Factors Affecting Utilization of Evidence Based Health Information System for Effective Supply Chain of Essential Medicine in Tanzania: A Case Study from Mbeya Region

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Abstract.

Background: Essential Medicines (EMs) are medicines that satisfy the priority health care of the population. They are selected with due regard to public health relevance, evidence on efficacy and safety, and comparative cost-effectiveness. While Health Information System (HIS) is a system that integrates data collection, processing, reporting and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services.

Method: A cross sectional study was conducted from April to June 2009 in Mbeya Region and at the national level to assess the factors affecting utilization of evidence based health information system for effective supply chain of EMs in Tanzania so as to develop strategies for valuable procurement at the facility and national levels. Quantitative data was collected from 33 health facilities (HFs) and qualitative data was collected from two focus group discussions and 23 different key informants from different levels of the EMs supply chain.

Results: This study revealed the following main factors that affect utilisation and management of information system (IS): lack of strong IS at Medical Store Department and Ministry of Health and Social Welfare to manage the organization, suppliers and clients needs; lack of compliance to the national ordering and deliveries guideline and procedures; inadequate funds; low capacity in implementing integrated logistic system; lack of national representative data during annual budgeting and forecasting of EMs requirements; and political interests.

Conclusion: In this study the supply chain of EMs at the HFs and central levels in Tanzania is not evidence-based. For effective utilization of HIS in the supply chain of EMs there is need to strengthen the capacity in the management and utilisation of HIS at facility, district and national levels.

Keywords: HIS; EMs; MSD; MoHSW; HF; Factors; Evidence; supply chain.

I.   Introduction

The concept of essential medicines (EMs) was established in 1975 (UNHCR, 2006). Essential Medicines are those that satisfy the priority health care of the population. They are selected with due regard to public health relevance, evidence on efficacy and safety, and comparative cost-effectiveness. Essential Medicines are intended to be available within the context of functioning health systems at all times in adequate amounts, in the

appropriate dosage formulations, with assured quality and adequate information, and at a price the individual and the community can afford (WHO, 2004a; MoH, 2006). Such adequate information needs to be tracked by using an efficient health information system (HIS) otherwise rational decisions related to EMs supply can't be made.

Health Information System (HIS) is defined as the system that integrates data collection, processing, reporting and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services (WHO, 2004a). A strong HIS is acknowledged as an enabling tool for evidence-based decision making (Uzochukwu *et al.*, 2004). Information generated by HIS helps to inform health practitioners, planners and decision makers on what is happening at the respective levels of the health delivery system (Lungo & Nhampossa, 2004). Collected and analyzed evidences/quality data help in making sound, efficient and effective planning, budgeting and allocation of scarce resources (Uzochukwu *et al.,* 2004). For example, accurate and timely HIS can inform health practitioners, planners and decision makers on disease specific burden timely. This helps to find appropriate measures to respond to the disease problem.

Many countries in Africa including Tanzania have realized the importance of adopting HIS for enabling individual and the government to make sound evidence-based decisions (Lungo & Nhampossa, 2004; Gething, 2007). This is reflected by substantial efforts done by ministries of health and donors in reforming HIS and investing resources in the same (Lungo & Nhampossa, 2004; Gething, 2006). However, lack of some autonomy in making decisions related to administrative, financial and logistic issues are some of the reported barriers in utilizing HIS in decision makings at the district levels. This implies that the central level of management still holding a big power over the lower level. On the side of essential medicine supply chain; a centralized distribution system has been associated with late and mismatch of drug deliveries (Lufesi *et al.*, 2007; USAID, 2000). In Tanzania, since the establishment of Medical Stores Department (MSD) in 1994, procurement of medicine and other medical supplies have been centralized and determined by the central level.

