Review of Health Information Systems Performance in Kenya with a Focus on Organizational and Behavioral Factors influencing Health Information Systems.

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Kenya

49th International Course in Health Development

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KIT (Royal Tropical Institute)

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A thesis submitted in partial fulfilment of the requirement for the degree of Master of Public Health

By

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Signature:-…….

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List of Abbreviations and Acronyms

AWP	Annual Work Plan
CBHIS	Community Based Health Information System
CHMT	County Health Management Team
DANIDA	Danish Aid Agency
DDI	Data Documentation Initiative
DDSC	District Disease surveillance Coordinator
DHIS	District Health Information System
DHRIO	District Health Records and Information Officer
ESP	Economic Stimulus Program
GFATM	Global Fund for AIDs, TB and Malaria
GOK	Government of Kenya
HIS	Health Information System
HISP	Health Information Systems Program
HMIS	Health Management Information System
HMN	Health Metrics Network
HRIO	Health Records and Information Officer
IEBC	Interim Electoral and Boundaries Commission
KEMSA	Kenya Medical Supplies Agency
KHPF	Kenya Health Policy Framework
MFL	Master Facility List
MOH	Ministry Of Health
NACPD	National Coordinating Agency for Population and Development
NGOs	Non-Governmental Organizations
NHIF	National Hospital Insurance Fund
NHIS	National Health Information System

NHISCC National Health Information Coordinating Committee

NHSSP National Health Sector Strategic Plan

PRISM Performance of Routine Information System Framework

SOPs Standard Operating Procedures

WHO World Health Organization

Glossary

Health information: "personal information that is information or an opinion about, a health service provided, or to be provided, to an individual''.(NSW,2002)

Health information systems :" as a set of interrelated components and procedures organized with the objective of generating health information and intelligence to monitor the health status and health services of a nation to improve public health care leadership and management decisions at all levels"(Lippeveld et al,2000).

Organizational factors:" elements and descriptors that define an organization's character. They include strong organizational leadership where management provides adequate funding, ensures availability of technology/personnel, allows the champion to function throughout the development process. They also include organizational structure, climate, politics, process and procedures" (Business, Law and Finance,2011).

Behavioural factors: **"**behaviours relating to the individual, to how that individual lives or has lived and to how that individual actually behaves"(Beech J. & Chadwick S.)

Data management:" a set of procedures to collect, store, analyse and disseminate data" (HIS, 2012e).

Health information data sources:" Routine health services and management data from health facilities and health programmes; national population censuses as well as data collected periodically on health facility infrastructure and personnel and from demographic and health surveys and special studies (HIS, 2012e)".

Information products-"Data which is transformed into information that become the basis for evidence and knowledge to shape health action" (Aqil, 2009).

Information culture:" A culture in which the value and utility of information in achieving operational and strategic success is recognised, where information forms the basis of organizational decision making and Information Technology is readily exploited as an enabler for effective Information Systems **"**(Curry and Moore ,2003)

Dissemination and use- "making information readily accessible to decision-makers, by providing incentives to facilitate information use"(

Indicator: "indicators are measurable characteristics of an individual, population, or environment that can be used to describe the health of that individual or population" (HIS, 2012e).

Governance: "Is the manner in which power is exercised in the management of a country's social and economic resources for development. Governance means the way those with power use that power" (MacCowley, 2005).

Motivation: "The willingness to exert and maintain an effort towards organizational goals" "(Franco et al,2002).

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Abstract

Background: The ability of Kenya's Health Information System (HIS) to yield effective, dependable, timely, and realistically accurate information for planning and evidence-based decision-making as well as monitoring health system performance was assessed and some of the recommendations implemented. However, no assessment have been done so far to evaluate the impact of the implemented recommendations hence this review.

Objectives: The thesis aimed at critically analysing Kenya's HIS performance based on Health Metric Network 2008 assessment in order to make recommendations to the government and stakeholders on HIS further improvement.

Methods: Literature Review

Results: Kenya's HIS continue to experience challenges which affect its functionality. It remains heavily donor dependent with inadequate allocation from the government. Data demand and use is still low even with the implementation of a national data repository which have eased data access. Dissemination of health information is poor which affects its use. Organizational factors which include availability of resources, and information culture as well as behavioural factors which include motivation and competence in HIS tasks were found to influence HIS. Linkage between data sources is hindering sharing information routinely. Lack of a regulatory and a legal framework is detrimental to HIS reforms.

Conclusions and Recommendations:

Availability of resources, good governance and supervision are vital for HIS to function. Linkage among data sources and integration will promote information culture. Implementation of the remaining recommendations should be hastened in order to address the challenges which continue to affect HIS performance.

Key words: Health information, health Information systems, organizational factors, behavioural factors, Kenya.

Word count:10,754

Introduction

Kenya has a thrust of strengthening HIS to measure its health system performance (HIS,2012a;WHO,2004)in order to improve its population health status and provide all its citizens with equitable, affordable quality health and related services at the highest attainable standards (MOH,2012a;GOK,2010a). With a fragmented database information system among other HIS weaknesses, the Ministry could not show its progress in its undertakings hence Health Metrics Network (HMN) assessment and recommendations (see Annex 5) (HIS 2004; HIS, 2008a).

Working as a program officer at the Department of Disease Prevention and Control (DDPC) Monitoring and Evaluation (M&E) Unit, I monitor the performance of health indicators and evaluate public heath interventions and also report to partners on specific indicators for accountability through the data from the national database District Health Information System (DHIS).I therefore require an effective well- functional HIS which is able to provide sound and reliable information for evidence -based decision-making and policy development not only at my department but also at all levels of the healthcare system(HIS,2012b;MOH,2012b;WHO,2007).There's notable improvement in transforming HIS to ensure it fulfils its mandate since the implementation of HMN assessment recommendations. However, there still exist gaps in HIS which hamper evidence-based decision making (HIS,2012b;HIS,2012c)as well as comparative performance assessment on health programs under DDPC (DPC,2012). Data demand and use is still low and feedback mechanisms still weak (MOH, 2012b). As a department, many a times we are fire-fighting disease outbreaks despite the availability of the disease trends analysis from the weekly reports which should trigger response to avert such outbreaks or deaths (DPC, 2012). Stock out of essential drugs at the health facilities is common due to non-use of mortality and morbidity data in drugs distribution in spite of logistics management information system (LMIS) linkage to DHIS (DOMC, 2012).

The study aimed at reviewing HIS performance in relation to HMN 2008 assessment and recommendations focusing on NHSSP 2 implementation period (2005-2012). It examined organizational and behavioral factors influencing health information and also analyzed HIS enabling factors from other countries.

CHAPTER 1: BACKGROUND INFORMATION ON KENYA

1.1. Geographic Profile

Kenya, one of the five East African countries occupies a total area of 580,646 km^2. It borders the Indian Ocean and lies between Somalia and Tanzania. It borders Uganda to the West, Ethiopia and South Sudan to the North. After the promulgation of the new constitution in August 2010, the country has adopted a devolved system of government with 47 administrative counties which has replaced the previous 8 provinces and 290 constituencies regarded as districts (GOK 2012, GOK 2010a).

1.2. Demographic Profile

Kenya has a population of 40 million people and a growth rate of 2.4% with the distribution indicating that 37% live in the urban while 63% live in the rural (KNBS, 2012; Nabutola, 2011).It has predominantly a young population with 43% of the total population aged below 15years with the median age estimated to be 18.8 years and a life expectancy of 62 and 65 years for males and females respectively. The total population life expectancy is 64 years (KNBS,2012).

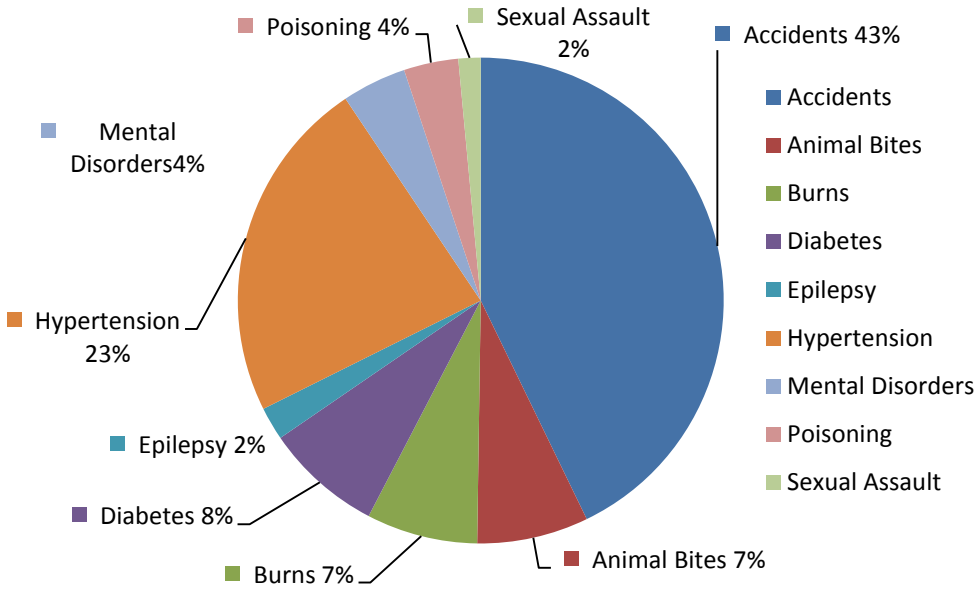
1.3. Socio-Economic status

Kenya is a regional hub in trade and finance within East Africa. Its main foreign exchange earners are agriculture and tourism. Agriculture acts as an economic growth driver and poverty alleviator employing 75% labour force with tea and horticulture being the main exports. It accounts for 26% of GDP directly and 25% indirectly. However, 46% of the population lives below the poverty line (GOK 2010b; MOP, 2011; Monday & Immaculate, 2009).Between 2003-2007, Kenya's economy was fast growing. Post- election mayhem in 2008 and corruption however retarded this growth .To address the challenge, the government has shown commitment in reviving the economy with a strong involvement of private sector which has seen major improvement of some sectors like ICT (MOP, 2010). Most of the rural poor are in high agriculture potential zones putting pressure on the 20% arable land. There has been a decrease in poverty rate from 53% in 1999 to 46% in 2009 but population growth has been attributed to the rise of number of the poor from 15.2 to 17.8million (KNBS, 2008; GOK, 2010c; KNBS, 2010; Monday & Immaculate, 2009).Wealth Indices indicates that among highest wealth quintile, a high concentration (79%) fall in the urban population with only 6% of the rural population being in the highest quintile. (KNBS, 2008; KNBS, 2010; Monday & Immaculate, 2009).

1.4 Health and Epidemiological Profile

Kenya is facing an epidemiological transition where Non Communicable Diseases (NCDs) are on the rise. Accidents, hypertension and diabetes pose a major public health problem as shown in Fig 1 (HIS, 2013).

