FACTORS ASSOCIATED WITH THE USE OF MULTIPLE ROUTINE DATA COLLECTION SYSTEMS (RDS) BY NATIONAL HEALTH PROGRAMMES IN TANZANIA

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By

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A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree of Masters of Public Health of Muhimbili University of Health and Allied Sciences

Muhimbili University of Health and Allied Sciences
October, 2016

CERTIFICATION

The undersigned certify that he has read and hereby recommend for acceptance by Muhimbili University of Heath and Allied Sciences a thesis/dissertation entitled ***"Factors associated with the use of multiple routine data collection systems (RDS) by national health Programmes in Tanzania"*** in (partial) fulfillment of the requirements for the degree of Master of Public Health of Muhimbili University of Health and Allied Sciences.

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Prof. Daudi O. Simba (PhD)

(Supervisor)

_____

Date

DECLARATION

AND

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I, **Desderi Joseph Wengaa** declare that this **dissertation** is my own original work and that it has never been presented and will not be presented to any other University for a similar or any other degree award.

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Lastly, however, I assert to be entirely responsible for any errors and/or deficiencies that may arise from this work.

DEDICATION

This work is dedicated to my late mother, Agnes Andrea -Wengaa whose tireless guidance, love to education, prayers and sacrifice enabled me to pursue studies in Health. I also dedicate this work to RTI International specifically my former HIS Project Director Niamh Darcy who always understood the importance of Public Health to my work and hence financed my studies.

ABSTRACT

Background: Fragmentation of data and duplication of reporting by vertical programmesas a result of multiple data reporting systemsare among the major challenges facing the central Health Management Information System (HMIS).Data reporting systems developed by vertical programmes often overlap with national HMIS thus adding a burden to health providers. However, there lacks evidence on factors influencing usage of multiple routine data systems in Tanzania.

Objective: The aim of this study was to explore factors influencing the use of multiple routine data collection systems (RDS) by national health programmes in Tanzania

Methodology: A qualitative study was conducted at central ministry of health ICT and HMIS units and vertical programmes between February and May, 2016. Fourteen respondents from the vertical programs, donors' community, ministry of health ICT and HMIS sections were interviewed. Main issues which were asked included the reasons for existence of multiple routine data collections systems, challenges and strategies of integrating multiple routine data collection system. Content analysis technique was used to group responses in themes.

Results: All respondents reported to have multiple routine data collection systems in their respective departments and programmes. Five major reasons for using multiple RDS were; different programmes requiring different types of data, influence by development partners , inability of the national HMIS to meet programmers' data requirements, lack of transparency in accessing the national HMIS data by the vertical programmes and development partners and lack of coordination between ministry of health , vertical programmes and partners.

A number of strategies to integrate existing multiple routine data collection systems such as: development of health data policy, improvement of coordination and governance of data systems and data use initiatives, development of national data warehouse, development of interoperability layer (data mediator) and data standards and improvement of software project management.

Challenges facing the ministry of health Tanzania in integrating multiple information systems included differences in expectations among vertical programmes; and resource constraints

Conclusion: This study has shown that differences in the underlying motives for data requirements among key actors are a major factor behind the existence of multiple information systems in the country. Despite positive intentions to integrate information systems, donor dependency in financing vertical programmes activities act as a major challenge to the Ministry of health's efforts in spearheading strategies for integration. Therefore, adequate resources are needed for the Ministry of health to maintain its own data warehouse and support the development of an inter-operability layer that will link it with data warehouses stationed outside the Ministry.

Key words: Routine data collection, Health information systems, vertical programs and data quality.

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ABBREVIATION AND ACRONYMS

DH	Demographic health Survey
DHIS	District Health Information System
DMO	District Medical Officer
DSS	Demographic Surveillance System
DQA	Data Quality Assurance
FOSS	Free and Open Source Software
HBS	Household Based Survey
HIS	Health Information System
HMIS	Health Management Information System
HIV/AIDS	Human Immune Virus/Acquired Immune Deficiency Syndrome
HRMIS	Human resource management Information System
ICT	Information and Communication Technology
IVD	Immunization and Vaccine Development
M&E	Monitoring and Evaluation
MDG	Millennium Development Goals
MOHSW	Ministry of health and Social Welfare
MUHAS	Muhimbili University of Health and Allied Sciences
NACP	National Aids Control Programme
NMCP	National Malaria Control programme
RDS	Routine Data Systems

SPHSS	School of Public Health and Social Sciences
SPSS	Statistical Package for Social Sciences
VR	Vital registration
WHO	World Health Organization

DEFINITION OF TERMS

Routine data collection: Reviewing the routine data which is already collected is a good place to start. By routine data collection it means information one request from people because it's relevant to delivering a given project. For example, in order to decide whether an activity is suitable for someone one may need to ask their age.
Routine data are collected continuously at various times periods (daily, patient by patient, monthly etc.) Come from the Health Information System (HIS) and its subsystems that are collected as part of an ongoing system. (Public Health Foundation of India, MEASURE Evaluation)

National Health Programmes: Components of a national health care system which administer specific services, such as national health insurance. For this case, the study will focus on the Tanzania vertical programmes of TB & Leprosy, HIV & Aids, and malaria, RCHs, EPI and the HRH.

Data quality: Data quality is a perception or an assessment of data's fitness to serve its purpose in a given context. (Teach Target publication, 2007). Aspects of data quality include: Accuracy, completeness, update status, relevance, and consistency across data source, reliability, appropriate presentation and accessibility. Within an organization, acceptable data quality is crucial to operational and transactional processes and to the reliability of business analytics, business intelligence, reporting. Data quality is affected by the way data is entered, stored and managed. Data quality assurance (DQA) is the process of verifying the reliability and effectiveness of data.

Information: Information is an additional "knowledge" users employ to enhance planning, programming, monitoring, evaluation, review, research for overall management and decision making of educational development. However, information has value only when there is a use for it. The value of information depends on demand; the higher the demand for information, the more value it has (Wako, 2003).

System: A System is working together to form a relationship and vision of the whole. Each component contributes to the proper functioning of the system. We may have a good data collection procedure, good data processing, and analysis in place, but if the result is never put to use, the system fails to work properly (Wako, 2003). It is only when the whole system properly functions together that we attain our goals.

Health information system: A system providing specific information support to decision-making process at each level of an organization

Health Management Information System (HMIS): is a process whereby health data are recorded, stored and processed for policy-making, planning, implementation and evaluation of health programs. The primary aim of Health Management Information System (HMIS) is to support informed strategic decision-making by providing quality data that help managers and health workers plan and manage the health service system (WHO, 2004).

CHAPTER ONE

1.0 INTRODUCTION

1.1. Background Information

The extent to which health care for Tanzania is timely, efficient, and appropriate for a given individual is determined by the characteristics of the delivery system. The encounter of multiple routine data collection systems by various agencies and agendas is that, they contribute to overlaps due to lack of common definitions and disaggregates and cannot combine routine data and research data. Health workers are burdened with work load in collecting data from such multiple routine data collection systems. Smooth integration of information system lays a foundation for successful health services delivery systems and it will make it easier to measure the cost benefits of Health Information Systems (HIS).

The World Health Organization (WHO) defines the health information system (HIS) as the system that integrates data collection, processing, reporting and use of information necessary for improving health services effectiveness and efficiency through better management at all levels of health services(WHO, 2004). The World Health Organization has identified health information systems as one of the six key attributes, or building blocks, of a health system. High quality health information is critical for addressing global health challenges and building strong public health systems (WHO, 2010). The Health Management Information System (HMIS) is crucial for evidence-based policy-making, informed decision-making during planning, implementation and evaluation of health programs; and for appropriate use of resources at all levels of the health system. This study will explore factors associated with the use of multiple sources of routine data collection systems in National Health Programs with particular focus on Tuberculosis (TB) and Leprosy, Immunization and Vaccine Development (IVD),

Reproductive and Child Health (RCH), National Malaria Control Programme (NMCP) and National HIV/AIDS Control Programme (NACP).

A Health Management Information System (HMIS) is a process whereby health data are recorded, stored and processed using software for policy-making, planning, implementation and evaluation of health programs. The system is crucial for evidence-based policy and informed decision-making at all levels from national down to the institutional levels. Evidence-based decision making is critically important for the appropriate use of scarce resources particularly in resource limited countries like Tanzania. The HMIS in most developing countries are inefficient and are greatly affected by unreliability of data resulting from underreporting. Reports from sub Saharan Africa indicate that vital health decisions, in this context, are made based on crude estimates of disease and treatment burdens (Nyamtema, 2010).

Studnicki (2006) stress that, public health organizations require well-designed information systems in order to make optimal use of the mounting supply of health-related data. Organizations rely on these systems to inform managerial decision making and improve operations in areas such as epidemiologic surveillance, health outcomes assessment, program and clinic administration, program evaluation and performance measurement, public health planning and policy analysis. Information systems require application objectives, units of analysis, data sources, data linkage methods, technology selection and integration strategies that could minimize the existing multiple routine data collection systems. A growing collection of models and resources now exist for developing effective information systems that are harmonized for public health organizations. The rise in importance of health information systems originated from advancements in information technology. Technological advancement creates a room for data available from multiple sources to be integrated for public and private sectors' decision making.

Routine data collection systems support a wide variety of public health system objectives, including epidemiological disease and risk factor surveillance, medical and public health outcomes assessment, facility and clinic administration such as billing, inventory, clinical records, utilization review, productivity analysis, demand estimation, program planning and evaluation, quality assurance and performance measurement, policy analysis, health education and health information dissemination. Major practical goals for the future development of Health Information Systems for public health include to integrate the multiple data sources available for public health outcomes, network information systems to make interaction and information flow between different entities feasible and to use health care delivery information systems to produce public health information regarding preventive services, preventable diseases and quality of care.

The public health sector has historically been attempting to design computer software for information storage. However, within years, there has been increase in number of fragmented information systems that are often incompatible leading to data duplication and inconsistencies. Information systems integration can offer opportunities for improved service delivery and enhanced population based decision making and management. Busagala and Kawono(2013) argue that linkage of data is often an effective method to obtain information across programs. Multiplicity of routine data collection systems across the health sector makes it difficult to attain quality data but as well lead to huge workload to health workers.

Smith et al., (2008) described the experience of implementing integrated health information systems in Tanzania. They viewed integration concept in developing countries health interventions to include not only integration of data and management procedure, but also integration of social-political and cultural mindsets of community members, local health worker, and government and donor communities. A number of existing multiple routine data collection systems are facilitated by donors. Need to

integrate these systems into the main health information system in order to provide a useful input for health care planning in Tanzania and in their developing countries.

