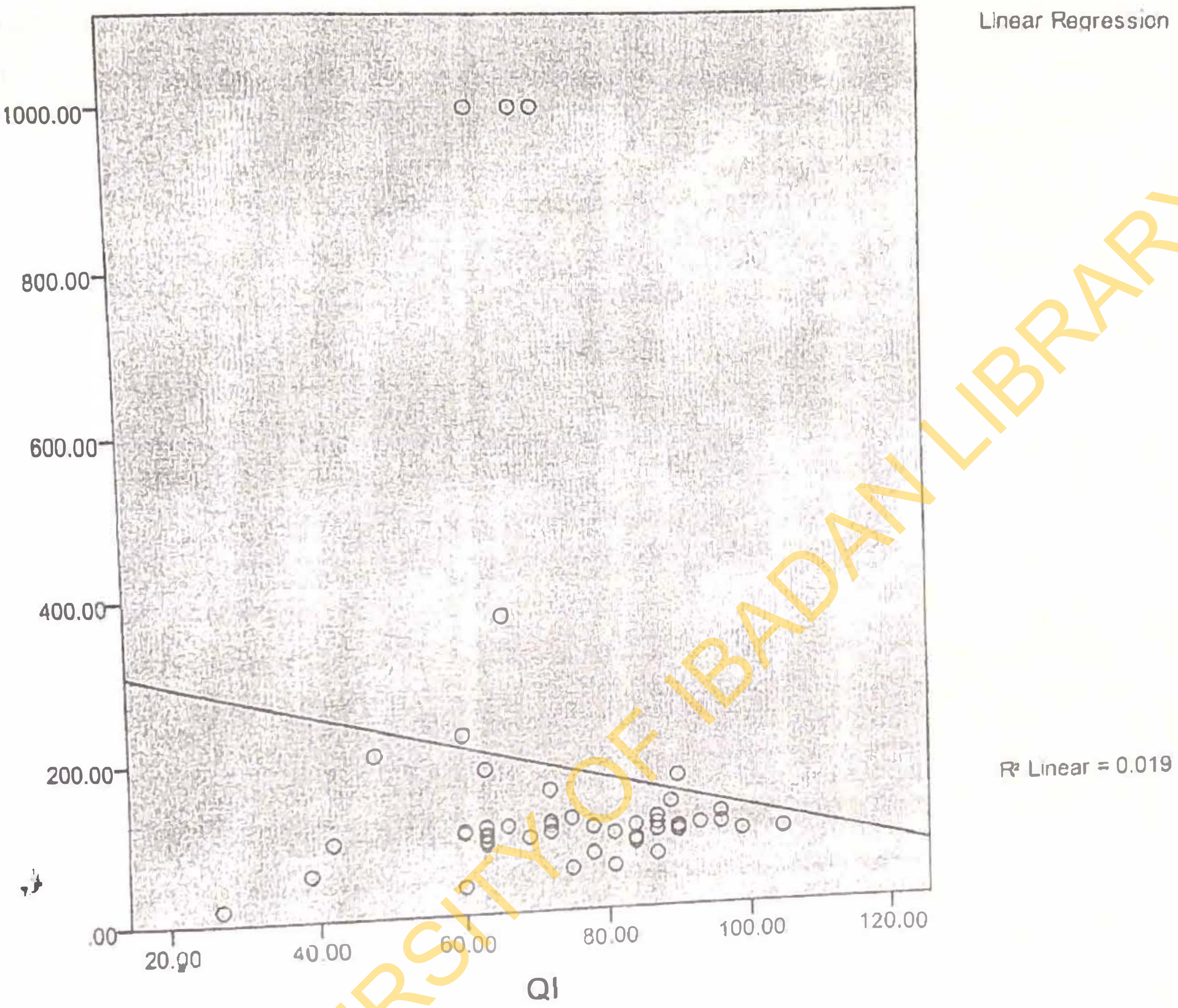

FIG. 4.9b: Correlation between the accuracy ratio for measles and quality index

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion

5.1.1 Consistency of generated data

There have been efforts to develop appropriate health information systems to generate accurate statistics from the service provision level (Suva,1986; Robey and Lee,1990, Husein et al, 1993, Onta et al.,1998). It had been reported that the key function of a health information system is to generate evidence that will be used for the improvement of health of individuals (Shahid and Muhammad, 2010). In most countries, inappropriate data are common problems in information systems (Makombe et al, 2008). Many of the data generated in Ogbaru and Onitsha North LGAs were either over reported or under reported. However, the rate of consistency was observed to be higher in Onitsha North. This may be due to frequent supervision visits conducted by the Local Immunisation Officer, as many studies had concluded that supportive supervision of health workers would lead to aggregation off accurate data. Based on the data generated, the coverage of the two LGAs for the audit year 2009 will not be accurate. There were differences between the number of vaccinations administered in the health facilities and the number reported to the LGAs. Under- reporting of data was mainly the inconsistency observed at the health facilities while at the local government areas, it was over-reporting. Similar results were obtained by Onta et al, 1998, in a study to assess the quality of immunisation data from routine primary health care reports in Nepal.

The result of this study also showed that there was a correlation between the accuracy ratios and quality scores for the health facilities. This suggests that the quality of the reporting systems is a major factor that may affect the consistency of the reporting systems. Ronveaux et al., (2005) had a similar result in an immunisation data quality audit verifying the quality and consistency of the monitoring systems. In another study conducted in Nigeria, authors recommended that special attention should be given to strengthen the ability of health workers to document information accurately (Ogunbekun et al, 1999). If the accuracy of data

will be improved, then better data need to be collected. Health workers need to understand what happens to the data, why the data are being collected or what it means for them, their wards or their patients if it is collected (Allotey and Reidpath, 2000).

5.2 Quality of the immunisation data monitoring system

Recording of immunisation depends on tally sheets for each antigen as well child health cards and registers for infants and pregnant women (WHO, 2004). Tally sheets were generally available in the health facilities and used. This is similar to the findings reported in DQS, 2010. However, it was observed in health facilities visited on their immunisation days that tallying was not done immediately after immunisation by the health workers even though majority of the health workers were aware that tallying ought to be done immediately after immunisation. Reports have shown that health workers consider recording of health facilities time consuming (Allotey and Reidpath, 2000). This was attributed to lack of adequate number of health workers in the health facilities with the few that are present being very busy during vaccination periods and not having enough time to tally doses of immunisations given. The Tetanus Toxoid tally sheets were generally unavailable in all the health facilities of the two LGAs. However, the facilities improvised by making use of a notebook.

Immunisation registers were used in all the health facilities during child immunisations. Individual recording forms were generally available except in four HFs in Ogbaru LGA. This finding is seen as an improvement on the DQS report of 2004, were all the HFs visited did not have basic recording forms like the tally sheets. Immunisation cards however, were observed to be generally unavailable. An important thing to note in this study was that of all the HFs that complained of not having immunisation cards, none was a privately owned HFs. Also, VMI tool was not available in many HFs especially the privately owned HF. Those that had the booklets generally did not update it. The findings of this study also corroborated those of Bosch-Capblanch et al., who reported that vaccine ledgers to manage vaccine stocks could be found in the majority of district offices and HUs holding vaccine stocks; however, only a smaller proportion was updated (Bosch-Capblanch et al. 2009).

Reporting component had good scores in majority of the HFs and the LG immunisation units. However, not all the reports were duly signed and dated by the officer in charge. All the

reports were available and complete at the LGAs while majority of the HFs also had complete reports except for a few HFs that did not record immunisation activities for a couple of months. Ogbaru LG had a chart for monitoring timeliness of reports which had reduced the lateness of reports to almost zero. However, there was no systematic way of handling late reports neither were addendum prepared for them in the two LGAs. They are simply ignored. In all the HFs visited including the two LG immunisation units, AEFI reporting forms were not available, neither were there AEFI committees or kits. The role of the health professional in supporting the national passive surveillance system is essential, as the first hint of a potential problem usually originates with the astute clinician who reports a case to the appropriate source (Singleton et al., 1999).

The investigation that resulted in the voluntary withdrawal of rotavirus vaccine was triggered by nine reports to Vaccine Adverse Events Reporting System (VAERS) of intussuception, eight of which had occurred within 1 week of the first dose of this vaccine (CDC, 1999). Health professionals have access to the most complete information related to adverse events experienced by their patients. Any index of suspicion that a serious event or death may be related to vaccination is reason for the health professional to submit a VAERS report. Determination of whether an event was caused by the vaccine is not a prerequisite for filing a VAERS report. When in doubt, providers should report to (VAERS). VAERS solicits reports for all events temporally related to vaccination, some of which may be coincidental and some of which may merely indicate a change in the frequency of expected events (Iskander et al., 2004). Post-marketing surveillance relies on health professionals to report suspicious events, thus improving the quality of reported data and contributing significantly to safeguarding public health.