Initially, a kit system was introduced. In this system, the MSD was required to distribute similar drugs to all healthcare facilities regardless of the need and epidemiological profile of the respective service population. The kit system was accompanied by overstocking, high expiry rates, re-distribution and stock out of drugs (MoH, 2002). The reasons for poor drug supply include lack of evidence based Information System (IS) and the centralized procurement system. Using HIS in drug supply was shown to be cost-effective in planning for drug requirement of Sexually Transmitted Infections in Kenya (Snow, 2000). Utilization of evidence also resulted significant improvement in solving problems of overstocking and stock out of medical supplies (Jitta et al., 2003). It has been reported from various studies that; data collection and reporting is perceived as fulfilling a duty imposed by the higher level (Chaulagai, 2005; Kimaro *et al.,* 2008). In most cases the data generated from the Health Facilities (HFs) are of poor quality because of little ability to organize, extract, and present information in a user friendly way, lack of tools; absence of job descriptions showing that health providers are suppose to deal with data management; absence of information system resources support; lack of monitoring and evaluation tools; lack of information use culture and feedback and supervision; and lack of relevant training (Mboera et al., 2001;

Kajeguka & Mboera, 2003; Mghamba et al., 2004; Rumisha et al., 2007; Kimaro et al., 2008). Such situation may affect the utilization of evidence based health information system in one way or another at all levels of EMs supply chains. For example failure to use evidence in drugs supply chain may results into stock out or overstocking at the lower levels (MoH, 2002). Stock out of EMs at the HFs has been reported to result patients' dissatisfaction over the services given at the delivery facility (Uzochukwu *et al*., 2002). These constraints also impose cost burden to patients by seeking service elsewhere including chemists and traditional healers. It is estimated that by improving access to EMs and other medical supplies, about 10 million lives per year could be saved (WHOc, 2004). However, the lack of access to essential medicines remains one of the most serious global public health problems. About 30% of the world's population lacks regular access to essential medicines; in the poorest parts of Africa and Asia this figure rises to over 50% (WHOc, 2004). People lack access to medicines because a product is unavailable or is not offered, or it is unaffordable (DFID, 2004).

Recognising above opportunities and weakness, the Ministry of Health and Social Welfare (MoHSW) in Tanzania earlier changed from the kit system to indent and integrated logistics systems (CPM, 2003, URT, 2006). The kit system was introduced in Tanzania in 1984 (MOH, 1993). The kit system was not utilizing information related to diseases burden and disease profile; under kit system a facility received a kit of different components of drugs. Since the system was not utilizing evidences in the supply chain the consequences at the facilities was overstocking and under stocking (URT, 2006). The current systems of drug procurement require each facility to place an order based on its actual requirements. Such practices cannot be beneficial unless there is effective utilization of evidence based HIS which inform the local decision makers and planners (Lungo and Nhampossa, 2004). Currently, there are complaints due to the fact that ordering and distribution of EMs are still improperly and inefficiently done (Mtei *et al*, 2007). In some occasions there is mismatch between what was ordered from MSD and what is delivered at the HFs (CPM, 2003). At the same time at the primary health care levels there is limited evidence on the use of health data and information (Mlinga, 2003).

In addition, a little is known on the utilization of HIS in the procurement process of medicine and medical supplies at different levels of the supply chain in Tanzania after shifting from push to pull system. Pull system is based on the available information; the push system does not necessarily need utilization of evidence. The process of changing from old to new system sometimes is associated with many implications to organization working practices, culture, norms, myth, procedures, and process and institutional structures. Such kinds of changes can result into total, partial or sustainability failures (Heeks, 1999). This research therefore intended to analyzed the factors affecting the existing HIS in relation to management and utilization of evidence on EMs procurement in different supply chain levels (facility, district and national levels) in Tanzania. At the end of the study it was expected that; the factors that were revealed from the field to justify whether the supply chain of EMs is evidence based or not.

II.   Methods

2.1 Study Area

This study was carried out in Mbeya Region in the southern highland zone of Tanzania. It involved two clusters (Rungwe District (rural) and Mbeya City (urban). The study areas were selected conveniently due to logistics reasons. The two districts are served by Mbeya Zonal MSD. The districts are implementing both indent and integrated logistic systems; these systems which require the utilization of evidence during ordering and delivering EMs. The clusters were assumed to be similar in terms of performance in particularly on EMs supply chain management. When was the study conducted (period)

2.2 Study Design

This was a cross-sectional study design. The public primary health care facilities (health centres and dispensaries) were the study units and provided the sampling frame because they are compulsorily required to order drugs from MSD (URT, 2006).

2.3 Study Duration

This cross sectional study was conducted from April to June 2009.

