The Role of DHIS2 Health Service Delivery Data in Enhancing Decision-Making at Tier 2 and 3 Health Facilities in Athi River Subcounty, Machakos

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DOI: 10.29322/IJSRP.14.06.2024.p15042

Paper Received Date: 18th June 2024
Paper Acceptance Date: 19th June 2024
Paper Publication Date: 26th June 2024

Abstract

Health service delivery data ought to be collected regularly to not only enhance the health services quality and care itself, but also inform constant changes that are less costly to the government and consumers of health services. The World Health Organization stipulates that the provision or delivery of health services is an external output of the inputs into the health system, including procurement and supplies, the health workforce, as well as financing. Although an increase in such inputs ought to translate into enhanced service delivery and access to services, this is not always the case necessitating WHO to call for regular collection of data on health service delivery to not only promote the availability of health services, but also guarantee adequate access to such services. The purpose of the study is to evaluate the influence of District Health Information Software 2 (DHIS2) service delivery, health commodity, health population and health costing data usage in decision making at selected tier 2 and 3 health facilities in Athi River Subcounty, Machakos, Kenya. This study will also seek to recommend finer ways of utilizing information in the DHIS2 web portal for concrete decision making for quality and better health care. The study location is Athi River Sub-County in Machakos County, Kenya. Study sites are three high volume public health facilities in the county. The study will be a descriptive cross-sectional study with mixed methods, it will seek to establish the health care workers' social characteristics and how they are related to behaviors and patterns. This study targets health care practitioners in the management and facility service provision departments. Purposive sampling will be used to select three (3) high-volume health facilities from Athi River Sub County. A proportional-to-size stratified random sample of health care providers from each department in the 3 selected health facilities will then be drawn. 107 health care providers will be sampled. Self-administered health care providers' quantitative questionnaire and Key informant interviews (KIIs) will be employed. Data will be analyzed descriptively using STATA software. Qualitative data will be analyzed using content analysis in ATLAS.ti. Data analyzed will be presented in graphs, charts, and tables, where necessary.

Key Words: *Health Service Delivery Data, Decision-Making, Health, Athi-River Subcounty.*

Introduction

Health information is the backbone of the overall health systems strengthening building blocks. Health information availability spearheads health workers to make sound decision-making, to plan better, implement, monitor as well as evaluate health programmes (Karuri et al., 2014). Significant financial and human responses have been injected into the economy worldwide to gather data from health facilities as well as communities. Globally, health care workers and community health workers collect data on patients, and then routinely report all the activities happening at the health facilities. The utilization of patients' health information is a significant component of health departments' structural capacity. As such, the performance of public health relies heavily on the information use effectiveness (Hotchkiss et al., 2012).

Health experts across the globe concur that HISs in most nations, and especially in developing countries, are badly inadequate to offer the necessary information to support health care and public health activities. Information's poor use for evidence-based decision making is perceived as being among the major causes of the current absence of linkages between individual care and public health systems in most developing countries (Karuri et al., 2014). Over the past eight years, Kenya has been going through a change in the governance of the public health sector. There has been a devolution of most functions from the central Ministry of Health

(MoH) to be controlled by the 47 counties, that is, the newly created administrative units intended to dispense political governance. County governments, guided by the Kenya Health Policy of 2012 to 2030, are now mandated to manage and coordinate the health services provision at the county level. Such responsibilities are the provision of drugs to the public domain, as well as the provision of family planning (FP) services (Ndiritu et al., 2017). However, data needed to guide policy and implementation strategies is in shambles within the counties because health care providers responsible for data collection are overburdened leaving very little time to collate quality data. Data would be needed to guide decisions regarding the supply and distribution of drugs or contraceptives, staffing, and budgets.

Kenya adopted the DHIS 2, which aggregates health data from registered health facilities across the country to a central, single national web-based portal. HIS such as the DHIS 2 plays a critical role in the health system by routinely gathering health care data and disseminating these to higher levels (Kuyo, 2019). DHIS 2 is a web-based platform for health management data utilized by governments and non-government organizations worldwide to monitor patient health, increase disease surveillance, and map disease outbreaks, as well as speeding up data access (DHIS 2.org, 2020). The use of this software has been key to Kenya's MoH in measuring, monitoring, and evaluating health indicators. DHIS 2 platform allows data entry through the mobile Android app, DHIS web portal itself, as well as direct import. DHIS 2 is the leading Health Management Information System (HMIS) in the world (DHIS2.org, 2020). Kenya is the first nation in Sub-Saharan Africa to make use of a completely online HIS for health (Gathua, 2016). All sub-counties, districts, and health facilities having the appropriate technology can connect to the DHIS 2 web portal via computers, and even mobile internet (Gathua, 2016).

With the assumption that the data is mostly accurate and complete, the DHIS2 provides a web portal from which aggregate data can be retrieved, exported, and then synthesized. In HIS, the primary goal of data collection and analyses is centred on improving programmes by enabling more informed decisions (Measure Evaluation, 2011). Yet, many decision-makers rarely access the required data. It may be that they are not conscious of how data can be utilized to make or enhance decisions. It may also be that the information they require does not exist or is faulty, and hence, cannot be trusted. The DHIS2 system has presented a never seen before potential for Kenya to transition from an era of unreliable and fragmentized HIS system to the more flawless situation of utilization and availability of quality health information for informed decision making (Karuri et al., 2014). However, despite the high demand for data from the Kenyan health sector, DHIS2 data is not fully utilized by health care providers at tier 3 and 2 health facilities. Facility level staff rely mostly on sub-county level management staff to generate, share, and use data to make decisions. The practical health information utility (how and effectively and often data is not or is used) is determined by various factors, which could be grouped into three groups: the technical or system aspects of data tools and processes, the organizational context supporting (or inhibiting) data processes, and the individual actions and attitudes of individuals who produce or utilize data (Measure Evaluation, 2011).

Gathering and summarization of data help in improving health care outcomes by ensuring that decisions are directed by evidence, and facilitates actions at each level, especially at the source such as health facility and community level where information is most needed (Kuyo, 2019). As a result, Athi River Sub County's tier 2 and 3 health facilities are expected to exercise an efficient and reliable use of DHIS2 data to facilitate strategic and informed decision-making for quality health service provision. Data uploaded on the DHIS2 tool by the HRIO are utilized by the county managers and the Ministry of Health in decision making. The health information from DHIS2 is also useful to researchers and health care providers in decision making geared towards supporting patient care. More than 63 standard DHIS tools are available for reporting. These tools are useful in reporting various types of DHIS2 data namely service delivery data, commodity data, population data and costing data. This study will seek to evaluate how various DHIS2 data types generated from the health facilities by health care providers, the facility management staff and community level personnel are used to influence decision making at selected tier 2 and 3 health facilities in Athi River Subcounty, Machakos, Kenya. The data generated is captured in various health facility registers, summarized in reporting tools, and reported in the DHIS2 web portal.

Literature Review

Roosan et al. (2016) argued that to monitor progress, as well as evaluate the implemented healthcare policies to strengthen health service delivery, it is crucial to determine the dimensions for measuring progress, which requires the collection of diverse and massive data. According to Loevinsohn and Harding (2005), some of the key characteristics collected through such data, with regard to good health service delivery, include the provision of a range of health services (comprehensiveness), that is suited and adaptive of the target population's needs including health promotion activities and preventative, curative, palliative as well as rehabilitative services. Another characteristic that the collected data revels whether or not has been achieved is accessibility, where factors such as barriers of cost, geography, language, or even culture are overcome, giving the community a direct and permanent access to adequate and quality health services. Pieper (2004) noted that data is also required to determine whether the coverage, quality, continuity, coordination, person-centeredness, as well as efficiency and accountability characteristics of health services to the

community are achieved. These characteristics ensure that all people in the community irrespective of their health status are adequately covered, with care continuity being assured across all care levels, health conditions, as well as over the life cycle, that the provided services are not only effective, safe, and centered on the needs of the community and individual patients but also that the services are given in a timely fashion.