Information systems have great potential to reduce healthcare costs and improve outcomes. The system of data collection and vertical data flow is rather complex (Mukama, 2003) and Wilson suggests that the creative use of information and communication technology (ICT) in health information systems is one of the most promising means of improving the quality, timeliness, clarity, presentation and use of relevant information for primary healthcare (Tanzania Global Health Initiative Strategy, 2010-2015).

1.2. Problem Statement

Good quality and timely data from Health Management Information Systems (HMIS) assist with management and planning of health programmes. Since 1990's, the MOHSW in Tanzania has undergone different reforms to strengthen the HMIS performance. For example from 2007 -2010, the MOHSW revised the old HMIS data collection tools and adapted the data warehouse software (called DHIS2) with the aim of increasing data generation and use. During the development of the data warehouse (DHIS 2), the MOHSW and its stakeholders tried to harmonizing indicators and data elements between the data collected by HMIS and vertical programs where data from vertical programmes fromRCH, HIV/AIDS, TB/L and malaria were integrated into the DHIS 2 as a way to combat multiple data reporting systems.

Despite the implementation of the new data warehouse, the vertical program (RCH, HIV/AIDS, IVD, TB/L, malaria etc.) have developed their own reporting systems that serve the vertical program within all levels of health service delivery that are running parallel to the national HMIS. For example the IVD programme has developed its own data reporting system called Vaccine Information Management System (VIMS) which

reports information on immunization services from health facilities. However most of the information collected by VIMS is also collected through DHIS 2.

The data reporting systems developed by vertical programmes often duplicate or overlap with the national main HMIS data which leads to difficulty in knowing which data to use and additional burden for health providers as they record multiple sets of HMIS data (MESI, 2010-2015). Why are there multiple reporting systems?

Identifying these factors that cause multiple reporting systems in the health sectors could improve the development and targeting of future interventions to improve HIS data in Tanzania as a whole (Kimaro, H. C. and Nhampossa,2005). This study will investigate those factors and strategies to integrated existing multiple routine systems with a particular focus on the verticle programmes of TB & Leprosy,HIV & Aids,malaria, RCHs,IVD,HRH and others in Tanzania.

1.3. Conceptual Framework

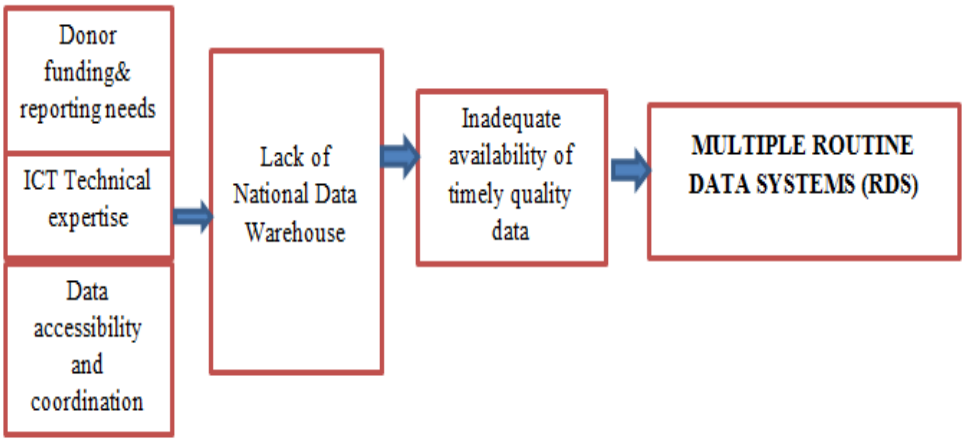


Figure 1: Conceptual framework

Multiple routine datasystems are contributed by variety of factors. Donors have contributed largerly to this(Wood-Harper and Bell, 1990) butfurther, there was no common reporting forms agreed upon between TB,HIV, EPI,Malaria and HMIS. The Vertical programmes reporting system structure is a challenge as they are not aligned to those of the main HMIS. Obtaining reliable data is a problem since the data sources and reporting systems are different, in addition some vertical programs report late since the vertical programs bypassed the districts and brought data to MOHSW headquarters. These differing data disaggregation requirements between the vertical programmes and HMIS made it hard to directly export data between the vertical programmes reporting system and the HMIS. Multiple systems are expensive, time consuming and exhausting to health workers as the parallel reporting systems of vertical programs and development partners as own source for health information through the national data warehouse. Hence, seeking how to harmozing parallel systems into routine HMIS as asole data source for health data in the country is necessary to improve data quality and reduce burden to health workers.

1.4. Rationale

The study is significant in health sectors in devoloping countries to rectify the weakness and challenges brought by multiple routine data systems.Further, it will give direction and guidelines for policy makers and health stakeholders for improving monitoring and evaluation data on health services through information and technology by providing potential recommendations on possible integration of the parrallel systems into main routine HMIS as asole data source for health data in the country. Also the study will be relevant for knowledge generation and references in materials for other future studies and learning to other countries to improve their systems.

1.5.Research questions

i. What are the reasons for the existance of of multiple routine data systems (RDS) by verticle programmes and other donor programmes in Tanzania?

ii. What strategies have been implemented by the Government and development partners to integrate existing routine data systems (RDS) into the main routine HMIS?

iii. How effective is the implementation of strategies to harmonize the multiple routine data systems (RDS)?

1.6.Study Objectives

1.6.1. Broad Objectives

To explore factors influencing the use of multiple routine data collection systems (RDS) on data quality in national health programmes in Tanzania.

1.6.2. Specific Objectives

i. To identify reasons for using multiple routine data collection systems by national programmes in Tanzania?

ii. To examine strategies set by the Government and development partners to integrate existing multiple routine data collection systems in Tanzania?

iii. To explore challenges in harmonizing data elements and indicators collected by national programmes with the national routine data collection system (HMIS/MTUHA).

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

Health Information Systems are those systems that captures, stores, manages or transmits information related to health of individuals or the activities of organizations that work within the health sector.Good quality and timely data from Health Management Information Systems (HMIS) assist with management and planning of health programmes.

Fragmentation of data, duplication of reporting by the vertical programs such as malaria, TB/leprosy, RCHs, HR, HIV and AIDS and EPI, unreliable central data source, and low levels of data use are among the main challenges faced by the central HMIS as the result of multiple reporting systems. This definition incorporates district level routine information systems, disease surveillance systems, and also includes laboratory information systems, hospital patient administration systems (PAS) and Human Resource Management Information Systems (HRMIS). Overall, a well-functioning HIS is an integrated effort to collect, process, report and use health information and knowledge to influence policy and decision-making, programme action, individual and public health outcomes, and research (PHIN,2011).

Health Information System (HIS) has been defined as the set of interrelated components and procedures with objective of generating health information and intelligence to monitor the health status and services of a nation and to improve public health leadership and management at all levels(WHO, 2010). According to World Health Organization (WHO), e-Health is defined as the cost-effective and secure use of ICT in support of health and health-related fields, including healthcare services; health surveillance; health literature; and health education, knowledge, and research.

The definition introduces a range of services such as electronic health records to ensure continuity of patient care across time, mobile health services (m-Health), tele-health,

health research, consumer health informatics to support individuals in health decision making, and e-learning by health workers. In practical terms, e-Health is a means of ensuring that correct health information is provided in a timely manner and with high quality, where it is needed and to whom it is needed, in a secure, electronic form for the purpose of improving the quality and efficiency of healthcare delivery and prevention programs.

According to MoHSW, (2012) in order for e-Health to successfully respond to the needs of the health sector, there are several specific ICT challenges that must be overcome. An assessment to identify these challenges was carried out through key stakeholder consultation. The assessment included an investigation of the current ICT services and infrastructure in the country, how data in the health system are collected and managed, referral ambiguities that result in loss of patients' follow-up, best practices for monitoring and evaluation (M&E), and the information pathway for a network of service providers who could be better supported through ICT.

There is a multiplicity of routine data collection systems within the existing main health information system that serves as a data source and complementary.Vertical program (such as reproductive and child health, HIV/AIDS, TB/L, malaria) have developed reporting systems that serve the vertical program within all levels of health service delivery that can be used for planning of vertical health programmes and meet donor reporting needs.(Source: Monitoring and Evaluation Strengthening Initiative (MESI, 2010-2015).

In Tanzania Health Sector, variety of systems exists to collect data such as the data on Human Resource for Health Information System (HRHIS) which collect HR data in public and private sectors. Others include the Infectious Diseases Surveillance and Reporting (IDSR), which collect data weekly and from the Health Facilities such as notification of disease outbreaks through the telephone. Routine data collection systems also include administrative records, services records and health and disease records.

Likewise data reported by the scorecard for RMNCH which reports health trends with a focus on RCH need to be captured into DHIS2 to generate the quarterly RMNCH score card. Department for Social Welfare (DSW), nutrition and others also report data on their own systems. Others on death registry; tracer medicines; District Health Profile; Reproductive, Maternal, Newborn and Child Health (RMNCH) scorecard, and; the payment scorecard for the Payment for Performance (P4P) initiative which are reported with own systems. Other programs like malaria, TB and Leprosy, NACP with the CTC - 3 Data Base for individual personal records for people on ART, EMR systems, Client registry systems which track patients over time and immunization –IVD.

Health Research for Action (HERA) explains that, in Tanzania, like elsewhere, health systems gradually develop a more pluralistic outlook in which the boundaries between public and private sectors have become blurred. This trend reflects a growing diversity in health care needs and effectuated demands, besides the reality of a liberalised system that allows a variety of providers to offer health services. If left unregulated this situation may compromise government responsibility for an equitable access to health services of an adequate quality. On the other hand there is a growing (international) perception that the complementary strengths of different health services providers may be the only viable option to accommodate the huge need for health care. It is this notion that led to the inclusion of PPP as a viable instrument in the 2005 National Strategy for Growth and Reduction of Poverty (NSGRP). (Health Research for Action Technical Review, March 2005). Public Private Partnership for equitable provision of quality health services provides a potential solution to this.

The main HMIS depends on the ability and competence of the data compilers and supervisors to detect errors and to rely on their personal initiatives to detect and rectify them. The reality, however, is that supervision at district and facility levels are inadequate and therefore it is unlikely that serious errors will be noticed as data flow up to the national level (Ministry of Health, 2002).The inadequate availability of data from

the comparatively larger private sector, as found in this study, would undermine the quality of comprehensive plans and the overall management of health services in the municipality. Other challenges of health information system are inadequate access to ICT, data quality and political will in Tanzania (Simba, 2004).