Recommendations for healthcare professionals to report to VAERS recently have been incorporated into the Standards for Pediatric Immunisation Practices, which are endorsed by multiple professional organizations. Despite the limitations of spontaneous reports, VAERS provides vital information of clinical importance. The identification of signals in adverse event surveillance may initiate further investigation of potential problems in vaccine safety or efficacy, and facilitate subsequent dissemination of safety-related information to the

scientific community and the public. This process begins with voluntary submission of reports of possible vaccine-associated events to VAERS by the informed and conscientious health professional (Iskander et al., 2004). The finding of this study showed that all the health workers were aware of what AEFIs were but more than three quarter of the health workers were not aware of the standard operating procedures for reporting AEFIs.

It was reported in the 2009 data quality audit, that the archiving challenge had generally not been addressed by most LGAs. This study also corroborates the findings of the DQS. Even though the LGAs keep data from health facilities in separate files in a sequential manner, they do not have good storage places like a file cabinet where they could be stored safely this made the retrieval of the reports a bit difficult. Furthermore there was no progress towards computerization of records at the LGA level despite the fact that the LGAs had computers, they were not used to capture data and reports. The general complain was that there were no personnel to handle the computerised archiving.

The demographic component had one of the strongest quality scores. This was also shown by the data quality audit reports for Liberia (2005) and Zimbabwe (2006). However, none of the HFs had a system which allowed for the collection of new births in the community. Majority of the HFs had a target by type of strategy (fixed, outreach, mobile) with a map showing the catchment areas by strategy including the outreach villages. All the HFs relied on the LGA for their target population, which the LGAs in turn get from the state level. There was no system in place both at the health facility and at the LGA levels, for collection of information on new births in the community.

The poorest quality scores were seen between the analysis and use of data component (Ronveaux et al., 2005, Bosch-Caplanch et al., 2009). In all the HFs visited, none monitored dropout rate. Majority of the health workers attributed this to their weak understanding of preparation and use of tool. Of all the HFs in the two LGs, only one HF situated in Onitsha North monitored vaccine wastage. This might be due to the HF being relatively new and having medical personnel who visited weekly to check on the HF's activities. No documented feedback was seen in any of the HFs. Immunisation coverage was not split by coverage in any of the HFs. There was community involvement in Ogbaru LG, probably

because the LG is a rural area. In Onitsha North however, community involvement was almost nonexistent except for an HF situated in Onitsha village where the indigenes live.

There was also no evidence of the use of data for action. There was no feedback to the health facilities or the communities. The LG immunisation officers however claimed that feedback was done orally without any documentation. Nyamtema (2010), had a similar finding in a study conducted in Tanzania, were almost half of his respondents stated that they had never used the HMIS data collected at the health facility level for planning, budgeting and evaluation of service provision. This was attributed by almost three quarters to poor knowledge on data analysis.

5.3 Knowledge of health workers on components of routine immunisation data monitoring system

It is being increasingly recognised that the challenges with the health workforce are the single most important obstacle to improving the performance of health systems and achieving key health objectives, particularly in low and middle income countries (WHO, 2008). Majority of the health workers in the two LGAs had an average knowledge of the various components of the data monitoring system. The data generated was not of very high quality and data consistency was inadequate. It has been reported that training may not always be the problem; instead it could likely be a manifestation of unwillingness to fill the forms and lack of commitment and accountability of the poorly supervised health workers (Daudi and Mwangu, 2006). Knowledge of the Health Management Information System (HMIS) concepts has been found to be associated with better quality of HMIS data however, this was not true of training on HMIS (Finau, 1994). This shows that understanding the basic HMIS concepts might not be related to the basic training on HMIS (Daudi and Mwangu, 2006).

It is expected that the LGA with more supervision visits would have better data quality and accuracy. However, this was not reflected in the data generated. This raises some doubts on the quality of supervision provided by the LIOs to the various HFs. Except for monitoring the number of visits made by the LIOs to the facilities; there is no mechanism for measuring and monitoring quality of supervision at health facilities.

Accountability as measured through queries made by district officials on delay of reporting did not reveal an association with better quality of data. This might indicate that the LIOs were keen to receive reports irrespective of their quality in order to satisfy the needs of higher authorities as reports had shown that data is often collected in order to meet bureaucratic obligations rather than performance monitoring (Feldman and March, 1981). Contrary to expectations and corroborating the study of Daudi and Mwangu, 2006, training and supervision did not seem to influence quality of the data generated. Some fundamental questions are raised from this study with regards to the effectiveness of routine immunisation data monitoring training as well as the quality of supervision conducted at health facilities. Are training opportunities offered according to actual needs? How effective are supervision visits in improving health workers performance in immunisation data monitoring? If lack of knowledge is not the main problem but a manifestation of reluctance to perform on the part of health staff, then training alone might not solve the problem (Finau, 1994). This calls for a need to revise approaches so as to make training on HMIS part and parcel of continuing education at the workplace and incorporated in career development of the respective staff.

5.4 Limitations of study

The limitations of this study include:

a. The inability of the immunisation DQA to verify vaccinations at the point of delivery.
b. Social desirability bias. Since many of the health workers had an idea of the right thing to do, the tendency for them to say exactly what was expected of them was high. This was minimized by using a structured questionnaire and confirmation through observation.
c. Recall bias was also a limitation of the study as participants might not be able to recall some of the information they were given during trainings. However, this challenge was greatly minimised as both observation and record review was employed in the study.
d. As a result of the small sample size, this study can not be generalised to a large population, there is therefore need for large scale studies to be carried out with the same objective given the crucial role of immunisation. This study however gives an insight into the challenges the routine immunisation data may face.

5.5 Conclusion

There were inconsistencies in the data generated in Ogbaru and Onitsha North local government areas. These inconsistencies were over-reporting and under-reporting in the two LGAs respectively. This shows a weakness in the monitoring system in the two LGAs.

Most of the weaknesses seen in the quality of the monitoring system were on core output/analysis and the use of data for action. These two components were also seen as key areas for improvement in the data quality audit that had been conducted in the country. The Standard Operational Procedures (SOPs) for reporting is not fully in use in the two LGAs as instructions on treating late reports were quite unclear to the focal persons.

Many of the health workers had attended trainings on immunisation monitoring system. However, this has not greatly improved the quality of the data generated.

5.5 Recommendations

1. The LGA should ensure the provision of all recording tools especially immunisation cards and vaccine utilisation forms. They should also monitor distribution and availability of tools at HFs. Also, refresher training should be organised for the heath workers on the use of the tools especially the VM1 tools.
2. Provision of files and file cabinets for each HF for proper storage of data. Also, LGAs should be encouraged to commence computerization of EPI data since computers had been distributed to them.
3. Training should be organised for the LIOs with emphasis on reporting and use of immunisation data.
4. There should be the development and dissemination of Standard Operating Procedure for AEFI monitoring from the national level. The LGAs should also be instructed to analyze and provide monthly feedback on AEFI reporting and incidence.
5. Regular and documented feedback analysis should be provided to focal persons in both LGAs and HFs and to the relevant authorities. This will make them see the usefulness of the data that had collected.
6. There should be a supportive supervision of the focal persons in HFs by the LGAs.

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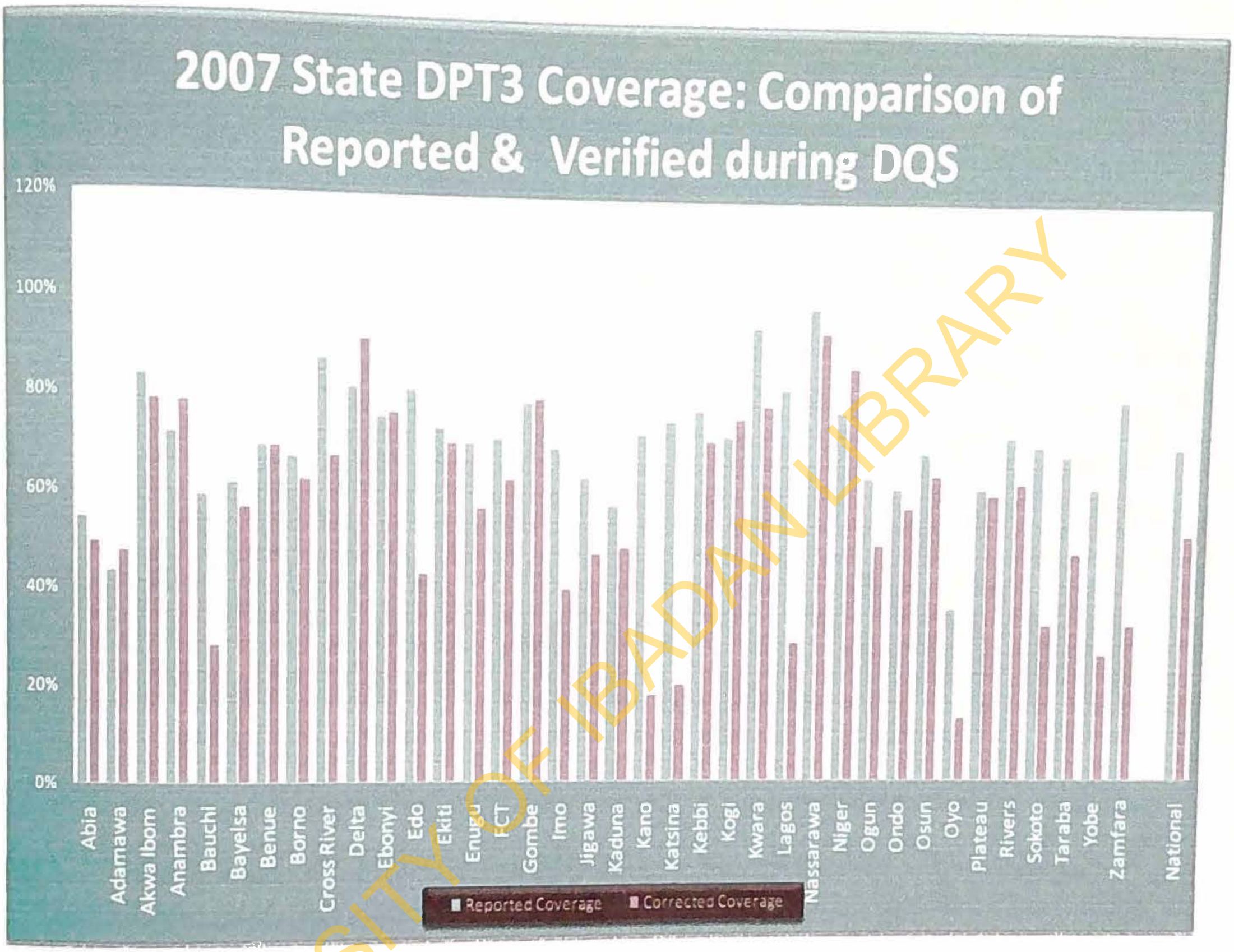
APPENDIX I