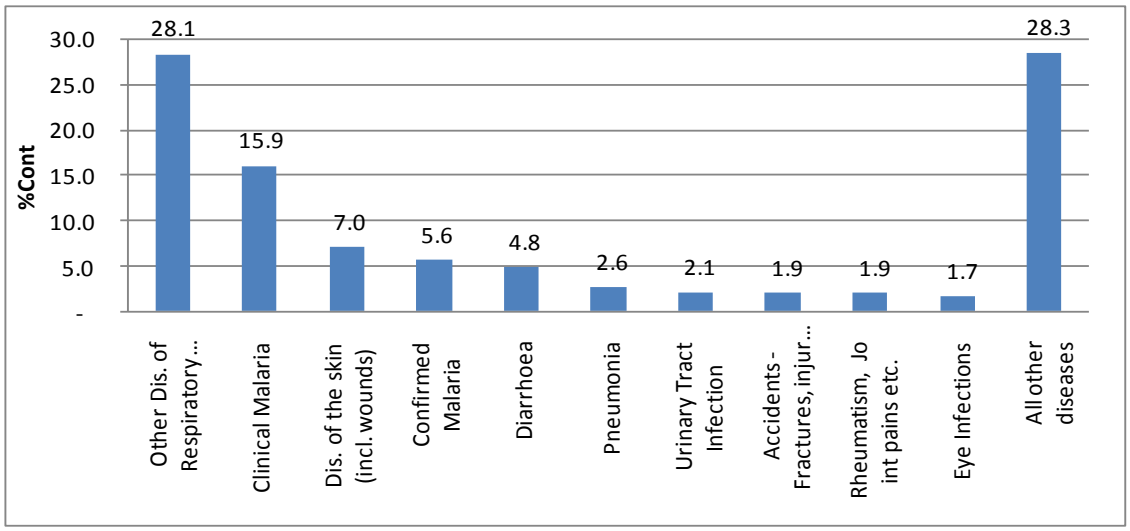
Figure 1: Non- communicable Diseases distribution in Kenya, 2012



Source: HIS 2013

Communicable diseases continue to burden the health care system with diarrhoea and pneumonia being among the top 10 leading causes of outpatient morbidity (Fig 2). Malaria remains among the major cause of morbidity although a decline in cases has been witnessed from 2010-2012(see Annex 2).Gender based violence to both males and females is increasingly becoming a major concern with 29,197 cases reported In 2012(MOH 2012b, MOH 2012a,HIS 2013). WHO Health Statistics (2012) indicates that HIV/AIDs prevalence in Kenya is at 3664/100,000 while TB prevalence is 283/100,000 (HIS, 2013).

Figure 2: Leading Causes of outpatient morbidity in Kenya 2012



Source: HIS 2013

1.5 Health system overview

Kenya has a decentralized health system which is regulated by the central and the county governments through MOH at the central level and the County Health Management Teams (CHMT) at the county level (GOK, 2011; GOK, 2010a, GOK, 2012). Health services and interventions are provided as defined by Kenya Essential Package for Health (KEPH) (GOK, 2011). There are over 9,000 health facilities in Kenya with the government owning 52% while 48% are privately owned and are all categorized under the KEPH levels (MOH, 2012a; MOH 2012b). The Community (level 1) is the foundation of service care delivery. Level 2 under which dispensaries and clinics fall constitutes the largest proportion(81%) of health facilities with a total of 7593.Level 3 ,the health centres form 13%(1266) while district, sub-district and private hospitals in level 4 constitutes 5%(422) . Level 5 and 6 are teaching and referral hospitals offering tertiary and highly specialized care at the national level. Moi Teaching and Referral hospital is situated in Eldoret while the other 3 level 6hospitals i.e. Kenyatta, National Spinal Injury and Mathari Psychiatry hospitals are situated in Nairobi(HIS,2012c;MOH, 2012b;MOH,2012a;MOH,2012b). Other Ministries involved in healthcare delivery include Ministry of Local Government who run health facilities under their jurisdiction in Nairobi and Mombasa Counties and Ministry of Defence who run the Armed Forces hospital and a few dispensaries which serve both the civilians and the Military staff. Other GOK parastatals affiliated to the sector include National Hospital Insurance Fund (NHIF), Kenya Medical Research Institute (KEMRI) and Kenya Medical Supplies Agency (KEMSA).Included in the sector are implementing partners like Faith Based Organizations (FBOs), Non-Governmental Organizations (NGOs) who are classified either as private-for-profit or private-not-for-

profit. Development partners supporting the sector include international partners who offer either technical assistance or funding for interventions either directly or indirectly through implementing partners (HIS 2011, MOH 2012b, MOH 2012a).

The national and county governments operationalize the health agenda by providing leadership and stewardship within the two tier government as stated in the constitution and as defined in the health legal framework (MOH, 2012a; GOK, 2009). All stakeholders in the health sector are involved in the operational and strategic planning which ensures functional coordination and partnership both at the national and county government hence their continued involvement in HIS reforms.

Table 1: Health facilities by KEPH levels and type

Kenya essential health package levels	**Type**	**Number**	**Proportion in%**
Level 1	Community	8000***** community units(CUs)	
Level 2	Dispensaries and clinics	7593	81
Level 3	Health Centres	1266	13
Level 4	District, sub-district and private hospitals	422	5
Level 5	Provincial General Hospitals and high level private hospital	16	0.2
Level 6	Referral and teaching hospital	4	
Total		**9301***	

Source: HIS Master Facility List, 2012

NB:-CUs not included in the total health facilities*

On human workforce development, Ministry of Health (MOH) lacks a skills inventory for health workforce both for in-service and pre-service training while the production of health workforce is unlinked to the sector's service

need (MOH, 2012b; MOH, 2012a; MOH, 2008; GOK, 2010b).However, staffing norms have been defined to guide the new counties on distribution of health workforce based on services and workload as defined in KEPH.

Kenya's GDP per capita is USD 478.22 while Total Health Expenditure (THE) is 5%.Households are the highest contributors to health expenditure contributing 40% out of pocket (OOP).Donors contribute 30% while the government's contribution through taxes and health insurance is 30%(WB, 2012; WHO,2011; GOK, 2010d;MOH,2012b; GOK, 2010b;).

Inefficiency in health products and technologies as well as inadequate funds pose a main challenge to Kenya's health system .MOH is spending USD 1.1 per capita on essential medicine in the basic package which is below the USD1.5-2 WHO estimates with 50% of the products being finance by development partners. The sector spends USD 19 billion on health products which is only 21% of the required investment indicating a gross under -investment. The high financial gap is attributed to the cost of TB drugs, ARVs and new vaccines introduction. Public sector consumes 74% while FBP/NGOs and private sector consumes 19% and 7% respectively. Primary care facilities consumes 60% of the health products with the community consuming 3%,County hospitals 30% and national hospitals 7 % (MOH, 2012b ;GOK, 2010d).

CHAPTER 2: PROBLEM STATEMENT, JUSTIFICATION, OBJECTIVES, METHODOLOGY AND LIMITATIONS

The problem statement,study justification and objectives will be discussed in this chapter. The methodology used in the study will also be outlined as well as the study limitations.

2.1 Problem statement

Determinants of health, health status and health system functioning are the main domains for measuring progress in health information systems.For each of these areas, core indicators should track progress and assess change in order to measure progress and assess performance in the health sector (HMN, 2008b).To do so, it is critical to have a well - functioning HIS which provides decision and policy makers with reliable health information. To ensure that Kenya's health sector is informed by accurate, reliable and timely health information both for evidence-based decision-making and policy formulation, GOK together with partners have invested in health information systems strengthening in response to Health Metrics network (HMN) assessment and recommendations (HIS,2008).

Despite the HIS structural design continued improvement on information completeness, weaknesses on accuracy, timeliness and reliability of the information still remains a challenge which could be attributed to behavioural factors influencing HIS such incompetence in HIS tasks and lack of data quality checks skills amongst health workers collecting health information which compromises data quality(MOH,2010; HIS, 2011).Information analysis, dissemination and use are not well embedded in the sector denoting supervision and training gaps as organizational factors(GOK,2010b).Use of information sources beyond routine health management information and data remains weak as revealed by recent reviews as a result of poor data quality or the system not focusing on the country's information need due to poor planning and management(MOH, 2012a; GOK 2010b; HIS, 2011).Data demand and use by health managers, decision-makers and other users in the sector to guide policies, plans and interventions is still weak despite data availability and eased access through District Health Information System(DHIS)indicating lack of promotion of information culture(GOK,2010b;HIS,2012c;HIS,2012b;Aqil,2009).To improve efficiency in health care delivery, an effective HIS which is adequately linked to other statistical units through user-friendly data capture systems is critical(DCPP,2004). Linkage with population based information systems e.g. Kenya National Bureau of Statistics (KNBS), vital statistics, health surveys, national health accounts, research and academic institutions have also been a challenge (HIS, 2012c). GOK and HIS stakeholders

collaborative effort of strengthening the national health system through these health information systems and sources is lacking (MOPHS, 2009; HMN, 2008a; HIS, 2013a). Inadequacy of HIS linkage between population and institution based sources not only undermines the principle of building upon existing initiative and systems but also impedes stakeholders involvement (HIS, 2013a).

2.2 **Justification**

There is need to review HIS performance after the implementation of some HMN assessment 2008 recommendations. HIS technical, organizational and behavioral determinants play a major role in the system's success or failure. A focus on organizational and behavioral factors helps in understanding how the organizational (health system) structure and individuals' behaviors influence HIS hence affecting health system performance (HIS, 2013b; Aqil et al, 2009). Identifying reasons for low data demand and use despite implementation of DHIS2 is critical. Choo et al, 2006 states that in a large professional organization like MOH, the ability to access, share and process information is essential to the organization's operation. Many studies have mainly focused only on technical factors hence the reason for not focusing on them in this study (Aqil et al, 2009).

HIS policy and which was ending in 2014 and HIS Strategic plan which ended last year are currently being revised to be aligned with the new constitution and devolved system which has two tier level of government i.e. at the national and county level. No review has been done to establish the two documents' impact on HIS operations. The study will therefore inform the review of the policy and the development of a second HIS strategy (HIS, 2008b; HIS, 2009; HIS, 2013a; HIS, 2013b).

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2.3 Objectives

2.3.1 General objective

To critically analyse Kenya's Health Information System in order to make recommendations to the government and stakeholders on HIS further improvement.

2.3.2 Specific objectives

1. To assess HIS performance in relation to HMN assessment recommendations
2. To describe and analyse the organizational and behavioural factors influencing HIS performance
3. To analyse HIS enabling factors in other countries

4. To make recommendations to the government and key stakeholders on further improving HIS performance

2.4 Methodology

2.4.1 Study design

The thesis is a descriptive analytical study based on literature review.

2.4.2 Search strategy

Scopus, Google Scholar and PubMed, KIT and Vrije University libraries were used for access to published articles and journals .World Health Organisation (WHO) database was accessed mainly for HMN documents while other organization websites e.g. GOK and Ministry of Health website was used for government documents. Measure Evaluation website was also accessed. Unpublished reports and reviews e.g. quarterly, supervisory regional, assessments and reviews were also accessed from the MOH offices from the professional colleagues who were also consulted for information. DHIS data base was also used for retrieval of required data. For inclusion criteria, only studies from Africa, Asia and Middle East all in English language and conducted from 2000 to date were used.