2.4 Sample Sizes Calculation

The sample sizes of HFs was calculated using a randomly probability formula with the following parameters: $1-\alpha$ = 95%: Confidence interval (%), P = 50%: Anticipated population proportion of clients that are satisfied with the current level of decentralization in EMs supply; d = 4%: Absolute precision required; ϵ = 2%: Relative precision; N = 53: Population size and $Z_{1-5/2\%}$ = 1.96. A sample of 33 HFs from the study area, equivalent to 62% of the total healthcare facilities was required. The sample size is adequate since it was recommended that at least 30% of the HFs should be included in the study so as to generalise the results in the specific study area (Kielman, 1995).

2.5 Sampling Techniques

The study employed both probability and non probability sampling to obtain the study units of n = 33 (HFs). Purposively, all 7 public HFs in Mbeya City and all 3 health centres from Rungwe district were included in the study. Random probability sampling was employed to obtain the rest of the 22 dispensaries from a sampling frame of a total of 42 public dispensaries in Rungwe district. From each selected unit, one among the following healthcare cadres per healthcare facility was expected to be selected for interview: in-charge/clinician, pharmaceutical staff or nursing officer. However, in the field experience revealed that the In-charges of the facilities were the key staffs to be interviewed per each HF. They were the only key staffs dealing with drugs ordering and management.

2.6 Data collection methods

Quantitative data was collected using a questionnaire with both open and closed ended questions and checklist tool was also used during record review. Qualitative data was collected to compliment quantitative data. Information sought included strength, weakness, opportunity and challenges, experiences and views regarding utilization of evidence based information system to support supply chain of EMs in Tanzania. Two methods were used to collect qualitative data, namely focus group discussions (FGDs) and in-depth interviews. Two FGDs were conducted one in Rungwe District and the other in Mbeya City. The FGDs participants were: District Medical Officer, District Hospital Medical Officer-in-charge, District Pharmacist, Health Management Information System focal person, District Health Officer, District Cold Chain Coordinator, District Laboratory Technician, Reproductive and Child Health Coordinator, District Health Secretary and District Nursing Officer. Information sought from the key informants included factors influencing drugs procurement and data management and utilisation at the healthcare facility. The key informants from HFs and national level were interviewed. At the national level (MSD) the following respondents were interviewed: Heads of 5 Directorates (Finance and Administration, Sales and Customer Service, Pharmaceuticals and Technical Services, Logistics and Information Systems). At the MoHSW; an Assistant Director Pharmaceutical Service was interviewed. At the facility level the in-charges of the facilities were interviewed.

2.7 Data Collection Tools

One tool was administered to the In-charges of the health centres and dispensaries to gather information about factors affecting information flow from healthcare facilities to Medical Store Department; it also intended to determine factors influencing EMs supply chain at the primary healthcare facilities. The tool helped to capture information for establishing strategic recommendations for the improvement of management and utilization of evidence based health information system for effective supply chain of EMs. The second tool was a structured questionnaire which was used to assess patients' satisfaction with the availability and accessibility of EMs and health services under the currently decentralized drugs supply system (pull system). The third tool was FGDs interview guide which was administered to district hospital staff members to gather information on factors influencing drugs procurement, data management and utilisation at the healthcare facility. The fourth tool was in-depth interview guide which was used to collect qualitative data from the MSD zones and central level staff and the MOHSW senior staff. Information sought was strength, weakness, opportunity and challenges that existed in managing and using evidence based health information system to support supply chain of EMs in Tanzania. The fifth tool was an in-depth interview guide which was administered to the health care facilities in-charges. The information sought was about challenges in utilization of evidence and consequences of drugs stock out at the HFs. The last tool was checklist, the tool used to collect the HF's profile information, such information included staff availability, service coverage population and capacity to raise fund to finance stock out of EMs.

2.8 Data Entry, Cleaning and Analysis

The EpiData version 3.1 was used for data entry. Data was exported from EpiData to SPSS version 18 by using start-transfer software for data cleaning and analysis. Lastly, Microsoft Excel software was employed for formatting tables and figures. Qualitative data was analyzed manually using matrices.

2.9 Ethical Considerations

The research abides for people's rights and national regulations for this case the researcher paid attention for the regulations and rules during the process of preparation and conducting of the research. This study received permissions from the Vice Chancellor of University of Dar es Salaam and Regional Administrative Secretary of Mbeya Region. During the course of field data collection, respondents were assured that the information provided would be kept confidential used only for research purposes.