COMMON MISTAKES IN TALLYING

Mistake in tallying	Possible problem that may occur	Correct practice
Tallying before the vaccine is administered	The child may not receive the vaccine	Give the dose first then tally using the tally sheet
Tallying at the end of a session according to number of doses contained in the used vials	"Wasted" doses may be counted	Tally each dose given (as above)
Tallying all vaccines under one age group (to include those outside the targeted age)	Will result in inaccurate coverage data	Separate tally for under 1 and over 1 year old

Source: WHO, 2004.

APPENDIX II



A comparison a reported and verified data during data quality assessment

Source: NPHCDA, 2009.

APPENDIX III

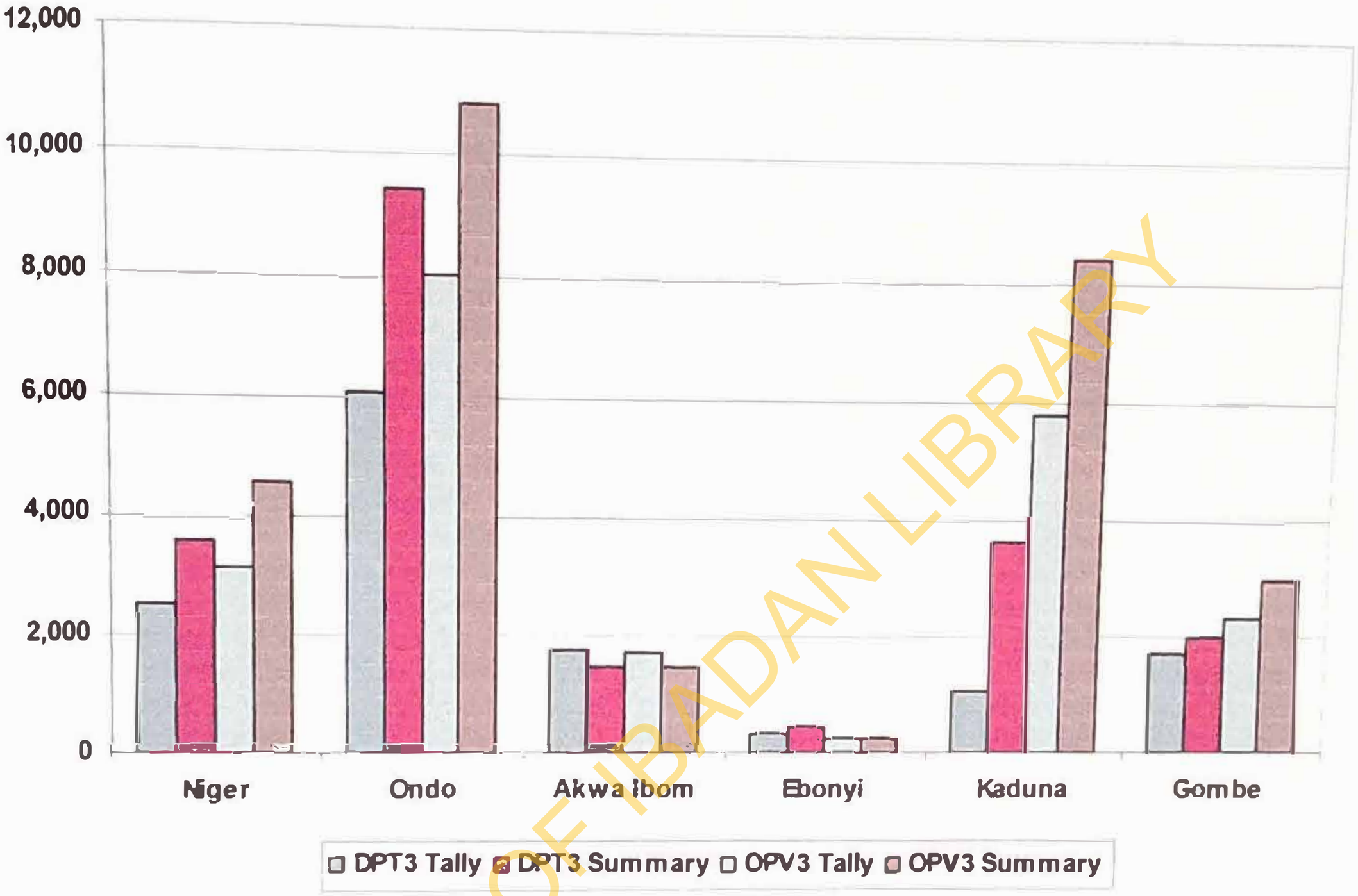


Fig 2.4: Comparison of DPT3 and OPV3 figures in health facility tally sheets and summary sheets during a Data Quality Self Assessment (DQS)

Source: NPHCDA, 2009.