2.4.3 Key words

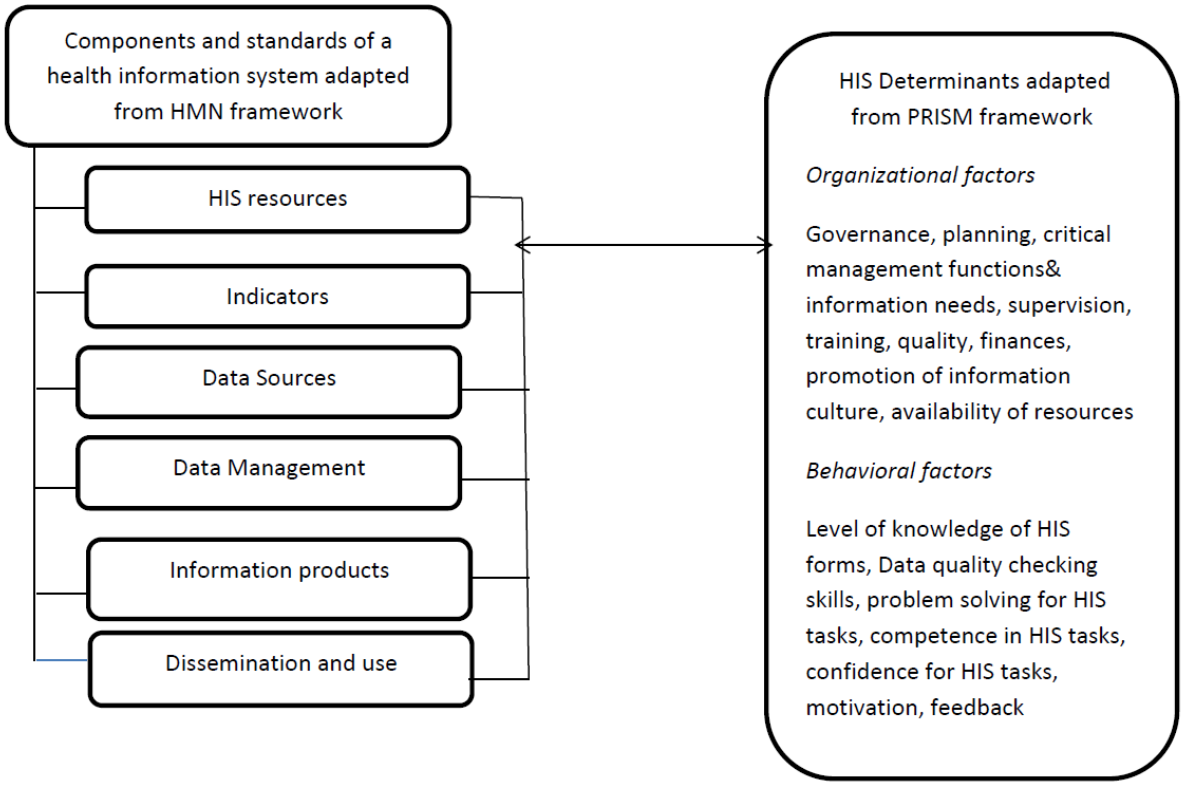
The search strategy use a combination of key words: Kenya Africa, Asia, Middle East , health information, health systems, health metrics network, routine health information systems, information systems, health management information system, monitoring and evaluation, population based information systems, vital registration, indicators, organizational factors, behavioural factors, governance, data management, information products and district health information system.

2.4.4 Conceptual Framework overview

The conceptual framework to guide the study is a combination of Health Metrics Network from WHO (see annex 3) and Performance of Routine Information System Management (PRISM) from Measure Evaluation frameworks (see annex 4). HMN framework was used in 2008 Kenya's HIS assessment and it is used as the universally accepted standard guide for health information collection, reporting and utilization (HIS 2008; HMN, 2007). The framework harmonizes and aligns countries' and their partners' efforts to ensure a sound and effective national health information system. It also provides a HIS strengthening roadmap (WHO 2008).PRISM framework is used for designing, strengthening and

evaluating routine health information systems (RHIS) and emphasizes on HIS performance by incorporating three performance determinants i.e. organizational, technical and also behavioural. It identifies strengths and weaknesses of HIS performance and allied factors which affect performance of a health system (Aqil et al 2010). I modified the framework to link the 6 HIS components i.e. HIS resources, indicators, data sources, data management, information products and dissemination and use to the behavioural and organizational factors (HMN, 2008b; Aqil 2010).

Figure 3: Conceptual Framework



Source: Adapted from Health Metrics Network (2007) and Measure Evaluation

2.5 Limitations

Analysing behavioural and organizational factors from other HIS data sources e.g. KNBS and vital registration, research institutions and universities was difficult due to limited access of information from these sources. There was a language bias as only articles written in English language were reviewed. Some articles had only the relevant title but no dates of publication or authors. Only a few studies from Kenya on organizational and behavioural factors influencing HIS were found hence the use of studies from other countries.

CHAPTER 3: RESULTS AND FINDINGS

HIS performance in relation to HMN 2008 assessment and recommendation report (HIS, 2008a) will be discussed in this chapter. Organizational and behavioral factors influencing HIS will also be described and analyzed.

3.1 Kenya's Health Information System Situation analysis

As a major pillar in health systems (WHO, 2007), HIS in Kenya is receiving attention from health partners and the government to facilitate the health system with information for evidence based decision making at all levels of healthcare hence the continuous reviews and assessments (GOK, 2010b; HIS, 2008b; MOH, 2007).However, MOH's contribution is mainly on manpower and structures through which the implementation of the recommendations is done with inadequate financial commitment. Although MOH coordinates monitoring and evaluation of NHSSP results tracking through HIS, insufficiently skilled manpower and poor infrastructure remains a major challenge to Kenya's health care delivery (HIS, 2008b; HIS, 2009; MOH, 2010).MOH is expected to provide leadership while working with partners to address the identified weakness in HIS but its leadership remain silent while some partners continue to impede the reforms. Delay in operationalization of HIS coordination committee (NHISCC) and lack of a legal framework points out poor leadership (HIS, 2012c;HIS,2013b).Health planners and decision-makers are not demanding data for use leading to management without NHIS data(HIS 2013b,HIS 2012c).

3.1.1 HIS Components

HMN defines a health information system to be made up of six components namely HIS resources, indicator, data management, data sources, information products and dissemination and use. The components interact with each other to provide better information.

a. HIS Resources

HIS resources which are also regarded as inputs are a prerequisite for its full functionality(HMN 2008b).The resources include finances, human resource, equipment, materials such as data collection tools, space, infrastructure(i.e. information, communication and Technology)(WHO,2007). Regulatory and legislative frameworks to guide HIS coordination which are also part of HIS resources are lacking although a HIS strategic framework and a policy exists (HIS, 2013c; HIS 2008a).

Kenya continues to operate with only 17% of the required health workforce even as the health infrastructure continues to grow. Poor skill mix and inequity in distribution of health workforce particularly in the arid and semi-arid regions have persisted (MOH 2009;MOH, 2012b).Attraction and retention of health workers mechanisms are lacking resulting into reduction from 7.35 health workers per 10,000 population in 2010 to 7.05 per 10,000 in 2012(MOH,2012b;MOH,2009).Based on the number of health workers projected as indicated in Table 2,HIS Division operates with only 12% of the required Health Records and Information officers pointing out a gap of 88%.Validity of the staffing norms remains questionable where a projection of 5,000 HRIOs is made yet strategy indicates only 1550 to be employed in a span of 5 years. There are only 2 epidemiologists out of the required 12 and not a single statistician with a projection of 200 leading to the question whether they are really needed in HIS (own observation).

HIS intends to implement DHIS upto the facility level ,an objective which may be far from being achieved due to lack of equipment e.g. computers at the facility level. The undertaking of implementing DHIS up to health facility level requires enormous resources since more health workers are required as well as training of those working in the facilities (DANIDA, 2012; HIS 2012b).Other shortages frequently experienced include collection and reporting tools .Breakdown and non- maintenance of computers and delays in sending airtime to HRIOs and disease surveillance officers for sending the reports is also a problem. Lack of office space at the district, in the hospitals and also at the national level is a major challenge affecting output of HRIOs who require space for computers and also for filing patient records at the facility level (HIS 2013c; GOK, 2007; HIS, 2012d).

Nonetheless, Kenya's HIS continue to receive technical and training support from the developing especially for DHIS implementation. Beneficiaries are mainly the national and district level who should scale down the training to the facilities but due to inadequate funds, most of health workers at the health facility level are not trained (DANIDA, 2012).HIS Annual Work Plan (AWP)2012 indicates that, out of the total Kshs.802, 111,400(USD9.4million) in the five year plan for HIS strengthening, government allocation is only 0.5 % i.e. Kshs. 4,982,000(USD 59,000). 797,129,400(USD 9million) of the total budget is from the donors who include USAID, WHO, Global Fund, UNICEF and CDC. Internationally, industry standards dictates that 3-10 % of project funds should go to M&E (IFRC, 2011) which is not the case in Kenya's HIS which acts as the MOH monitoring and evaluation unit. Donors fund specific program M&E units without involving the central HIS (MOH, 2006).

Lack of funds for printing HIS data collection and reporting tools affects service delivery. Immunization program was forced to lobby for funds to

print the revised tally sheets and immunization registers since they were introducing Pneumococcal Conjugate Vaccine which may not be enough posing a reporting challenges if the tools are out of stock (HIS, 2012c).

Table 2: HIS staff requirement

CADRE	Total Human Resource requirements as per staffing norms and standards	Existing staff currently to support NHIS	Gap	Staff to be recruited as per the strategic plan (2009-2014)
Health Records and Information personnel	4882	572	4310 (88.3%)	1550
ICT Officers	235	8	227 (96.6%)	20
Statisticians	221	0	221 (100%)	4
Epidemiologists	12	2	10	3
Public Health Specialists	4	0	4	1
Health Economists	2	0	2	1
Total	**5356**	**582**	**4774**	**1579**

Source: HIS, 2012

b. Indicators

HIS Division together harmonized the indicators which reduced from 86 to 46 which are still many (MOH; 2012b;HIS, 2011a;HIS,2011b).Although the indicators were selected according to international guidelines, the required public health functions as well as the minimum service standards,they do not capture specific information on important determinants of health e.g. risk factors on non-communicable diseases(NCDs) which in increasingly becoming a public health problem in Kenya(MOH,2012b). Consideration of global health status was not done given that NCDs are now a global health problem with 66% of deaths due to NCDs (WHO, 2010). However HIS being the custodian of indicators has contained attempts from disease specific programs like Malaria, TB and HIV to sneak indicators (HIS, 2012b).

Percentage of fully immunized children is taken to measure the government commitment to health instead of using the percentage of children under 1 year who have received a third dose of DTP3 which measures the strength of public health system in providing health services(Loren et al,2006).

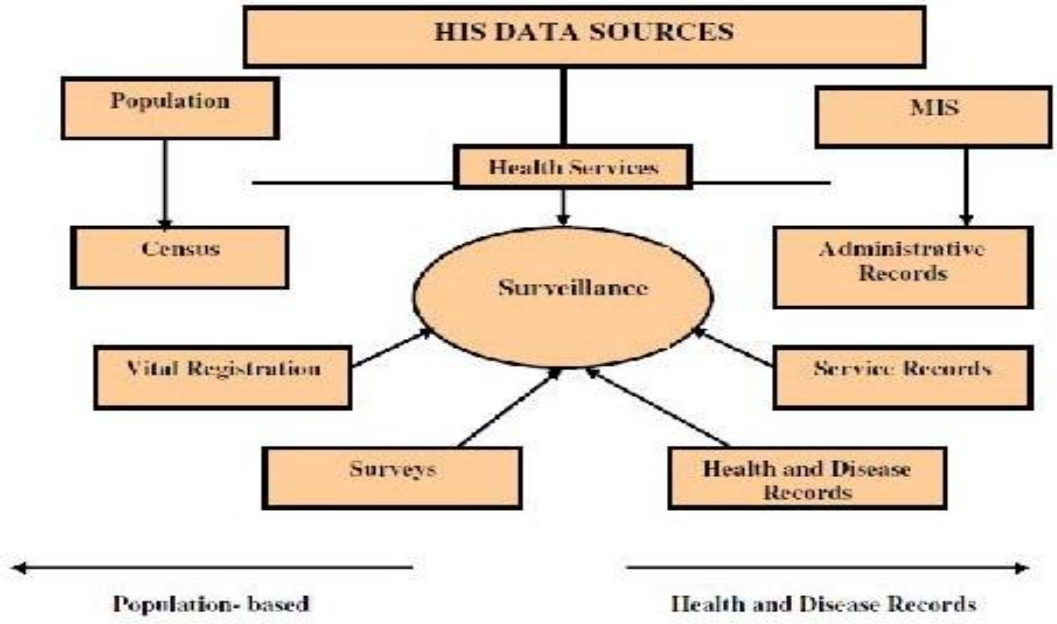
Given that the health system faces challenges notably health workforce shortage, some of the indicators may not be achievable hence becoming a burden to the already overwhelmed health workers e.g. number of health facilities with minimum staffing norms given the staff shortage as earlier discussed.

c. Data sources

HIS data in Kenya is mainly generated from health institutions from both private and public health facilities, population based sources through census collected by KNBS or the National Coordinating Agency for Population and Development (NCAPD) and vital registration through Registrar of Persons office which records deaths and births (HIS, 2009a). Integration between the data sources exits only between HIS sources within MOH i.e. epidemiological data on morbidity and mortality collected through routine health information systems (service delivery), disease surveillance systems (case reports and notifications), logistics management information systems (commodities and drugs) and human and financial management information system (HIS,2008b). Other sources of institutional data include police records (violent deaths and accident reports) and occupational records (work-related injuries reports) (HIS 2008a; HIS 2012a). Research institutions like Kenya Medical Research Institute and universities are also part of HIS data sources collecting research data (MOH, 2012b; HIS 2008a). Linkage and data sharing between population and information based systems is weak as data is not shared routinely as it should be but it's only provided only on request (HIS, 2008b).