Due to the existing challenges and success attained by various stakeholders and partners (such as reproductive and child health, HIV/AIDS, TB/L, Malaria) on access and use of data sources on health information, efforts had been made to address the challenges of multiple routine data systems.In Tanzania the technology is still behind despite of the efforts that had been made by the government, partners, and private institutions in continuing to invest in various ICT initiatives, without some form of a national plan and coordination which contributes to multiplicity of routine data collection systems and hence poor data quality leading to poor decisions (Kimaro and Nhampossa, 2005). The eHealth strategy calls for the integration and interoperability of HIS to support more efficient access to needed data and information for policy development and delivery of health care, collecting data once and using many times *(*Tanzania National eHealth Strategy July 2013 – June 2018*).* The health sector needs a comprehensive, complete and fully functional main system to mitigate the challenges existing (Braa *et al*., 2004).Health sector and its stakeholders use health information that has been obtained through surveys in the country.

Efforts to strengthen the HMIS in developing countries go back to only a decade ago (WHO, 1996). As a result of these efforts enormous amount of data has been generated in many of these countries to the extent that in some of these countries data has become a source of problem. This is because often managers are overwhelmed with lots of data that they cannot analyze effectively and use it for decision-making. The collection, compilation and analyses of data become an end rather than the means of improving health care services (Opt, 1987). In addition, data produced continued to be of doubtful

quality and untimely, thus ending up being not adequately used for decision-making (Finau, 1994).Multiple routine data systems that exist in the health sector currently makes it difficult for adopting a culture of data use at health facility, district, and national. The situation applies to different health departments and programs (URT, 2011).

2.2 Significance of ICT in HIS

The application of ICT in health information system is of practical importance as it provides new system in health sectors. If applied effectively in developing countries it comes with better solutions of existing challenges facing health sector in the country.

WHO, Africa regional office (2010) identified the roles and significances of ICT in managing the multiple routine data collection systems as stated below:

Awareness of the significant role that Information and Communication Technologies (ICT) can play in strengthening national health systems in order to accelerate progress towards the achievement of the MDGs and the improvement of health outcomes in the Region; Noting that e-Health can improve the availability, quality and use of information and evidence for policy and decision making through, among others, strengthened health information systems and public health surveillance systems.

Further noting that the use of ICT can improve efficiency in health services through solutions such as the use of Personal Digital Assistants at the point of care, electronic health records, and other applications which provide patient billing, patient scheduling and tracking, and electronic transmission of prescriptions, and ultimately improve the quality of care.Maintaining of all systems within the main HMIS – DHIS2 data warehouse would discourage multiple reporting by different disease programmes.

Currently, in Tanzania, it is difficult to stregthern other strategic information initiatives as the result of multiple routine systems. Lack of national data warehouse, strategic information is currently readily not availed and used for various purposes like: politicians who receive the Maternal and Child Health (MNCH) scorecard and push for actions to reduce and address maternal and child health issues; the HRH data to track HRH and

eliminate any ghost workers; prompt alerts and speedy reaction to disease outbreaks, and; allocation of facilities and resources.(Tanzania national eHealth Strategy July,2013-June2018).

Recognizing that ICT applications through telemedicine can contribute to improving equity in health by connecting underserved populations in rural areas with urban health facilities with highly qualified personnel and medical technologies, awareness that ICT solutions can contribute to training and professional development of health workers through continuing medical education using targeted eLearning programmes and help address the Human Resources for Health crisis. Recognizing that the spread of ICT including the Internet and mobile phones provides an opportunity to reach the public at home, at school and at the workplace with health educational and promotional information

2.3 Challenges of HIS

The HIS is subjected to many challenges that need attention and appropriate measures. The advancement in science and technology is growing and the challenges associated with that growth are inevitable in other sectors including health sector. ICT is the field that is constantly dynamic and its cross cutting issue. The following are the challenges facing health information system in developing countries including Tanzania;

They function in the public sector and often only capture data from interactions with the public health system or with specific surveillance and monitoring programs operated by donors in conjunction with the public health system (Vital Wave Consulting HIS, 2009). However, this is beginning to change, as evidenced by HIS coverage of private clinics in Zambia and private providers' integration into the Sao Paulo HIS scheduling system. In India, the government is able to collect health statistics from private health care providers with varying degrees of quality.

There is significant fragmentation and duplication in data collection**,** because governments, donors and implementing partners have little incentive to collaborate with others on data collection, to share data, or to leverage existing systems and as the result, multiplicity of routine data collection systems. This is evidenced by number of HIS data sources in developing countries like Tanzania. Variety of systems exists to collect data such as the data on Human Resource for Health Information System (HRHIS) which collect HR data in public and private sectors. Others include the Infectious Diseases Surveillance and Reporting (IDSR), which collect data weekly and from the Health Facilities such as notification of disease outbreaks through the telephone. Likewise data reported by the scorecard for RMNCH which reports health trends with a focus on RCH need to be captured into DHIS2 to generate the quarterly RMNCH score card.

Department for Social Welfare (DSW), nutrition and others also report data on their own systems. Others on death registry; tracer medicines; District Health Profile; Reproductive, Maternal, Newborn and Child Health (RMNCH) scorecard, and; the payment scorecard for the Payment for Performance (P4P) initiative which are reported with own systems. Other programs like malaria, TB and Leprosy, NACP with the CTC - 3 Data Base for individual personal records for people on ART, EMR systems, Client registry systems which track patients over time and immunization –IVD. All these exist and vary in period of operation.

In many cases, health workers must complete separate forms containing the same information for delivery to different agencies who do not share data among themselves. National ministries of health are seldom in a position to resist the demands of donors who fund large health care programs, and moreover the incremental cost of collecting additional data is largely invisible to the donor, so there is little disincentive to adding additional indicators that accumulate over time into very large workloads for local health workers.

Busagala (2013) in his research on underlying challenges of e-health suggested the following cases. Inadequate ICT training, inadequate sources of ICT infrastructure fear of change, lack of support and high costs of installations. According to Vital Wave Consulting HIS (2009), the health information system is not used by those providing or managing health services at the local level, as these individuals are often presumed to not need health information of this nature. The data collected is determined by users far removed from the actual delivery of health services, and seldom has relevance to improving those services. Donors require indicators for purposes of program evaluation and not necessarily the improvement of service delivery. Data flows in one direction, from those at the bottom doing the collecting to those further up the chain of command. Health care providers do not have access to information beyond their health facility, and as such are unable to compare their performance to that of similar health facilities. The final users or consumers of HIS are the policy makers and other stakeholders as well as agencies. In Tanzania, the same applies where specific vertical programmes are the final consumers of health information system obtained in the multiple routine data collection systems. The effects of the mushrooming multiplicity of routine data collection systems are inevitable.

2.4 Decentralization of HMIS in Tanzania towards the district level

The decentralization of district based health system was part of the strategy for achieving the WHO's goal of "health for all" which was officially launched in 1978 in the Alma-Ata conference (WHO, 1978). Decentralization of health system focuses on the transfer of decision making, planning (political), budgeting (financial), management, and resource allocation (administrative) of health care from the national to the district and sub district levels (Mills, 1990). The aim is to reduce costs associated with a centralized health care system and to create a more flexible, efficient, and responsive system (in terms of quality and quantity) to deal with public health problems.

Following Alma Ata, many developing countries like Tanzania embarked on such decentralization efforts with limited results; district managers continue to be plagued with lack of reliable and systematic information to make decisions (Lippeveld, 2001, Mwangu and Simba, 2005). Decentralization efforts are shaped by various impediments including the lack of relevant resources (financial and human), unclear definitions of roles and power distribution, inadequate autonomy, and frequent interference by national level ministry officials and donors in local affairs. Decentralization of HIS is associated with other processes, such as participation of stakeholders in the development and use of the systems and the integration of various reporting systems that are operating at the local level.

2.5 Scaling of Health Information Systems: Challenges and Approaches

In the context of information systems (IS), *scale* refer to the scope of an IS (for example, how many users are served), whereas *scaling* could imply the expansion of this system in scope and size (for example, making the system accessible to more users or increasing its functionalities). The issues of scale and scaling have particular implications in the context of health care and health information systems (HIS) in developing countries. For example, various reform efforts related to the introduction of computer based HIS have died premature deaths as "pilot projects" (Heeks, Mundy, and Salazar, 1999) because they could not be expanded to a level where they were useful for health managers (Braa, Monteiro, and Sahay, 2004). For example, to make effective decisions on resource allocation for a district, the manager needs health data from all the clinics in the district and not just from an isolated and limited set of clinics from a preselected pilot area (Braa et al., 2004). However, for these systems to grow to this required level of scale, they need to be accompanied by the scaling of human resources capacity, at two levels at least. The first is at the level of users. The growth in scale of a HIS is often is associated with an escalation of its technical complexity, for example, through the need for larger databases, greater bandwidth, and the increased need to interface with existing legacy systems (Kimaro and Nhampossa, 2005). This increased complexity requires that users

have a higher level of technical competence in order to be able to use these systems effectively. Secondly, human resource capacity needs to be scaled at the level of the implementation team responsible for providing technical and organizational support to the users and the user organization.

2.6 Empirical reviews

To gain a broad understanding of the research that has been done on health information system, we draw on four recent reviews of the literature by Simba (2005), Busagala et al., (2013), EJISDC (2008) and Vital Wave consulting (2009).

According to Simba (2005), the inadequate availability of data from the comparatively larger private sector, as found in this study, would undermine the quality of comprehensive plans and the overall management of health services in the municipality. The wide margin of error limits prediction of the future, rendering the planning exercise futile. The resulting uncertainty would make health managers suspicious of data collected through the routine system, thus reinforcing reliance on the use of intuition that will further undermine evidence-based decision making and planning.

In general, this case study (Kinondoni) emphasized the importance of having simple and operationally feasible routine health information systems for purposes of generating basic data that are easy to collect, reliable and hence more useful for decision making purposes. The more complicated and multi-staged the system is, the greater the chance of introducing errors, either during the transcription or the reporting stages. The greater the margin of error, the less reliable the data and hence the reduced value of the data in management and decision-making.

Data validation and strict supervision of data collectors are crucial in minimizing errors in a routine data collection system.

According to Vital Wave consulting (2009), the existing HIS applications and challenges had been studied in few countries including Rwanda and Uganda which is among East African countries. As one of the first countries affected by malaria pandemic, Uganda

also became one of the first to implement a serious, effective strategy at slowing the rate of infection and coping with the disease burden the disease poses. The struggle against malaria has colored and shaped many of Uganda's health reform efforts in the past two decades. The area where the HIS were used has been identified. Government establishment of the Health Review Commission which resulted in the development of three-year, five-year and ten year plans as well as the Health Sector Strategic Plan (HSSP) I and II

HIS Initiatives**:** Investments made for development of routine facility based HIS. Surveys for population-based data sources; Uganda HIN uses wireless PDAs for data transmission HIS Type**:** Paper–based at the local levels, computer-based at the district and national level. Tanzania as one of the countries affected with major health problem which are HIV/AIDS, TB and malaria and others mentioned above. The study further stipulated that for better results of HIS the country should invest in ICT infrastructure and human capacity building for ICT from lower level of administrative to national level. Busagala et al., (2013) in his research explored the following arguments and recommendations;

a) For fast adoption of e-health it is recommended to develop or adopt Information Management Systems that support mobile technologies to be used in remote areas and for emergency services. This is due to the fact that both patient and healthcare workers are mostly (over 90%) using mobile phones.

b) Establishment of ICT training sessions to healthcare workers in all health facilities in Tanzania on how to use ICT tools. This will increase effectiveness and efficiency of adoption and use of ICT given the mushrooming of the multiple routine data collection systems that are existing and operational.

c) Take an advantage of the use of radio, TV and mobile as a means for communication. Most patients in rural areas rely on radio for health information.