APPENDIX IV

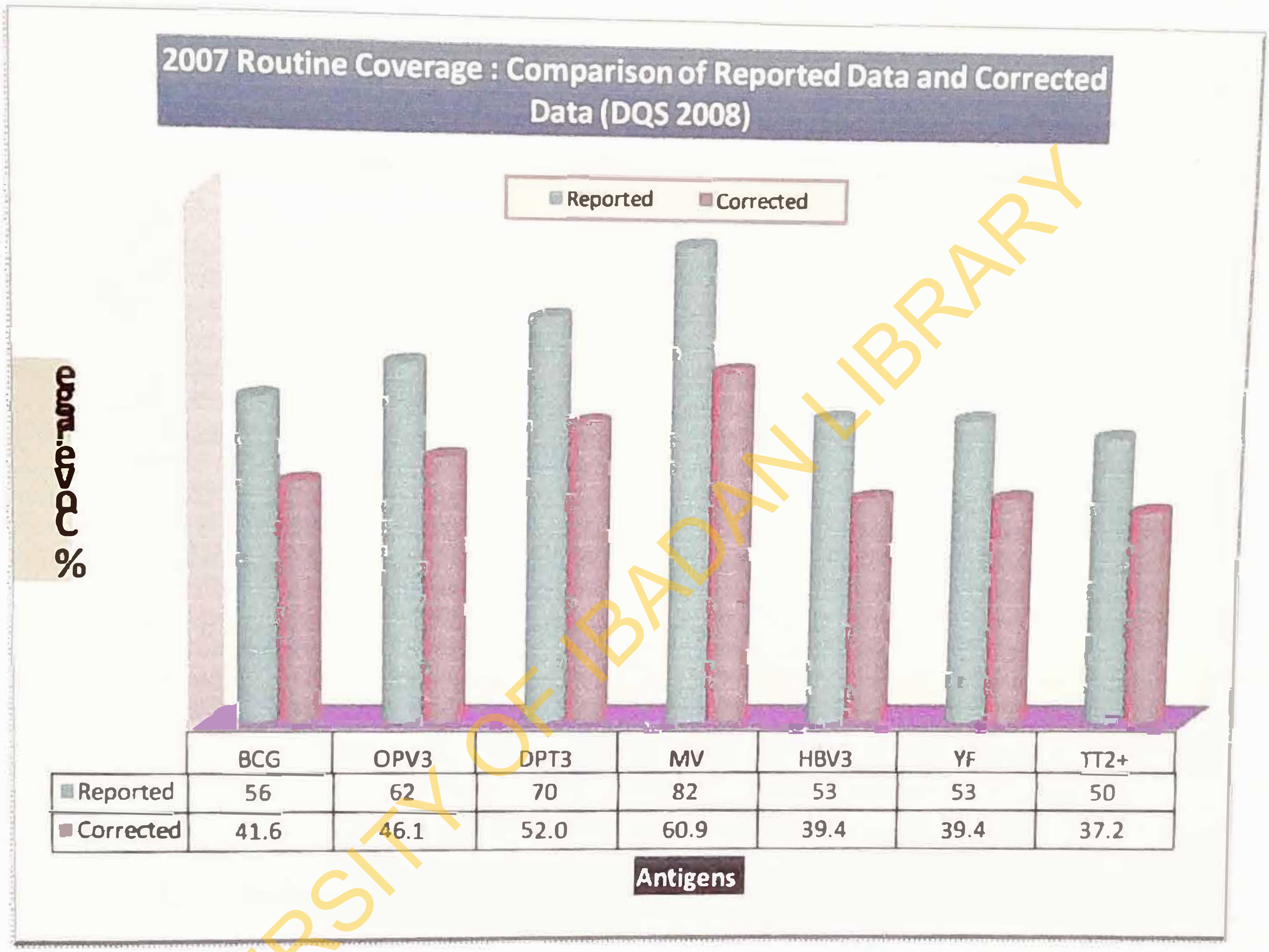


Fig. 2.5: A comparison of reported and corrected data during data quality assessment

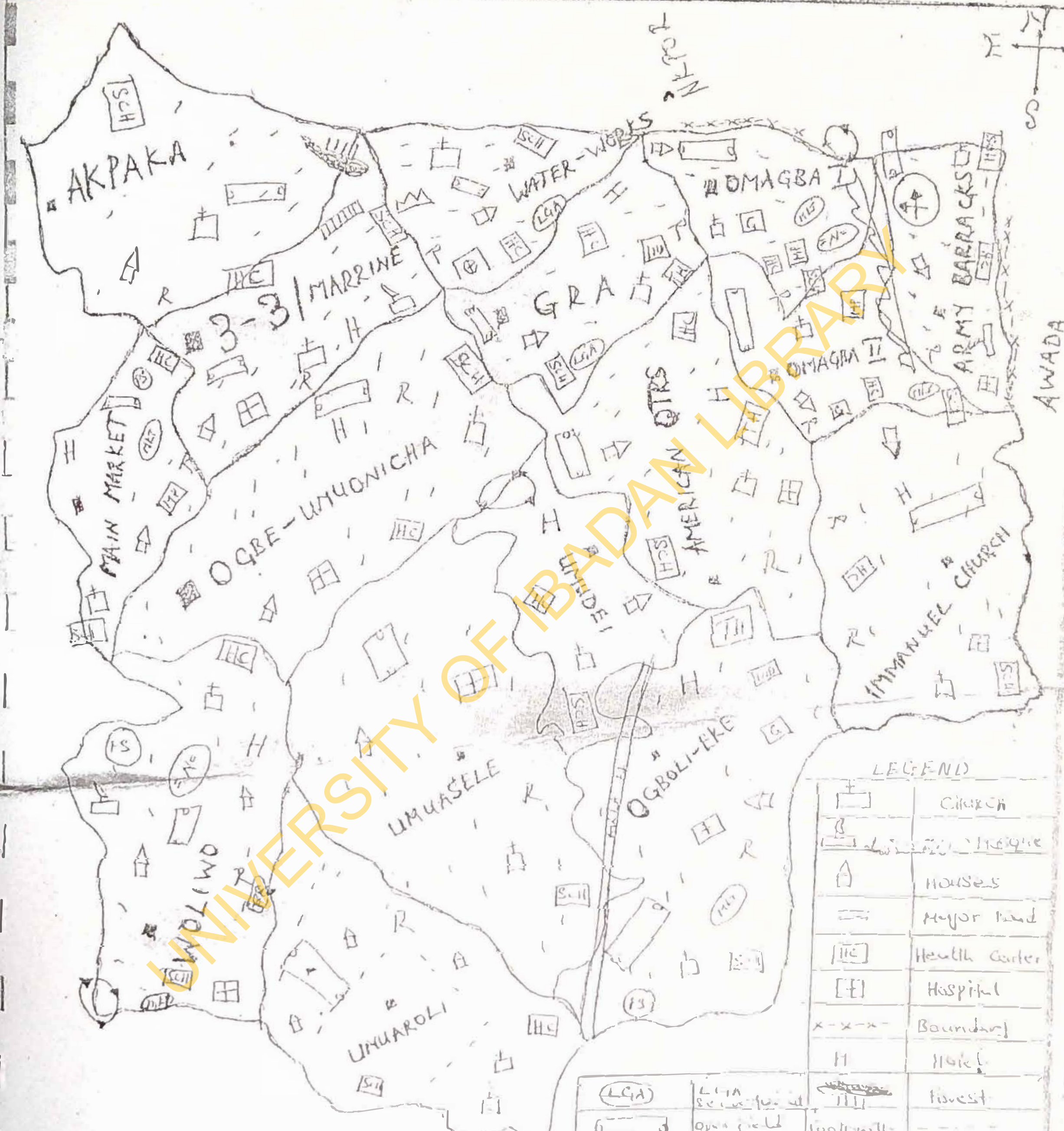
Source: NPHCDA, 2009.

APPENDIX V

MAP SHOWING HEALTH FACILITIES IN OGBARU L.G.A.

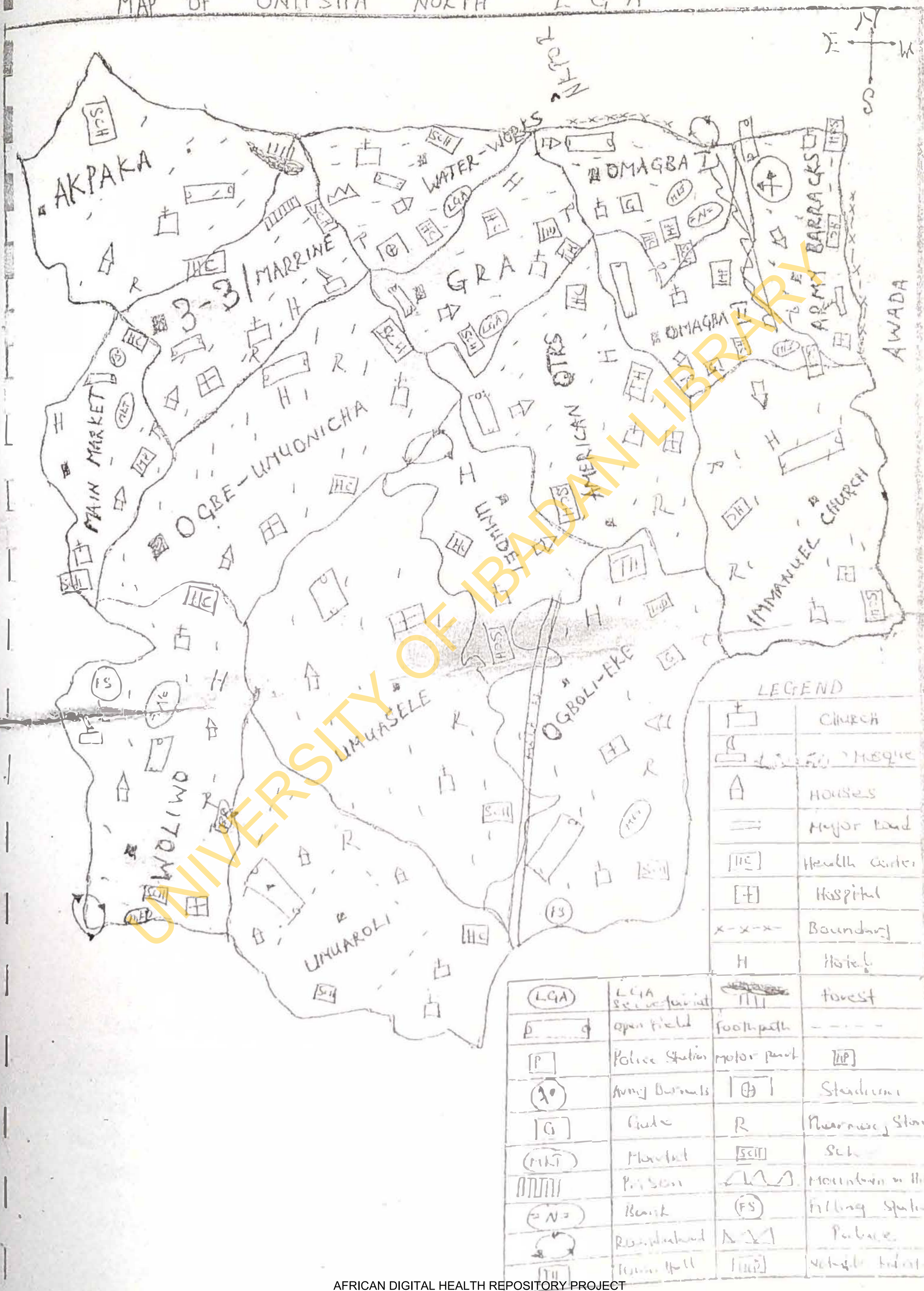
APPENDIX VI

MAP OF ONITSHA NORTH L G A



APPENDIX VI

MAP OF ONITSHA NORTH L G A



APPENDIX VII

ACCURACY AND QUALITY OF ROUTINE IMMUNZATION DATA MONITORING SYSTEM IN OGBARU AND ONITSHA NORTH LOCAL GOVERNMENT AREAS, ANAMBRA STATE, NIGERIA