Use of research in advocacy and policy making in health is still low despite a lot of data being collected from health research (HIS, 2013c).A proposed National HIS Coordinating Committee constituted of various statistical institutions, MOH and stakeholders to strengthen HIS by providing technical guidance on data management from various sources has not been achieved despite several meetings held to deliberate on the same (NHISCC meeting minutes, 2011).

Figure 4: HIS data sources



Source: WHO- Health Metrics Network, 2006

d. Data Management

Collection of data is done using standardized harmonized tools. However, health facilities face frequent stock-outs of the data collection tools. The National HIS infrastructure assessment conducted country wide in November 2012 by MOH in conjunction with USAID revealed that only an average of 67% health facilities were reported to have all data collection and summary tools (HIS ,2012d)

Health facility summaries are sent to the district before 5th of every month where data entry, storage, analysis and interpretation is done at the district level by the DHRIO through DHIS (HIS, 2012e). Health programs upload their data summary tools for program specific indicators to the DHIS (HIS, 2013b). Although HIS has developed facilitators' guides to train health workers especially at the health facility level on basic data management, the training is yet to take place (HIS, 2012e; HIS, 2012c).

Coding of inpatient data using the WHO's International Coding of Diseases reference books (ICD-10) is done in very few hospitals yet it should be done in every admitting health facility (HIS, 2012c). Vital registration of births and deaths is still very low and causes of death are not coded due to lack of institutional capacity. Disease surveillance data is collected

weekly by the disease surveillance officers, sent to respective programs on weekly basis for disease trends computation (DDSR, 2012).Reporting from the sentinel sites is however not consistent e.g. Malaria program receiving only 10 weekly reports at an average out of the 33 expected reports from the sentinel sites from malaria epidemic districts (DOMC,2012).

To ensure data quality, national data quality assurance protocols have been developed but health programs e.g. Malaria program continue to use different approaches without involving central HIS resulting into duplication (HIS, 2012f).

e. Information products

DHIS has been implemented as the national data repository at the district level and in all referral and district hospitals (DANIDA, 2012).Plans to roll it to health facility level are underway with pilot being done in a few high volume health centers in all the 47 counties (HIS, 2012c).However, inadequate HRIOs who are currently deployed upto district level to manage the data up at the facility is yet to be addressed. Although DHIS tracks completeness and timeliness of reports from heath facilities, there are still reporting gaps especially from the private health facilities. Inconsistency in reporting and non-reporting is still being experienced despite a HIS policy being available to guide HIS activities (GOK, 2010b).A facility will report surveillance data for 2 weeks , then fail to report in the third week and in the fourth week , data for the previous week will be included, compromising quality data (HIS 2012b).

All districts are expected to achieve a 100% in reporting to HIS but from the DHIS Enhancement report,2012, only 72% of the districts who achieved over 80% in 2012.Discrepancies on data sets among data sources are being reported both at the national and the district level, despite the source of data being the same e.g. number of patients tested for malaria cases may not tally from IDSR, lab information system and HIS and yet the source is the same i.e. the lab register indicating poor data quality(HIS,2012b; DOMC,2012).Data validation checks are not outlined within the sources(HIS,2013a).Parallel reporting from programs due to donor influence is still a challenge despite DHIS implementation as the national data repository .Malaria program have a reporting system Malaria Information Acquisition System(MIAS), which is run by Management Services of Health(MSH) who have employed a data clerk to be entering the data from the malaria program yet the 2 HRIOs in that office are entering the same data in DHIS(DOMC, 2012; GOK, 2010b; HIS, 2012c).

Information products like reports and publications are not available due to failure to print. The Data Demand Initiative(DDI) in the DHIS where such reports are archived for access is no longer active.

f. Dissemination and use

Dissemination is mainly done within the health sector with no consideration of the users outside the health sector(MOH ,2012b).Only HIS users with access rights can access the data from DHIS which limits the dissemination to those without the access rights (DANIDA , 2012). Users without access to DHIS have to rely on DHRIOs to access the information. HIS annual reports are upto date since 2009 unlike before the HMN assessment when there used to be a backlog of even 3 years e.g. the HIS 2007 annual report was a 3 years backlog report (HIS, 2007).That notwithstanding, HIS annual report does not reach all the healthcare delivery levels as expected especially at the health facilities, which is attributed to poor distribution and dissemination (HIS, 2012c). Health programs also produce their annual reports or quarterly bulletins which are disseminated to other programs and stakeholders (HIS, 2012b).Dissemination workshops to the lower levels are not being organized. Quality of the report contents is not validated e.g. HIS 2012 report is missing a lot of important health indicators e.g. on HIV prevalence which limits the use of the report (own observation).

Information use among district health managers have improved since they have to use data from DHIS to set district AWPs and upload them to DHIS (Various DHMTs Reports, 2012). However, demand and use of data by health workers at the point of production remains low (HIS, 2009a; MOH 2012; GOK, 2010b).Feedback mechanism is lacking especially from top to bottom (HIS,2012c). Health workers from the facilities do not regularly attend the quarterly or monthly meetings due to lack of transport, hence missing out in the feedback meetings (HIS, 2012b).

DHIS has Data Documentation Initiative component where all reports and publications from MOH and other HIS data sources can be shared but it's not operational (HIS, 2012b; DANIDA 2012).Master Facility List (MFL), a comprehensive list of all health facilities with a unique identifier for every health facility plays a vital role in information dissemination as it compares health facility performance longitudinally in every KEPH level through the DHIS link. Nonetheless, regular updates are not being done and capacity building at the health facility level is yet to be completed (HIS, 2012c).

3.2 Health Information Systems Organizational and Behavioural Factors

The section will describe and analyze organizational and behavioral factors influencing HIS in Kenya. The discussion will be guided by the modified conceptual framework.

HIS organizational factors include governance, planning, finances, critical management, training, quality, supervision, availability of resources, information needs as well as promotion of information culture. Behavioural factors include level of knowledge of HIS forms, competence in HIS, problem solving on HIS tasks, quality checking skills, confidence in HIS tasks, feedback as well as motivation. According to Aqil et al (2007) these factors affects HIS performance and are interlinked.

3.2.1 HIS Resources

a. Organizational Factors

Kenya, like many African countries have been implementing health sector reforms aimed at improving health care delivery (HIS in Africa n.d). The donor-driven reforms which include decentralization of HIS and efforts to integrate all health information systems were introduced by multilateral financial organizations e.g. World Bank to African countries as part of public sector reforms (Roberta, 2009). In his study on HIS in Kenya, Roberta states that sustainability of HIS reforms in Kenya have been a challenge due to verticality in donor funding to the HIS in specific health programs with little or no involvement of the central HIS. He further states that selective funding destabilizes HIS policy implementation and encourages verticality in health information systems. Lack of a regulatory framework to enforce the policy indicates poor governance. Inadequate allocation of funds to HIS from the government can be attributed to poor planning and poor policy implementation which makes HIS in Kenya heavily donor dependent creating uncertainty in sustainability of the gains achieved since the implementation of the HMN assessment recommendations (Roberta, 2009; HIS,2012c). Inadequate health workforce especially in HIS management is due to inadequate resources, lack of motivation as well as inadequate retention (HIS, 2013c). The World Bank embargo to employ caused a serious gap in HRIO staffing yet there are many who have qualified and training is on-going (HIS, 2013b). As discussed earlier, The staff projection indicates that models used internationally like the Workload Indicators for Staffing Needs(WISN) to determine the number of health workers required based on the workload and compared to the staff outputs are not being used by MOH which is as a result of poor planning. Lack of office space and for HIS staff is attributed to poor planning and management. Although district health information offices are all equipped with computers, maintenance is a challenge due to lack of supervision.

b. Behavioural Factors

Poor filing and retrieval of patients' files affects the competence of HRIOs as they cannot perform their HIS tasks comfortably due to inadequate working and storage space in the hospitals (HIS, 2013b; HIS, 2012d).The time the HRIOs spent looking for patient's files in a non- conducive working environment can lead to poor performance due to frustrations which go with the working environment. However, HIS Vision 2030 flagship project targets improvement of infrastructure which includes office space. NHSSP (2012) also indicates that the government intends to construct 19287 units which include outpatient, inpatient, administration, pharmacy and health records departments as physical infrastructure investment.

Lack of HRH retention and attraction strategies e.g. incentives in terms of promotion for health workers performing well in reporting, affects the motivation of health workers who are collecting data daily amid the overwhelming workload (GOK,2010b;MOH, 2009).DHRIOs and District Disease surveillance Coordinators(DDSCs) receive airtime money to facilitate them in sending the reports(DDSR,2012). However, the money does not come regularly forcing them to use their own money which is demotivating. It's not possible for health workers to keep on spending their money from their meagre earnings on government services yet there are no refund mechanisms.

3.2.1 Indicators

a. Organizational factors

Indicators on percentage of health facilities with minimum staff norms lack utility criteria (Charles L. &Alec M., 2004) hence becoming unachievable. Given that Kenya have a huge HRH gap as discussed earlier, it is difficult to have minimum staff norms in all health facilities (MOH, 2009; HIS, 2010; Muga et al, 2004) .The information need as an organizational factor the indicator on minimum staffing norm is providing can neither be acted upon at local or at the national level until staffing is improved at all health facilities.

b. Behavioural factors

Indicators on number children under and over five years (see fig.4) have continued to confuse the health workers who lack skills in interpreting. Instead of targeting to reduce the number of children treated for malaria, they set a higher target by increasing the number of children they will treat for malaria indicating incompetence in HIS task and also lack of knowledge on HIS forms which collect the data for these indicators (MOH, 2011).Lack of indicators on NCDs denies health workers knowledge on the

show to calculate the NCD targets yet they are seeing patients with those conditions. The need to know more about indicators so that they can participate in prevention by educating he community and patients (WHO, 2010).

3.2.2 Data sources

a. Organizational factors

Coordination mechanisms, cooperation among the staff working in HIS from all data sources, sharing of responsibility as well as commitment are management and planning functions which affects HIS as internal organizational factors (Nurdin, Stockdale, & Scheepers,2012) .However, fragmented and uncoordinated HIS organizational structures affect HIS activities e.g. information sharing among the systems (HIS, 2009b). Delay in formation of the NHISCC indicates a governance problem within MOH, KNBS and other stakeholders (HIS, 2009; MOH,2012a).There have been several meetings to discuss the formation of the committee but it has not yielded much(NHISC meeting minutes,2011).Lack of linkages among the data sources also indicates management gap.