Over 90% of the patients and health-care service key informants use mobile phones.

d) Installation of electric power generators including use of renewable energy should be a priority. This will provide enabling environment of e-health adoption to increase efficiency and effectiveness of health services delivery.

e) Policy makers should make policies that will change the situation in order to create an enabling environment for adoption of e-health including infrastructure, and training of more human resources.

f) On the health information systems, Free and Open Source Software (FOSS) could be one of the recommended solutions. This can mitigate the problem of budget limitations. This is due to the fact that FOSS solutions reduce the total cost of ownership while providing scalable and robust capabilities. Tanzania health sector has adopted the online District Health Information System (DHIS2) as an open source system that could house other systems though integration approach. This is believed to be one of the mechanisms to discourage the multiplicity of routine data collection systems that are existing

EJISDC (2008), on the research paper argued that without a concerted effort to match managerial objectives with other key administrative, socio-political and epidemiological priorities integrated health information systems will lead to little tangible benefits in terms of improved health care in Tanzania. These arguments suggest the way forward and measures that should be implemented to improve and increase efficiency and effectiveness in health services delivery.

According to the literature reviews of the past researches the knowledge gap is clear on the multiplicity of routine data collection systems and the need to have the main health information system in developing countries like Tanzania. This study was interested in determining the factors influencing usage of multiple routine data systems. This study

investigated those factors with a particular focus on the verticle programmes of TB & Leprosy,HIV & Aids,malaria, RCHs,EPI,HRH and others in Tanzania.Hence, seeking how to harmozing parallel systems into routine HMIS as asole data source for health data in the country is necessary to improve data quality and reduce burden to health workers.

2.7 Implications of the vertical-horizontal debates on information systems integration

Given the capacity constraints of existing health services, especially in low income and high aid-dependent countries, there is a need to concentrate resources on a limited set of programmes or activities (e.g. 'Packages' of health services) oriented to priority interventions. There is thus the need to rely on vertically delivered programmes. However, the longer-term perspective emphasizes the importance of strengthening the health systems to a level such that most interventions can be delivered in an integrated way. This integration requires education and training, strengthening of management and information systems, and the development of a sense of ownership in communities and health workers (Oliveira-Cruz, Kurowski and Mills, 2003).

A local health service can therefore continue to have vertical or special programmes where and when required but, at the same time, this emphasizes the need for an integrated service with the capacity to sustain the activities of the vertical programmes in the long term. In theory, the two approaches need not to be mutually exclusive, but complementary (WHO, 1996). However, in practical terms the implementation of these modes in a synergistic way has shown to be complex, conflicting and challenging.

It happens that vertical programmes oppose the integrated approach to health care delivery, contributing to a state of fragmentation, redundancy and multiplicity of (information) systems. We argue that one key aspect of conciliating these approaches includes the subsequent need to strengthen and reframe the existing diverse health information systems. For these to happen effectively, some lessons from attempts in integrating information systems in large organizations can be useful.

2.8 Challenges of information systems integration in organizations

Integrating heterogeneous data sources is a fundamental problem in information and database management systems, and has been a topic of research over the last two decades (Mykkanen and Korpela, 2003).

Organizations, both for-profit and not-for-profit, typically experience multiple challenges as they attempt to progress from stand-alone systems to an 'organization-wide' integration approach. These challenges include changing organization environments, processes, data and applications, data flow, technology as well as support mechanisms. Research has established that information systems integration is not simply a technical – rational process of "solving problems", but involves important economic and political processes in articulating interests, building alliances and resolving conflicts over shaping outcomes (Webster, 1995).

Several approaches have been used for integration all around the world, including Electronic Data Interchange (EDI), Enterprise Application Integration (EAI), Business Process Reengineering (BPR), Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), technologies for data warehousing and e-commerce. All these approaches seek to rationalize the organization and the information systems, with the espoused aims of enhancing quality and speed of services, avoiding fragmented and redundant work processes. Integration of these diverse and fragmented information systems, usually seen as a core requirement for better effectiveness of large corporations, is often portrayed as a relatively solvable minor technical issue. This technical focus has led to minimal gains been achieved in practice.

Currently, there is a widespread recognition within information systems communities that such change process is challenging and involves both technical and organizational issues (Davenport, 1998; Mabert, Soni and Venkataramanan, 2003). The relatively simplistic approach to develop technical solutions was also reflected in early research in

this area which tried to identify success factors. Such approaches have been criticized by researchers that humans do not always act in rational ways (Feldman and March, 1981) and that political processes in the organizations are important (Webster, 1995).

Challenges related to information systems integration are illustrated through the following four examples.

- The first example is from Webster (1995) concerning the dichotomy in the use of EDI in the supply chain. Powerful users, both politically and economically, such as the major UK motor manufacturer, unilaterally imposed their own in-house computer systems or information handling practices upon their trading partners. They did this by extending their own hardware systems into their suppliers' premises, dictating product and inventory coding and data handling procedures according to their own established in-house information systems and standards. As a result they achieved information sharing through relationships of domination, coercion and subordination rather that partnership and collaboration.

- The second example is of Rolland and Monteiro (2002)'s description of an extensive case study of integration project in a global ship classification company. The ship surveyors' work practices around the world needed to be standardized and supported by a new system, including one common database. However, exactly because the system was integrated, the local changes and workarounds did not just stay local, but propagated throughout the network and had "global" consequences. This had the effect of partially undermining the central standardization attempts, and leaving the enterprise with a less than "perfectly integrated" information system.

- The third situation is provided by Lee and Madnick (1992) citing Argyris and Schön (1978), in which an international bank attempted to install integrated information systems for letters of credit, accounts procedures, and reports across geographical boundaries. It ended up developing and redeveloping some fifty different information systems.

- The fourth example is regarded to the integration of various hospital information systems (e.g. patient administrative systems) with the ongoing introduction of electronic patient records systems in Norwegian hospitals (Monteiro, 2003). The integration of different information systems modules are creating tensions around the level of autonomy that should be granted to these different systems. Over time, the autonomy of the non-electronic patient records modules is eroding as the vendors of the electronic patient records are also developing modules for patient administrative systems.

Integration of information systems as demonstrated by information systems researchers is an extremely complex task and full of surprises. From the examples above, we see that some of the complexities are contributed to by the following conditions:

- Tensions between standards and local adaptations;

- Asymmetrical power inter-organizational relationships;

- Divergent agendas and interests of multiple actors;

- Intra-organizational conditions including a blend of institutional, technological, socio-economic and cultural factors.

While the findings of information systems research sensitize us to the problems of integration, they however cannot just be taken directly into our problem domain. There are additional complexities arising from the particularities of the public health domain, the particularities of diseases addressed, the involvement of donor agencies, the constrained settings of developing countries and various other contingencies. Thus, to understand the complexities of the problem domain there is a need for additional analytical concepts, as described in the next section.

2.9 Health Data Standards

Data standards define rules by which data are described and recorded. Data standards are the principal informatics component necessary for information flow through the national health information infrastructure. With common standards, clinical and patient safety systems can share an integrated information infrastructure whereby data are collected and reused for multiple purposes to meet more efficiently the broad scope of data collection and reporting requirements. Common data standards also support effective assimilation of new knowledge into decision support tools, such as an alert of a new drug contraindication, and refinements to the care process. (Washington Publishing Company, 1998). Policy guide on data standards would support improve the harmonization of routine data systems in Tanzania.

In order to share, exchange, and understand health data in Tanzania health sector set up, we must standardize the format as well as the meaning. Data Standards provide consistent meaning to data shared among different information systems, programs, and agencies throughout the product's life cycle. These include representation, format, definition, structuring, tagging, transmission, manipulation, use, and management of data. These agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics to ensure that materials, products, processes, and services are fit for their purpose (ISO 2002).

At the most basic level, data standards are about the standardization of data elements: (1) defining what to collect, (2) deciding how to represent what is collected (by designating data types or terminologies), and (3) determining how to encode the data for transmission. The first two points apply to both paper-based and computer-based systems; for example, a laboratory test report will have the same data elements whether paper or electronic. A data element is considered the basic unit of information, having a unique meaning and subcategories of distinct units or values (van Bemmel and Musen, 1997).

In computer terms, data elements are objects that can be collected, used, and/or stored in clinical information systems and application programs, such as patient name, gender, and ethnicity; diagnosis; primary care provider; laboratory results; date of each encounter; and each medication. Data elements of specific clinical information, such as blood glucose level or cholesterol level, can be grouped together to form datasets for measuring outcomes, evaluating quality of care, and reporting on patient safety events. (Washington, DC: The National Academies Press, 2004. doi: 10.17226/10863.)

At the level of the health care organization, the lack of common data standards has prevented information sharing between commercial clinical laboratories and health care facilities, between pharmacies and health care providers regarding prescriptions, and between health care organizations and payers for reimbursement (Hammond, 2002). The lack of standards has also prevented the reuse of clinical data to meet the broad range of patient safety and quality reporting requirements.