MY NAME IS AWOGU NKIRUKA. I AM A POSTGRADUATE STUDENT IN THE FACULTY OF PUBLIC HEALTH, UNIVERSITY OF IBADAN. I AM COLLECTING INFORMATION on the above topic which will be useful in strengthening the routine immunisation monitoring system in the state. The information obtained will not be used against you and will be kept confidential. You have a right to withdraw at any time if you choose to. I thank you for your anticipated cooperation in answering the questions honestly.
Consent: now that the study has been well explained to me and I fully understand the content of the study process, I will be willing to take part in the study.

_____ _____

Signature of participant Date

_____

Signature of interviewer/Date

Section A: Identifying Information

1. Serial number_____
2. Name of Local Government Area 1. Ogbaru 2=Onitsha North
3. Name of health facility_____

Section B: Demographic Characteristics of Respondents

1. Sex:
2. Age in years:_____
3. Cadre:_____
4. Area of specialization:_____
5. Highest qualification:_____
6. Have you ever received training on immunisation data monitoring?

Yes =1
No =2

7. When was the last time you received training on immunisation data monitoring system?

_____

Section C: Knowledge of the Recording Component

8. What are the tools for recording vaccinations at the health facilities? (Check all that are applicable)

a. Child health card ☐
b. Immunisation register ☐
c. Tally sheets ☐
d. Health facility summary sheet ☐
e. Monitoring chart ☐

9. Tally sheets are used in the following sessions (check all that are applicable)

a. Fixed ☐
b. Outreach ☐
c. Mobile ☐

10. Can the same tally sheet be used for more than one session? Yes ( ) No ( )

11. How do you tally?

a) Before vaccination is administered Yes ( ) No ( )

b) At the end of an immunisation Yes ( ) No ( )

c) Immediately after immunisation is given Yes ( ) No ( )

d) Tallying all vaccines under one age group Yes ( ) No ( )

12. What are some of the information contained in an immunisation register?

a) Identification number Yes ( ) No ( )

b) Name of the infant Yes ( ) No ( )

c) Name and address of parents Yes ( ) No ( )

d) Vaccination provided Yes ( ) No ( )

e) All of the above Yes ( ) No ( )

Section D: Knowledge of Core Output/ Analysis

13. What do you understand by monitoring data in immunisation?

_____

14. Why is monitoring important? _____

15. List two indicators for monitoring immunisation?

16. What are the tools for displaying monitoring data?

a) Drop out monitoring chart Yes ( ) No ( )

b) Immunisation register Yes ( ) No ( )

c) Tally sheets Yes ( ) No ( )

d) Health facility summary sheets Yes ( ) No ( )

17. Is it appropriate to analyse immunisation data at the health facility

1= Yes 2= No

18. If your answer is yes, why? _____

19. What are your measures of access to immunisation?

a) OPV3 Yes ( ) No ( )

b) BCG Yes ( ) No ( )

c) DPT1 Yes ( ) No ( )

d) DPT3 Yes ( ) No ( )

20. Can you produce an immunisation monitoring chart? Yes ( ) No ( )

21. If the difference between DPT1 and DPT3 is high, what does it suggest?

a) High coverage level Yes ( ) No ( )

b) High drop out Yes ( ) No ( )

c) Poor access to immunisation services Yes ( ) No ( )

Section E: Knowledge on Use of Data

22. List two reasons identified for high drop out rate?

_____

23. Is feedback a valuable tool for improving immunisation coverage? Yes ( ) No ( )

24. If your answer to the above is, why? _____

25. What should routine feedback reports contain?

a) Coverage and drop outs Yes ( ) No ( )

b) Timeliness or completeness of reports Yes ( ) No ( )

c) Cases of vaccine preventable diseases Yes ( ) No ( )

d) Results of investigation into adverse events following immunisation Yes ( ) No ( )

26. What methods do you use for providing feedback to the communities or health facilities?

a) Monthly reports Yes ( ) No ( )

b) Meetings Yes ( ) No ( )

c) Monthly newsletters Yes ( ) No ( )

d) None Yes ( ) No ( )

Section F: Knowledge of Archiving Component

27. Is it important to store recorded data? Yes ( ) No ( )

28. If your answer to the above is yes, why? _____

29. Where is the appropriate place to store the data generated?

30. How do you store the data generated?

(a) by filing manually (b) by using computers

31. What is the minimum period for the storage of tally sheets?

a) One month

b) Six months

c) 1 year

d) 2 years

e) 3 years

Section G: Knowledge of Reporting Component

32. When do you send reports of vaccinations performed to the LG?

a) Weekly

b) Monthly

c) Quarterly

d) Yearly

33. How many copies of the report do you prepare?

(a) 1 (b) 2 (c) 3 (d) 4

34. Do you include obstacles encountered during immunisation sessions in the report?

Yes ( ) No ( )

35. What is done to late reports? _____

36. Is it important to check the accuracy of the data before reporting? Yes ( ) No ( )

37. When is the data accuracy verification checklist used?

a) At the time of report submission

b) After report submission

c) Before report submission

d) Whenever one has time

38. drop out rate should be less than (a)5% (b)10% (c)15% (d)20%

39. What do you think are the reasons for inconsistency in data? (check all that are applicable)

a) Insufficient motivation

b) Poor supervision

c) Inaccuracy in data entry

d) Misunderstanding of the reporting forms and procedures

e) Lack of reporting forms

Section H: Knowledge on Demographic Characteristics

40. What are the population groups targeted for routine immunisation services in Nigeria?

a) 0-11 months Yes ( ) No ( )

b) 0-59 months Yes ( ) No ( )

c) 0-14 months Yes ( ) No ( )

d) Women of child bearing age Yes ( ) No ( )

e) Pregnant women Yes ( ) No ( )

41. How do you determine your target population?

a) Conducting house to house census Yes ( ) No ( )

b) From national population census Yes ( ) No ( )

c) From birth registers Yes ( ) No ( )

d) 4% of the total population for women of childbearing age Yes ( ) No ( )

e) 22% of the total population for women of childbearing age Yes ( ) No ( )

f) 4% of the total population for pregnant women Yes ( ) No ( )

42. Is the current target population the same as that of the previous year? Yes ( ) No ( )

43. If no, why?

STANDARD QUESTIONS TO ASSESS THE QUALITY OF THE MONITORING SYSTEM

QUALITY QUESTIONS LGA LEVEL

Question		Comment	SCORE (0 or 3)
Recording component			
1	Are vaccine receipts and issues recorded in a vaccine ledger book?	To assess appropriate record-keeping of vaccine receipts and issues. Is the following information completed in the ledger (vaccines received, issued, remaining balance, expiry date and batch number) Time Range: JAN-DEC 2009	
2	Is the current ledger book up to date for a given vaccine (or vitamin A)?	Check whether the last date of vaccine issue recorded Physically count one of the antigens and compare with quantity in ledger	
3	Is there a log of syringe supply and delivery to HF and is it up to date?	Is the stock available identical to the one in the register (count). Although availability without being up to date is zero score. Is there a log book available for syringes and delivery to HF. Is the log book available up to date?	
4	Does the LIO know the annual vaccine requirements for the LGA?	Availability of annual plan indicating vaccine forecasting Availability of vaccine forecasting sheet Is target population of under 1 and WCBA /pregnant women in the annual plan Quantities to be reflected in annual RI micro plan. Does he have annual micro plan?	

STANDARD QUESTIONS TO ASSESS THE QUALITY OF THE MONITORING SYSTEM

QUALITY QUESTIONS LGA LEVEL

Question		Comment	SCORE (0 or 3)
Recording component			
1	Are vaccine receipts and issues recorded in a vaccine ledger book?	To assess appropriate record-keeping of vaccine receipts and issues. Is the following information completed in the ledger (vaccines received, issued, remaining balance, expiry date and batch number) Time Range: JAN-DEC 2009	
2	Is the current ledger book up to date for a given vaccine (or vitamin A)?	Check whether the last date of vaccine issue recorded Physically count one of the antigens and compare with quantity in ledger	
3	Is there a log of syringe supply and delivery to HF and is it up to date?	Is the stock available identical to the one in the register (count). Although availability without being up to date is zero score. Is there a log book available for syringes and delivery to HF. Is the log book available up to date?	
4	Does the LIO know the annual vaccine requirements for the LGA?	Availability of annual plan indicating vaccine forecasting Availability of vaccine forecasting sheet Is target population of under 1 and WCBA /pregnant women in the annual plan Quantities to be reflected in annual RI micro plan. Does he have annual micro plan?	