In tier 2 and 3 facilities in Athi River sub county, and the whole of Kenya in general, health workers are considered one of the key pillars on which the healthcare delivery system is based. Relatedly, Onyango (2016) carried out a study that focused on Shalom Hospitals to investigate the various ways that data collected on the group of hospitals can be used to improve the HR-related aspects of the hospitals in general. Using a quantitative research design and with a target population of 200 nurses who worked with Shalom Hospitals in Machakos County, and with the help of questionnaires with close-ended questions, the author established that the working environment, internal motivating factors as well as the various staff retention strategies that this group of hospitals use are some of the notable factors influencing the nurses' willingness to work there or seek employment elsewhere. In this context, the study noted that work environment positively influences both nurse retention by working as an internal stimulating or motivating factor. Thus, this data showed that by improving the work environment and thus increasing staff motivation, the management of Shalom Hospital would increase nurse retention by tapping into the nurses' intrinsic motivation.

According to Hotchkiss et al. (2012), improved data use for decision making at the government and non-governmental institutions demands for enhanced data quality, as well as information products, which as a result demand for better HIS. HIS is a term used to mean any structure that is responsible for harvesting, mining, storing, managing or convening/ transmitting data/ information associated with health of people or the organizational activities (Hill, 2012). HIS strengthening has gained wide attention in the previous years, as shown by the Health Metrics Network (HMN) formation (https://www.who.int/healthmetrics/en/), the launch of the Obama's Global Health Initiative, plus the convening of Global Health Information Forum dated in 2010. Formation of the Global Health Initiative demands for "strengthening existing public heath surveillance and other data collection systems for monitoring diseases, conditions, health service provision, and health outcomes", and this is segment of an integrated approach to reinforce the country and global health systems (Hotchkiss et al., 2012).

The role of HIS in any health system is not only real-time collection of health-related data and conveying the same to higher ranks in the health care system, but also in the facilitation of informed decision-making at every level, mostly at the data collection point (Odhiambo-Otieno, 2005). Weak information systems are among the major challenges in the Kenya's health sector that was discovered in the of Vision 2030's First Medium-Term Plan. The HIS policy of Kenya 2012-2030 unravels and discusses various shortcomings existing in the current HIS, which entails inadequate capacity of health staff, many parallel data collection systems, unskilled personnel that handles data, amongst others. The same challenges are captured in a paper by Kihuba et al. (2014). Several other studies have highlighted concerns regarding the gig of health information systems suggesting they generate poor-quality data (Fisher et al., 1992; Hahn et al., 2013; Mahmood & Ayub, 2010; McCaw-Binns et al., 1996; Peabody et al., 2004; World Health Organization, 2012).

The health population includes all human elements affecting or being affected by the health service delivery, including the health, the sick or patients, community health workers (CHWs) and health care providers. Globally, health workers and CHWs collect data on patients, and then routinely report all the activities happening at the health facilities. The consumption of patients' information on health is a key component of health departments' structural capacity. As such, public health performance relies heavily on the information use's effectiveness (Hotchkiss et al., 2012). Health-related data are collected by individuals who play personal and professional roles in the health systems. Improvement in the use of health information is perceived by researchers as being integral to the scale up of the delivery of quality health care services. Once raw data has been processed, it becomes information, which is useful in drawing conclusions and leads the researcher to make information decisions. Hence, health information and data come from several sources, which includes institution-based sources for instance, facility records and surveys and individual records, and population-based sources, for instance, vital registration, household surveys, and censuses (WHO, 2008). A facility-based routine HIS will only gather data on the services offered by those health facilities, and not from any other source such as the tourism industry (Hotchkiss et al., 2012).

Roosan et al. (2016) conducted a pilot study to investigate how population data visualization and health analytics impact and influence support of decisions. Using Veteran's Affairs (VA) database as a method for identifying similar multifaceted patients on the basis of a similar complex patient case, the authors performed a qualitative data analyses for preferences of population information display that ultimately yielded 4 key themes: (a) it is difficult to trust the big/population data, (b) it is difficult to explore

patient similarities without embedded analytics (c) a range of tools are required or needed to direct the view such as zoom, filter and overview, and (d) improving the overall display requires different presentation of the population display itself. the study noted that the available data on population health reveals that maintaining a healthy lifestyle is difficult for the majority of the population, particularly those from poor socioeconomic backgrounds as even the process of accessing simple drugs such as antibiotics is marred with complexity.

According to Kavosi et al. (2018), costing has been one of the notable factors influencing health decisions. As a result, various facilities, both tier 2 and 3, have embarked on strategies that focus on reducing cost. In this context, the phrase "decisions of value" has been employed to imply decisions with potentially large repercussions for both finance or cost and quality of, or healthcare outcomes (Williams, Brown, & Healy, 2018). However, even with the adoption and implementation of such strategies, the available health costing is not adequate to support informed decisions to support a sustainable health system. Due to this inadequacy of data, most health facilities are compelled to outsource healthcare services to become relevant. Consequently, Kavosi et al. (2018) decided to carry out a study to investigate some of the central factors influencing the decision making at the time of outsourcing healthcare services. The authors combined various methods to collect the relevant data: an extended literature review of the factors in question, the assembling of a panel of experts as well as Delphi technique. These methods were reinforced with purposive sampling. In total, 180 factors were mined from the various articles selected for inclusion, from where 29 sub-factors were selected by the panel of experts, covering six broad factors including technology, quality, performance feature, management, as well as economy. These factors were identified as having the most effect in the outsourcing of health services. However, these results were different from those obtained using Delphi technique, which showed that regarding healthcare services, only 22 sub-factors have the greatest influence on outsourcing decision making. Nevertheless, the study concluded that in outsourcing health services decision making is not only a complex process but also multi-criteria. Additionally, outsourcing is a feasible strategy for saving cost, increasing efficiency, reducing service delivery time, improving skills, and improving the health care quality in general.

Methods

This study adopted a systems theory, which is defined by Wilkinson (2011) as a conceptual framework that is founded on the principle that a system's segments can best be comprehended in the context of relationships with one another, as well as other systems, instead of in isolation. Systems theory was first coined by biologist Ludwig von Bertalanffy in the 1940s, studied further by Ross Ashby (1956) and George Bateson (1979). In the current state of the art, the researcher will apply Performance of Routine Information System Management (PRISM)'s theoretical framework of Measure Evaluation (Aqil et al., 2012; Belay & Lippeveld, 2013). As shown in Figure 1, the PRISM framework helps in the establishment of the factors influencing information use. The framework also defines the HIS components, as well as their interconnection to yield high- caliber data and progressive utilization of information, resulting in enhanced health systems' performance, and hence enhanced health outcomes (Aqil et al., 2012). Performance of routine HIS (RHIS) is influenced by HIS processes, as well as behavioural determinants.

This study was conducted within one sub county within Machakos county. Athi River Sub County is among 8 sub counties that form Machakos county. This study took place in selected high-volume health facilities in Athi River Subcounty, Machakos County in Kenya particularly those owned by the MoH. Machakos County has one tier 5 hospital, 20 tier 4 hospitals, 65 health centres (tier 3), and 328 dispensaries (tier 2) (Table 1). The target population of this study will be the health care practitioners in all the departments both in the management and facility service provision areas, including Medical Doctors (M.Ds) who are specialist, Medical Officers, nurses, Registered clinical officers, Pharmacists, Laboratory technician/technologists, health records officers, Dentist/ dental technologist, public health officers, Physiotherapist, and the general staff in the IT department. The health care practitioners in all the department are targeted because they generate medical data in these facilities and have access to data in their facilities.

The study design used was cross-sectional; it used a mixed methods approach employing quantitative and qualitative approaches to establish the factors influencing use of service delivery data, health commodity data, health population data and health costing data by the health care providers to make health related decisions in Athi River sub county. The study was also descriptive in nature, exploring the key components of each objective. The quantitative data elicited the level of utilization of DHIS 2 datasets at facility level while the qualitative data giving insights into the current practices in DHIS2 data use for decision making. Triangulation of the two sets of data generated recommendations for better utilization of DHIS 2 data to inform decisions at the facility level. The questionnaire was administered to sample size of 145, while the interviews were conducted to sixty (60) health care worker.

Quantitative data was managed, cleaned for possible errors and omissions, recorded, and analysed descriptively using STATA software. Content analysis was employed in the analysis of qualitative data using ATLAS software. Means as well as standard deviations were computed for the continuous variables. Frequencies, proportions or percentages were obtained from the quantitative data to determine the number of service providers who use data to make decisions at the facility level. The study findings were

scrutinized and presented in tables, graphs, and charts, where necessary. The primary outcomes in this study are data utilization and decision making at the facility level.