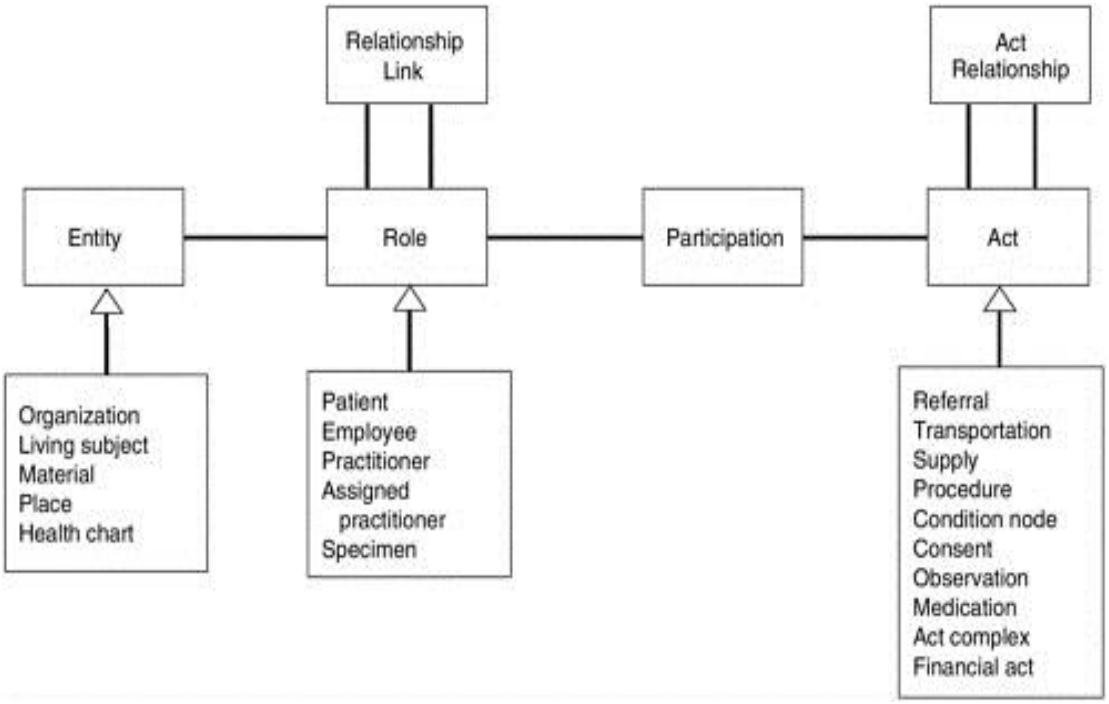


Figure 2: HL7 reference information model. SOURCE: Hammond, 2002

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Study Design

Qualitative methods were used to collect information and the study was conducted in a period of four months between February and May 2016.

3.2 Study Area

The study was conducted at the central ministry of health and mainly focused on departments which are directly involved with the HMIS implementation.

3.3 Study Population

The study population was officials from the vertical health programmes, HMIS unit of the ministry of health and donor organizations.

3.4 Sampling method and Sample size estimation

3.4.1 Sampling method

Given the nature of the study, there are specific people in specific positions who are directly involved with Health information systems for Malaria, HIV/AIDS, RCH, IVD, TB/Leprosy, HMIS and HRHIS in particular. Purposive sampling technique was used to select specific individuals from the vertical health programmes, HMIS unit and donor organizations which are affected by the multiplicity of routine data collection systems.

Under purposive sampling, specific individuals are selected who are appropriate to provide information on the subject matters. Many programs are affected by the multiplicity of routine data collection systems, but for the purpose of this study, the focus was on Malaria programme, HIV/AIDS programme, and RCH, IVD, TB/Leprosy, HMIS and HRHIS since these are main generators and users of the routine data sources across health programmes in the country. The vertical programs which were included in the study are listed below.

- National Malaria Control Programme - NMCP
- National Aids Control Programme – NACP

- Reproductive and Child Health Programme – RCH
- National Tuberculosis and Leprosy Programme – NTLP
- Immunization and Vaccine Department – IVD
- Health Management Information System – HMIS
- Human Resources for Health Information System - HRHIS

Sample size and sample distribution is presented in table 1 below

Table 1: Sample Size and Sample Distribution

1	**Offices/Units**	**No of Respondents**	**Department**
1	NMCP	2	M & E team
2	NACP	2	M &E Team
3	RCH	1	M &E team
4	NTLP	1	NTLP M & E section
5	IVD	1	IVD M &E team
6	HMIS/ICT	4	The main HMIS team
7	HRHIS	1	The main HRHIS team
9	USAID/Global Fund	1	HIS department
10	CDC	1	HIS section
Total		14	

3.5 Data collection methods and tools

Both primary and secondary data were collected for this study. Primary data refers to first-hand information that a researcher collects from the field either through asking respondents (in-depth interviews) or through observation. Secondary data on the other hand refers to information that is collected from already available literature. Specifically the secondary data were collected through reading reports and publications from the ministry of health and from other researchers. For primary data collection, in-depth interviews were conducted.

3.5.1 In-depth interviews

Data were collected through in-depth interview using interview guide. The interviews were conducted by the principal investigator and recorded. Key informants were interviewed to provide detailed information regarding factors or reasons leading to existence and usage of multiple routine data collection systems by the vertical programmes mentioned above and other donors in Tanzania, what strategies have been used by the Government and other development partners to integrate existing routine data sources into the main HMIS and assess how effective has the implementation of the strategies been and furthermore. The study further identified challenges on harmonization and integration of the indicators and data elements between the data collected by main HMIS versus those collected by other routine data collection systems as other parallel sources of information. All interviews were recorded through a digital recorder.

3.5.2 Secondary Data

Secondary data were collected through review of available literature from different sources. Specifically, information regarding government and development partners/donors strategies to integrate health information systems for NMCP, NACP, RCH, TB/Leprosy, IVD, HMIS and the HRHIS were collected through secondary sources. Findings from the review of documents were used to seek elaboration during interviews.

3.5.3 Pre-testing of data collection tools

Pre-testing of questionnaire was done to identify content validity of data collection tool and to estimate time length of the full interview. An in-depth interview was conducted by researcher to two study participants, one from Malaria programme and another participant from among the donors. A minimal modification of the research guide was done basing on issues that were raised during pre-test. Some of the modifications included rephrasing of questions to make them clear and understandable to respondents and adding probing to questions in the interview guide.

3.6 Ethical consideration

Ethical clearance was sought from Muhimbili University of Health and Allied Sciences (MUHAS) Institutional Review Board (IRB) under the Directorate of Research and

Publication and granted permission to go to the ministry of health key personnel, vertical programmes staffs, the ICT team and some donors.

For all interviewed staffs, a written informed consent was issued before conducting the in-depth interviews to study participants (Appendix 3). Participants were assured of the right to refuse to participate or withdrawal from the interviews without being accused. Confidentiality was ensured by not including the names and tittles of the respondents in the results.

3.7 Data processing and Analysis

3.7.1 Data processing and quality control

Data was collected and rechecked for completeness and consistency of information on daily basis by Principal investigator. Data validation was checked after data entry. Open ended questions were coded before entry

3.7.2 Data Analysis

After collection of field data, the researcher transcribed all recorded interviews. The researcher used thematic content analysis to analyze the information obtained whereby information collected was grouped in common themes and sub themes (reasons for existence of routine data collection systems,challenges on harmonization of routine data collection systems, indicators and data elements and strategies to integrate existing routine data sources into the main HMIS).Overall, the analysis was inspired by the responses from the main HMIS unit and the vertical programmes staffs on why multiple routine data systems exist.

3.8 Plans for Utilization and Dissemination of Information

All participants in the research will be given a report of the findings, and will be encouraged to comment on them. As well as the above; dissemination of the results will take place by several methods including:

1. Production of a report that will be sent to the Ministry of health – HMIS unit Tanzania and the monitoring and evaluation funding partners.

2. Publishing papers in specialist and general, national and international journals that is responsible on data use and systems strengthening.
3. Presentation of papers at both national and international conferences on multiple routine data sources areas while also lobbying influential individuals through conferences, seminars or meetings.
4. Write press articles for publications that are read by policy-makers. RTI International where the researcher works has a University in North Carolina called RTI University and often has an external communications department with someone who can help in drafting a press release.
5. Peer-reviewed journals and conference abstracts will be used and can help to influence the evidence based data use.
6. Meetings with key stakeholders are a useful way of keeping them informed and engaged with the research.

CHAPTER FOUR

4.0 RESULTS

4.1 Reasons for using multiple routine data collection systems by national programmes in Tanzania

The concept of multiple routine systems is well understood by all respondents. The researcher wanted to know if the respondents understand very well the concept of multiple routine systems before proceeding to the reasons of using multiple routine systems. In seeking the responses, one of the respondents said;

> *"…these are systems that collect information that are related* "Voice 2, HMIS-MOHSW
>
> Another respondent said;
>
> *"…the health sector has many systems that collect data from the health facilities however some of these systems collect same data elements and indicators."* Voice 3, IVD-MOHSW

Every department has a system that it uses to collect information from the lower level however these departments collects some information that are similar from the lower level. Some of the Central level participants from Ministry of Health - HMIS team understood multiple systems as those systems which collect similar data across programs for specific purposes; these are different from main surveys, main training institutions information systems, human resources systems and other major research systems.

Asked why there are multiple data reporting systems? Respondents gave different views. The researcher identified about six frequent areas that were pointed out by the respondents; Vertical programmes, Donors and partners, Existing national HMIS, Transparency and data accessibility, HMIS policy and Coordination of vertical programmes and the partners.

Most of the vertical programmes are inherently fragmented due to high level of specialization. Each program collects its own data since the data collected by each programme is different from the other vertical programmes. For example the data collected by IVD program is different from that of NACP programme. The NACP program collects

information on testing of HIV and enrollment of clients to HIV care while IVD program collects information like number of children vaccinated and number of fridges available. Among the stakeholders interviewed at NACP one of them reported;

.*"....NACP collects information related to HIV but other programs collects different information which are not the same as what we collect and that's why we use different systems to collect data* "Voice 4, NACP-MOHSW

Most of the vertical programmes are supported by different donors and partners. The donors and partners need data to measure performance of their indicators as a result different data reporting systems have been introduced.

.*"....these vertical programs gets money from donors who also comes with different data reporting systems"* Voice 10, MOHSW

When asked about this, the respondents working with the donor's organization said;

. *"....we want to monitor progress of different indictors that we are supporting"* Voice 7, CDC

The existing national HMIS does not collect all data required by all vertical programmes as a result some vertical programmes are still collecting information using their own data collection tools. For example the DHIS 2 reports only aggregated data while some vertical programs, such as NACP requires patient level data which is not collected through DHIS 2. DHIS2 collects information on vaccination coverage only but does not collect information on vaccine cold chain management. One of the officers from the vertical programmes said;

.*"....the current DHIS 2 cannot offer all we need"* Voice 9, NACP-MOHSW

Responding on inability to collect data for programmes' need, respondents from the HMIS unit reported to have already started integrating most of the vertical programs in the DHIS

2 and that there are efforts to integrate the remaining programmes into DHIS 2. However the patient's level data will not be collected through DHIS2 but through Hospital Management Information System and that some hospitals like Muhimbili and Tumbi have started using this system.

"…we have integrated most of the vertical programs like Malaria, TB, HIV and HRH into the DHIS 2,however we only collect aggregate data and not patient level data which is needed by other programs like HIV and TB " Voice 1, HMIS-MOHSW.