Strong stakeholders participation in most of the data sources e.g. in population based surveys, HIS reviews and also in research has strengthened governance, partnership and collaboration especially at the national level where all stakeholders are involved in HIS activities e.g. in review of HIS strategy and policy (HIS, 2013b; HIS, 2012d).

b. Behavioural

Use of research for policy formulation and advocacy require all those involved to have knowledge on HIS forms and competence in HIS tasks since it involves data collections and analysis (HIS, 2013b). Data quality checking skills are also paramount since data quality will determine its use in advocacy and policy formulation as well as in evidence–based decision-making while using data from the research (HIS, 2009).A lot of resources i.e. time, money and also human resource are going into research. If the data is not utilized to inform policy and advocacy, researchers will be demotivated as well as donors who fund the research(Own observation).

3.2.3 Data management

a. Organizational factors

Non –printing of data collection tools indicates poor planning as well as lack of finances which affects the performance of the health system (HIS, 2012c)**.** Delay in training health workers on basic HIS is attributed to uncertainty in HIS funding since the item is not in AfyaInfo , the implementing partner's budget neither is thee printing of data tools which

indicates poor planning during the planning phase of the project both from the partner and MOH(HIS,2013b). Parallel approaches for data quality assessment is due to poor coordination, lack of collaboration between the HIS data sources indicating poor management (HIS, 2012f). However, increased reporting rates are attributed to training of DHRIOs on DHIS (HIS, 2012b).

b. Behavioural

As indicated in the NHIS infrastructure assessment report 2012, literacy in data management using information technology was lowest (below 50%) among clinical staff who included nurses at the health facility. Most health facilities are managed by nurses who are entrusted with data management yet they have low literacy on data management indicating their incompetence in HIS tasks and cannot solve problem for HIS tasks as well(HIS,2012c,HIS 2012d).

3.2.4 Information Products

a. **Organizational factors**

Poor governance is responsible for lack of a legal framework to enforce compulsory and comprehensive reporting by all health service providers to central HIS using standardized formats and reporting tools (HIS, 2009b). Due to lack of a regulatory framework as a governance component, parallel reporting from disease specific programs have continued inspite of DHIS implementation as a national repository (HIS, 2012c;HIS ,2012b).

b. Behavioural

Discrepancies in reporting from various sources indicate lack of data quality checking skills or insufficient knowledge in HIS forms leading to inaccuracy eventually compromising data quality.

3.2.5 Dissemination and Use

a. Organizational factors

HIS policy indicates that periodic reports and publications should be shared with all stakeholders through the available channels (HIS, 2009a). Poor enforcement of the policy due to weak HIS organizational structures is to blame for poor dissemination of information as the sharing does not happen neither is action taken to those who are obliged to disseminate. HIS strategy also indicates that forums for information sharing and dissemination will be conducted (HIS, 2013c).Poor planning and lack of resources to conduct the forums contributes to low demand and use of health information.

Promotion of information culture is lacking in HIS as access to information especially from DHIS has been limited to only those with access rights. However, as DHIS improvement continues, discussion is underway of provisions to be made for any user to access the data by creating an account (HIS,2012c;HIS 2013b).Nonetheless, apart from the users within MOH and the stakeholders, very few people are aware of DHIS or the right of access to health information indicating an information need gap(HIS,2013c). Feedback promotes information culture and acts as dissemination product (HIS, 2013c). Non-interaction between health care levels and lack of feedback mechanisms indicates lack of support supervision between the levels. Support supervision visits and district quarterly meetings are not regular due to inadequate funds (HIS, 2012c).

b. Behavioural

Data Demand Initiative non functionality and non-updating of MFL is as a result of staff turnover and the new staff do not be have the skills on how to update due to the delayed training on basic HIS(HIS,2012b).

CHAPTER 4: HIS ENABLING FACTORS IN OTHER COUNTRIES

HIS enabling factors in HIS components from other countries will described and analyzed in this chapter.

4.1 Resources

4.1.1 Organizational factors

Mugdha (2007) cites political influence in funds allocation as a health information systems enabling factor. Commitment to good governance increased funding from the government and enhancement of accountability mechanisms are required (Mugdha, 2007). As Zubeeda (2004) states in a case study on DHIS implementation in Andhra Pradesh State in India, both political and financial support from the Chief Minister's office played a key role in the success of the project hence improved access to health information to health workers who were mainly working at the community level. Training of university graduates as monitoring and evaluation officers in Botswana also helped in alleviating the inadequate staff challenge (Ladikwe et al, 2013).

4.1.2 Behavioural

Use of HIS data to set targets and manage resources indicates that the managers have confidence in HIS tasks and also have data quality checking skills to ensure use of accurate and reliable information which guides their planning and decision-making (Nielsen n.d) supports Krickberg (2007) also indicates that, HIS is not only a tool for collecting indicators but it is also closely linked to clinical, preventive practice and health management as well. Health workers in these levels require training and motivation as happened in Andhra Pradesh State in India where motivating health workers through training and empowerment in health information access helped them to understand the indicators and targets hence improving their knowledge and confidence in HIS tasks (Zubeeda ,2004) It indicates how better resources and political commitment in HIS can change information value and culture hence resulting in health workers appreciation and competence in HIS tasks as Zubeeda (2004) states.

4.2 Indicators

4.2.1 Organizational factors

Faced with the problem of non-reporting especially from marginalized rural hospitals, South Africa linked the hospital reporting system at New

Hope Hospital to the DHIS through a specific reporting form which was tracking inpatient indicators and resulting to improvement in reporting(Jaccuci, Shaw, and Braa,2006).

Verticality in reporting on indicators affects performance. Ethiopia encountered verticality problem in reporting even after reducing their core indicators to 105 but discussions continued with an intention to further reduce the indicators to 80 or 85 in an effort to control the verticality (HMN, 2007).

4.2.2 Behavioural

According to Loren et al (2006), measurability of any indicator depends on its adequate support by good quality data. South Africa study on New Hope Hospital revealed that the staff from the non-reporting hospitals were demotivated due marginalization. Interlinking their information systems with the national DHIS motivated them to report on specific indicators hence improved reporting rates (Jaccuci, Shaw, and Braa , 2006).

4.3 Data sources

4.3.1 Organizational factors

Networking of information systems makes interaction and information flow between data sources more viable hence better information sharing (Mercedes et al). Kumalo (2006) cited fragmentation in South Africa's HIS where systems were not integrated .However, South Africa census and vital registration records were highly adequate according to their assessment (SSA, 2009).In South Africa, staff at the Vita Registry were trained on using ICD-10 for coding births and deaths at the vital as well as coding of diseases as a diagnosis standard coding recommended by White Paper 1997 health reforms (SSA, 2009).

4.3.2 Behavioural

In South Africa, mechanism exists for verifying the completeness and consistency of HIS data from different sources at the district level ensuring data quality checks. A micro-data for public access to health information also exists hence creating awareness of HIS tasks to the public.

4.4 Data management

4.4.1 Organizational factors

Zambia trained health workers at the district and in some facilities on data management which improved service delivery and case management at the facility level (Malaria Consortium, n.d).

In a HIS assessment conducted using the PRISM frame work in Oyo, Kebbi and Niger states in Nigeria, lack of data collection and summary tools at the health facilities were reported. Local Governments Authorities (LGAs) also reported that their reports were not being entered by the State MOH (SMOH) where the DHIS is hosted even though they sent them on time. The SMOH also indicated that they didn't have funds for printing the revised HIS tools and had to rely on donor funds or the Federal government to print the tools (USAID, 2012).However, in Oyo state, State MOH pushed their agenda showing the importance of role HIS plays to the parliament and allocation for HIS was done indicating good governance (USAID, 2012).

Talat et al, (2011) in their study in Pakistan on HIS in basic health units indicated that analysis were being carried out at the health facility level in nearly 84% of reporting facilities with only 16% not performing analysis indicating health workers' high level analysis skills at the facility level, allowing health workers to analyse the information needs of their communities hence promoting information culture.

Uganda faces challenges in analysing vital registration data due to lack of basic analysis skills by the district staff leading to non-reporting of even basic frequencies of data being captured at the population office hence incompetence in HIS tasks. (HISSP Uganda, 2009).Uganda has however constituted a National Task Force on births and deaths registration which is fully functional. The task force is coordinated by the Uganda Registration Services Bureau (URSB) and consists of all stakeholders e.g. government ministries, NGOs and development partners hence strengthening vital registration management and governance functions (HISSP Uganda, 2009). This task force is an opportunity for putting resources together which can be used for capacity building staff from all data sources.

4.4.2 Behavioural

Lugho (2008),in his study on DHIS performance noted that, despite the software being introduced in Tanzania in 2002, assessment done five years later indicated that although its reliability was high, the usability was very low due a mismatch between online and paper-based data entry forms .Those doing data entry were frustrated since the electronic tools were designed differently from the paper-based once which they were using for data collection and summaries demotivating them in performing HIS tasks. However, retraining of health workers resolved the issue making the health workers develop appositive attitude towards the system. Assumption were being made before that the staff automatically

knew how to operate the system yet the forms which were in English were translated to Kiswahili, Tanzania's national language. Health workers became competent and had confidence in their HIS tasks (Lugho,2008)

Asangansi (2012) in a Katsina state study in Northern Nigeria, states that HMIS remained dysfunctional despite setting up of administrative positions and employment of staff. He reported that HMIS forms were frequently unobtainable at health facilities, health workers lacked skills on how to fill the forms and the filled forms were not submitted which demotivated them hence the lack of confidence in HIS tasks. However, continuous training addressed the challenge.

4.5 Information Products

4.5.1 Organizational factors

South Africa's National Health Act mandates the National Department of Health to coordinate and facilitate the establishment, implementation and maintenance of health information systems by all administrative levels including the private sector in an effort to create a comprehensive NHIS. The Act also stipulates the types of data to be collected and submitted, the manner and format in which and by whom they should be compiled and must be submitted to the National Department of Health (SSA, 2009).Existence of such an Act provides good governance to HIS activities and also strengthens HIS mandate and provides regulatory and legal frameworks where a legal action can be taken against those who fail to abide.

HMN 2006 assessment in Sierra Leone indicated that there were inconsistences and incompleteness in reporting some indicators which was due to lack of data quality assessment skills among health workers who requested to be trained on the same. Lack of regular supportive supervision by the DHMTs due to lack of funds also contributed to poor data quality. Coverage of above 100% reported by district based on vaccines administered in immunization was attributed to inaccuracy of the local population figures (HMN, 2006).Use of Village Heath Teams to register household for the exact population figures resolved the issue.

4.5.2 Behavioural

Adjei (2005) states that one of HIS misgivings revealed by its assessment is the incompleteness, doubtful quality and untimeliness which affects the use of health information and frustrates managers when in need of information. They cannot solve problems of HIS tasks due to unreliable information portraying them as incompetent. In the Andhra Pradesh State study in India, as earlier mentioned training motivated health workers

which in return created competence in HIS tasks and they were able to solve HIS tasks problems (Zubeeda, 2004).

4.6 Dissemination and use

4.6.1 Organizational factors

HIS dissemination goal is to increase the number of health information users and encourage information continual use for planning, decision-making or performance monitoring (Mercedes, 2005).
Community involvement in HIS is not only a form of dissemination of HIS but also an opportunity for community empowerment in decision making and planning on health issues affecting them. In Sierra Leone, community leaders were involved in the development of DHIS and were invited in all meetings held by Health Information Systems Program (HISP) together with health facility staff which strengthened not only the relationship among the health delivery levels but also ownership of the project(Kossi et al,2013).

Inadequate skills, non-reporting, lack of adequate data collection and reporting tools as described earlier, as well as sincerity in reporting all affect data quality as Matthew et al (2008) found out in the study on integration of HIS in Tanzania. Moreover, he indicates that a general mistrust in data accuracy, poor decision capacity and low initiative of data use affected the performance of the newly implemented HIS. Chaulagai et al (2005) also indicates that due to poor data quality, its use in planning and management of health services in Malawi was rare. Nonetheless, increased support supervision especially at the lower levels improved quality.