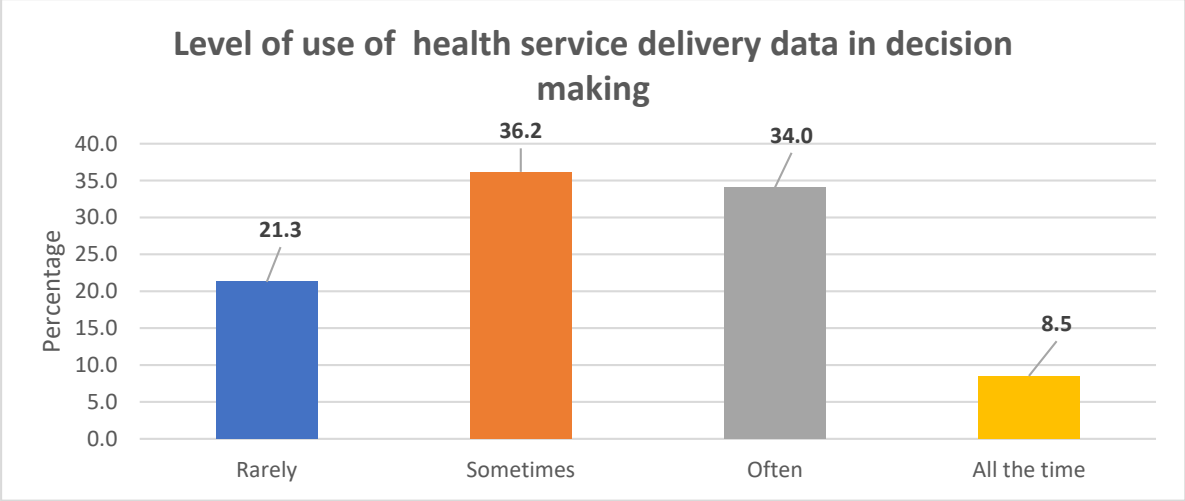
Results

The purpose of this study was to evaluate the influence of DHIS2 health data usage in decision making at selected tier 2 and 3 health facilities in Athi River Subcounty, Machakos;

4.1 Health Service Delivery Data and Decision Making

The first objective of the study sought to understand the level of use of the health service delivery data from DHIS 2 in making decisions by users of the information obtained.

Figure 1:Level of use of health service delivery data in decision making

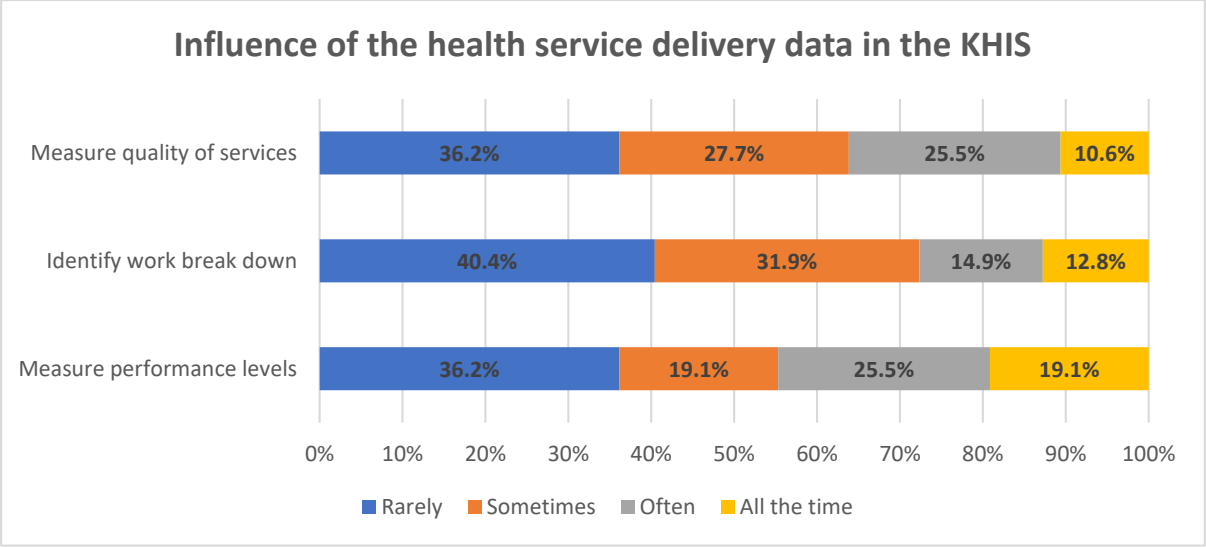


According to the findings, 36.2% of the respondents said that information about the delivery of health services was sometimes utilized in decision-making, while 34% said that information was frequently used. Additionally, 21.3% of participants stated that the data on the delivery of health services was used infrequently, while 8.5% said it was used all the time.

4.1.1 Influence of the health service delivery data in the KHIS

The health service delivery data captured in KHIS was used to make several decisions at the facility level. The data was used to measure the quality of services rendered, identify work breakdown and to measure performance levels of the staff. Figure 4.10 below shows the level which KHIS data was used to make these decisions.

Figure 4.2: Influence of the health service delivery data in the KHIS



From the findings, 36.2%reported that health service delivery data was rarely used to measure the quality of services, 27.7% reported that the data was occasionally used, 25.5% reported that the data was frequently used, while 10.6% said that the data was used all the time in measuring the quality of services. When asked if the health service delivery data used to identify work break down, 40.4% said that the data was rarely used, 31.9% said that it was sometimes used, 14.9% reported that the data was often used and 12.8% said that the data was used all the time to identify work break down. On how often the health service delivery data was to measure performance levels, 36.2% it was rarely used, 19.1% said that it was sometimes used, 25.5% said that was frequently used, while 19.1% reported that the data was used all the time.

4.2 Health Commodity Data in the KHIS and Decision Making

The study further sought to understand the frequency of use of health commodity data in the information system in decision making.

Table 4.1: Frequency of using the health commodity data in KHIS for decision-making

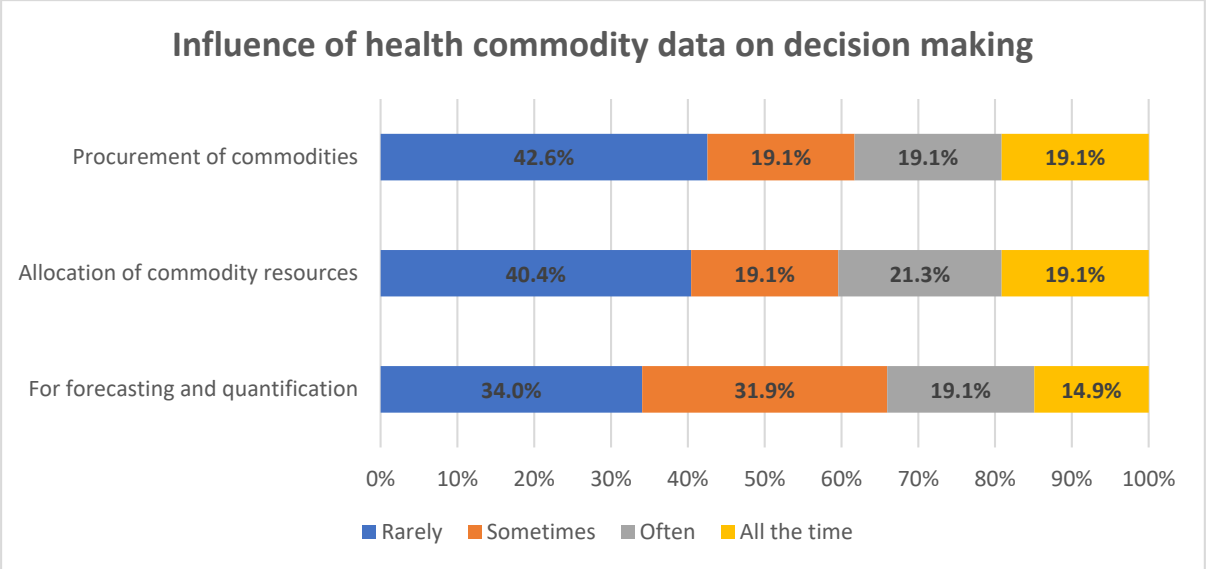
	Frequency	Percent
Rarely	18	38.3
Sometimes	10	21.3
Often	10	21.3
All the time	9	19.1
Total	**47**	**100.0**

According to the study's findings, 38.3% of respondents stated that health commodity data from KHIS was infrequently utilized for decision-making, followed by 21.3% who said it was occasionally used, 12.3% who said it was frequently used, and 19.1% who said it was always used.