III. Results

This study aimed to analyze the factors affecting the existing HIS in relation to management and utilization evidence on EMs procurement in different supply chain levels. The factors affecting management and utilization of HIS in the supply chain were grouped into four categories: Technical, logistics, financial, political and administrative factors.

3.1 Technical Factors

a)   Data Analysis and Information Use:
All respondents declared that, they normally collect and analyse data for health service at their HFs. However, a term data analysis was difficult to many of the respondents, extra elaboration was necessary. This was revealed when one respondent said *"to be honest we don't conduct detailed analysis"*. This was also agreed to one of the FGD participants that, *"data analysis and utilization is an issue to medical practitioners since it is not given emphasis on their training curriculum"*. Results showed that 3(9.1%) respondents conducted data analysis manually and 31(93.9%) used a calculator. None of the respondents used computer during data analysis. It was declared by FGD participants from both study areas that *"sometimes recalculation of the facility drug requirements is done at the district level; otherwise orders are sent back because of being wrongly calculated"*.

b) Use of Information Obtained From HIS
The uses of information generated after data analysis included: reporting to the next level 33 (100%), planning 17(51.5 %), drugs estimates 24 (72.1%), decision making 19 (57.6%), local interventions like community health mobilization about endemic/epidemic disease 21 (63.6%), observation of seasonal trends of a disease 16(48.5%) and influence local decision makers like counsellors or district medical officers 4 (12.1%). Other uses were setting targets 4 (12.1%), assess and evaluate the

performance of HFs 3 (9.1%) and identification of the critical problem within facility coverage area 5(15.2%).

c) Information Related Factors that affect EMs Supply Chain
All respondents acknowledged that when they place an order to district or MSD using the information they have, they never received all the quantities and types of drugs ordered. The main reason was ration distribution regardless of the information given by facility. This was revealed in one quarter when all facilities of one cluster (Mbeya city) (dispensaries and health centres) were supplied with four tins of Amoxicillin regardless of the facility level.

Openness of the system was seen to be a serious problem that affected the availability of drugs. The general view of the two FGDs participants about the supply system of EMs were inclined on the way the system of supply design. The system of drugs supply was designed on defensive way, there is no one to blame in case when there is a stock out. This is because there are different sources of getting drugs for example from MSD, donors or other sources using CHF, NHIF, and cost sharing funds. Therefore, if there is stock out of drugs at MSD; MSD do not struggle much to solve the problem with expectations that the health facilities will finance the deficit using CHF, NHIF, and cost sharing funds and vice versa is true. This affected much the status of stock of at the health facilities (HFs) since some of them generate a small amount of money from those sources.

Another challenge was that, no facility recorded stock out. When the respondents were asked why they don't record stock out, their responses were as follows: not indicated on the data collection tools 17 (51.5%) and no use of that information 10 (30.3%). However, when they were asked on the consequences of not doing so; they responded as follows; difficult to know actual amount of money lost through cost sharing 7 (21.2%), lack of actual data for future drugs forecast 29 (87.9%) and reporting untreated people 5 (15.2%).

d) Training on Drug Ordering and Information Management
Out of 33 respondents, 18 (54.5%) were trained during ILS training, during supervision 10(30.3%) and during in-service training 6 (18.2%). Majority 32 (97%) of the respondents said the duration of training was inadequate. Of those who got training during supervision, most of them, 14 (87.5%) said the contents were shallow as opposed to the ones who got training during ILS. They later said training was comprehensive with a lot of materials which was not *proportional* to time allocated (five days) with no consideration to the carders trained.

e) Status of HIS at MSD and MoHSW
At MSD there was ORION version 9.2 system. The system integrates all department of an organization (finance, warehouse, finance administration and management, procurement and inventory). The system specifically is known as Enterprise Resources Planning (ERP). It was declared by the organization respondents that, the system play a big role in supporting procurement, storage and distribution of drugs and other supplies; which are main roles of MSD. The information technology (IT) department integrates ILS system to EPR/ ORION system. However, it was stated

that ILS consumes a lot of MSD resources for data entry; since ILS is manual from the HF to MSD zonal levels.

The following IS strengths were identified by almost all heads of departments: The system assisted in solving the problem of stock out and overstocking, reduction of expiry rate to <2% which is below the tolerable (5%) international rate. The process of retrieving the required information was seen to be easy, communication between central and zone stores was easy, the system helped to balance the demand and supply of EMs, increased data integrity; it was easy to know the total sales, turn over, value of stock and stock level. The system assisted to control theft because of its security properties like using authenticate. Other mentioned strengths were: improvement of record keeping and speed for serving customer, knowing trend of distribution, redistribution of drugs to different zones. In addition the system helped to give data that support forecasting, projection and budgeting for future drugs requirements.