Some of staffs from the vertical programmes and partners do not have access to DHIS2 data. To access data from DHIS2, one needs to have a password which is provided by the HMIS unit. On the other hand getting access to DHIS 2 is a long process. In order to access to DHIS2, one need to get approval from the Permanent Secretary. For example one of the respondents from the vertical program said;

"….We don't have access to the current DHIS 2 and I have been told that the vaccine information is also available in DHSI2" Voice 8, IVD-MOHSW

Responding on lack of transparency and data accessibility the respondent from the HMIS unit reported that the ministry has developed a data use and dissemination policy to create demand for data through improved data dissemination and make use of data for decision making for improvement of the quality of health services. The ministry has also developed web portal (dashboard) for accessing data from all the vertical programs. This web portal pulls data from DHIS2 and some other existing information systems like Human Resource and presents it in a graphical format which is easy to understand. No password is required to access the web portal. People are encouraged to use the DHIS 2 web portal which does not require login information.

"….The DHIS 2 web portal is a free online tool that people should use to get data from the DHIS 2" Voice 2, HMIS-MOHSW

Some of the vertical programs and implementing partners were not involved in the integration process. On the other hand some of the implementing partners are not members of the Monitoring and Evaluation Technical Working Group (TWG). The MOHSW established the M&E TWG to improve coordination of vertical programmes and implementing partners. The longer term vision is to have a strong M&E TWG group that benefits from active participation from the separate directorates and vertical health programmes. The TWG has two sub-committees: the first focuses on defining and prioritizing indicators and M&E tools and the second focuses on ICT and Information Systems architecture. The latter is aimed to ensure that the health sector, as a whole, is moving towards a set of integrated applications and services that meet the needs of the sector as well as separate vertical health programmes and directorates which spear herds the HMIS implementation in the country. All issues related to HMIS are discussed during the M&E technical working group. Being part of the M&E working group helps to coordinate partner's efforts and avoid duplication of data collection systems. This was mentioned by one of the respondents who said;

" There are many departments in the health systems like Malaria, TB,RCH etc. and each these programmes run on its own and each one need its own information. So if they are not well coordinated each programme will introduce its own data reporting system." Voice 6, Global Fund

When asked about the coordination of partners through M&E working group, respondent from the HMIS unit reported to have monthly M&E technical working groups to discuss the HMIS implementation progress and that all partners are invited to attend these meetings.

4.2 Strategies employed by the government to integrate existing multiple routine data collection systems in Tanzania

Respondents acknowledged the use of multiple system as a problem due to the burden they bring to lower facility workers on data collection and that there is a need to integrate the existing multiple routine data collection systems so that information is collected once and shared to all users.

The ministy of health and developing partners have developed data use and dissemination policy as a way of sharing infomation and promoting data use among stakeholders. In line with this, the ministry has developed a DHIS 2 webportal to facilitate free access of information generaated from DHIS 2. The DHIS 2 webportal does not require user login information.

This was reported by one respondent who said:-

"…the ministry has developed a data use and dissemination to guide how information will be shared and used for decision making" Voice 7, CDC

Through the data use and dissemination policy, the MOHSW want to ensure that existing data reporting systems in the health sector support data access and data use. The data use and dissemination policy is also in line with the open data policy which defines what data should be public, how to make data public, and how to implement data access and use policy. Setting the default to open means that the government and parties acting on its behalf will make public information available proactively and that they will put that information within reach of the public (online), without barriers for its reuse and consumption.

The need to create standards was seen as an important issue during the in-depth interviews. The ministry is working with partners to create standards that can allow smooth integration of different systems. Each system needs to meet the standards so that they can talk to each other and share information. This was supported by one of the respondent who said:-

"…we need to link various systems through exchange layer that allows sharing of information across systems." Voice 5, ICT-MOHSW

Efforts are underway to link various applications by developing interoperability layer that will allow sharing of data.

The ministry of health has improved coordination and governance of data systems and data use initiatives. The ministry has developed eHealth strategy that guides how data systems will be implemented. This also includes improvement of coordination between different steering committees and TWG dealing with data and data systems in the PORALG and MOH.

"As ministry, our main role is to coordinate, convene a meeting, but also we invite various stakeholders who are using HMIS information like MALARIA, NACP, and Human Resource for Health" Voice 10, HMIS -MOHSW

According to HMIS officials, HMIS unit uses participatory approaches such as meetings, workshops and seminars to build consensus among partners on the integration process. An example being mobilization of concerted efforts and funds by HMIS unit from vertical programmes to resolve availability of data collection tools problem.

Another issue that was mentioned by participants is the data warehouse. The data warehouse is an important tool that can be used to house information generated from different health programs. The MOHSW has developed a data warehouse (DHIS 2)to house information generated from different programmes. DHIS 2 is typically used as national health information systems for data management and analysis purposes, for health program monitoring and evaluation, as facility registries and service availability mapping. DHIS 2 helps the MOH to manage their operations more effectively, monitor processes and improve communication. In Tanzania health sector, most of information (aggregate data) is reported through the DHIS 2 software. However there are some information like laboratory, medicine and supply that are still not reported through the DHS2 software. The need for DHIS 2 was mentioned by many respondents, one of them said:-

."....yes, there is need to use the DHIS 2 for all data and integrate all the data into DHIS 2" Voice 9, NACP-MOHSW

Another area of concern which was mentioned was on the improvement of software project management. The ministry of health has developed guidelines and data collection mechanisms to ensure data systems projects are known. All existing projects need to be mapped to avoid duplication.

4.3 Challangein harmonizing data elements and indicators collected by national programmes with the national routine data collection system (HMIS/MTUHA)

We identified two major challenges related to the integration of the existing information systems, these included; heterogeneity of interests among vertical programmes and resource constraints (infrastructure, human resources, and financial resources)

There is a conflicting interest between health programmes in achieving standardized and integrated information systems which makes it difficult to reach a "final" agreement. The ministry of health has managed to standardize and integrate some of the vertical programs information systems into the DHIS 2, but ensuring continue use and reliance to the integrated information systems by the vertical programs is still a big challenge. Some vertical programmes feel that their requirements have not all been integrated into DHIS 2 and some feel that they don't have ownership to DHIS 2.

This was supported by one of the respondent who said;

"…I don't think if all requirements will be captured through DHIS 2 since the DHIS 2 collects only aggregate data and not patient level data "Voice 11, TB & Leprosy-MOHSW

Moreover, lack of resources (Infrastructure, Human and Finance resources), challenge the efforts to attain comprehensive integrated health information system. For instance, low internet connectivity in remote districts was reported as being a challenge to the effort of scaling up the DHIS 2. Furthermore, integration requires human resource with vast knowledge and skills on integration process. Most of the staffs at the national level do not have enough capacity and knowledge on the integration process.

"…our ICT staffs at the national level need training on the concept of integration so that they can be able to manage this process by themselves "Voice 1, HMIS-MOHSW

Most of the integration initiatives are implemented by implementing partners which brings a question on sustainability. The ministry has started to implement a new program in collaboration with John Snow Inc. (JSI) which aims at developing standards and requirements for interoperability layer. One of the objectives of this project is to build the capacity of the ICT staffs of the ministry on integration processes.

"…in order to archive integration, we need to build our internal capacity to it and this is now our first priority" Voice 1, HMIS-MOHSW

Integration requires a lot of financial resources. The HMIS uses participatory approaches such as meetings, workshops and seminars to build consensus among partners which requires a lot of financial resources.

"…Budgets for the health sector are focusing on functional areas, but to the side of monitoring and evaluation, we are given a small amount of money, as one among the serious challenge. So financial constraint is an issue we face generally, and I don't think if it is the health sector only, but almost in all sectors. In reality data issues are not given priorities." Voice 10, HMIS -MOHSW

CHAPTER FIVE

5.0 DISCUSSION

5.1 Reasons for using multiple routine data collection systems by national programmes in Tanzania

Vertical programs in the Tanzania have very strong installed base of information systems reinforced by funds from donors

In Tanzania, the vertical program (such as reproductive and child health, HIV/AIDS, TB/L, malaria) have developed reporting systems that serve the vertical program within all levels of health service delivery that can be used for planning of vertical health programmes and meet donor reporting needs. The data reporting systems developed by these programmes are financed by donors, for example CTC database is financed by CDC and VIMS is funded by Bill and Melinda Gates etc. In addition, the vertical programmes are inherently fragmented due to high level of specialization. This indicates that, the vertical programmes have a very strong base of information systems reinforced by funds from donors and that the donors have influence on the data collection systems operated by these vertical programmes. The vertical programmes such as NACP and IVD have established strong systems (CT2 and VIMS respectively) that run from the lower level to higher level with a strong financial support from the donors and clear reporting structure. Comparatively, the funds spent to run these systems are almost the same as the total budget to implement the national HMIS. The fact that the vertical programmes are inherently fragmented due to high level of specialization has resulted into each program developing its own data collection systems and that each vertical program collects information that is different from the other vertical program.

Further, the reporting systems developed by these vertical programs often duplicate or overlap with national main HMIS data which leads to difficulty in knowing which data to use and additional burden for health providers. The findings from this study are similar to findings from a study by Baltazar C (2004) which revealed that the difference between the disease specific information systems are not arbitrary; rather they are influenced by several reasons including the characteristics of diseases, treatment specificities, resources

constraints and policies. In addition, the influence of donors is supported by Wood-Harper and Bell who argues that donors are a key vehicle through which Information Systems are introduced in developing countries (Wood-Harper and Bell, 1990), creating a dependency of governments on them, for technical and managerial expertise. Such vertical programmes, which tend to oppose an integrated approach to health care delivery, contribute to a state of fragmentation and redundancy, and associated problems (Hutton, 2002; Cassels and Janovsky, 1998).

Therefore this finding implies that many of the vertical programmes are still characterized by highly fragmented health management information systems, supported by stand-alone donor support. Moreover, these systems have very well defined and elaborate vertical organizational structures with many people employed in there which further reinforces their strengths and the tension towards any change attempts.

The existing national HMIS does not collect all data required by all vertical programmes

The ministry of health has rolled out the new revised HMIS to all regions in Tanzania mainland. Not all information from the vertical programmes has been integrated into the national HMIS. This is especially true with patient level data which is not collected through the DHIS 2. The missing of key information required by the vertical programmes in DHIS 2 has caused the vertical progammes to develop different data collection tools to capture the missing information from the health facilities and thus causing multiple routine data collection systems.

From these findings and a study of the experiences reported in the information systems literature, it became clear that integration of the vertical programmes is a complex and challenging matter which needs a much more comprehensive approach requiring an analysis of the information systems of individual vertical program and that all requirements from the vertical programmes are analyzed and incorporated into the national data warehouse (Baltazar, 2004). If the national data warehouse does not have all data required by the vertical programmes, they develop their own tools to collect missing data and thus resulting into multiple routine data collection systems.