4.2.1 Influence of the health commodity data in the KHIS

The study further sought to understand the impact that health commodity data had on procurement, allocation and quantification of health commodities.

Figure 4.3: Influence of health commodity data on decision making

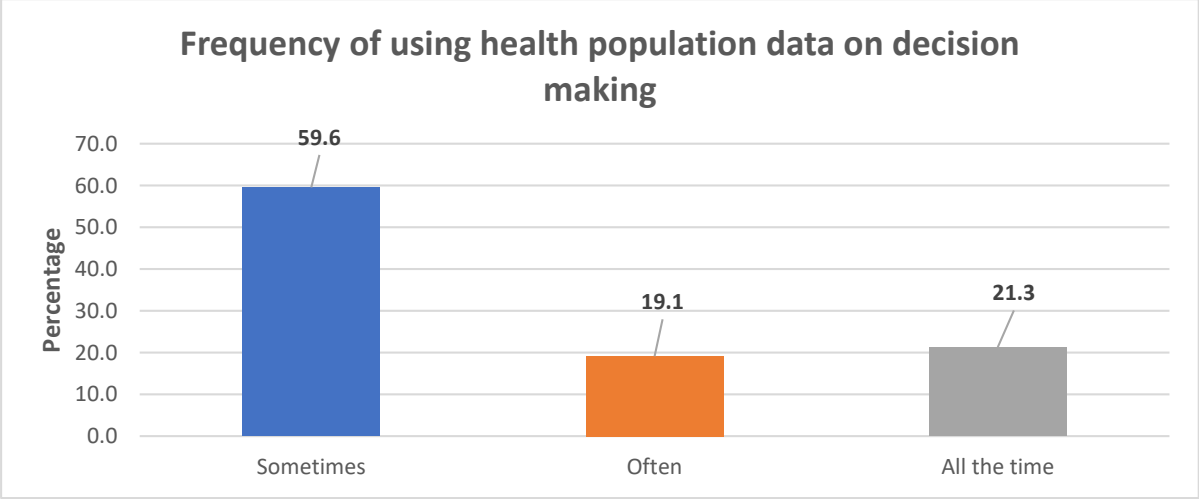


According to the findings in Figure 4.11 above, 42.6% of the respondents said that health commodity data rarely affected commodity procurement, 19.1% said that it occasionally did, 19.1% said that it did so frequently, and another 19.1% said that it was always used to inform decisions on procurement of commodities. Further, 40.4% of the respondents reported that the data was rarely used for allocation of commodity resources, and similarly, 34.0% of stated that it was rarely used for forecasting and quantification of health commodities. Additionally, only 19.1% of the respondents reported all time use of health commodity data in procurement decisions, with another 19.1% reporting its use always in making decisions on allocation of resources, and 14.9% stating that the data was always used in forecasting and quantification.

4.3 Health Population Data and Decision Making

The study also sought to establish the frequency of use of the health population data in KHIS on decision making. The respondents were expected to give their opinion on whether it was used all the time, sometimes or frequently.

Figure 4.4: Frequency of using health population data on decision making

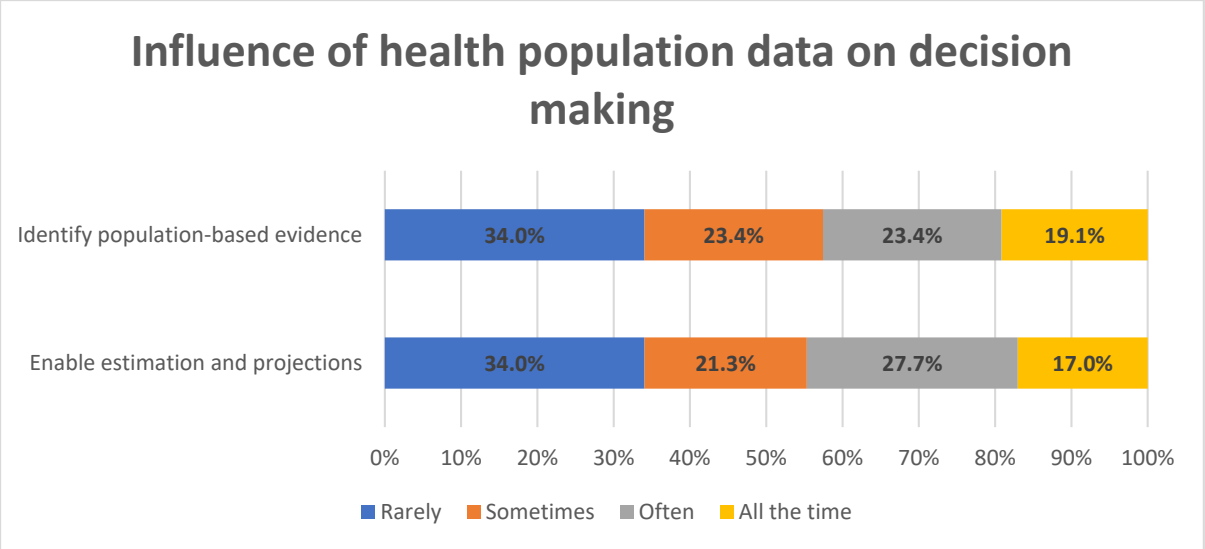


The results indicated that 59.6% stated that health population data in KHIS was occasionally used in decision making, 12.3% stated that the data was always used, while 19.1% reported that the data was frequently used in making decisions.

4.3.1 Influence of the health population data in the KHIS for decision making

The study further sought to understand the effect that health population data had on decisions such as identifying population-based evidence and making estimations and projections within the health facilities.

Figure 4.5: Influence of health population data on decision making

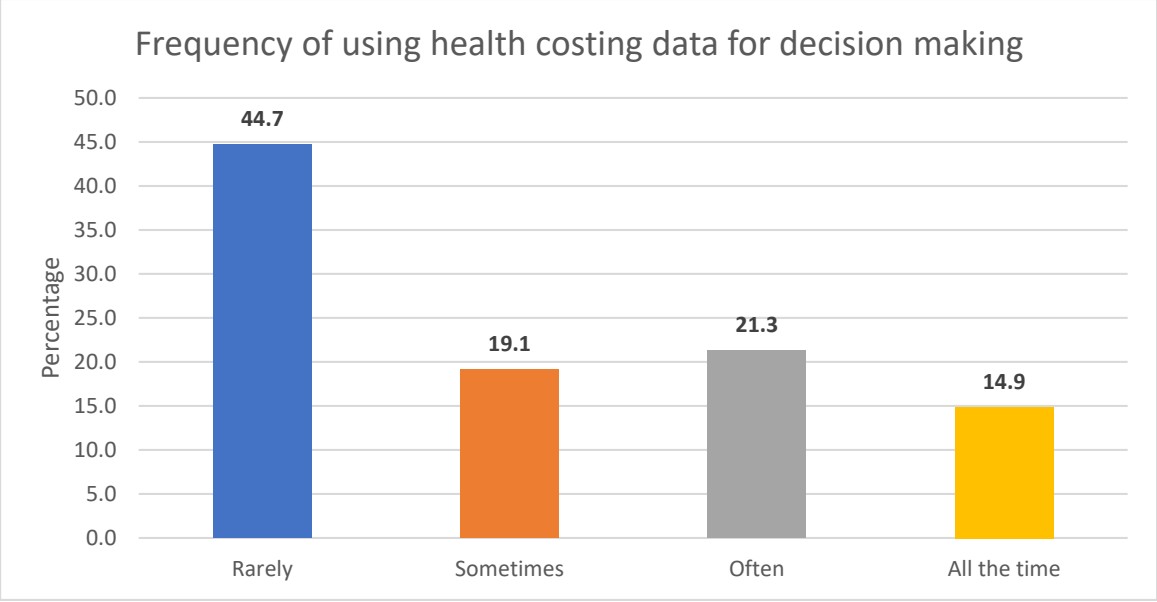


The findings indicated that 34.0% of the respondents had the opinion that health population data in the information system was rarely used in identifying population-based evidence. A percentage of 23.4 stated that the data was sometimes used; another 23.4% stated that the data was frequently used, with 19.1% stating that the data was always used to identify population-based evidence. When asked how often the health population data was used for estimation and projections, 34.0% of the respondents said that it was rarely used, 21.3% said that the data was sometimes used, 27.7% reported that the data was frequently used, and 17% stated that the data was used all the time.