At the ministry level ILS system was expected to manage all issues related to drugs supply. The system was expected to determine the actual needs of every HF, to determine loss and damage of drugs on the supply chain make people be responsible in record keeping, to increase client satisfaction of health services provided, encourages team work spirit to all supply chain players.

Despite of the strengths detailed above; at MSD there were critical reported weaknesses that were related to drugs information system management (ORION/ERP). The reported weaknesses included: Power fluctuation, computer virus, poor knowledge on system use among staff, delay of data entry processes, the system can't manage suppliers' contracts, the system is within an organization not scaled or accessible to suppliers and customers, the system was not yet upgraded for seven years. Other reported weakness were   ERP system can't be used for online tendering and ordering, the system has weak forecasting models for that matter forecasting and projection were done manually using MS-Excel spreadsheets, the system is both manual and automated due to ILS sub-system.

At the ministerial level, the following weaknesses related to ILS were reported: The system is manual hence not easy to retrieve information when needs arise, lack of human resources only (40%) of available staffs were skilled, not all system players from different supply levels were responsible, no adequate supportive supervision. Accountability problem of DMO/DP this was revealed at one of the district. The DMO and DP are responsible to ensure that each facility place an order and reconcile before sending them to the MSD Zonal office. Kiwanja Mpaka health centre showed a placed order which was placed but not removed from the R&R book (i.e. no copy was sent to zonal office of MSD and another remained at the district). That facility missed drugs for that quarter.

At MSD the following opportunities were reported: conducting training on computer system use, communicate new changes on the system, conduct intensive system analysis, ensure adequate users participation during design of new system and implementation so as to increase a sense of ownership, consult IT staff in case of system failure, start with basic computer knowledge and skill (introduction to

computer and Microsoft office) to non computer literate staff before training them on ERP system as some of the system end users were found to have no any computer background and they are suppose to interact with the system, reviewing the system to identify the gaps, scale the system to customers and suppliers/tenders. Other reported opportunities were: upgrading or design a new system to meet current and future organizations, client and supplier's needs, distribution of data collection tools to the lower level on time. Lastly, it was proposed to use efficient internet providers for data transfer.

At the ministerial level, the following opportunities were reported: reviewing ILS and redesign it, redesign HMIS, strengthening district staff to work effectively on their levels, provision of effective support supervision, review and develop an effective resources allocation formula.

II. Logistics factors

a) Availability of data collection tools
Majority of the respondents were aware of the data collection tools. These included patient register 32(97.0%), dispensing register 30(91%), ledger book/MTUHA (HMIS) book 31(94%) and request and report (R&R) forms. However, R&R form, the tool which is potential during medicine ordering was out of stock in many (53.6%) HFs. One of HF in-charge of Kiwanja Mpaka health centre said *"data tracking tools is a problem at our facility. Sometimes we do operate without them. For example currently we don't have prescription forms, bin cards and OPD cards and there is a stock out of these tools at the district hospital, we have to wait until delivery is made from MSD which is still not a reliable source"*.

In-charge for Maseba dispensary; was quoted *"We place an order for data collection tools like request and report (R&R) forms but they are not delivered, I don't know what MSD think on the next order, how it will be placed"*. Another facility in-charge was using improvised ledger book. However, one focus group discussant had these to say: *"there was a misuse of R&R forms during quantification of drugs requirements, and this accelerated stock out of the tools, as the results they have to photocopy them during the next quarter order"*. In case of stock out of the tools, the facility in charge do either of the following options: go to the DMO office and photocopy data collection tools 22(66.7%), borrow from the neighbour HFs 3(9.1%), request from the district hospitals 13(39%), place an order from MSD 3(9.1%), place order to the district or operate without data collection tool(s) 6 (18.2%).

b) EMs Forecasting and Quantification data
It was revealed that the lack of national *representative* and aggregated data to the MoHSW from the district hospitals lead the process of budgeting and forecasting drug requirement to be not evidence based but just estimates at the national level.