Some of the vertical programs and implementing partners were not involved in the integration process

During the development of the new HMIS/DHIS 2 the ministry of health worked with different vertical programmes and partners through the M&E technical working group in order to include their requirements into the national HMIS. The M&E technical working group was established to strengthen collaboration and communication linkages between the national HMIS and the vertical programmes. All issues related to HMIS are discussed during the M&E technical working group. However not all vertical programmes and implementing partners do attend to the M&E technical working group. The health sector needs a comprehensive, complete and fully functional information system to mitigate the challenges existing (Blaya et al., 2010).This implies that some requirements from the vertical programmes were not included in the national HMIS since there were no representatives from those programmes who could provide their data needs to be included into the national HMIS. Being part of the M&E working group helps to coordinate partner's efforts and avoid duplication of data collection systems.

5.2 Strategies set by the Government and development partners to integrate existing multiple routine data collection systems in Tanzania.

The MOHSW has created Monitoring and Evaluation (M&E) technical working group as a way to improve coordination of vertical programs and donor data reporting systems

The health sectors have a lot of data reporting systems that have been developed to curter the data reporting needs by the vertical programmes. It is important that the different systems that are developed are coordinated in order to avoid duplications. To solve the problem of parallel data reporting systems, the MOHSW created an M&E technical working group to improve coordination and harmonization of different data reporting systems. All issues related to HMIS initiatives are discussed in the M&E technical working group. Despite the formation of the M&E technical working group, some partners do not attend to these meetings. The MOHSW need to ensure that all vertical programmes attend to these meetings by sending invitations and making follow up. In addition, the MOHSW has developed a strategy (eHealth strategy) that stipulates the vision of the ministry and how information systems will be managed. Based on the national eHealth strategy (2013 -

2018), all software development need be communicated to the ICT unit of the MOHSW and the eHealth Steering committee for approval prior to development. The need for coordination is also supported by Kimaro and Nhampossa who argue that without some form of a national plan and coordination contributes to multiplicity of routine data collection systems and hence poor data quality leading to poor decisions (Kimaro and Nhampossa, 2005). This strategy has helped to ensure that all new data systems are known by the entire ministry and thus avoiding duplications.

The MOHSW has developed a data warehouse (DHIS 2) to house information generated from different programmes

The data warehouse is an important tool that can be used to house information generated from different health programs. In Tanzania the DHIS 2 has been developed as data ware house for health data. DHIS 2 is typically used as national health information systems for data management and analysis purposes, for health program monitoring and evaluation, as facility registries and service availability mapping. DHIS 2 helps the MOH to manage their operations more effectively, monitor processes, and improve communication. Donald and John (1997) argue that, major practical goals for the future development of Health Information Systems for public health include to integrate the multiple data sources available for public health outcomes, network information systems to make interaction and information flow between different entities feasible and to use health care delivery information systems to produce public health information regarding preventive services, preventable diseases and quality of care. Despite the development of the data warehouse that has integrated information from the vertical programmes; some information is still not reported through DHIS 2. For example patient level information like personal records for people on ART is not collected through DHIS2. This implies ineffective of the developed data warehouse to collect all the data needed by the vertical programmes and donors.

The MOHSW has developed user requirements that will be used to develop data standards and interoperability layer to enhance sharing of data across different systems

Currently, the MOHSW has no national data standards in order to facilitate interoperability of different systems. Each system has its own data standards. However, the MOHSW has now started developing requirements that will be used to develop data standards and

interoperability layer. The development of data standards and interoperability layers requires processes and stakeholders involvement that normally take a lot of time. In the case study of Health Information System Project (HISP) in South Africa, Jacuzzi et al. (2005) argue that standardization is necessary management perspective to harmonize and integrate information systems.

The envisioned potential challenges the development of interoperability will encounter is the acceptance from the main users of the national HMIS and other partners. However if the interoperability layer will be developed will help to solve the problem of multiple reporting systems by ensuring that all systems have similar data standards and sharing of information. Busagala, &Kawono, G.C (2013) argue that linkage of data is often an effective method to obtain information across programs.

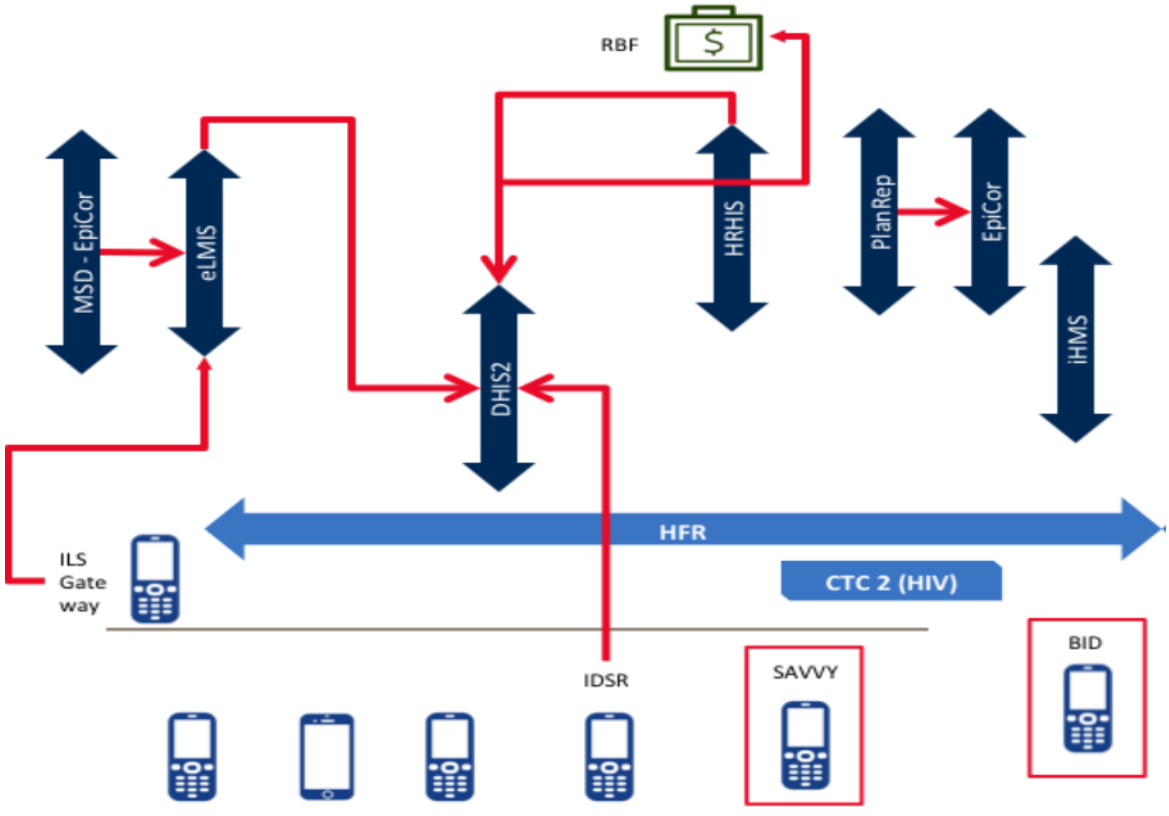


Figure 3: Current eHealth System Applications and Data Interchange in Tanzania. SOURCE: MOHSW, 2015

To address this situation the author argues a stepwise approach to developing a comprehensive eHealth enterprise architecture that is aligned with the broader e-Government policies. In order to ensure that there is interoperability of different systems, the following need to be done:-

- Collaboratively develop standards, policies and guidelines for interoperability implementations
- Develop functional and technical requirements for national interoperability
- Identify and establish governance structures for interoperability
- Facilitate review of systems for compliance.
- Develop capacity of health sector leaders to understand interoperability to provide effective leadership.
- Establish national interoperability layer or health information mediator services.
- Facilitate upgrade of existing systems to make them interoperable

The figure below shows the conceptual model of the eHealth architecture that illustrates the key components of the interoperability layer that can be developed to enable sharing of information from different systems. The Tanzania health sector could adopt this conceptual model and come out with such architecture for sharing information.

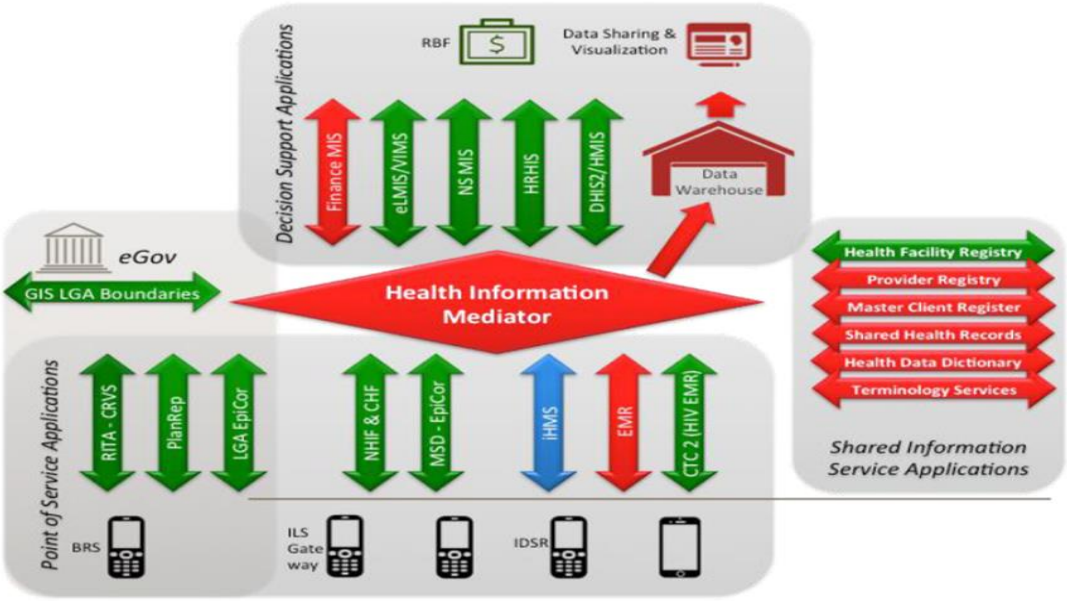


Figure 4: The proposed eHealth Conceptual Model. SOURCE: MOHSW, 2015

5.3 Challenges in harmonizing data elements and indicators collected by national programmes with the national routine data collection system (HMIS/MTUHA)

As pointed earlier, the ministry of health has established the M&E technical working group where all vertical programmes and implementing partners are represented to improve coordination. The fact that some vertical programmes and implementing partners are not attending the M&E technical working groups brings a question of poor coordination of HIS activities and a challenge to the integration process. Attending to M&E working group is key to achieving integrated systems. To solve this challenge, the MOHSW need to make sure that all partners working on different information systems are members of this technical working group as all activities and developments are discussed during these meetings.

Furthermore, the access to integrated information is still a challenge and thus limiting the data use for decision making. As discussed earlier, the ministry has developed a data warehouse which has integrated some of the vertical program data needs. However, the study has shown that not all people from the vertical programmes and implementing partners have access to this information. This has again caused the vertical programmes to continue using their data reporting tools and thus creating multiple data reporting systems.