4.4 Health Costing Data and Decision Making

The researcher also sought to know the frequency of use of health costing data in KHIS for decision making. The participants were expected to state if the health costing data was used all the time, sometimes, frequently, or rarely.

Figure 4.6: Frequency of using health costing data for decision making

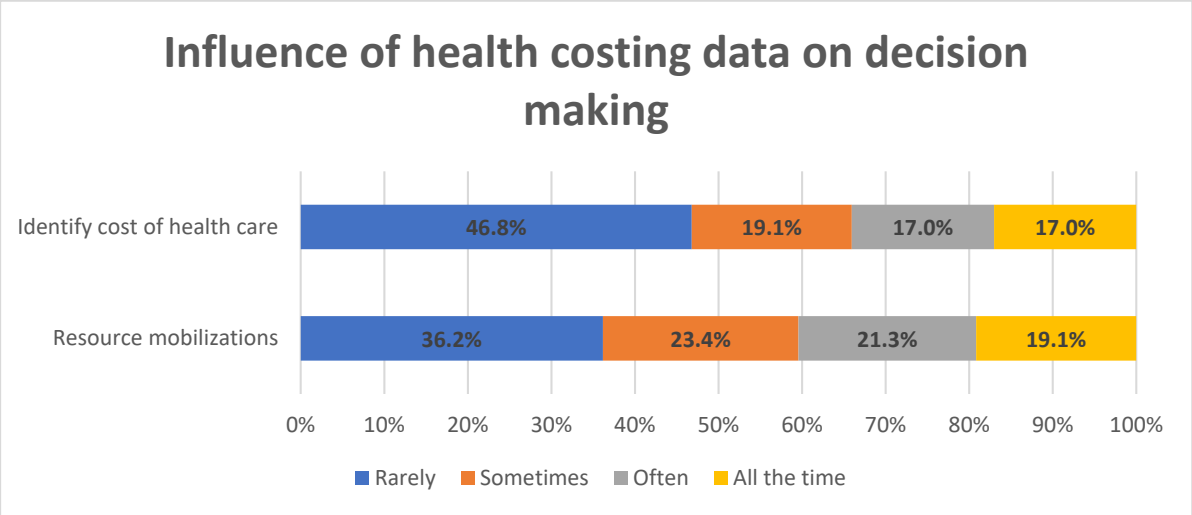


The results indicated that 44.7% of the respondents opined that the health costing data in KHIS was rarely used for decision making. Further, 21.3% stated that the data was frequently used, 19.1% said that the data was sometimes used, with 14.9% stating that the data was used all the time for decision making.

4.4.1 Influence of health costing data on decision making

The respondents were also requested to state the level of influence of the health costing data in KHIS in decision making aspects namely; identifying the cost of health care and resource mobilization.

Figure 4.7: Influence of health costing data on decision making

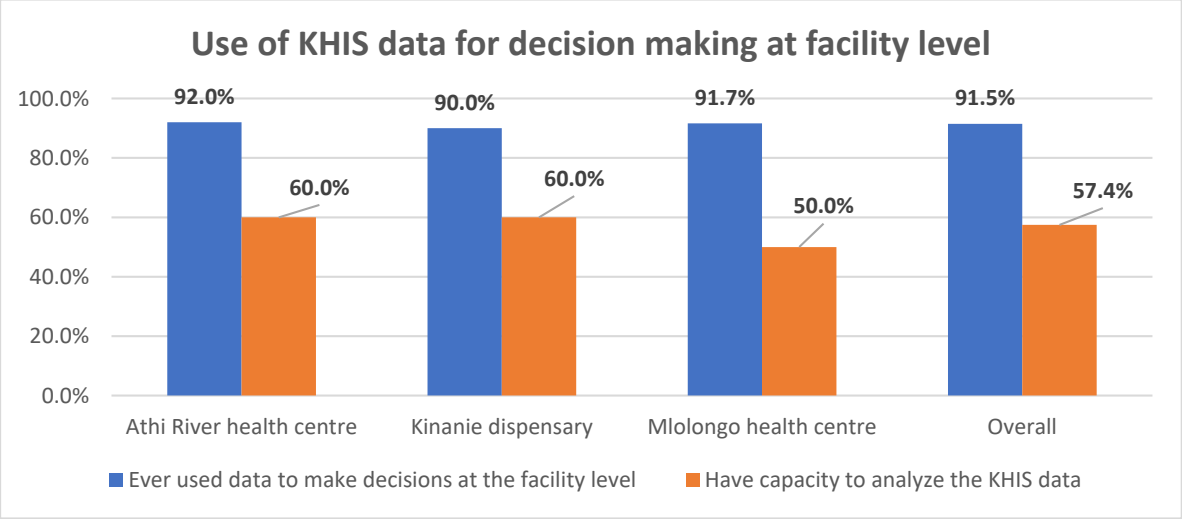


From the findings, 46.8% of the respondents stated that health costing data in the information system was rarely used to identify the cost of health care, 19.1% stated that the data was sometimes used, 17.0% stated that the data was frequently used, while another 17.0% stated that the data was always used. When asked about the influence of health costing data on decisions relating to resource mobilization, 36.2% stated that the data was rarely used, 23.4% stated that the data was sometimes used, 21.3% stated that the data was frequently used, and 19.1% stated that the data was always used.

4.5 KHIS Data and Decision Making at Facility Level

The researcher requested the respondents to state whether they had used the data in KHIS for decision making and also if they had the ability to analyze the data.

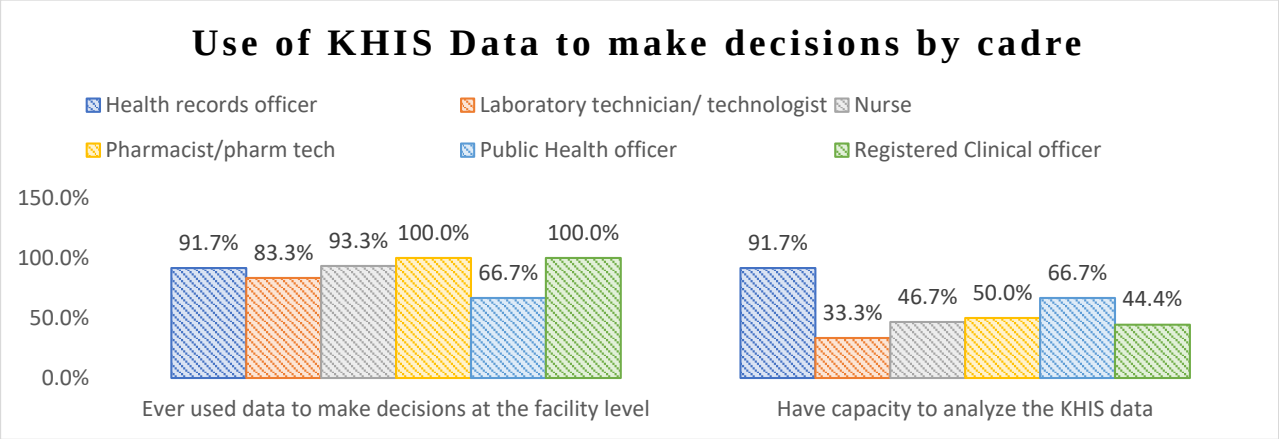
Figure 4.8: Use of KHIS data for decision making at facility level.



The study findings indicated that most of the respondents had used KHIS data for decision making, with 91.5% of respondents having used the data for decision making and 57.4% having the capacity to analyze KHIS data. Of the respondents from Athi River health centre, 92% stated that they had used KHIS data in decision making, 91.7% of Mlolongo health centre respondents, and 90.0% of Kinanie dispensary reported to have used the data for decision making. Further, 60.0% of the respondents from Athi River

health Centre stated that they had the ability to analyze KHIS data, another 60.0% and 50.0% of the respondents from Kinanie dispensary and Mlolongo health centre respectively reported to have the capacity to analyze KHIS data.