III. Financial factors

a) Facility population coverage and capacity to mobilize fund
According to EMs supply guideline all HFs which are at the same level e.g. dispensaries and health centre get the same amount of EMs funds on quarterly basis.

In case of stock out each HF is supposes to use funds mobilized from various sources. Such regulation does not consider the HF capacity in mobilizing and its population coverage See Table **1&2**.

Table 1: Population Coverage by Facility and Case Managed in Year 2008

Facility level	Type of population	Range	Min	Max	Mean	Std. Dev
Dispensary	Population coverage	18664	1306	19970	6044	4808
	Case managed	3303	841	4144	2057	1025
Health Centre	Population coverage	47913	9946	57859	35149	20583
	Case managed	21953	5930	27883	14203	9728

Table 2: Quarterly Raised Income by HFs from NIHF, CHF and Cost Sharing per Quarter in Year 2008

	Quarter	Range	Min	Max	Mean	Std. Dev
Dispensaries	Quarter1	298,200	7,300	305,500	146,766	100,855
	Quarter2	368,020	13,400	381,420	150,553	113,441
	Quarter3	432,950	20,000	452,950	164,190	124,481
	Quarter4	450,965	13,830	464,795	169,125	152,027
Health centres	Quarter1	5,936,830	423,170	6,360,000	3,022,519	2,429,368
	Quarter2	5,017,952	1,033,495	6,051,447	2,364,206	2,122,761
	Quarter3	4,653,690	210,000	4,863,690	2,058,299	1,928,473
	Quarter4	3,190,700	450,000	3,640,700	1,598,962	1,471,443

b) Financial grants from central government

Inadequate disbursement of funds from treasury to the MoHSW was also seen as a challenge. The MoHSW *respondent* reported that *"As per Dec 2008, there were 4,095 dispensaries, 465 Health centres, 130 district/district designated hospitals, 19 regional hospitals, four referral hospitals and four special hospitals. I normally receive drugs funds for the above HFs and hospital monthly, the funds are sometimes not sufficient"*. The respondent also shares one experience *"for example, one month I received TShs 800 million. It was difficult for me to allocate the money, I considered only the hospitals even though the money was not enough; since it was estimated that for one district hospital to operate satisfactorily, it need about 30 millions per month. The following month I received TShs 3 billion, that was easy to allocate to HFs"*

IV. Political factors

Political interests – adequate drugs funds are given during general election years, funds for drugs are not disbursed on time from treasury. It was reported that during general election years Members of Parliament (MPs) fight to ensure that uncompleted HFs buildings are completed and ensure that drugs are available at all HFs. It was also revealed that political interest and provision of inadequate funds for drugs had significant impact on utilization of evidence based HIS. The MSD use different formula for forecasting drugs requirement. Among of the formula were:

1. Quantity to order = Historical data for sales + Anticipated events (outbreaks)
2. Quantity to order = Actual sales in the last year + Lost sales in the last year + Anticipated events (outbreaks) personal communications with Mr Haule the Director of Sales and Customer Care.

It was reported that if the second formula is used to project drugs requirements, it results in overstocking, unless if the formula will include private facilities lost sales only. Public lost sales could be mainly caused by inadequate fund on the facility's account. One respondent said *"The facilities drugs requirements projections are 100% per year while government may meet only 40 to 60% of the projected demand. If the facilities' information will be used by MSD to place an annual order it could lead to overstocking at MSD since we are not required to sale on credits unless we are directed by the MoHSW. Overstocking may results into expiry drugs and destruction of drugs is extremely expensive"*.   However, one respondent from MSD said *"during general election years we estimate drugs requirements using our normal formula but the actual sales exceeded the quantity estimated compared to other years"*

V.   Administrative factors

a) IS development and maintenance management support
Internal resistance to change was another reported weakness at MSD; people were not accepting changes internally. For example it took one year to make decisions on what to do after getting system auditing report. Other reported weaknesses included: the system was designed with no adequate users' requirements and the system also does not change with the growing organization requirements i.e. it is not flexible.

b) Supportive supervision
Responses on time spent and technical support provided by CHMT members during quarterly supervision visits and in particularly on information management and use were as follows: Sixteen (48.5%) said it was adequate, 12(36.4%) not adequate, 3(9.1%) time was partial and 2 (6.1%) said they had never been supervised. Results revealed that monitoring and supervision was not effective. One respondent said *"during quarterly supervision visits, the CHMT members do things partially and sometimes they come without prior information for their arrival hence not easy for us to identify in advance the areas of weakness where we need technical support or sometime they come at late hours"*.

c) Human resource for data management
Availability of human resources was one of the factors which affected the overall processes of IS management and utilization. On average, health centre (HC) had a requirement of 46 staff; however, the average available staffs per health centre were 30. There was a deficit of 17 health workers of different carders. An average dispensary's health workers requirements (5) while available (4) and deficit (2).