4.6.2 Behavioural

Shirin and Mashiero (2010) support the need to motivate by giving incentives inform of off days to health workers who collect large volumes of data. Giving an example from India where an auxiliary nurse spends more than 3 hours to systematize the data gathered during the day, they argue that the data is subject to unintended errors, misreporting as well as underreporting due to the heavy workload hence compromising quality leading to low demand and use. South Africa through HISP motivates staff to use health information through incentive systems (SSA, 2009).

CHAPTER 5: DISCUSSION

Discussion of my study findings is guided by the modified conceptual framework and the study objectives as described in Chapter 2.

HIS performance

The study found out that Health Information System in Kenya is heavily donor dependent with the government's commitment to allocate more funding far below the expected therefore threatening sustainability and ownership. Poor investment in HIS equally curtails health sector's strategic thrust of establishing a functional, vigorous, effective and efficient HIS as indicated in the HIS strategic plan. Although the government have provided human resource as part of its contribution to HIS reforms, it has to show more commitment to its financial obligation to continuously support HIS if the gains are to be sustained. The staffing projections were found to be unrealistic and were not done using the staff workload. The study also indicates that staffs are leaving the Ministry due to lack of retention and attraction mechanisms.

Given that 46% of Kenya's population live below the poverty line and the country's Total Health Expenditure is only 5% with household contributing 40% out of pocket, it may be an uphill task for the government struggling with other issues like high unemployment, high HIV/AIDs and TB as well as non-communicable diseases prevalence to invest in HIS as expected hence continued reliance on donors. According to the findings, current achievements in HIS have led to increased use of health information for planning and accountability at the district level. DHIS has eased information access and availability making it easier to monitor sector performance through NHSSP and program indicators. District Medical Officers are now using the information from the DHIS for target setting in their district Annual Work Plans. However, the study shows that the improvement at the district level has not translated to improvement at facility level as information demand and use at the point of production is still low.

Notably from the findings is the poor dissemination of health information and lack of feedback mechanisms and as Angel (2004) states, lack of feedback and interaction between health care levels causes HIS failure ultimately affecting its use. Non-functioning of the Data Demand Initiative as a dissemination initiative is detrimental to HIS performance.

As Damtew,2009 states, use of health information at the point of production helps the health care providers and managers in performance monitoring hence promotion of information culture which still remains implausible given that feedback mechanisms particularly from top to bottom hardly exist. Stansfied et al (2006) also states that use of information to create rules of action and indicates production of

knowledge used for evidence based decision making. Information products such as bulletins are also not available.

NCDs indicators as the study found out have not been included in the list yet NCDs are now a global health burden. Diabetes and Hypertension according to HIS data contributed to 31% of the NCDs in Kenya in 2012. Failure to measure their prevalence may be a health system burden as the prevalence increases yet the country in undergoing an epidemiological transition where the NCDs are becoming more prominent.

Stock-out of data collection and reporting tools which threatens the flow of data is still rampant in the health facilities. Although districts and major hospitals have been supplied with computers, maintenance is lacking. Even as HIS plan to roll out DHIS to the facility level, the study indicates a gap in capacity to handle the system at the facility level. During the development of the MOH M&E framework and Action Plan(2006), it was resolved that MOH through HIS will strictly control any premature addition of indicators since it will inhibit HIS and M&E functionality hindering MOH accountability(MOH,2006).

The study found that, the adhoc creation of indicators has been controlled. Nonetheless, HIS is confronted with another challenge of non-printing of the revised data collection and reporting tools which threatens the flow of data.Lack of linkages between institutional -based and population- based data, civil registration, research bodies and institutions of higher learning who are also collecting data on health sources affects decision making since HIS in MOH mainly base their decisions on routine data only and not capturing non –routine data. The study found that accessing non-routine data is done adhoc on request instead of information being routinely supplied from all the HIS sources to allow comparison between health system performance and the population.

According to the findings, HIS has over the years struggled with the management of inpatient data which is attributed to lack of enough HRIOs. Coding inpatient discharge notes using ICD-10 reference books is not being done as required in all admitting health facilities and as a result HIS is missing out in knowing the major causes of admissions which is major planning component of health interventions. Motivation is also lacking among HRIOs in terms of promotions and career development. The study also revealed that where coding is done, disease classification errors are exhibited which is attributed to invalid diagnosis, poorly coded primary diagnosis, age conflicting with diagnosis, diagnosis conflicting with anatomical sites as well as invalid and poorly coded procedures.

Organizational and Behavioural factors

The study also indicated that both organizational and behavioural factors are interlinked and affecting each other e.g. inadequate resources to train health workers on basic HIS will lead to lack of knowledge on HIS forms and eventually result in incompetence in HIS tasks. Level of knowledge on HIS forms, lack of competence as well as lack of confidence in HIS as behavioural factors influencing HIS is caused by lack of basic training on HIS. Resources for continuous capacity building on HIS to health workers are required as the system evolves according to both global initiatives and local health needs. A good outcome is a motivation to health workers as they can appreciate use of the acquired skills in solving HIS problems. Given that the Ministry is grossly understaffed with major gaps in HRIOs cadre, competence in HIS tasks which includes data management may remain a challenge for MOH to contend with.

HIS enabling factors from other countries

The study indicates that Vital Registration Department lack institutional capacity in coding of causes of death using ICD-10 as happens in South Africa, a challenge which is affecting their HIS tasks competence hence low registration of deaths. Due to lack of linkage between MOH and vital registration the problem has not been resolved as indicated in HIS Strategic Plan, 2009.Kenya can therefore learn from South African and offer training on coding of causes of deaths using ICD-10 books to the Vital Registration staff.

Nonetheless, it is as a result of poor governance, planning and lack of critical management as organizational factors that verticality in donor funding has continued according to the findings despite a HIS policy being in place. South African developed Parliamentary Acts for HIS policy which mandated everybody to comply in reporting to HIS and the enforcement which helped them address similar problems. If a Parliamentary act is formed through a legal system, those refusing to comply will be forced to do so.

Motivation is key in attraction and retention of health workers. Creating rewarding mechanisms will motivate the staff whether in training opportunities or through days off as South Africa is already doing. Assumption that health workers understands the data collection forms is also harmful and denies them an opportunity to learn new skills or update themselves as the study in Tanzania revealed. Designing the forms and programs in a language health workers can understand is equally important.

What has emerged from the study is that attempts to resolve this challenges by establishing a National Health Information Coordinating Committee to coordinate HIS activities has dragged its feet exhibiting a governance and policy problem which may be due to autonomy of some

sources e.g. KNBS who are generate income from the information they gather. Government's commitment to HIS resource mobilization is critical as happened in Oyo state in Nigeria as well as in Adhra Pradesh where the highest office supported HIS.

Conceptual framework

The Framework helped me in achieving the study objectives. However, it was not easy to find specific studies on the organizational or behavioural factors influencing health information. Another limitation is that the behavioural factors have left out so many behavioural aspects of an individual making it difficult to relate the individual's behaviour towards health information. The factors are not exactly focusing on the actual behavioural factors.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

This chapter will discuss the study conclusion as well as make recommendations.

6.1 Conclusion

The study set out to review Health Information Systems (HIS) in Kenya and analysed both organizational and behavioural factors influencing systems .It was based on the Health Metrics Network 2008 assessment report focusing mainly on the recommendations. It assessed and analysed the performance of the implemented recommendations and also analysed the possible reasons for non-implementation of those not yet achieved.

One of the significant findings emerging from the study is that both organizational and behavioural factors play a major role in HIS success or failure hence impacting health system performance. Although a lot has been achieved in HIS reforms, there are still gaps which require attention if HIS is to achieve its mandate. Investing in HIS both in human resources and finances is inevitable for the government if it expects HIS to provide it with quality information for evidence-based decision making ,planning, policy making , resource allocation as well as performance monitoring of the health system and progress measuring in the health sector. However, due other competing priorities in other sectors, the government may not manage to adequately allocate sufficient funds to HIS although it has made efforts in improving the allocation compared to what was there before the HMN assessment. HIS therefore has to continue relying on donor support.

The study has also shown that sharing of data from institutional based, population based and research institutions remains a challenge due to lack of linkages. However, HIS linkage among data sources may not be possible since some sources like KNBS are depending on the information they generate for financial survival. Nonetheless, formation of the proposed National HIS Coordinating Committee will help in creating forums for routine information sharing from all the data sources which will subsequently promote an information culture not only to other users at large but also among health managers and lower level workers where demand and use of information was found to be weak. Furthermore, dissemination and feedback has to be improved if information promotion is to be achieved. Memorandum of Understanding can be signed among the sources where they can share data even at a fee.

Equipment and office space are equally important for HIS to function. Data collection tools must be availed at the health facility to ensure continuity of treatment and staff provided with enough staff for their working comfort if they are to be productive.

Lack of legal and regulatory frameworks also emerged as a major setback to the implementation of the HIS policy and the HIS strategy which are two crucial documents which helps in standardizing the HIS operations in response to the KHPF and NHSSP and more importantly to Kenya's long term plan, the Vision 2030.The findings of this study suggests that if HIS can adopt some enabling factors being applied in other countries as alternatives , notably the motivation of health workers in South Africa and India by offering incentives and through trainings, develop Parliamentary Acts to enforce HIS policy like in South Africa as well as operationalizing the coordination committees like in Uganda, can impact on both behavioural and organizational factors hence improving performance in health system.

The study contributes to the existing knowledge of HIS performance by providing an insight of its performance after the implementation of HMN recommendations. However, major caveat to be noted in the study is that it was an analytical study through literature search. Use of data collection tools which go by the original frameworks if they were used in the study could have given more insights. Studies on organizational and behavioural factors influencing HIS not only in Kenya but also in Sub Sahara Africa were limited. Accessing information from other statistical constituents e.g. vital registration, KNBS or research institutions was not possible hence the use of HIS form MOH in most references.

6.2 Recommendations

For HIS to continue providing quantitative and qualitative data which is essential for identifying major health problems, evaluating health policies for planning health programmes and also for efficient management of health services, the following long -term and short- term recommendations are proposed to the policy makers in the government as well as to the stakeholders:

To the government (policy makers):

1. Both the national level government and the counties Government should ensure that all in management levels are using information for planning and management. Information culture should be promoted through performance based monitoring to increase demand and use of health information.
2. It is imperative that the government at the central level and the newly formed county level consider recruiting and deploying staff for HIS if it is to effectively function. However, the projections for staffing norms should be revised to address the health needs of the country by using internationally recognized models like WISN
3. Coordination of the fragmented donor funding to ensure that the money is channelled through central HIS ensuring that 3-10% of any project money in MOH is allocated to M&E for HIS use. County

governments should also allocate enough funds to the County health information systems in the new devolved sytem

4. Pending trainings on basic HIS should be hastened to ensure that health workers acquire necessary skills in data management which will motivate them to use the data at the point of production and all levels. Health workers from Private facilities should also be included in the trainings.
5. Government to spearhead the formation of the proposed NHIS as well as the National HIS coordinating committing(NHISCC) which should coordinate HIS operations and promote the linkage among the data sources as well as address other challenges like verticality in funding and reporting
6. An assessment of the HIS policy and the strategy to establish their impact on HIS performance is necessary given that the strategy is expiring next year before. The assessment will guide the development of the second one which already underway to ensure that it's aligned with the new devolved system as per the new constitution. A legal framework to regulate HIS operations is necessary if HIS is to succeed in its operations.