Figure 4.9: Use of KHIS Data to make decisions by cadre



The use of KHIS data was assessed by the various cadres of the respondents. From the results in Figure 4.17 above, it was evident that most of the respondents in the various cadres had ever used the data and information captured in the DHIS2 system. Nevertheless, it is important to note that only two thirds of the public health officers ever used this data to make decisions at facility level. In terms of capacity to analyze the KHIS data, most of the respondents in the various job cadres reported not being able to analyze the data. For instance, whereas 83.3% of the laboratory technicians used the data, only a third were capable of analyzing the data. Similarly, in spite of all the registered clinical officers and 93% of the nurses using the data, those who could analyze the data were only 44.4% and 46.7% respectively.

This was echoed during the discussions with the key informants. Personnel at the health records department in a number of health facilities in Athi River Sub-county were asked about the purpose of capturing the data. Generally, it was reported that the data is captured to aid in decision making both at the facility level and planning at the county level. The data would also be used to keep track of the services offered to various patients who visit the health facilities.

> *"The use of DHIS 2 data at Athi River level 4 is very important for evidence-based decision making, because through the data, we're able to order for, let's say for example the KEPI vaccines, our drugs for our clients. Yes, it is of great help because we're able to ensure we have continued care for our patients."*
>
> Nurse, Athi River level 4 Hospital

Another nurse added,

> *"In the case of where I work in the PMTCT, we always order for drugs for our clients, for our mothers and for our infants who are exposed. So, with data, we are able to know how many infants we have and how many prophylaxes we need. So, with that data, the Sub- County is able to order commodities that meet the number of our clients' need."*
>
> Nurse, Athi River level 4 Hospital

In addition, the community health assistant for Kinanie-Mathatani Ward indicated that the data is used to improve for service delivery as it helps in strengthening the services that are normally offered at the facility level and at what durations are they being offered. For health commodities, it was reported that the helps in knowing the time when commodities are needed, the number of the commodities which were received and the ones which have been used. This was echoed by nurses at Athi River Level 4 Hospital who noted that

> *"When we capture data, we're able to forecast on commodities and that one helps to plan for our patients to have continued support"*
>
> Nurse, Athi River level 4 Hospital

> *"We capture this data, we use it to know the problems, to know the number of patients and the data helps to spot new diseases and it helps in planning. For example, when we capture the data using the DHIS, we are able to indicate new diseases and to plan for ways to eradicate them if it's like vaccination and so on."*
>
> Health records, Athi River level 4 Hospital

The community health assistant for Kinanie-Mathatani ward added;

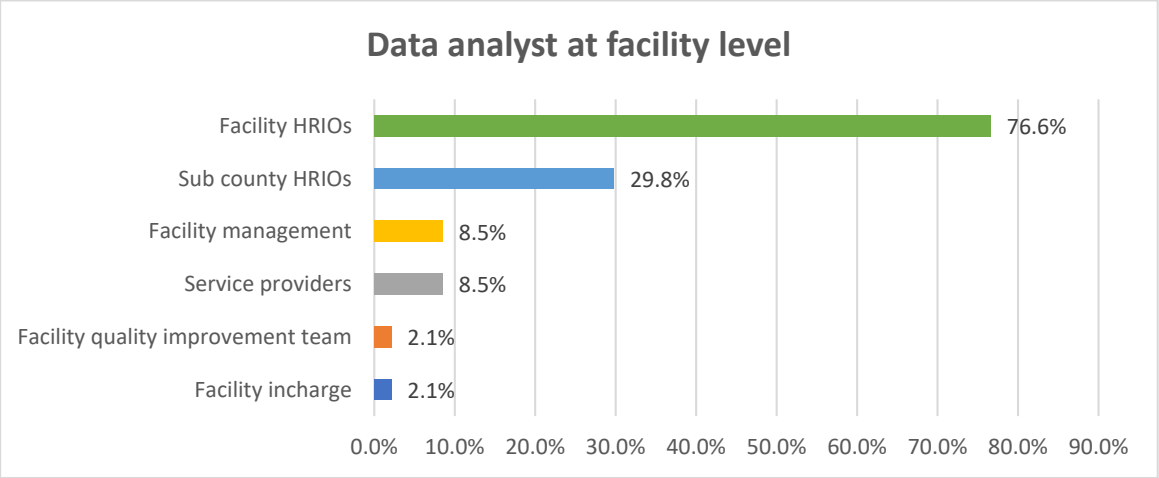
"My knowledge concerning DHIS2 is that the reports that we normally receive or the reports that we normally make are uploaded in that system and they help us to know, if there is a problem, how we are going to manage it, or how we are going to plan for an intervention to be done."

Community Health Assistant, Kinanie-Mathatani ward

4.7.1 Data analyst at facility level

The research also aimed at establishing who among the users of the information system analyzed the data at facility level.

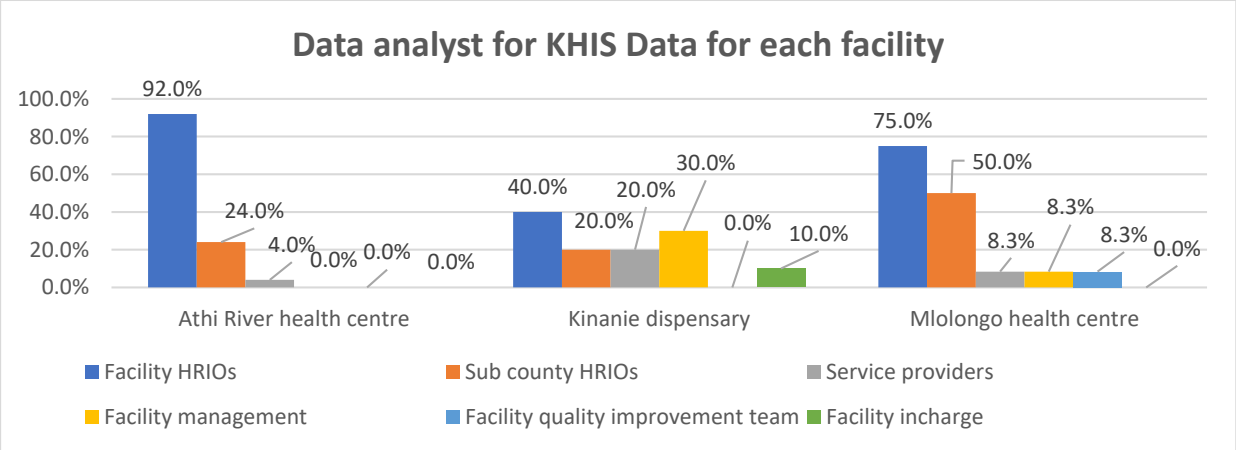
Figure 4.10: Data analyst at facility level



From the findings, 76.6% of the respondents stated that facility HRIOs analyzed the data at facility level, 29.8% reported that sub county HRIOs were the data analysts, 8.5%% reported that the facility management analyzed the data, another 8.5% reported that service providers analyzed it. Facility quality improvement team and facility in-charge were each stated by 2.1% as the ones who analyzed KHIS data at facility level.

The researcher also sought to understand the data analyst for each facility that participated in the study. The results were as shown in Figure 4.19.