		Is vaccine forecast indicated in the plan? Does he know the formula to calculate vaccine requirement?	
5	Are health staffs aware of standard operating procedures (SOP) to record a severe Adverse Events Following immunization (AEFI)?	What is AEFI? Are there reporting form? Check records of reported AEFI cases Are there AEFI kit? Do they have functional AEFI committee?(Check minutes of meetings) Is there any SOP available?	
6	Do the LGA's reports found at LGA level have at least one date stamped or written on them?	Determine what proportion of correct HF report you would need to answer "Yes." Define for which period (e.g. for the previous year) Define the date significance: the date the report was signed The date of receipt at LGA level stamped or written on it by the LGA office. Is there a list of all reporting facilities How many these HFs reported for the last 12 months? Significantly yes when 80% proportion agrees Does One out of this 80% proportion have at least date stamped or written on them? Select 10 report at random if receipt date tally with the date in	

		the timeliness and completeness chart?	
7	Are the LGA reports (that are sent to the state level) completely and correctly filled in?	To select a number of fields to be checked in all LGA reports and check whether these have been correctly filled in. Check all fields and signature of the HODs	
Archiving component			Weight (3)
8	Is there a separate file or sub-file for each HF and are the reports inside filed by month and by wards	Storage should facilitate retrieval and monitoring (and be well organized). Are reports filed by health facility and date? Check individual files for each facility for the past 12 months	
9	Have all HFs data for the months under review been processed?	Have data been entered for the period under review? Availability summary LGA reports for the period (100%) Are late reports (if any) included in the main summary? Sorted, , verified , , submitted	
10	Are supervisory reports from LGA to HF available at the LGA ?	Do they have supervisory plan? How many visits conducted from previous twelve months? All reports available for visits conducted (filled in supervisory checklist/book/report available for the previous 12 months Of the planed visits how many were conducted	

		Was supervisory checklist used Reports of supervision of the HF by the LGA, Reports of supervision of the Ward by the Ward Focal Person. Reports of supervision by the State and Partners (not to affect scoring)	
11	Are copies of the last feedback to the health facilities easily available?	Feedback includes Monthly meetings, Bulletins, analyzed data for actions. Are they given feedback? (Monthly meetings minutes, coverage, dropout and wastage) When was the last feedback given?- Availability of 4 feedback reports from previous 12 months	
	Computerized archiving		
12	Is the LGA computerized? If yes then Is the last date of backup within one week? (look at the date the file was created on the backup)	Check disc for last saved date; look at the file creation date First are files stored on the computer? If yes, check if backup mechanism is in place. If yes, check when last backup was done	
13	Can the official immunization tabulations for the previous year be reproduced from an archive electronic file? Can you retrieve immunization final summary of previous year from the archive file electronically?	To check official immunization tabulations = final summary of previous year data. Check for the existence of file on previous records for the past 12 months	

		Check for the existence of yet another file containing the summary of these previous 12 months	
14	If more than one computer has immunization data, is there either a functioning network or a written, well-organized method of data transfer? (read it)	How many computers are used for immunization data entry? Is there document/guidelines in place that stipulates how to receive, enter and merge data?	
15	Is the date of printing /production on every tabulation/chart produced, or if the data is archived, the date the archived file was created?	Are there dates on monitoring charts? Does archived data display dates?	

Reporting component			Weight (3)
16	Have the LGA reports of the last 12 months been sent on time?	On or before 10th of every subsequent Month. If there were late facility reports, how many were sent and updated? Check submission dates shown on each LGA report for the past 12 months Is there a delivery note for the reports sent?	
17	Is the procedure for dealing with late reports known and applied?	Check the procedure they are using whether applied. What is done with late reports? Check for records of updated reports for the 12 months in 2009.	
18	Did all the monthly reports from the HFs use the same form/format for the current year?	Are all reports submitted using the RI Activity Summary Report format?	
19	Is there a system for investigation of individual reports of AEFI from the LGA to state?	Serious adverse events should be rapidly reported and investigated. Investigators should be looking for any evidence of programmatic error that must be rapidly corrected or rumours that cause problems. Is there a functional committee? Is AEFI incorporated in the reporting system? Are completed AEFI reports available?	

20	Is the cold chain temperature monitoring chart completed daily?	Check the chart and compare the latest reported temperature with the actual temperature in the refrigerator. Is the cold chain monitoring chart available Is the temperature monitored twice a day including weekends and public holidays. Are there thermometer in the freezers, cold boxes and refrigerators?	
21	Did all the visited HFs report adequate supply of administrative forms tally sheets/reporting forms/health cards?	Verify that there is a ledger to record distribution Are there filled supervisory checklists? If yes, do they show stock out of administrative forms? Are the forms available? If yes are they adequate? Verify forms/health cards?	

Demographic information component			Weight (3)
22	Is the LGA target population for immunization of infants and pregnant women (and school children, if applicable) known?	The (current) target population should be different from previous year Known: the interviewed senior staff member should be able to tell (without looking) approximately how many infants the LGA contained and how the figure was calculated Is there demographic data properly displayed and is such data broken down by target groups?	
23	Is there a LGA map of the catchment areas showing HFs and providing immunization strategies (fixed, outreach, mobile)?	Ideally, the map should include target population, target, and type of strategy. Two maps should be in place Map for LGA showing wards, Health Facilities and their target populations. 2) Map of ward to depict HFs catchment areas and implementation strategies.	
24	Is the proportion of infants per strategy type known for the LGA? (fixed post, outreach and mobile)	Is there summary data of total children to be covered by each strategy? Totals should add up to the LGA total.	
25	Are the target population of each HF available for the previous year?	if available totals should add up to the LGA total.	
26	Has the same target population for child immunization been used on different tabulations, reports, charts, tables etc.?	Check to see if target population shown on charts tally with that on demographic profile.	
27	For the previous year, is the LGA target population value (for child immunizations) found at the LGA the same as that used at national level?	Compare figures obtained from the national level to that being used at the LGA level.	
28	For the previous year, has only one target population value (for child immunization) been seen on all tabulations?	Look out for common target population for Annual Plans, Annual Reports and Monitoring Reports	

29	For the previous year, has only one target population value (check at least total population) been seen in all health projects/programmes?	Check with various initiatives (e.g. polio, nutrition, malaria) whether the target population is consistent at LGA level. Work out the figure for population being used by a particular initiative and see if it tallies with the total population	
Core outputs/analyses component			**Weight (3)**
30	Is there a target number of children that the LGA strives to vaccinate during a calendar year or reporting period?	Is there a set target for each antigen? Is it national target or their own set target State the target	
31	Is the completeness of the immunization reporting from HF recorded and monitored at LGA level?	Using all the HF reports for the previous months. Are all reports from all facilities been received? Is it on display (Tabulated form)?	
32	Does the LGA record and monitor timeliness for HF immunization reporting?	LGA staff should be able to describe what % of HF reports was received on time, received but not on time, and not received at all during the period. Are actual dates for reports receipt entered for timeliness? LG. Astaff should be able to say (based on printed information) what % of HF reports was received on time during the last three months. Record of timeliness should be available since is for 2009	
33	Is the drop-out rate (for DPT1/DPT3) monitored?	Is there a chart for drop-out monitor? Is there a clear understanding of the importance of Drop-out?	
34	Is there monitoring tool for the LGA vaccine wastage?	Discuss the importance and reasons for wastage. Check vaccine utilization form for monitoring wastage. What system is in place to address high/low vaccine wastage rates?	
35	Is there a table or graph by month of the number of Vaccine Preventable Diseases (VPD) (broken down by	How do these data correspond to coverage data (i.e. more cases in areas with poor coverage).	

	Disease)?	Looking at measles and pertusis Monthly bar chart and dot map to show the trends of each disease Do they monitor whether there is an outbreak (are there alert & threshold levels indicated? When was the last VPD outbreak? Was it investigated (is there an investigation Report)?	
36	Is an up-to-date chart/table of the completeness of the current year's immunization data available?	Completeness = reports received out of the expected reports from the health facilities Has the analysis been done?	
37	Is the HF performance monitored at the LGA level?	Monitoring of HFs: graph/figures showing how all HFs are performing during the current year. (Show the current 2 months analysed data of each H/F and given feed back) Are there tables in place to indicate no. of children immunized by months per antigen?	
38	Are supervisory plans activities monitored?	A written schedule of supervision that includes visiting every HF within the previous twelve months. (Look at current reports and file of checklist). Is there a supervisory plan in place (Supervision by HODs/PHCC, LIO, Health Educator and Cold chain officer)? What proportion of planned supervisory visit is achieved? (< 80% = 0).	
39	Has the LGA selected an indicator for the monitoring of immunization safety?	What indicator has been selected (AD syringes available, safety boxes, safe waste disposal sites)? Is the LGA monitoring immurization safety indicators? Is the documentation on this available? Check records of monitoring of selected indicator.	