To the stakeholders (Including information users, other data sources, private care providers, NGOS and supporting partners):

1. Verticality and funding of HIS segments in health programs should be discouraged with the resources being channelled through HIS to benefit the entire system. Other systems like Vital Registration can benefit through trainings organized. Private health care providers should comply also with the policy to increase reporting for improvement of data quality.
2. Continued, collaboration and support in terms of capacity building, employment and finances is necessary if the gains in HIS reforms are to be sustained since the government's investment alone cannot sustain HIS if it was to serve all its users with quality data reliable for evidence-based decision making and planning.
3. NGOS and other stakeholders should team up with the government in creating awareness to the community and other users to market HIS as well as encourage them to access health information from DHIS to monitor the health sector performance. Community Health workers should be supported to do so at the community level as a way of disseminating information to a wider reach which will improve its demand and use instilling an information culture.
4. Further research is needed for continuous improvement of HIS before the new policy and strategic plan are developed. Midterm reviews for the policy and the strategic plan is necessary to measure the impact.

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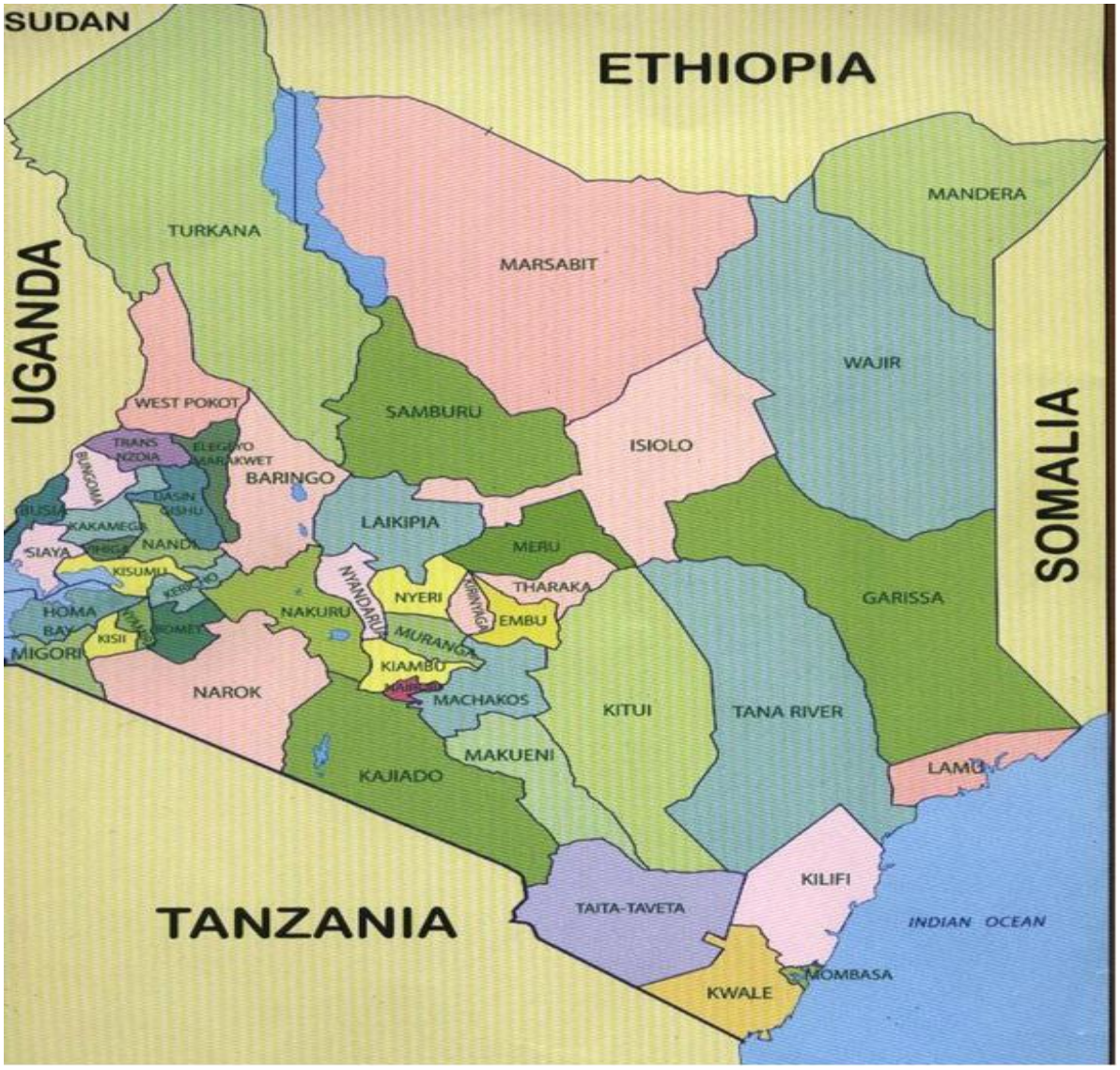
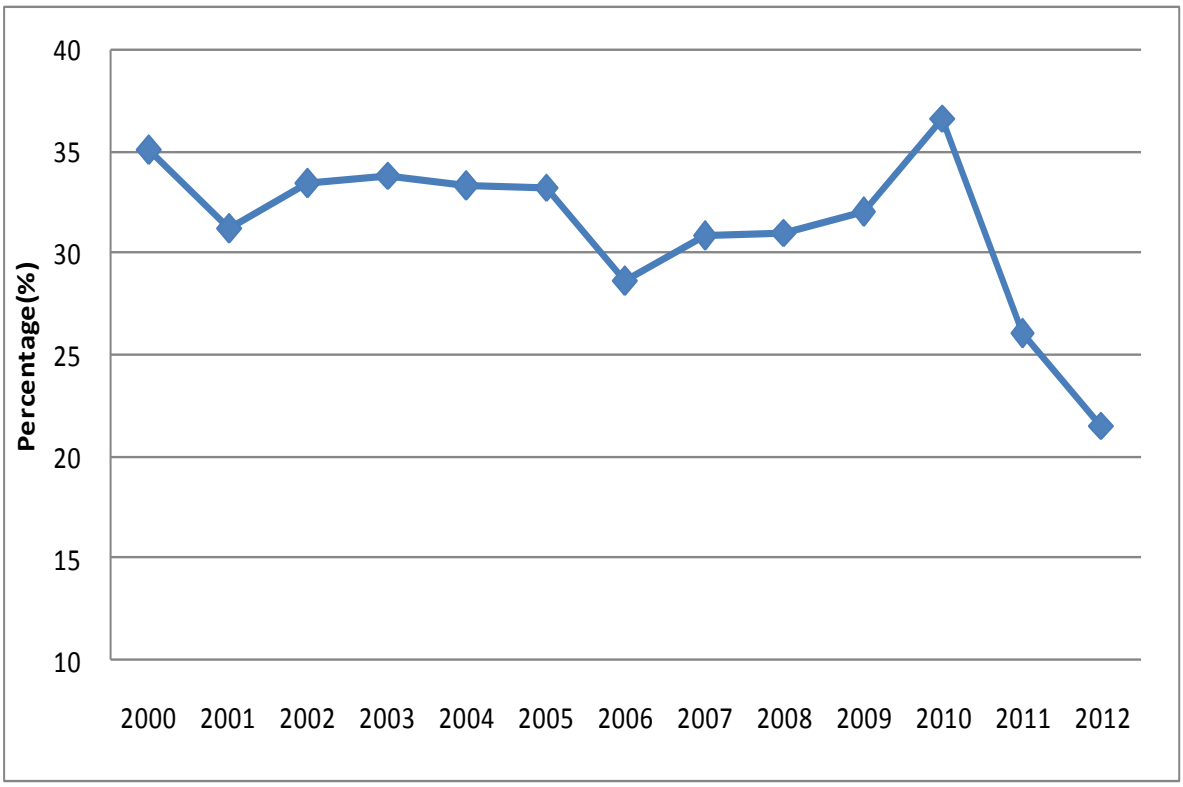
ANNEXES

ANNEX 1: MAP OF KENYA SHOWING 47 COUNTIES



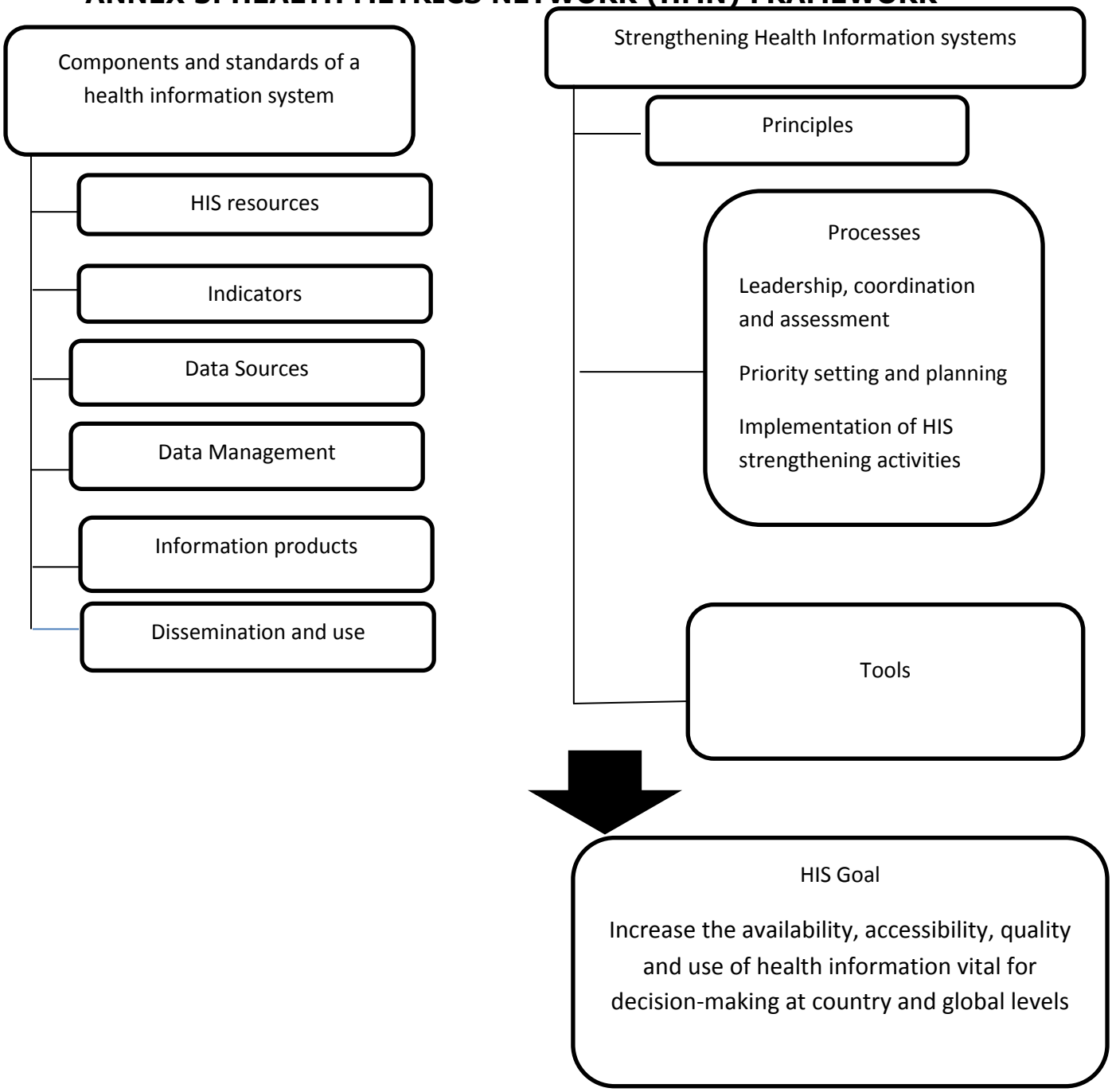
Source: Interim Elections and Boundaries Commission (IEBC),2012