Figure 4.11: Data analyst for KHIS Data for each facility

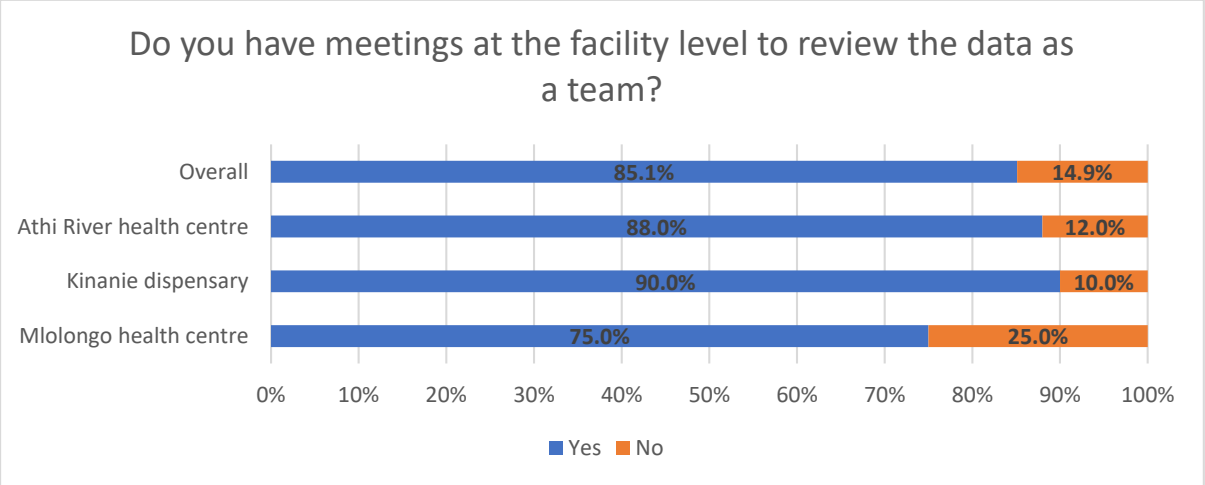


From the results, 92% of Athi River respondents that the Facility HRIOs analyzed the data, 24% stated the sub county HRIOs as the analysts, and 4% reported that service providers analyzed the facility data. At Kinanie dispensary, 40% reported that facility HRIOs analyzed the facility data, 20% stated sub county HRIOs analyzed the data, another 20% sated that the data was analyzed by service providers, and 10% reported that facility in-charge were responsible for KHIS data analysis. Of the respondents from Mlolongo health centre, 75% reported that facility HRIOs analyzed their data, 50% reported that sub county HRIOs analyzed the data, while service providers, facility management, and facility quality improvement team were each reported by 8.3% of the respondents as the ones who analyzed facility KHIS data.

4.7.2 Data review meetings at the facility level

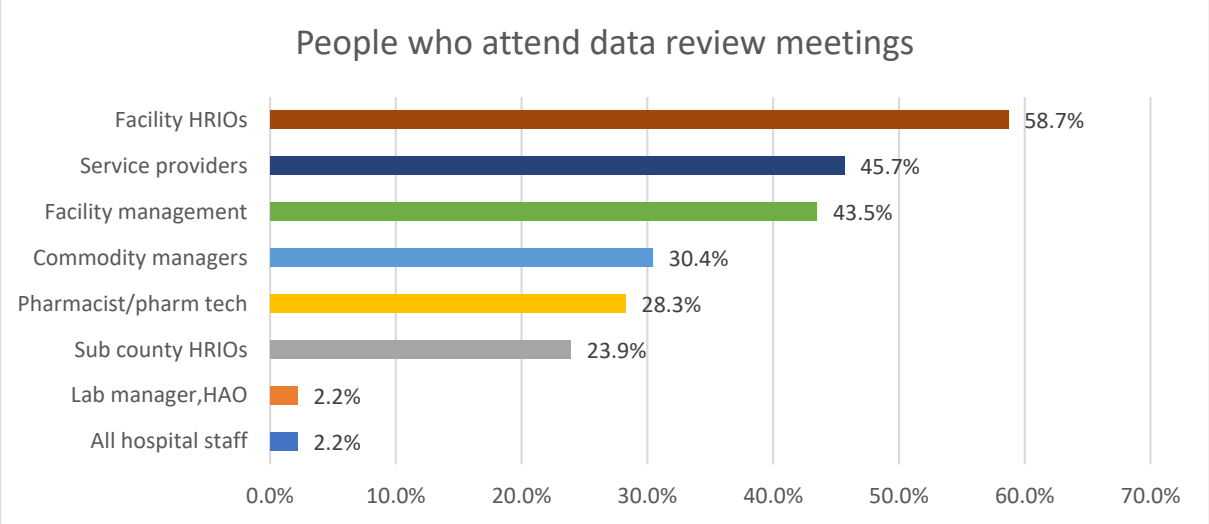
The study also sought to know if respondents held facility meetings to review data in the information system.

Figure 4.12: Whether data review meetings are held at the facility level



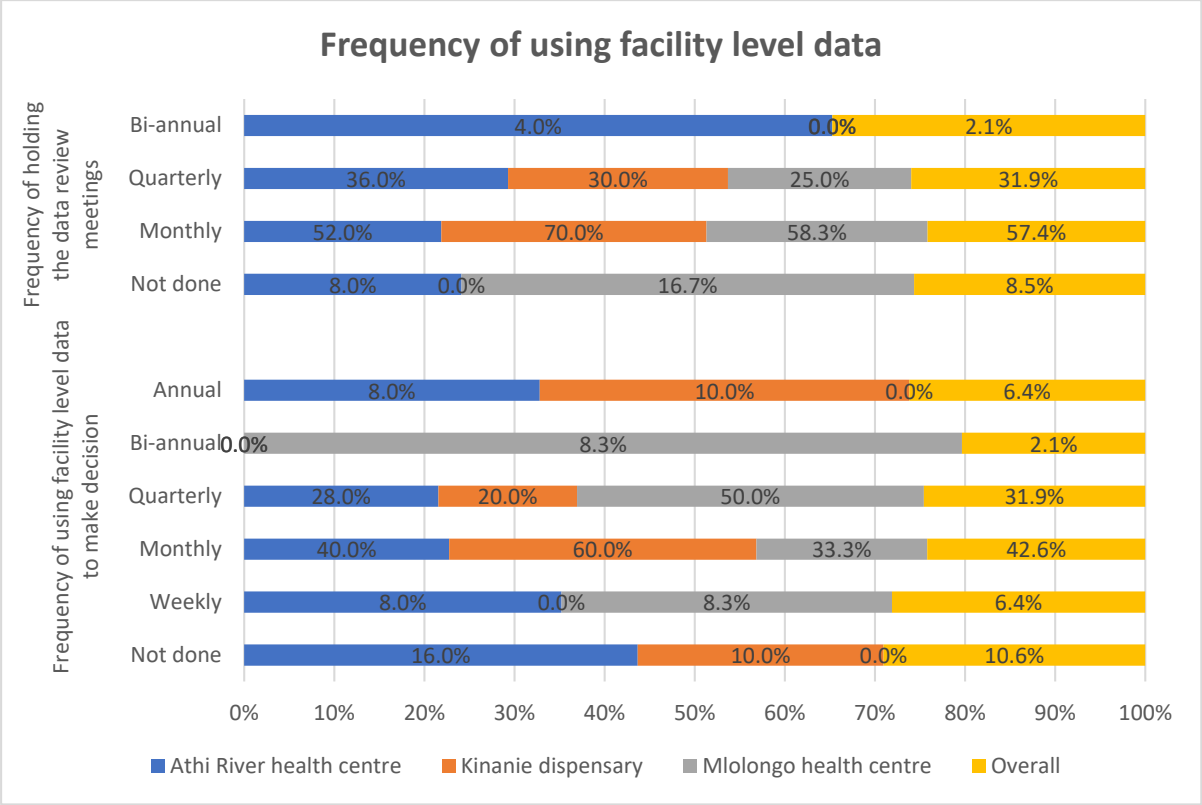
In general, 85.1%agreed that they meetings were held at facility level to analyze data while 14.9% said that no such meetings were held. At Athi River health centre, 88.0% of the participants said that they held meetings to analyze data while, 12% stated that there were no such meetings. Of the respondents from Kinanie dispensary, 90% reported having facility level meetings to analyze KHIS data, while only 10% stated that there were no meetings. Three quarter of the respondents from Mlolongo health centre agreed that they held meetings to analyze data while the remaining quarter of them stated that there were no such meetings.

Figure 4.13: People who attend data review meetings



From the results, 58.7% of the participants reported that facility HRIOs attended the review meetings, 45.7% said that service providers attended, 43.5% stated that facility nmanagement were the attendees of the meetings. Further, 28.3% stated that pharmacist attended the review meetings, 23.9% reported that sub county HRIOs attended, which lab managers and all hospital staff being mentioned as attendees of the review meeting s, each by 2.2% of the respondents.