Evidence of using data for action			**Weight (3)**
40	Is there an analysis of HF data performed regularly with HF staff?	Analysis: can be done within supervisory visits, meetings at LGA level, etc. Explore the quality of analysis as well as the exhaustiveness of the HFs data said to be analysed: none of them should be left out. Check record of minutes of previous meetings Check also previous supervisory reports What proportion of planned meetings were held?	
41	Does the LGA send regular monthly written feedback to the HFs?	Verify Availability of copy at least four feedback (reports/bulletins) from previous twelve months Verify from quarterly meeting's minutes with HF staff	
42	Are areas of low access identified and evidence of action taken to deal with it?	Discuss the importance and reasons for low access. How do the three strategies (fixed site, outreach and mobile teams) relate to the issue of access in the LGA? Has the LGA identified and listed low access areas Is there a plan of action to deal with low access? (Is the action related to the supervisory plan What was the DPT1 coverage before and after specific actions [Verify from micro plan, feedback report, and other intervention plans e.g. outreach] Check DPT1 coverage by strategy (mobile, outreach and fixed site)	
43	Have reasons for any high drop-out (>10%) been identified, and are there any plans/actions to deal with high drop-out (>10%)?	Are there managerial practices that could be changed to reduce the drop-out rate? What system is in place to address high drop out (above 10%)?	

		Is there any communication plan? Is there a tracking plan for drop-out?	
44	Is there monitoring of LGA/HF vaccine stocks?	The manager should be able to say (based on written information) whether one HF has encountered a vaccine stock-out. If no vaccine stock-out is reported, ensure that the monitoring is possible and done. Staff should be monitoring the level of reserve stocks and taking action if stock goes below a specified reserve level. Stock-out = interruption in vaccine supply (for any vaccine). There should be a minimum and maximum stock level for each LGA by antigen. Are there records of vaccine utilization forms or distribution plan? Is there any system in place for stock replenishment at both LGA/HF levels?	
45	Are there problems with completeness and timeliness of reports?	Are the late or incomplete reports usually from the same HFs? What was done to follow it up? What other actions were taken to encourage/induce timely reporting? Is there a system in place to facilitate early reporting? (Check monitoring charts for timeliness and completeness)	
46	Are the recommendations made for the last three supervisory visits followed up in subsequent visits?	Have they follow up the recommendation of the supervisory visits Check supervisory reports for the last 3 visits. (*the supervisory book left in the facility should have a column for follow-up actions on recommendations*)	
47	Has the monitoring of the selected immunization safety indicator been adequate during the last 12 months?	Are AD syringes available. Are safety boxes available. Do they have standard waste disposal sites? How effectively used in the last 12 months Check the selected indicators (Need to know % of facilities meeting the selected indicators)	

QUALITY QUESTIONS, HEALTH FACILITY LEVEL

No.	Question	This question should be designed to find out:	Weight (3)
Recording component (HF)			
1	Are there tally sheets for infant vaccinations on the desk (or easily available) and do they have entries for the last immunization day?	The main concern is evidence of use of available (official) forms and tally sheet. Check/observe whether immunizing and tallying is followed.	
2	Are registers used for recording individual information about child immunizations?	Each health centre should have a book or register where each immunization history can be registered and traced back. Is the Child immunization register available Are the entries completely filled with name of the child, age, sex, date of start, and mothers name, traceable address etc	
3	Can a child's vaccination history be easily and rapidly retrieved in the registers?	A new dose should not be entered as a complete new entry but entered in the location where previous doses have been entered. Score 0 if the register is used as a new entry for any immunization, if date are not indicated score 0. Each health centre should have a book or register where each immunization history can be registered and traced back. Check the register to see that dates for subsequent doses are entered.	
4	Are registers (or pre-printed forms) used for recording individual information about women's TT immunizations?	There may be registers or health cards if cards kept in HF. Is the TT register available? Are the fields correctly filled (with dates of subsequent doses)	
5	Do the dates of planned sessions coincide with the dates of actual immunization sessions	Check the Immunization register and compare the dates with the plan	

QUALITY QUESTIONS, HEALTH FACILITY LEVEL

No.	Question	This question should be designed to find out:	Weight (3)
Recording component (HF)			
1	Are there tally sheets for infant vaccinations on the desk (or easily available) and do they have entries for the last immunization day?	The main concern is evidence of use of available (official) forms and tally sheet. Check/observe whether immunizing and tallying is followed.	
2	Are registers used for recording individual information about child immunizations?	Each health centre should have a book or register where each immunization history can be registered and traced back. Is the Child immunization register available Are the entries completely filled with name of the child, age, sex, date of start, and mothers name, traceable address etc	
3	Can a child's vaccination history be easily and rapidly retrieved in the registers?	A new dose should not be entered as a complete new entry but entered in the location where previous doses have been entered. Score 0 if the register is used as a new entry for any immunization, if date are not indicated score 0 Each health centre should have a book or register where each immunization history can be registered and traced back. Check the register to see that dates for subsequent doses are entered.	
4	Are registers (or pre-printed forms) used for recording individual information about women's TT immunizations?	There may be registers or health cards if cards kept in HF. Is the TT register available? Are the fields correctly filled (with dates of subsequent doses)	
5	Do the dates of planned sessions coincide with the dates of actual immunization sessions	Check the Immunization register and compare the dates with the plan	

6	Are individual immunization cards used, updated and given to the caretaker at the time of the immunization visit?	Blank cards should be available in the HF. Immunization cards are often integrated in "Road to Health" or other health cards. Child health card instead "Road to Health" Does the mother know the next appointment date (conduct Exit interview- ask 5 mothers: 4/5) Mother shows site of vaccination or mentions type of vaccine. Are the dates recorded on the child health cards/road to health card Are there blank Child health cards available in the facility?	
7	Are vaccine receipts recorded in a vaccine ledger book?	Check against available stock (count doses in the fridge). Check for Vaccine management tool Does the HF record vaccine batch number and expiry date? Conduct physical count of all antigen	
8	Do you know the expected date of receiving/collecting vaccine?	Verify against the dates of collection.	
9	Is the VM1 tool up to date for all vaccines?	Up to date = all receipts and issues recorded immediately. Check against stock (in the fridge). Compare the date of last entry and the date of the last immunization session.	
10	Is the receipt of a selected vaccine in the VM1 tool complete for the period under review?	Check or verify Is the stock available identical to the one in the register (do physical count) Check records of the ledger book for the period under review	
11	Is there a log (VM tool book/stock card) for receipt/issuing of syringes supplied (AD/non-AD disposal/reconstitution syringes)?	Can perform a stock check. Is there a log book for receipt issue of syringes? Check records and conduct physical count	

12	Are all individual recording forms available for the previous 12 months?	Individual recording form = tally sheet and register. Check records for the period under review	
13	Is the cold chain temperature monitoring chart completed daily?	Check the chart and compare the latest reported temperature with the actual temperature in the refrigerator. Is the cold chain monitoring chart available Is the temperature monitored twice a day including weekends and public holidays? Is there thermometer in the freezer, geostyle, coldbox and refrigerators?	

Reporting component (HF)			Weight (3)
14	Have all reports for the previous 12 months been signed by the Officer-in-Charge or Officer authorized to submit the HF report?	Score for example: If >80% reports are signed score "Yes".	
15	Do all the reports from the period under review have at least one endorsement or written on it as "signed date" or "compiled date" by the HF?	If >80% reports are signed score "Yes".	
16	Are the HF reports correctly filled in?	Check that all fields are correctly filled	
17	Are health staffs aware of standard operating procedures to record a severe adverse event following immunization (AEFI)?	Ask health staff what is supposed to be done if a child becomes severely ill or dies after a vaccination. Ask to see any forms that are to be used. What is AEFI? Do they have a kit? Do they have reporting form? Ask to see copies of previously filled forms Check HF summary for AEFI cases Do they have functional AEFI committee?	