IV. Discussion

The study intended to validate a hypothesis that stated that *"**The supply chain of EMs at the primary healthcare and central levels in Tanzania is evidence-based"**.* Based on the findings obtained from this study it can be concluded that the supply chain of EMs at the primary healthcare and central level in Tanzania is not evidence-based. This is because it does not utilise information generated at HFs. This statement is being justified by the following factors affecting the supply chain system: The budget allocation for drugs is

inadequate. The budget does not put into consideration of potential factors like population coverage, facility capacity in mobilising extra funds and epidemiological profile of the respective facility. According to CIHI (2002) population coverage and demographic characteristics are critical factors affecting EMs consumption. According to the ILS Drug Supply Guidelines, each facility is supposed to order drugs based on burden of diseases, taking into consideration budget ceiling (URT, 2006). The experience showed that in most of the time the district has no financial capacity to supplement/cover the deficit for the HFs.

Representative data for budgeting and forecasting process of national EMs requirements was lacking, indicating the requirements of EMs are not based on evidence. Indirectly this affected the utilization of HIS (Raja *et al* 2000, Snow 2000). Drug consumption data was rarely used in determining order. Consumption data are often recommended for drugs ordering (WHO, 1999). Failure to use consumption data may results into problems associated with overstocking or under stocking (Snow, 2000). It is recommended that, consumption data must be adjusted in the light of known or expected changes in morbidity patterns, seasonal factors, service levels, prescribing patterns and patient attendance WHO(1999). Under stocking was observed in some study HFs. In addition, it was also observed that HFs put low consideration of other potential factors like disease seasonal variations, quarterly budget allocate, expiration of drugs and population characteristics.

Recording was observed to be poor at facility and district levels. So, tracking of stock out is difficult. Stock out information is an important factor in making sure that drugs are readily available when needed. The information is useful for determining the actual drugs requirements. Stock out data makes easier to capture information on the patients who missed drugs. It also helps to quantify drugs which could have been used during the period of stock out. Inadequate skills and knowledge on data analysis was another constraining factor. There was use of historical data, which does not take into consideration of previous year lost sales data for public facilities drugs forecasting. Last year lost sales data was reported to be used during the years ending with 0 and 5 (electoral years). Moreover, drug forecasting by MSD was done manually making it difficult in forecasting requirement. The reason for doing it manually was due to its IS weakness, it lacked the models which could be used to forecast drugs requirements.

V. Conclusion and Strategic recommendation

In conclusion, the supply chain of EMs at the HFs and central levels in Tanzania is not evidence-based. This is due the gaps detailed on the discussion part above.

This study come with the following strategic recommendations: At the facility levels capacity building on drugs forecasting, budgeting, ordering and reporting is of paramount important. Supportive supervision is also needed so as to identify gaps on drugs information management and make rectification. On the side of technology, there is a need to explore how to use mobile technologies to report the status of essential drugs availability at the health facilities. The experience shows that use of mobile phones is very

effective approach. The SMS for life project being implemented in the health sector use the mobile phone to report on the availability of anti malaria drug through SMS.

At the national level; new system development should employ end users participation and not top down approach so as to avoid partial, total or sustainable failure. The current MSD's working system has proved to be ineffective since it can't accommodate the customers and suppliers/tenders needs and it end at zonal level not district level; with such scenario the new design should consider these gaps. MSD management should opt to use a reliable internet vendor to overcome the problem of "on" and "off" of the internet connectivity. Logistics management including delivering drugs and tools for data collection should be done on time by MSD. In addition, during the process of budgeting and forecasting drugs; the MoHSW have to use data generated from the lower levels instead of using estimates. To enhance effective and efficient supply chain of essential medicine; the government of Tanzania is also obligated to disburse the funds from treasury to the MoHSW and from MoHSW to MSD on time so that MSD can deliver the services to the hospitals and health facilities on also time.

Acknowledgement

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