ANNEX 2: OUTPATIENT MALARIA CASES TRENDS, 2000-2012



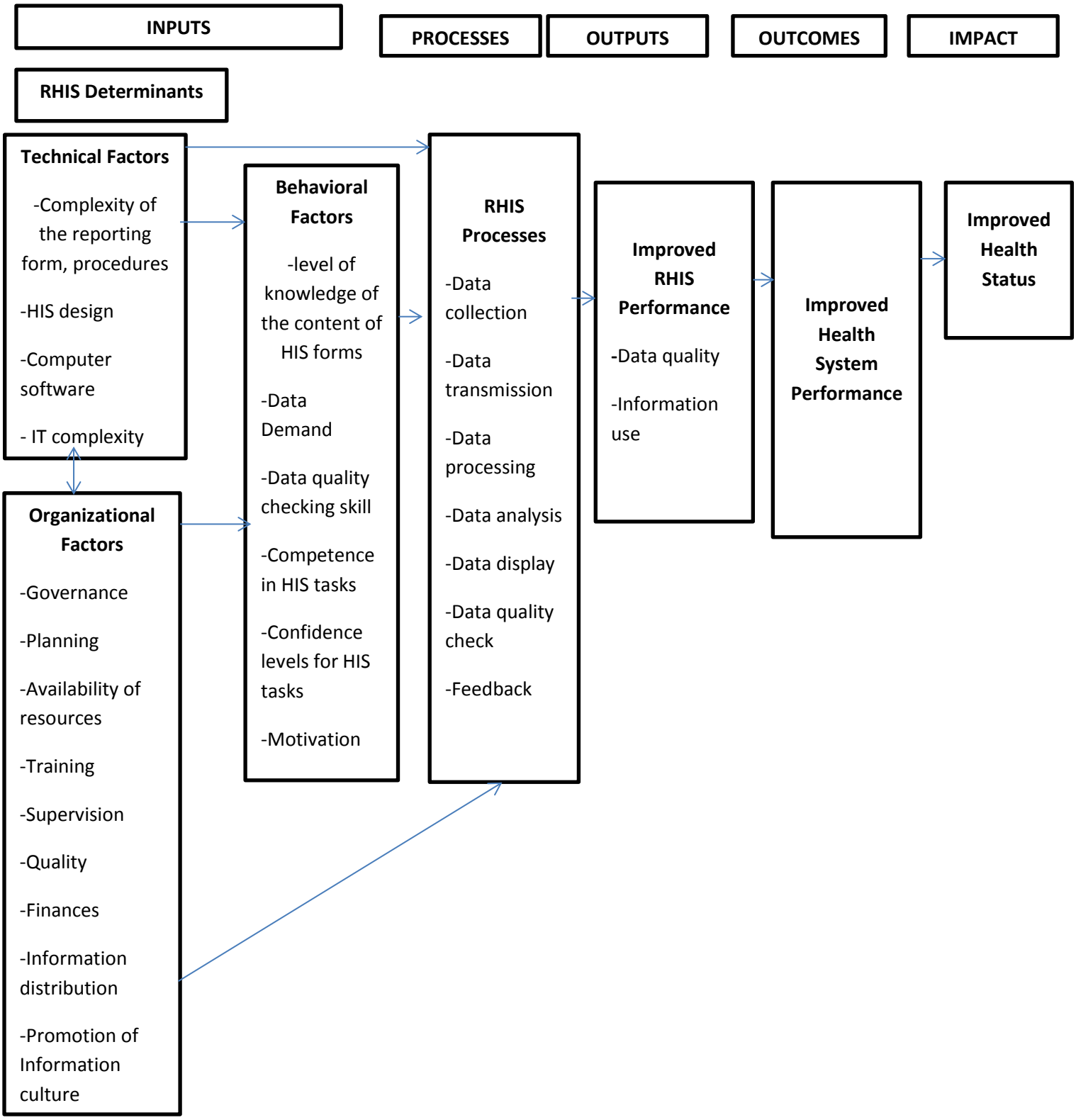
Source: Health Information System, 2012

ANNEX 3: HEALTH METRICS NETWORK (HMN) FRAMEWORK



Source: WHO, Health Metrics Network

ANNEX 4: PERFORMANCE OF ROUTINE HEALTH INFORMATION SYSTEMS MANAGEMENT(PRISM) FRAMEWORK



Measure Evaluation-Performance of Routine Information Systems Management Framework

ANNEX 5:HEALTH INFROMATION SYSTEMS ANALYSIS MATRIX

HIS analysis

HIS components	HMN 2008 Assessment Report findings	Major weaknesses identified	HMN recommendations	Achievements	Current challenges	Contributing factors to non-achievement	Specific contributing factors
Resources	44%	No funds allocated for information collection Resources program specific with no collective allocation to HMIS DHRIOs not supported to do supervision Inadequate health information professionals	Government to allocate resources to support performance monitoring and evaluation	Donor supporting implementation of recommendations National HIV/AIDs program supporting Electronic Health Records and Monitoring and Evaluation trainings	HIS donor dependent Government allocation to HIS not adequate	Organizational Organizational	Governance, planning, critical management and information needs
Indicators	70%	Too many indicators partners creating own indicators oftenly Data collection tools not harmonized and printed	Harmonize indicators	Indicators harmonized National level monitoring only national indicators as	Health programs not receiving data as expected to monitor program specific	Organizational/ Behavioral	Supervision, data quality checking skills, problem solving for HIS tasks, competence in HIS tasks,
		Staff overburdened by parallel data collection		health programs monitor their program specific indicators	indicators In-patient data not being coded	Organizational/ behavioral	motivation, training
Data sources	53%	No linkage among HIS systems No integration between HIS and other MOH sub-systems e.g. finance, Human Resource No coordination in assessments of HIS systems No common data repository	Create linkages between facility based, population based and administrative data Integrate HIS with other MOH sub-systems	National data repository (DHIS) developed and trainings done at national and district levels	Linkages yet to be established HIS trainings not yet done in some level 3 and 4 health facilities Fragmented assessments among data sources still being done	Organizational Organizational/ Behavioral organizational	Governance, critical management functions, planning, motivation Governance, planning, information needs
Data Management	31%	No standardized database Duplication of activities Inadequate training in data management and geared towards program specific No HMIS policy and strategic plan	Establish data warehouses at the national, provincial and district level Build capacity for health managers to enhance use of evidence during planning, budgeting	Warehouse established at the national and district level easing health information access HIS policy and Strategic plan developed	Training still program specific Impact of the Policy and strategic plan yet to be evaluated	Organizational organizational	Training, governance, resources availability

		Too many indicators Tools printing costly Lack of back-up No data warehouses at each level of health care delivery Manual data validation	and supportive supervision Capacity health information managers in and deploy them in all areas Support infrastructure to enhance efficiency of reporting Develop a HIS policy guidelines and a strategic plan Strengthening of the Monitoring and Evaluation framework of the health sector	Health facilities mapped using GIS and coded Master Facility List developed Training guides to train health facility level on basic HIS being develop Top health managers sensitized on DHIS All districts equipped with computers for DHRIOs and receive standardized airtime	Health managers not using data for evidence based decision making Majority HRIOs especially at the district cannot afford to pay for their fees No promotion for those who have acquired degrees Training on basic HIS yet to commence Data demand and use for decision making still low	Behavioral/ organizational Organizational/ Behavioral Behavioral/ Organizational Organizational Behavioral/ organizational	Motivation, lack of knowledge of HIS forms, information needs, confidence for HIS tasks, competence of HIS tasks, data quality checking skills, training, promotion of information culture, supervision Availability of resources, training, motivation Motivation, promotion of information culture, data quality,

							competence in HIS tasks , confidence for HIS tasks, supervision, training
Informatio n products	46%	Systematic data collection methods consistent only on population based data In-patient data not available Data from clusters follow different schedules and not timely Health facilities reporting not consistent Incompleteness and inaccuracy in reporting Private facilities not reporting Standard operating procedures not circulated Reporting tools stockouts Epidemiologists not hands on	Develop legal framework for HIS	Timeliness, accuracy and completeness being checked through DHIS Standard operating procedures for revised data collection tools circulated and health workers trained Partners supported printing of revised tools	Legal framework yet to be developed Inpatient data still a challenge as coding is not being done Some private health facilities still not reporting No government allocation for printing tools	Organizational Behavioral/ Organizational Organizational/ Behavioral Organizational	Governance, critical management and information needs, availability of resources, finances, Supervision Availability of resources, governance , planning, critical management

		Weak data aggregation and analysis HRIOs lack career advancement		2 epidemiologists deployed at HIS national office Health Information managers now being trained at a degree and Masters level for career development with only a few from HIS national office securing sponsorship	2 epidemiologists not enough	Organizational Organizational	Training, competence in HIS tasks, lack of knowledge of HIS forms Motivation, critical management and planning
Dissemination and use	51%	Data dissemination and use the weakest Printing of assessments not done Resource allocation not evidence based No resources allocated for printing and dissemination of reports. When printed, they	Conduct regular meetings at all levels to share feedback	Districts hold quarterly meetings to share feedback Feedback enhanced in DHIS among those access rights	Meetings not held in all quarters due to lack of funds Those without access rights are left out in the feedback	Behavioral/organizational Organizational/ Behavioral	Information needs, availability of funds, motivation, training, promotion of information culture, supervision, problem solving
		remain as history No feedback especially from the national to lower levels		HIS annual report available	Inpatient data in the report not representative as its only from 24 admitting facilities	organizational	for HIS tasks

Health Metric Network scores:

0 to 19%-not functional

20 to 39%-not adequate at all

40 to 59%-present but not adequate

60 to 79%-adequate

ANNEX 6:LIST OF INDICATORS

1. Infant mortality rate	24. Ten most frequent cause of hospital admission
2. Under-five mortality rate	25. Ten most frequent cause of inpatient death
3. Maternal mortality ratio	26. Inpatient death rate (excluding maternity)
4. Percentage of pregnant women having at least four antenatal visits during this pregnancy	27. OPD utilization rate
5. Percentage of deliveries conducted by skilled health personnel	28. Hospital admission rate
6. Percentage of health facilities with BEOC /CEOC	29. Bed occupancy rate
7. Percentage of maternal death audit	30. Service output per provider (workload)
8. Percentage of fully immunized under one children	31. Percentage of approved positions filled
9. Vitamins A coverage amongst 6-59 month population	32. Doctor/population ratio
10. Percentage of under weights amongst under five attending clinics	33. Nurse population ratio
11. HIV prevalence among 15-24 year old pregnant women tested	34. Percentage of health facilities with minimum staff norms
12. Percentage of HIV positive cases receiving ARV treatment	35. Percentage of health facilities up to physical standard
13. Percentage of HIV positive pregnant women receiving Navirapine treatment (PMCT)	36. Percentage of clients satisfied with services
14. Percentage of sexually active population using condoms	37. Percentage of HMIS report received
15. Percentage of Under five population treated for malaria	38. Percentage of households with access to improved water and sanitation
16. Percentage of five and above population treated for malaria	39. Percentage of tracer drug availability
17. Malaria inpatient case fatality	40. Per capita allocation to health (both GOK and donor)
18. Percentage of < 5 population and pregnant women sleeping under LLITN	41. Percentage of GOK budget allocated to health
19. Contraceptive prevalence rate	42. Percentage of GOK recurrent budget for health
20. Percentage of WRA receiving family planning services	43. Percentage of budget allocation for drugs
21. TB detection rate	44. Percentage of budget allocation to rural health centers and dispensaries
22. Cure rate among smear positive TB cases (Under Directly Observed Treatment Short Course)	45. Percentage of health recurrent budget allocation for Kenyatta and Moi hospitals
23. Ten most frequent cause of OPD attendance	46. Percentage of GoK and donor budget expenditure in health