Archiving component (HF)			Weight (3)
18	Can copies of all previous reports from this HF be found?	Check and review previous 12 months and current report	
19	Is there one location where the previous Immunization reports and recording forms are stored?	Availability of a place where files or forms are kept Check all files	
20	Are the reports of the HF organized in a file by date?	The main concern is that the reports are easily retrievable. Are all files filed in order?	
21	Are HF reports available for the entire period?	Check that HF reports are available for the previous 12 months	
22	Are the child registers available for all periods of the previous year?	Check that HF reports are available for the previous 12 months	
23	Can all tally sheets covering the previous year be found?	Check that all tally sheet for past 12 month available?	
24	Are registers for TT vaccinations to pregnant women available for the entire previous year?	Verify through TT registers. The register should also have information on non pregnant women for 12 months in 2009	
25	Is the latest feedback on data from LGA easily available?	Are there feedbacks from the LGA? Records of feedback in the last twelve months. Check for last feedback	

Demographic information component (HF)			Weight (3)
26	Does the HF have data on the number of infants born in their catchments area?	The number of births should be different from the previous year. Discuss if there is a difference with the target population available at LGA level. Discuss ways to collect target population information from community (e.g. birth register), SIAs data, or other sources. Discuss if the target was set up by the LGA or HF level. Does the HF have population by target group? How do they arrive at the data?	
27	Does the HF have a system which allows the collection of information about new births in the community?	This may include community health workers, traditional birth attendants, outreach clinics etc. A system means (a) organized way to collect the information in every village/community and (b) a written track available at the HF.	
28	Does the HF have a target set on the number of children that should be vaccinated during the calendar year?	Compare the previous year's coverage with the set target. Discuss how realistic the value is.	
29	Does the HF have a target by type of strategy: fixed/outreach/mobile, with a map showing the catchments area by strategy including the outreach villages?	Displayed catchments area map showing Target by Strategy	

Core outputs/analysis (HF)			Weight (3)
30	Does the HF have coverage split by type of strategy fixed/outreach/mobile?	It is important to know the proportion of numbers actually reached by each strategy. If yes, verify. they reporting data by strategy (i.e fixed and outreach)	
31	Does the HF have an up-to-date chart or table (preferably on display) showing the number of vaccinations by report period for the current year?	Monitoring coverage chart – must be UP TO DATE. Are monitoring charts up to date? All monitoring charts should be displayed Are all antigens monitored?	

32	Is there a monthly chart/graph of VPD cases (broken down by VPD)?	How do these data correspond to coverage data (i.e. more cases in areas with poor coverage). When was the last VPD outbreak? Was it investigated? Why did it occur? Do they have bar graph monthly? And dot map for cumulative?	
33	Is the drop-out rate (for DPT1/DPT3) monitored?	Preferably on display with the same monitoring chart as the coverage one. Discuss the importance and reasons for drop-outs. at plans and actions are in place to address high DO? at is the current reported Dropout Rate?	
34	Does the HF monitor vaccine wastage?	Discuss the reasons for wastage and any ways it might be reduced. Discuss whether the health worker knows how much the vaccine wastage is and how it can be calculated. Check vaccine utilization forms Is there any record on vaccine discarded due to VVM change? What system is in place to address high/negative vaccine wastage?	

Evidence of using data for action component (HF)			**Weight (3)**
35	Are areas of low access identified and evidence of actions taken to deal with it?	If there is low access (evidenced by low BCG or DTP1 coverage), how does it relate to the effectiveness of the three strategies (fixed site, outreach and mobile teams). Is there outreach and communication plan? Check the no. of children vaccinated by strategy	
36	Have reasons for any high drop-out been identified; are there plans/actions to deal with it?	Check monthly report for evidence of analysis Check monthly report to see reasons for these dropout Is there a plan to address reason for high/ negative drop-out?	

37	Have actions been taken on the last feedback from the LGA?	If yes, what actions have been taken Is there a copy of the last feedback? (ask for a copy) Check for previous recommendations Check for evidence of action taken from the recommendation	
38	Is there interaction with the community regarding immunization? Ask for information on "what" and "when"?	Is the health staff actively involved in any community committees or meetings on health, investigations of outbreaks or any rumours of AEFIs, etc.? Is there a functional village health committee? Are there minutes and records of attendance of the monthly meetings for the past 6 months available? Are there any feedbacks from the HF to the community through the village health committee?	

Data Collection Tool - LGA Level **YEAR 2010**

No	Health Facility	Target Population	DPT3												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1															
2															
	Total Health Facility summary sheet														
1															
2															
	LGA Summary Sheet *(data sent to State)*														

No	Health Facility	Target Population	MEASLES												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1															
2															
	Total Health Facility summary sheet														
1															
2															
	LGA Summary Sheet *(data sent to State)*														

APPENDIX VIII

ETHICAL APPROVAL

NNAMDI AZIKIWE UNIVERSITY TEACHING HOSPITAL

P.M.B. 5025, NNEWI, ANAMBRA STATE, NIGERIA

Prof. S. N. Nnatu
MB, BCH, FWACS, FICS, FMCOG, FRCOG London
Chairman
Board of Management

B.O. Chukwunta
B.Sc, MA, MBA, AIIA
Director of Administration/
Secretary to the Board

Prof. R. O. Ofiaeli
MBBS (IB), FMCS, FICS, FWACS,
Chief Medical Director
Chief Executive

Dr. A. O. Igwegbe
MBBS, FWACS, FICS, FISS
Chairman
Medical Advisory Committee

E-mail: [illegible]@yahoo.co.uk
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Telegram: [illegible]

Our Ref: NAUTH/CS/66/VOL.4/184

Your Ref: ____________

Date: [illegible] June, 2011

Awogu Cecilia Nkiruka
Department of Epidemiology,
Faculty of Public Health
University of Ibadan.

ETHICAL COMMITTEE APPROVAL

RE: AN ASSESSMENT OF ROUTINE IMMUNIZATION DATA MONITORING SYSTEM IN ONITSHA NORTH AND OGBARU LOCAL GOVERNMENT AREAS OF ANAMBRA STATE

I write to inform you that after due consideration of your revised research proposal, approval is hereby conveyed for you to commence the study.

The principal investigator is required to send a progress report to the Ethical Committee at the expiration of three (3) months after ethical clearance to enable the Committee carry out its oversight function.

....	....
Prof. P.U Ele	J.U Ugochukwu (Mrs)
Chairman, NAUTH Ethical Committee	Sec. NAUTH Ethical Committee

APPENDIX XI

CONSENT FORM

IRB Research Approval Number.....

This Approval will elapse on ...../...../.....

Title of Research:

An Assessment of Routine Immunisation Data Monitoring System in Onitsha North and Ogbaru Local Government Areas of Anambra State

Name and Affiliation of Researcher:

This study is being conducted by Miss Awogu Nkiruka Cecilia, Department of EMSEH, Faculty of Public Health, College of Medicine, University of Ibadan.

Purpose(s) of Research:

To determine the quality and accuracy of routine immunisation reporting system in Onitsha North and Ogbaru Local Government Areas of Anambra state.

Procedure of the research, what shall be required of each participants and approximate total number of participants that would be involved in the research:

This will be a one phase research involving the distribution of questionnaire to one participant each in all the 50 health facilities in the LGA. It will be interviewer administered so that the participants can understand the questions well. Every research participant will be expected to complete a questionnaire.

Expected duration of research and of participant(s) involvement:

This research will be expected to last for an approximately two weeks and we expect that you would not spend more than one day.

Risk(s):

It is expected that this research would pose no physical, biological or social harm to all the research participants as all the procedures involved are non invasive and no samples (blood, urine, saliva) are collected.

Cost of Participating, If any, of joining the research:

Your participating in this research will cost you nothing but your small amount of time and effort.

Benefit(s):

Participating in this research will give you the opportunity to ask questions about immunisation and also determine if you need more training on the data reporting system.

Confidentiality:

All information collected in the study would be given code numbers and no names will be collected. This will ensure that no link would be established to you. As part of my responsibility to conduct this research properly, officials from the NAUTH Ethics Review Committee may have access to these records.

Voluntariness:

Your participation in this research is entirely voluntary.

Consequences of participant's decision to withdraw from research:

You can also choose to withdraw from the research at anytime. Please note that some information that has be obtained about you before you choose to withdraw may be modified or used in reports and publication. These cannot be removed anymore. However the researcher promise to make good faith efforts to comply with your wishes as much as is practicable.

Any apparent or potential conflict of Interest:

This research work is strictly for academic purpose and is self funded.

How the research result will be used:

The results gotten from this research will be submitted to my department for the award of MPH Field Epidemiology degree and also published in an academic journal.

Statement of Person Obtaining Informed Consent:

I have fully explained this research work to _____ and have given sufficient information, including about risk and benefits, to make an informed decision.

DATE_____SIGNATURE_____

NAME_____

Statement of person giving Consent:

I have read the description of the research. I understand that that my participation in this research is voluntary. I know enough about the purpose, methods, risk and benefits of the research study to judge that I want to participate in it. I understand that I may freely stop being a part of the study at any time. I have received a copy of the consent form.

DATE_____

SIGNATURE_____

NAME_____

Detailed contact information including contact address, telephone, fax, e-mail and any other contact information of researcher(s), institutional HREC and Head of Institution:

This research has been approved by the Health Research Ethics Committee of the Nnamdi Azikiwe University Teaching Hospital Nnewi. If you have any question about your participation in this research you can contact the Principal Investigator Awogu C. N at the Department of EMSEH, College of Medicine, University of Ibadan. Her phone number and email address are 08063849699 and enkayspecial@yahoo.com respectively. You can also contact the Head of Department of EMSEH, College of Medicine, University of Ibadan or the Chairman, NAUTH Ethics Committee, NAUTH Nnewi .

Thanks.