The national data warehouse does not have all data required by the vertical programmes which bring a challenge to integration process. In addition, some vertical programmes including the NACP with CTC database, IVD with immunization vaccine database and the CDC with PROMIS systems fear that their requirements will not get the attention needed to ensure that their needs are met, and if the programs have pride of ownership in their existing vertical systems which meet their needs.

Each system needs to meet the standards so that they can talk to each other and share information. However during the development of the data warehouse, there was no data national standards available and each system had its own standards which bring a challenge to integrate all systems in the data warehouse.

Another challenge to integration is poor network infrastructure coupled with low financial resources. The developed data warehouse system is accessed online and it requires an

active connection to the central server. For instance, low internet connectivity in remote districts was reported as being a challenge to the effort of scaling up the DHIS 2. Busagala et al., (2013) argues that the underlying challenges of e-health are inadequate sources of ICT infrastructure. This brings challenges to accessing information stored in data ware house for decision making.

5.4 Study Limitation and mitigations strategies

In conducting this study, there are a number of obstacles which were encountered which in one way hindered the effectiveness of the study. One of the Limitations the study was the limited exposure of some information by the relevant officials from the vertical programmes and municipalities, that is, some information were not easily accessible and openly shared due to their confidentiality and willingness of the respondents to provide more information by being busy with their activities hence limited time. Another limitation was lack of enough funds to be able to smoothly conduct the exercise and payment of allowances to interviewee since most were central level staff at the ministry who needed some allowances.

To address the above challenges, the researcher used a range of techniques including; audio recording of voices to capture information, more probing on the subject matter, sought additional information from other staff on the same department, at some point the researched had to twist the questions while using simple and clear language and finally conducting data validation after entry.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

Integration of HIS in developing countries characterized by multiple vertical programs is quite a challenge. This research has identified about five reasons causing multiple reporting systems in the health sectors which are: influence of donors and partners, specialization of different vertical programmes, inability of existing national HMIS to collect all indicators, lack of transparency and data accessibility and lack of coordination of vertical programmes and partners. This research has also identified different strategies employed by the government to integrate existing multiple routine systems such as: creation of Monitoring and Evaluation (M&E) technical working group as a way to improve coordination of vertical programs and donor data reporting systems, developed a data warehouse (DHIS 2) to house information generated from different programmes and development of user requirements that will be used to develop data standards and interoperability layer to enhance sharing of data across different systems.

Despite the fact that the ministry of health has taken initiatives to integrate the existing multiple reporting systems, there are still some challenges that this research has identified such : some vertical programmes and implementing partners are not attending the M&E technical working groups which brings a question of poor coordination of HIS activities and a challenge to the integration process, the current DHIS 2 which has been developed as a data warehouse is not capturing all information required by the vertical programs and poor network infrastructure coupled with low financial resources.

The message the paper sends to public health and other practitioners in HIS is that under-estimating the non-technical issues of integration can account for a very significant portion of failures of integration of HIS. While technically, the DHIS 2 consists of datasets for the need of the vertical programs, some of the programs however are using their previous systems, presenting challenges to the integration initiatives. Thus, the paper underscore the need to understand the socio economic challenges related to HIS integration which goes beyond technical fixes.

6.2 RECOMMENDATIONS

Tanzania is continuing to focus on improved HMIS reporting compliance, expanding supportive supervision to improve data quality, and the MOH continues to lead the ongoing HMIS integration and strengthening process. There is ongoing HMIS work that continues to ensure that the indicators and data elements by vertical programmes are comprehensively placed and reported by the health care workers, and that the HMIS meets the international and national planning priorities. As more interventions are implemented by programmes to improve use of health data, integration efforts need to continue and be evaluated as a core component of the Tanzanian integrated national HMIS. This paper provides the following specific recommendations;

1. Develop and implement Information Systems data Policy guidelines in terms of harmonization and create data standards for interoperability for better use of information, and its rationalization

2. Since Tanzania Ministry of Health has recognized DHIS2 as an ideal software for data warehouse, it is recommended that the Health Facility Registry (HFR), The Comprehensive Council Health Plans (CCHP), the eLMIS, HRHIS, TIIS, HoMIS (paperless system), Telemedicine and Financing continue to stand alone with interface into DHIS2 while the vertical programs including HIV/AIDS, TB, Malaria, EPI and others could be integrated direct into DHIS2 for aggregate data.

3. Improve data management to ensure that appropriate information is accessible, using appropriate Information and Communication Technology (ICT), including the internet and an integrated data warehouse approach that rationalizes and harmonizes different subsystems and databases through an established interoperability layer with the enterprise architecture.

4. In cases where vertical programmes have transaction based data requirements that can only be addressed through additional operational informational systems, the HMIS team should work with them to ensure that aggregate forms of such information are incorporated into the national Data Warehouse. In addition, the

ministry of health should strengthen the collaboration and communication linkages between the national HMIS and the vertical programs.

5. Strengthening the collaboration and communication linkages between the national HIS and the vertical programs represent and involve the different stakeholders and parties in negotiations and discussions at different steps along the way taking the current ‘good’ practices as the point of departure.
6. Donor dependency –increase coordination of funds from donors and increase internal funding for HIS activities
7. However, as implied from this study, strengthening the collaboration and communication linkages between the national HIS and the vertical programs represent an opportunity to curb the integration challenges.

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APPENDICES

Appendix 1: Informed Consent Form for the interviewees

Malaria programme, HIV/AIDS programme, RCH, IVD, TB/Leprosy, HMIS, HRHIS programmes, WHO and CDC in Tanzania.

Informed Consent for participation in collection of information about the implication of multiplicity of routine data collection systems in Tanzania

May I request your favour to use your precious time to respond to questions enclosed to this questionnaire? I am conducting a research on the implication of multiplicity of routine data collection systems for the Malaria programme, HIV/AIDS programme, RCH, IVD, TB/Leprosy, HMIS and HRHIS programmes in Tanzania. The research is intended to be used for academic purposes only and not otherwise.

Procedures

The research will be conducted by interviewing representatives of the Malaria programme, HIV/AIDS programme, RCH, IVD, TB/Leprosy, HMIS and HRHIS programmes in Tanzaniaand other key stakeholders who are directly or indirectly involved in the health information systems data collection and reporting, production, receiving, distribution and use of health data at different levels. The method will be through holding individual interviews that will take approximately 30 minutes of your time. During the interview, you will be asked questions about the existing routine data collection systems (RDS) which are used in your program.

Benefits

Your participation in this interview may increase your understanding of collection, dissemination and use of health data from multiple health information systems.In addition; the information you will provide will help in developing my research dissertation report that is expected to provide recommendations for improving health sector in Tanzania

Risks

There is no risk to you from participating in this interview.

Confidentiality

All information from this interview will be kept confidential and stored in a secure (locked) place. Information collected during individual interviews will only be shared directly with the supervisor. The information gathered in your interview and transcribed on paper and in electronic format will be kept in a locked and secure place until the final report is prepared and during that time only the researcher will have access to this information. Note: With your permission, an audio recording of this interview will be made to allow the interviewer to review your responses. The audio recordings will be deleted once the final report is completed.

Compensation

You will receive no compensation for participating in this study interview

Voluntary participation, refusal and withdrawal

You are being invited to participate in this study. Your participation is completely voluntary you do not have to answer any questions that you do not want to answer. Your decision to participate or not participate will not affect your employment.

For additional information

If you have any questions or need additional information about the data collection, you may contact:

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RTI International/MOHSW – M & E Section
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Statement of Consent

I have read this consent form or have had this consent form read to me and I received a copy of the consent form to keep for my records. I certify that I have had the opportunity to ask questions and my questions were answered. I agree to voluntarily participate in this assessment/study of collection of information about implication multiple routine data collection systems.

Interviewer

Print name_____Signature _____Date_____

Interviewee

Print name_____Signature _____Date_____

Appendix II: Interview Guide

Section A: Respondents Background information/Profile

1. What is your age?
2. What is the name of your Agency?
3. What is your job Position?
4. What are your years of Experience in this position (working years)?
5. What is your education level?
6. What is your field of study?

Section B: Reasons for existence of Routine Data Collection Systems

1. Are there any routine data collection systems existing and are being used in handling your day to day activities?
2. If Yes, can you mention if there a single routine data collection system for use or more than?
3. Would you mention existing routine data collection systems or give more details on the use of routine data collection systems under your agency?
4. What are the reasons for the existence of such routine data collection systems?
5. What are your thoughts regarding the adoption, influence and use of routine data collection systems in your programme/organization?
6. In case your agency has more than one routine data collection systems for use, what do you think are the factors behind adoption and use of multiple routine data collection systems?

Section C: Challenges on harmonization of Routine Data Collection Systems, indicators and data elements

7. In case you ever experienced working with multiple routine data collection systems to report on Malaria programme, HIV/AIDS programme, RCH, IVD, TB/Leprosy, HMIS and Human Resource issues, what do you think are the advantages and disadvantages?
8. What are your views on the use of multiple routine data collection systems in your programme??

9. What overall challenges are associated with use of multiple routine data collection systems?
10. What are the challenges associated with the use of multiple health systems in your programme? Malaria programme, HIV/AIDS programme, RCH, IVD, TB/Leprosy, HMIS and HRHIS.

Section D: Strategies to integrate existing Routine Data Sources into the main HMIS

11. Given the need for data integration and consistency, do you think there is a need to address the challenge of multiple routine data collection systems in the sector you are working in?
12. Have there been any interventions to integrate routine data collection systems that are existing?
13. Who are the key drivers towards integrated routine health data collection systems?
14. Specifically, what is the role played by the government(Ministry of Health and Social Welfare) in order to put in place integrated routine data collection systems for Malaria programme, HIV/AIDS programme, RCH, IVD, TB/Leprosy, HMIS and HRHIS ?
15. What are strategies being put in place by the government (Ministry of Health and Social Welfare) to address the use of multiple routine data collection systems?
16. Do you have any general comment or recommendation regarding use of multiple routine data collection systems?

    Please comment

Appendix III: Themes and subthemes for the study

1. Reasons for existence of Routine Data Collection Systems
    - Availability of routine data collection systems existing
    - Types of routine data collection systems available
    - Reasons for existence of routine data systems
    - Factors behind adoption and use of multiple routine data collection systems
2. Challenges on harmonization of Routine Data Collection Systems, indicators and data elements
    - Advantages and disadvantages of multiple routine data collection systems
    - Overall challenges are associated with use of multiple routine data collection systems
3. Strategies to integrate existing Routine Data Sources into the main HMIS
    - Need to address the challenge of multiple routine data collection systems
    - Interventions to integrate routine data collection systems
    - Key drivers towards integrated routine health data collection systems
    - Role played by the government
    - Strategies being put in place by the government
    - Recommendation regarding use of multiple routine data collection systems