Figure 4.14: Frequency of using facility level data



The study revealed that most review meetings were held monthly, as reported by 57% of the respondents. Additionally, 31.9% said that the review meetings were held quarterly, 2.1% reported that these meeting were held twice a year, while 8.5% stated that the meetings were never held. Of the respondents from Athi River health centre, 52.0% stated that review meetings were held monthly, 36.0% quarterly, 4.0% twice a year, and 8.0% said that the meetings were not held at all. In Kinanie dispensary, 70.0% of the respondents reported that review meetings are their facility were held every month, and 30% said that the meetings were held quarterly. Among Mlolongo health centre respondents, 58.3% stated that the review meetings were held monthly, 25% reported meeting quarterly, and 16.7% said that there were no such meetings.

When asked about the frequency of using facility data for decision making, 42.6% of the respondents said that the data was used monthly, 31.9% stated that it was used quarterly, 6.4% weekly, another 6.4% annually, 2.1% biannually, while 10.0% reported that there were no meetings. Further, 40% of the respondents from Athi River health centre reported that facility data was used every month, 28% reported that the data was used, 8.0% reported weekly use of the data, another 8% annual use, while 16.0% said that the data was not used at all. At Kinanie, 60.0% reported that facility data was used monthly, 20% said that it was used four times a year, 10% reported that it was used once a year, with another 10% reporting that the data was not used at all. At Mlolongo health centre, 50% of the respondents reported that facility data was used in making decisions quarterly, 33.3% said that the data used monthly, 10% said it was used annually, 8.3% said that the use was bi-annually, and another 8.3% reported that it was used weekly.

4.6 Discussion of Results

In this section, the findings of this study have been compared with other studies. The section is organized based on the study's objectives as follows.

The study found out that although health delivery data was used for decision making, only a small percentage of 8.5% of the respondents acknowledged the use of the data all the time. This suggests a need to ensure that the service delivery data be properly used for decision making in health facilities. Additionally, the study highlighted that the respondents reported that the health delivery data was rarely used for measuring quality of services, identifying work breakdown, and measuring performance levels (36.2%, 40.4%, and 36.2% respectively). As proposed by (WHO, 2010), health service delivery data ought to be collected regularly to not only boosting the quality of services as well as health care itself, but also inform constant changes that are less costly to both the government and the consumers of health services. If health delivery service data collected from DHIS is not used for making informed decisions, then there would be no need to collect the said data. This calls for stakeholders to be keen in using the data for

decision making. Further service delivery data influences health decisions, or at least the process through which health decision are made by informing a diversity of judgements especially those pertaining to MDGs, include the delivery of interventions as a way of lessening maternal mortality, child mortality, and the burden resulting for the three major diseases that the world strives with of HIV/AIDS, tuberculosis as well as malaria (WHO, 2010). This claim commensurate with the findings of Avong (2018) who argued that data pertaining to health service delivery is scarce due to underreporting of various issues that affect delivery. In Kenya, and certainly in Athi River sub county, this inadequacy of data is further intensified by inadequacy of resources to collect it.

The study's findings highlighted that respondents stated that health commodity data from KHIS was utilized for decision-making, as stated by 21.3% who said it was occasionally used, 12.3% who said it was frequently used, and 19.1% who said it was always used. However, 38.3% of respondents stated the data was rarely used for decision making. Further, the findings indicate a big percentage (42.6%) of the respondents said that health commodity data rarely affected commodity procurement, while 19.1% said the data always affected procurement decisions. Further, 19.1% of the respondents reported all time use of health commodity data in procurement decisions, with another 19.1% reporting its use always in making decisions on allocation of resources, and 14.9% stating that the data was always used in forecasting and quantification. Health commodity data is crucial in decision making in a facility. This finding is supported by a report by the Ministry of health that evidence is crucial for data required for the achievement of the MDGs, together with the rising insistence for bilateral and multilateral donors to illustrate their contribution/ impartation towards development of health has also ignited an escalated information demand (Ministry of Health, 2015). The claim is also supported by another study by (Odhiambo-Otieno, 2005) who found out that the role data in any health system is not only real-time collection of health-related data and conveying the same to higher ranks in the health care system, but also in the facilitation of informed decision-making at every level, mostly at the data collection point It also resonated with a report by (Ministry of Health, 2015), that current HIS has limited information needed to monitor health goals and empower individuals with timely and comprehensive health information. Matters of accessibility and scale of use of health service information have remained a bone of contention in Kenya's health sector (Ministry of Health, 2015).

The study indicated that health population data in DHIS was used for decision making, with most respondents (90.4%) acknowledging its use. Although there was a perception that population health data was rarely used for decision making on identifying population-based evidence, and on estimation and projections, the study found out that this data is useful for decision making by the facilities. This finding was supported by the literature which emphasized that public health performance relies heavily on the information use's effectiveness (Hotchkiss et al., 2012). Further a pilot study by Roosan et al. (2016), to investigate how population data visualization and health analytics impact and influence support of decisions found out that a population database is an indispensable element in reducing the complexity and uncertainty in improving the general population health from the insights gathered from various data. Moreover, the findings of this study resonated with Morrato, Elias, and Gericke (2007) who investigated how population-related routine data could be used to support evidence-based health policy decisions focusing on the national health policies of some of the global countries with the most advanced health systems: Australia, the UK, and the USA. The authors acknowledged the significant role played by routine population-related health information systems in not only informing policy decisions but also evaluating their effectiveness.

Regarding the fourth objective of this study, it was highlighted that health costing data was crucial for decision making by the facilities. Although 44.7% of the respondents felt that the health costing data was rarely used for decision making, the study found out that it was used frequently, sometimes and also always as suggested by other respondents. Decisions to identify the cost of health care and resource mobilization majorly rely on health costing data. The mixed perception regarding the influence of health costing data for decision making in the facilities underscore the importance of improving the use of the said data by stakeholders to make informed decisions. These findings resonate with studies by Kavosi et al. (2018), that emphasize that costing has been one of the notable factors influencing health decisions by various facilities, both tier 2 and 3. The study was also supported by literature, emphasizing on the phrase "decisions of value" which was employed to imply decisions with potentially large repercussions for both finance or cost and quality of, or healthcare outcomes (Williams, Brown, & Healy, 2018). Moreover, the study echoes previous research by Dakin et al., (2015), who supported to the National Institute for Health and Care Excellence (NICE)'s claim that efficiency in health decisions in various health facilities is not solely dependent or influenced by cost-related data but a multitude of information on other aspects of healthcare and related settings.

Conclusion and Recommendation

The study found out that although health delivery data was used for decision making, only a small percentage of the respondents acknowledged the use of the data all the time indicating that the data on the delivery of health services was also used infrequently. This suggests a need to ensure that the service delivery data is properly and more frequently used for decision making in health facilities, especially when measuring quality of services, identifying work breakdown, and measuring performance levels. Health commodity data is crucial in decision making in a facility and other stakeholders. The respondents felt that health commodity data from DHIS 2 was utilized for decision-making in their facilities despite having others who pointed out by other there were cases where the data was rarely used for decision making. Further, the findings indicated a negative perception by a large number of the respondents who said that health commodity data rarely affected decisions, but also noted other respondents who said that the DHIS 2 data affected decisions. The use of health population information is vital in scaling up of the delivery of quality health care services. Information obtained after processing raw data contained in the software can be used to make informed decisions by stakeholders. The study indicated that health population data in DHIS was used for decision making, with most respondents acknowledging its use. Although there was a perception that population health data was rarely used for decision making on identifying population-based evidence, and on estimation and projections, the study found out that this data is useful for decision making by the facilities. The study findings highlighted that health costing data was crucial for decision making by the facilities. Although respondents felt that the health costing data was rarely used for decision making, the study found out that it was used frequently, sometimes and also always as suggested by other respondents. The mixed perception regarding the influence of health costing data for decision making in the facilities underscore the importance of improving the use of the said data by stakeholders to make informed decisions.

To increase the use of health data for decision making at the health facility level, the ministry of health should consider building the capacities of the nurses and other staff in different departments to enable them collect accurate data, feed it into the KHIS system and be able to do basic data analysis. This will enhance their understanding and will increase the utilization of this data to make informed decision to improve planning and service delivery. The ministry of health or county departments of health should ensure adequate infrastructure to enhance data capture and utilization at facility level. For instance, all health facilities should have enough computers in all departments to facilitate data capture. There should also be network and internet at the facility to enable data sharing. Data review should involve all stakeholders at the facility level. For example, nurses are mostly involved in collecting health information but are rarely involved in data review. To enhance utilization of this data, those involved in data capture should be involved in analysis and review of the information.

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